THE EFFECT OF DIRECT TAXES ON INCOME AND WEALTH DISTRIBUTION IN THAILAND UNDER COMPREHENSIVE INCOME CONCEPT

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ผลของภาษีทางตรงต่อการกระจายรายได้และสินทรัพย์ในประเทศไทย ภายใต้กรอบนิยามรายได้แบบสมบูรณ์

น.ส.วรมาศ ลิมป์ธีระกุล

Thesis Title	THE EFFECT OF DIRECT TAXES ON INCOME AND WEALTH DISTRIBUTION IN THAILAND UNDER COMPREHENSIVE INCOME CONCEPT
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Field of Study	Economics
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Accepted by the FACULTY OF ECONOMICS, Chulalongkorn University in Partial Fulfillment of the Requirement for the Doctor of Philosophy (Economics)

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วรมาศ ลิมป์ธีระกุล : ผลของภาษีทางตรงต่อการกระจายรายได้และสินทรัพย์ในประเทศไทย ภายใต้กรอบนิยามรายได้แบบสัมบูรณ์. (THE EFFECT OF DIRECT TAXES ON INCOME AND WEALTH DISTRIBUTION IN THAILAND UNDER COMPREHENSIVE INCOME CONCEPT) อ.ที่ปรึกษาหลัก : รศ. ดร.ชัยรัตน์ เอี่ยมกุลวัฒน์

วิทยานิพนธ์ฉบับนี้ทำการศึกษาเรื่องความไม่เทียมกันทางรายได้และทรัพย์สินของครัวเรือนในประเทศไทยภายใต้กรอบนิยามรายได้แบบสัมบูรณ์ และผลของภาษีรายได้บุคคลธรรมดา และภาษีที่เก็บจากอสังหาริมทรัพย์ต่อปัญหาดังกล่าว การศึกษานี้ใช้ดัชนีShorrocks วิเคราะห์ความไม่เทียมกันแบบจำแนกตามแหล่งรายได้และประชากร และแบบจำลอง Heckman Selection ในการวิเคราะห์ผลการเปลี่ยนแปลงนโยบายภาษี จากผลการศึกษาพบว่า รายได้ที่เกิดจากถือครองทรัพย์สิน และความเหลื่อมล้ำในกลุ่มผู้ประกอบการคือสาเหตุหลักของความไม่เท่าเทียมกันทางรายได้ ภาษีรายได้บุคคลธรรมดาลดความเหลื่อมล้ำได้น้อยมากและมีแนวโน้มลดลง เนื่องจากฐานภาษีที่แคบและการปรับลดอัตราภาษี ถึงแม้ว่าการปฏิรูปภาษีในช่วงเวลาดังกล่าว จะช่วยเพิ่มโอกาสในการมีภาระภาษีรายได้บุคคลธรรมดา แต่ผลการเปลี่ยนแปลงเชิงนโยบายกลับมีผลในการลดภาระภาษี นอกจากนี้ผลประโยชน์จากสิทธิ์ลดหย่อนต่างๆแปรผันตรงกับรายได้ โดยผู้ที่ได้รับประโยชน์ส่วนใหญ่คือ แรงงานวิชาชีพชั้นสูง การถือครองอสังหาริมทรัพย์มีการกระจุกตัวสูงกว่ารายได้ โดยสาเหตุหลักมาจากกลุ่มครัวเรือนที่มี่รายได้สูง ครัวเรือนในเขตกรุงเทพมหานครและผู้พักอาศัยในเขตเมือง ภาษีที่ดินและสิ่งปลูกสร้างจะเพิ่มรายได้ให้แก่รัฐบาลท้องถิ่นและลดความไม่เท่าเทียมกันด้านรายได้ ได้ดีกว่าภาษีอสังหาริมทรัพย์เดิม รัฐบาลควรทบทวนและจำกัดวงเงินสิทธิประโยชน์ทางภาษีที่เอื้อต่อผู้มีรายได้สูง ตลอดจนเพิ่มโอกาสในการออมและการลงทุนให้แก่กลุ่มรายได้น้อยและรายได้ปานกลาง รวมทั้งเพิ่มโอกาสทางการเงินให้แก่ผู้ประกอบการขนาดเล็ก เพื่อลดช่องว่างทางรายได้และทรัพย์สินอย่างยั่งยืน การยกเว้นภาษีที่ดินและสิ่งปลูกสร้าง ควรพิจารณาจากความจำเป็นทางเศรษฐกิจแทนมูลค่าสินทรัพย์ เพื่อให้ภาษีดังกล่าวครอบคลุมฐานภาษีและเพิ่มรายได้ให้แก่รัฐบาลท้องถิ่นได้อย่างมีประสิทธิภาพมากยิ่งขึ้น

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5885905129 : MAJOR ECONOMICS
KEYWOR
D:

Inequality, personal income tax, land and building tax, Shorrocks Index decomposition, Tax policy reform

Voramast Limteerakul : THE EFFECT OF DIRECT TAXES ON INCOME AND WEALTH DISTRIBUTION IN THAILAND UNDER COMPREHENSIVE INCOME CONCEPT. Advisor: Assoc. Prof. Chairat Aemkulwat, Ph.D.

This thesis research comprises three studies, each of which investigates the inequality of income and wealth in Thailand from 1996 to 2017 and the impact of personal income tax and taxes on real estate on that inequality. Shorrocks Index decomposition technique is applied to examine the key drivers of inequality in the country in the first two studies. In the third study, the analysis is developed under the Heckman Selection Model to estimate the effect of personal income tax policy reform on the individual. The overall results demonstrate that accrued capital gains from asset ownership are the main drivers of income inequality, and that more than half of the total inequality stems from entrepreneurs. Personal income tax has very limited and diminishing redistributive impact due to the small tax base and the specifics of tax policy reforms, which broaden the tax base, but reduce the tax payers' liabilities. Tax benefits are positively correlated with income, and professionals comprise the group that receives the greatest benefit. Inequality of real estate ownership is much higher than income inequality. The main source of inequality comes from high income households, particularly households in Bangkok Metropolis and other urban regions. Thus, land and building tax would raise more revenue for local government and reduce income inequality more effectively than have the previous taxes on real estate. Personal income tax benefits related to or dependent on level of income should be revised and made more restrictive. Additionally, the government should emphasize policies that promote savings and investment among low and middle income groups and provide equality in financial access to small entrepreneurs in order to help them thrive in the market. Land and building tax ought to be universally applied, and any exemptions to this tax should be granted to economically vulnerable groups.

Field of Study:	Economics	Student's Signature	
Academic Year:	2020	Advisor's Signature	

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Chapter 1

Introduction

1.1 Background and Significance of problems

The problem of income inequality is addressed in an international context not only because of the issues with fairness, but because it can hurt long-term economic growth (OECD, 2014). The findings indicate that a one-percentage point increase in the top-20% income share results in a 0.08 percentage point decrease in GDP growth over the following five years. In contrast, a one-percentage point increase of the lowest 20% income share results in a 0.38 percentage point increase in GDP growth over the following five years (Dabla-Norris, Kochhar, Suphaphiphat, Ricka, & Tsounta, 2015). Income inequality signifies that the lower income group might not be able to afford proper health care or acquire human and physical capital; thus, a country with high income inequality may face lower labor productivity (Stiglitz, 2012). In addition, income clustering can lower aggregate demand because the rich tend to spend a smaller proportion of their income than do the middle class and the poor (Taylor, Rezai, Kumar, Barbosa, & de Carvalho, 2014).

Despite all of this, wealth concentration is rising around the world. From 1990 to 2016, the wealth share of the top 1% in the United States increased from 28% to 33%. In the US, high income inequality leads to higher wealth inequality. Even in China, the wealth share of the top 1% has increased from around 16% to 30% as a result of unequal results of privatization. The public wealth transfer to the private sector is the primary cause of this large wealth gap, which also mitigates the redistributive power of the government in the long run. However, around the world, the bottom 75% still own around 10% of the wealth (WID[1], 2018). Furthermore, although the middle class mainly gain their wealth share through rising house prices, the majority of real estate and financial portfolios are owned by those in the high-income group (Alvaredo, Chancel, Piketty, Saez, & Zucman, 2017).

Tax can lessen income inequality in two ways. First, it is a channel that transfers income from the rich to help the poor. Second, tax revenue is an important source of government revenue used to build infrastructure and provide social welfare and other subsidies. However, the redistributive impact of direct taxes in Thailand is lessened by tax structural reform and tax loopholes (Chandoevwit & Jawala, 2011; Jitsuchon & Plangpraphan, 2011).

With respect to income, for example, personal income tax in Thailand covers only a small fraction of Thai population because of a large informal labor sector and tax deductions and exemptions. As of 2015, the Thai population had reached 65.73 million. At that time, there were 38.6 million in the labor force, which comprised 16.91 million in the formal sector (44.1% of total labor force) and 21.41 million in the informal sector (55.9% of the total labor force). However, only 10.7 million people, or

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[1] The world wealth and inequality database (WID. world) project provides longitudinal data of income and wealth distribution for more than thirty developed and developing countries. The data is a compilation of both public and private databases, such as national accounts, tax return data, surveys, and accredited media data.

around 27.75% of total labor force, submitted Thai tax returns (PND 90 and 91) that year. The actual number of taxpayers is approximately 4 million people[2].

Personal income tax (PIT) in Thailand also treats income from different sources and different occupations unequally. For example, most tax payers can deduct 50% of their wages up to 100,000 baht, but certain tax payers such as doctors or lawyers can deduct 60% of their earned income as an expense, without limit. In another example, unearned income like interest and dividends is subjected to a flat 15% withholding tax, while earned income is subjected to progressive tax rates as high as 35%. There are also income exempted from personal income tax[3] such as income from the sale of securities on the Stock Exchange of Thailand, income from mutual funds and sale of mutual fund unit, income from public school operation[4], and farmer income from selling rice.

During the past 20 years, personal income tax has been moving toward marginal tax rates with increasing tax allowances, deductions and exemptions. Tax benefits that are universally applied regardless of income level, such as personal allowance, child allowance, and elderly allowances, have been introduced to relieve the tax burden. Another category of tax benefits are measures that depend on the taxpayer's level of taxable income; these include such benefits as deductions on insurance premiums and deductions on long term investments, which are used to promote desirable economic activity such as long term saving and financial investment to stimulate growth. The latter group of tax benefits have been widely discussed among researchers because they comprise the leading type of tax expenditure, and the majority of itemizers are those in high income tax brackets (Ananapibut, 2012; Chawanote & Laovakul, 2017; Muthitacharoen, 2017; Muthitacharoen & Phongpaichit, 2020). This problem not only reduces tax revenue for the government, but also exacerbates income inequality.

In addition to income, real property is also subject to taxation. In Thailand, the central government assigns local governments to collect these taxes. However, certain repealed property taxes -- local development tax (LDT) and building and land tax (BLT) -- have never raised sufficient revenue for the needs of local government, nor have they effectively reduce wealth concentration due to outdated assessment property values and complex administration. As a result, the Thai government recently implemented a regimen of land and building tax to replace the previous combination of local development tax (LDT) and building and land tax (BLT). Land and building tax covers all types of real property, including unused land, and the tax assessment is now based on the property value. The Thai government expects that land and building tax will raise more revenue for local government, stimulate proper land use, reduce price speculation, and increase local citizen participation. Land and building tax became effective in the 2020 tax year.

Previous research into income inequality and the redistributive impact of tax in Thailand is still mostly confined to market income. Nevertheless, it can hardly be denied that growth in asset value is another important source of household income.

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[2]https://thaipublica.org/2016/01/personal-income-tax-structure-29/

[3] See Appendix A for the list of assessable income exempted from personal income tax in Thailand.

[4]Excluding income from non-formal private school activities in the tutoring category

Sources of wealth like real estate and financial assets are highly concentrated among high income households, which may lead to greater income inequality, as these assets are potential source of household income. Previous studies of income inequality that include potential income from capital show that these assets can significantly alter inequality (Armour, Burkhauser, & Larrimore, 2013; Fräßdorf, Grabka, & Schwarze, 2011; Larrimore, Burkhauser, Auten, & Armour, 2016a). The first study discussed in this publication aims to apply this concept by analyzing data on Thai households in order to compare the results with previous studies in this field. Shorrocks index decomposition technique is used in this study to provide a detailed analysis of the main drivers of income inequality in Thailand.

Real estate concentration is another issue that captures public interest. The study of inequality in real estate has many challenges because the details of land price are not usually disclosed and complete like those of income. The price of property varies based on many factors such as size of land plot, location, and personal judgement. The study of Laovakul (2013) is among the key research that provides numerical evidence on the problem of land concentration in Thailand. The problem of land concentration and inefficiency of real estate tax in Thailand led to the new real estate tax act, the land and building tax. Numerous studies by tax economists have been done to evaluate the potential of this new tax law, including such work as that of Chaihard (2012) and Laovakul (2016b). The second study in this thesis attempts to fill the literature gap by simulating this new real estate tax act using data on Thai households from the Socio Economic Survey (SES) in order to compare the differences in efficacy between the previous tax on real estate (local development tax and building and land tax) and the new land and building tax. The previous studies on real estate ownership have usually focused on land size, but value of real estate is equally important, and is the focus of this current study. In addition, land and building tax is now based on the value of the property, and the ability to pay the assessed tax is dependent on the income of land owner. The second study analyzes these two elements in greater detail.

The majority of research on the elasticity of personal income tax focuses on changes in behavior of tax payers in response to changes in tax policy. However, it is equally important to study how the combination of behavioral response and changes in tax policy affect personal income tax liabilities. Studies of elasticity of taxation are usually done at the aggregate level; examples of this type of study include the work of Tanzi (1969), Ram (1991), Creedy and Gemmell (2004 and 2013), and Reed, Rogers, and Skidmore (2011). The third study in this publication adapts the previous aggregate model for use with individual level data in order to estimate the elasticity of personal income tax in response to changes in personal income tax policy over a period of 21 years. The study also demonstrates how the preferential tax treatments of personal income tax violate horizontal equity and vertical equity principle of taxation. The horizontal equity principle states that people who have the same level of income should be subjected to the equal amount of taxes, and the vertical equity principle states that people who have more income should be subjected to higher tax liabilities (Musgrave, 1959).

The three studies in this thesis analyze the inequality of income and wealth and the effect of tax policy reform in Thailand from 1996 to 2017. The main data in this study were sourced from the Socio-economic Survey (SES) conducted by the National Statistical Office (NSO).

1.2 Objective and scope of the study

This study aims to analyze income and wealth inequality in Thailand and to illustrate how direct taxes can help reduce economic inequality. This study brings a new dimension to the field of study by broadening the definition of income from market income to a comprehensive income concept.

This thesis consists of three studies with three corresponding objectives, as follows.

The first thesis article, "The effect of income components and taxes on income inequality in Thailand under the comprehensive income concept", quantifies the amount of inequality contributed by each income source, and the contribution to inequality by population subgroups that are segregated according to their employment status and socio-economic class. It also measures the reallocative impact of personal income tax. Shorrocks index decomposition by factor contribution and population subgroup is applied in this study. The level of contribution on aggregate inequality for each factor is compared across the time period to demonstrate the changing pattern of income composition and reallocative impact caused by personal income tax reform occurring from 1996 to 2017. Income in this study includes all money income, income in-kind, and accrued capital gains from real assets and financial assets.

The second thesis article, "Inequality in household real estate ownership and the effect of property taxes on income inequality in Thailand", compares inequality of income and real estate ownership among Thai households from 2007 to 2017 by income decile, regions, and community type using Shorrocks index decomposition by population subgroup. In response to changes in the real estate tax regimen in the country, this study provides a simulation of land and building tax in terms of redistributive impact, tax progressivity, and tax revenue in order to compare the efficacy of this new tax regimen with the previous real estate tax regimen (local development tax and building and land tax). Real estate ownership in this study covers residential, farming and business properties of Thai households. The data on unused land and land owned by juristic persons are not included in the study.

The third thesis article, "The effect of personal income tax policy reform on personal income tax liabilities in Thailand", measures the elasticity of personal income tax in response to changes in tax policy from 1996 to 2017. The model regression is done using Tobit analysis to demonstrate the impact of personal income tax policy reform on the elasticity of personal income tax. This study also contains a regression analysis by occupation group to demonstrate the effect of the non-uniform tax treatment of Thai personal income tax.

1.3 Contributions of the study

The first study contributes to literature in the field by broadening the scope of income inequality analysis from money income to comprehensive income. It is undeniable that assets generate income in the form of capital income and accrued capital gains, and those forms of income are important sources of saving and investment, especially for the high income group. The potential income from assets is incorporated into the data of money income to illustrate the link between income and wealth, which should be addressed amidst increasing wealth concentration and persistent income inequality in the country.

The second study contributes to the literature in the field of demonstrating the lack of equality of real estate ownership among housheolds and by providing a detailed analysis by income decile, region, and community type. It also provides the incidence of real estate taxes. The findings in this study help identify the souce of land concentration; further, it compares the potential of land and building tax with the previous real estate tax regimen. As the majority of real property is exempted from land and building tax, this study simulation includes a scenario in which land and building tax is applied without exemption in order to estimate the possibility of improving this tax law in the future.

The third study contributes to the literature in the field by evaluating how changes in personal income tax structure, allowance, deductions and exemptions affect the personal liabilities of the individual. It reveals which tax policies would significantly affect the tax burden among the Thai population. Regression by occupation group is also performed in order to measure the effect of these tax benefits on each occupation group in order to address how preferential tax treatments of personal income tax in Thailand violate the principle of horizontal equity of taxation.

1.4 Key Terms and Definitions

This study attempts to analyze income inequality in Thailand by utilizing comprehensive income as defined by Haig-Simon. Comprehensive income is defined as an increase in one's power of consumption during a specific time period (Haig, 1921), or it can be viewed as the total market value of consumption plus changes in the value of wealth during a specific time period (Simons, 1938). The comprehensive income includes all sources of income. Ideally, comprehensive income would include both money income and income in-kind, and it includes both earn and transfer income. The changes in value of assets include both that is realized and accrued (Alm, 2018).

In this research paper, income includes cash income, transfers, in-kind benefits, transitory income, and capital gains. The intent is to demonstrate the role played by income from capital and income taxes on income distribution in Thailand over the past 21 years. Our motivation comes from the rising share of capital income and assets among high-income households (WIID, 2018).

Cash income is probably the easiest to measure and most widely recorded in the survey data. Cash income consists of the following (Armour et al., 2013; Smeeding & Weinberg, 2001)

- Money wages and salary is a total money received for performing work as an employee during a year.
- Business income is a net money income (gross revenue minus operating expenses) from one's own business or partnership before taxes.   Any realized depreciation is considered as an operating expense.
- Farm income is the net money income from a farming activity from one's own account, being an owner or tenant farmer before taxes. It usually includes net-proceeds from selling or bartering goods and services from home production.
- Interest is a payment received from bonds, deposits, and other interest-

bearing accounts.

- Dividends is an income received from assets such as stocks or mutual funds

- Rents is a net income from leasing a house, land, store and other property; net royalty income is a regular payment from estate or trust funds

- Cash transfers is money received without requiring goods or service in return. This includes pensions, annuities or welfare, work compensation, and assistance from other persons outside of the household

- Non-current income refers to other money receipts such as insurance proceeds, inheritance, bequests, gifts, scholarships, lottery and gambling winnings, commissions, and other "windfall" receipts. The NSO includes realized gains from selling assets in this category.

Income in-kind is a non-cash payment received in exchange of goods and services. The income in-kind available in SES are imputed rent, unpaid goods and services and unpaid food and beverages. An imputed rent is the estimated rent paid by a tenant for renting a comparable amenity.

Unrealized capital gains are the net change in asset value during a given period, whether the asset is sold or not. They have potential to increase household purchasing power. They are rarely included in the context of income inequality analysis in Thailand due to data limitations, but we would like to include capital gains to see whether such inclusion alters the income inequality situation. We have attempted to impute the amount of unrealized gains from asset appreciation or depreciation on a yearly basis for the purpose of including the amount of capital gains from financial assets and real estate in the definition and calculation of comprehensive income. The value of assets owned by each household enable us to estimate the amount of accrued capital value of Thai household, which make our study unique from those that have come before.

Market income includes all cash income and transfers. To add the variation in an income inequality analysis in Thailand, this study includes income in-kind, and capital gains in the definition and calculation of comprehensive income.

1.5 Outline of the thesis

Each thesis article is presented as an individual article in Chapters 2, 3 and 4 respectively. Each study begins with an introduction and literature review. Then, the methodology and the summary of data is presented for each. After that, the empirical results are discussed, and each article finishes with a conclusion and discussion of research contribution. Chapter 5 presents the overall conclusion of this thesis by summarizing the main findings, research contributions, limitations, and future research opportunities.

Chapter 2

The Effect of Income Components and Tax on Income Inequality in Thailand under Comprehensive Income

ABSTRACT

This study analyzes the key elements of income inequality in Thailand between 1996 and 2017 using Shorrocks index decomposition technique. The analysis is done in three aspects: income source composition, employment status, and socio-economic class. This study contributes to the field by constructing a model for calculating comprehensive income from the Socio-economic survey (SES). The empirical result provides that the force of accrued capital gains on aggregate income inequality are much larger than the reallocative effect of personal income tax. Accrued capital gains from financial investments and real estate property accounted for 27.93% and 16.68% of aggregate income inequality, respectively, while conventional income sources like business profit and wages account for 24.07% and 14.88% of inequality. The contribution of personal income tax on income inequality reduced from 5.32% to 1.52% from 1996 to 2017. Decomposition by employment status demonstrates that 58.34% of income inequality stemmed from the economically inactive group thanks to their increasing population and relative income share, as well as high-income inequality within the subgroup. Decomposition by socio-economic class demonstrates that inequality among entrepreneurs in the trade and service sector caused 50.08% of income inequality. The high value of Shorrocks' index of entrepreneurship can be explained by income and wealth disparities among small and large entrepreneurs. The majority of personal income tax is paid by people in the top 10% of income, along with high-income earners like state enterprise employees and professionals, technicians, and managers. The effective tax rate in these groups was much higher than in the other groups. However, the contribution from personal income tax become smaller for these individuals, while low-income group members and low-skilled workers saw an increase in personal income tax. The empirical results in this study lead to a call for the improvement of taxation, and equality in financial opportunity. Tax on wealth would alleviate income concentration, and progressive tax rates on capital income could be considered as well.

Keywords: Inequality, Accrued capital gains, Personal income tax

2.1 Introduction

Thailand has gone through major economic structural changes in the past few decades, shifting from a strong agricultural base to increased manufacturing and service activities. The country benefited from an influx of foreign direct investment (FDI) during the 1980s and 1990s, which resulted in rapid growth before the country's economy was hit hard by the Asian economic crisis. After that, growth seemed to down and has been limited to less than 5% annually in the past few years. Although the Thai labor force has become more educated, the country is facing the issue of an aging

population that is likely to lead to reduced productivity in the future. Statistics show that the poverty rate in Thailand is gradually declining; however, income inequality persists. In addition, wealth inequality in the country has been increasing -- an issue which has been widely discussed and which has raised concern among policy makers.

In 2017, the income inequality in Thailand was 0.435 as measured by the Gini Coefficient, while income inequality in developed countries and other Asian countries was lower. At that time, Thailand was ranked 40th in terms of the Gini Coefficient of income inequality (World Bank, 2018). In 2019, the wealth share[5] of the top 10%, and top 1% of individuals in Thailand was estimated by Credit Suisse to be 76.6%, and 50.4%, respectively (Suisse, 2019), while the NESDC (2017) reported that the Gini coefficient of wealth in the country equaled 0.6207, with the top 10% of income earners accounting for 31.3% of the country's total income.

Rising wealth concentration around the world, including in Thailand, should raise concerns and lead to further study of the role of wealth and assets on income inequality. High-income individuals continue to accumulate wealth, which is almost impossible for low-income groups who can hardly make ends meet. Nowadays, assets represent important sources of income, especially for high-income households because the assets generate income for owner in the form of passive capital income, and the value of assets also accumulates in the form of accrued capital gains, which can be realized when the assets are sold.

The way that people earn their living also influences the composition of individual income and wealth. People in the labor market receive the majority of their income from wages, while capital earners focus on increasing the value of their assets and passive income from investment and capital gains realization. In addition, wages and salary of labor in the formal sector are recorded and taxed by employers, while the income of those in the informal sector depends on the personal tax compliance and is often the object of tax avoidance.

Personal income tax in Thailand focuses mainly on wages and salaries. People whose income is earned mainly from wages are subjected to higher tax liabilities than people who receive passive income from their assets and investments. Nonetheless, the tax structure has been changing for the past 20 years, moving toward higher tax thresholds and lower marginal tax rates. Moreover, the tax deductions and exemptions related to investment are positively correlated with the levels of income, resulting in a diminishing effective tax rate, as well as the reallocation of personal income tax.

Previous research on income inequality in Thailand has been confined to market income; however, recent research about income inequality in other countries has started to include asset-related income, and it has been found that these income sources alter inequality in a considerable degree.

Income scope in this study is built upon comprehensive income defined by Haig and Simon (Haig, 1921; Simons, 1938), which includes labor earnings, capital earnings and capital gains of an individual over a year. This study incorporates cash income, transfers, in-kind benefits, transitory income, personal income tax and capital gains into the household income data. The data in this study are from the Socio-Economic Survey (SES) of 1996, 2007, and 2017 conducted by the National

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[5] Wealth share reported by Credit Suisse (2019) includes both financial and non-financial wealth

Statistical Office (NSO). Shorrocks index decomposition is applied to examine the key elements of inequality in Thailand by income, employment status, and socio-economic aspects.

The objective of this study is to quantify the amount of inequality stemming from each income source, and the impact of personal income tax on income inequality as measured by the Shorrocks index. In addition, the amount of inequality among the Thai population is quantified and categorized by employment status and socio-economic class. Further, distribution of income and wealth, as well as personal income tax liabilities, are provided. The Shorrocks index decomposition is utilized to clarify the main driver of inequality in Thailand, the main group that faces issues concerning income inequality and their contributions to inequality in the country.

The study contributes to the field by broadening the scope of the concept of income inequality in response to wealth concentration issues and changes in income composition. Specifically, it analyzes the impact of accrued capital gains on income distribution. The result of factor decomposition by income source demonstrates the role of assets and wealth, and the reallocative impact of personal income tax on income inequality. The empirical result can provide numerical evidence for future tax reform in order to stimulate more equal distribution of those income sources. The results obtained from subgroup decomposition will help identify the groups of people that policies need to target in order to alleviate income inequality.

This study is organized as follows: Section 2 presents related theories and background knowledge regarding income concepts, structural change of the Thai economy, income and wealth inequality in Thailand, and changes in personal income tax structure and the impact of the tax structure on income inequality. Section 3 describes the methodology of using Shorrocks index decomposition by factor contribution and population subgroup, and the estimation of accrued capital gains. Sections 4 presents summary statistics of Thai household annual income per capita and the distribution of personal income tax. Section 5 reports the empirical result of income inequality, factor contribution and subgroup contribution (by employment status and socio-economic class) on aggregate income inequality. Finally, the conclusion and policy implications are discussed in section 6.

2.2 Literature Review

Comprehensive Income

Income is an indicator of individual's purchasing power in a given time period. Economists have been arguing about how income should be measured, and which definition should be adopted in their research. Simons (1938) proposed that income can arise from the use of assets, gains from transactions, and economic activities. He concluded in his work that income should be defined as the value of total consumption and change in net wealth of a person over a specific time period. Larrimore et al. (2016a) proposed that the ideal measure of income should count all inflows from every sources that increase one's purchasing power or consumption.

Income inequality research has started to broaden the definition of income to reflect household purchasing power, as the proportion of income generated by capital income is increasing, especially the higher income groups (Armour, Burkhauser, & Larrimore 2013; Smeeding & Thompson, 2010). Expanding the definition of income to comprehensive income exacerbates previously identified inequality and broadens the identified income gap between the rich and the poor when compared to money or taxable income without the inclusion of transfers or capital gains.

According to the work of Fräßdorf et al. (2011), capital-related income is very volatile, and has been generating a larger portion of disposable income in the United Kingdom, the United States, and Germany in recent years. The Shorrocks index decomposition in this study shows that capital-related income contributes to greater than proportionately to income inequality compared with its share as a component of disposable income. Although the share of capital income in the UK fluctuated slightly between 3.8% - 5.6% from 1992 to 2004, its share in total inequality rose from 8.0% to 14.3% during the same period. The share of capital income in Germany increased gradually from 2.5% to 5.6% from 1984 to 2005, but the relative contribution of capital income to total income inequality increased from 9.1% to 20.7%. In the US, the share of capital income decreased slightly from 11.1% in 1984 to 9.4% in 2001, but its relative contribution to total income inequality increased from 32.6% in 1984 to 41.5% in 2001. The authors of this particular study explained that people invest in capital markets and insurance in order to smooth their consumption after retirement, and the returns on investment are positively correlated with income because of better financial opportunity and higher accumulated wealth.

The study of wealth inequality in the United State of America since 1913 by Saez and Zucman (2016) demonstrates that the wealth share of lowest 90% resembles an inverted U-curve (the wealth share was equal to 16%, 35% , and 23% in 1930's, Mid-1980's and 2012 respectively). Wealth growth is mainly generated from fixed income claims and corporate equities. The rise of the lower 90% is due to an increase in housing value and pension funds like IRAs and 401(k) plans. The falls in share prices after 1985 as a result of defaults on mortgage debt, student loans and credit card loans outweighed the growth of pension funds. Moreover, even today, the middle class has not yet recovered from the Subprime Crisis of 2008.

Including capital gains in the calculation of income is quite complex because of the many factors involved, such as economic conditions, fluctuation in rates of return, and portfolio hedging profiles (Armour, Burkhauser, & Larrimore, 2013). Capital gains from assets do not only occur when they are sold, but the value is also accrued due to change in asset price. Nowadays, assets are an important income source, especially for high-income households. The high-income group keeps accumulating wealth, while those in low-income groups can hardly make ends meet. This can lead to greater income inequality.

Researchers in this field debate whether to use realized or accrued capital gains. Realized gains are the accumulated value of an asset over a holding period when it is sold, which can vary and is subject to numerous factors such as personal preference and contemporary economic environment. On the other hand, accrued capital gains are accounted for on a yearly basis. Moreover, as we consider asset price

appreciation or depreciation, the accrued capital value can capture the impact of economic changes such as financial market performance and changes in real estate prices on household income in a given year. When capital gains are included, the share to total income and volatility in assets value and rates of return affect the income inequality (Armour et al., 2013; Larrimore, Burkhauser, Auten, & Armour, 2016b; Smeeding & Thompson, 2010).

One study of the top 1% of income share in the United States using IRS tax return data showed that the inclusion of taxable realized gains increased the share of the top 1% from 6.7% to 9.1%, while reliance on accrued gains smoothed the growth to 5.3% over the period of 1989-2007. Utilizing comprehensive income for analysis resulted in slower growth rate of inequality in US over the 1989-2007 period, and it impeded growth over the 2007-2013 time frame. The accrued gains increased the top 1% during the time period of 1989-2013 (Larrimore et al., 2016b).

Apart from capital gains, both transfers and income in-kind are important income sources for middle and low-income households. Housing is also a key asset among homeowners; thus, imputed rent should be counted as well. Home owners also improve their wealth share through rising house prices. Findings in the US found that including income in-kind increased the share of those outside top 1% group by 1-2% over 1989-2007. In fact, including transfers, income in-kind and imputed rent to the IRS data decreased the top 1% share from 17.4% to 11.1% in 2013 (Larrimore et al., 2016b).

In addition to aggregate income inequality, researchers have also attempted to clarify the cause of income inequality. Shorrocks index is applied by many researchers because this index can be decomposed in many aspects. The factor decomposition technique quantifies the amount of income inequality caused by each income source (Bartels & Schroeder, 2020; Benjamin, Brandt, & McCaig, 2017). The empirical result also reflects change in economic structure on income inequality. Furthermore, detailed analysis from subgroup decomposition can provide greater information about the role of population characteristics on income inequality and the changes over time than aggregate income inequality.

Brewer and Wren-Lewis (2016) analyzed changes in income inequality in the United Kingdom from 1978 to 2008, and found that income inequality in the UK increased rapidly from 1978 to 1991 before remaining quite constant thereafter. Shorrocks index of income inequality in the UK increased from 0.084 in 1968 to 0.166 in 1991, and then fluctuated between 0.158 - 0.171 during the years 1991-2008. According to this study, employment income is the main contributor in total income inequality. Male and female employment income constitutes 104% of net income and contributed 157% of total income inequality in 1978. This share dropped down to 89% in 2008 due to the rising share of self-employment income, pensions and investments. Employment income accounted for 130% of total inequality in that same period. Employment tax equaled 29% of net income in 1978, but reduced income inequality by as much as 47%. The share of tax fell slightly to 23%, and the redistributive impact decreased to 41% in 2008.

Albers, Bartels, and Schularick (2020) estimated that, in 2018, real estate value was close to 10 trillion Euros, or 2.75 times the country's GDP. The wealth of the middle income group (P50-P90) mostly consisted of their own houses. Most of the equity was owned by people in the top income decile. As a result, an increase in housing capital gains helps reduce income inequality, while financial booms aggravate income inequality. People in the top 10% were found to have owned 46% of the real assets and 66% of financial equity. The share of primary residence in net wealth increased from 49% in 2002 to 53% in 2017, and its contribution to aggregate inequality increased from 11% to 16% during the same period. In contrast, financial equity accounted for only 10% of population's net wealth, but its contribution to overall inequality rose from 48% in 2002 to 53% in 2017 (Bartels & Schroeder, 2020).

Wealth also affects income inequality in Germany through capital-related income, and rental expenditure. Rental and leasing income accounted for only 3% of disposable income, but the effects on aggregate income inequality increased from 19% in 2002 to 31% in 2017. Around 60% of the population in rural municipal areas own their houses, while only 30%- 40% of household in urban area own their houses. Rental payments accounted for 40% of disposable income for people in the lowest 20%. Rising wage inequality in Germany was found to have stemmed from inequality between firms, the declining influence of labor unions, and technological changes that replace routine work and low-skilled workers with automation (Bartels & Schroeder, 2020).

A study of income inequality decomposition in Vietnam from 2002 and 2014 by Benjamin et al. (2017) showed that income inequality in Vietnam is mainly driven by business income and wages. This study applied factor decomposition from the work of Shorrocks (1982) to illustrate the change in economic structure and its influence on income inequality. The share of wages to total household income per capita increased from 30.5% in 2002 to 42.1% in 2014. Inequality in wages contributed to 42.5% of income inequality in 2002, and its contribution dropped slightly to 41% in 2014. The share of wages increased because there was more labor in the market, but its contribution did not rise as much due to the strong growth in wages that had been distributed to the middle group of the range. The share of business income to total household income per capita remained quite constant at 23%, but its contribution to total inequality increased slightly from 30% to 33% during the same period. However, farm income was still a primary income source for households in the lowest 20% and also helped dampen inequality. Although the share of farm income decreased from 30.6% to 20.2% in the period of study, it helped reduce inequality by 2% in 2002, and 4.8% in 2014.

There have a considerable number of research studies on income and wealth inequality in Thailand, and the problems identified in these studies have raised many concerns among policy makers, resulting in a need for a study that investigates the relationship between wealth and income inequality. Therefore, this study contributes to the field by inserting potential income from asset ownership into the inequality analysis. In order to answer the research question, comprehensive income definition defined by Haig (1921) and Simons (1938) is applied in this paper. Comprehensive income in this study includes all money income, goods and service received without

pay or income in-kind, imputed rent for home owners, personal income tax (denoted as negative value), and accrued capital gains. For capital gains, this study applied accrued capital gains from housing and financial assets according to the work of Larrimore et al. (2016a).

Economic structural change and inequality

Thailand has gone through cycles of economic bust and boom for the past five decades (Aemkulwat C & Amornvatana C, 2016; Sarntisart, 2000). Thailand implemented the National Economics and Social Development plan in 1961. At that time, the country focused on infrastructure development and manufacturing in response to the industrialization in the country. Since the plan was launched, Thailand has adopted an export-led policy and put the emphasis on the manufacturing sector to boost the economic growth, which has resulted in structural change to the Thai economy.

The Gini coefficient of Thailand graphed over time is presented in Graph 2.1. From the data, it can be seen that the Gini Coefficient of Thai household income increased from 0.478 in 1988 the peak of 0.536 in 1992, and that, since then, the index has been gradually decreasing, reaching 0.514 in 2006, and falling to its lowest point at 0.445 in 2015. The Gini coefficient increased slightly to 0.453 in 2017. The richest 10% of the population was found to hold 35.29% of the total income, while the poorest 10% held only 1.86%. The income shares of D2- D7 were also found to be decreasing.

Graph 2.1 Gini Coefficient of Income by Country in 2017

Gini Coefficient of Income by Country as of 2017

Source: https://data.oecd.org/inequality/income-inequality.htm
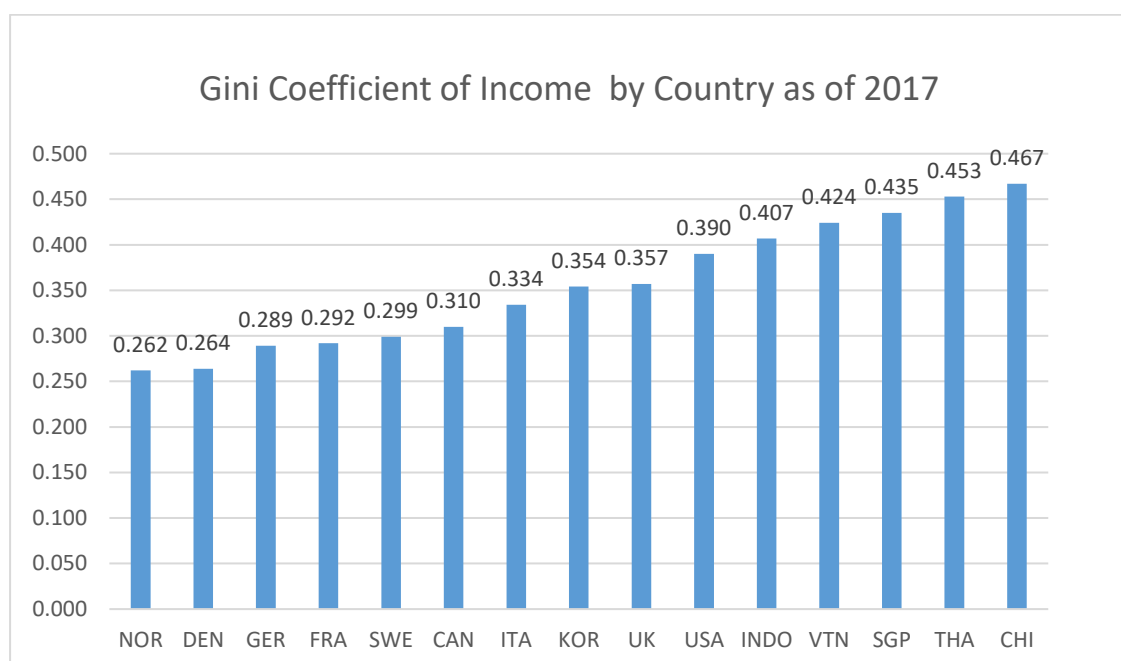
Retrieved January 1st, 2020

Graph 2.2 Gini Coefficient of Thai Household Income per Capita from 1988 to 2017

Gini Coefficient of Thai Household Income per Capita from 1988-2017
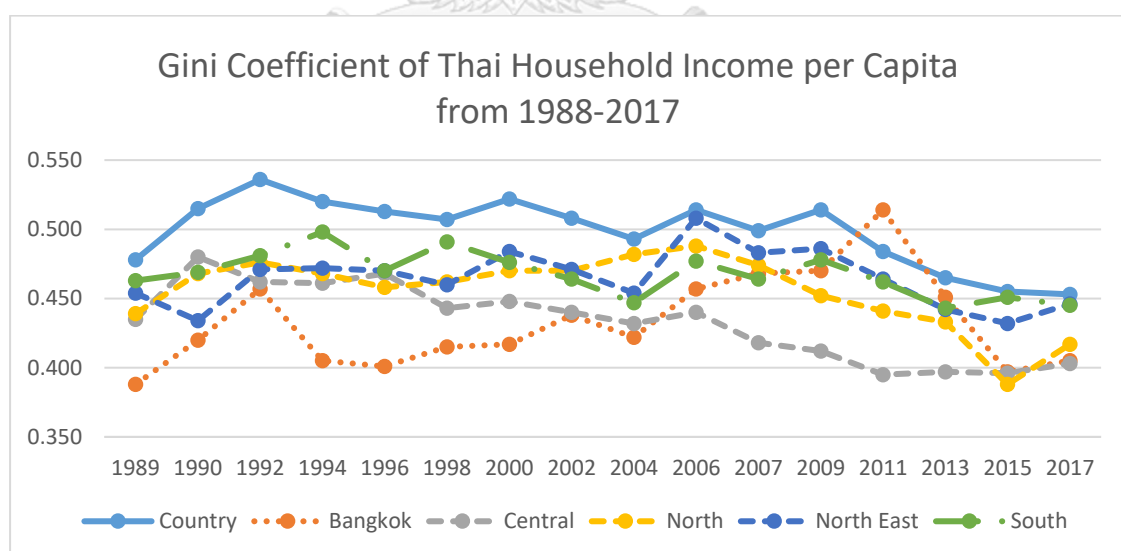
Source: Thailand poverty and inequality report conducted by NESDC (2017)

According to the study of Tinakorn (2002) (as quoted in Krongkaew and Kakwani (2003)) the GDP share of agricultural sector decreased from 31.5% in 1960 to 11.4% in 2000, while the industrial sector increased from 19.7% to 43.1%, and the service sector decreased slightly from 48.8% to 45.5%. The NESDC (2017) indicates

that the majority of low-income households comprised those working in the agricultural sector because wages and salaries in this sector had remained stable at less than 6,000 baht per month for the previous 5 years, while the average wage in the manufacturing and service sectors had increased at 2.2% and 1.5% per year, respectively. The average monthly wages of labor in the manufacturing and service sectors equaled 12,532 baht and 14,867 baht, respectively.

The growing disparity in wages aggravates income inequality in Thailand. This highlights the need to distribute the economic gains from the owners of capital, which is a small fraction of Thai people, to those who provide labor, especially in an agricultural sector, which is the poorest group and which represents the majority of the population.

Jeong (2008) reported that Thai household income gradually increased from 1976 to 1986, and then increased sharply after that. Income inequality exhibited an inverted U-shape as it increased from 1976 until 1992, and then decreased thereafter. The Thai economy moved toward industrialization in the late 20th century as there was an increase in manufacturing and service employment from 33.4% to 49.2%, and a relative decrease in the agricultural sector from 61% to 42%. The Thai workforce at this time became more educated, with a higher percentage of labor completing secondary, vocational, and university or higher degree programs. The empirical results have pinpointed that workforce allocation via education, financial deepening, and occupation jointly accounted for 38% of income growth during the period of study. However, from 1976 to 1992, the rate of growth of high-income group rose more sharply than that of the lower-income group, and alternate from 1992 to 1999. This divergent and convergent pattern resulted in Kuznets curve of income inequality.

The decomposition of the Theil L index in Jeong (2008) demonstrated that change in income distribution in Thailand was mainly driven by change in occupation, financial deepening, and education, while the change in personal characteristic and structural reform was minimal. The change in labor proportion between income level from occupation, education, and financial deepening jointly accounted for 53% of the inequality dynamic.

The change in income distribution among occupations was the most prominent of forces among group effects. This caused 46% and 54% of the increases in income inequality during the 1976-1986 and 1986-1992 periods, respectively, and caused 85% of the decrease in economic gap during the 1992-1996 period. Moreover, the income convergence caused by changes in occupation, education, and financial deepening contributed to 99% decrease in economic inequality. The result from change in equality within subgroup was only 28%. The graphical expression shows that the inverted-U curve stemmed from between group dynamics. The economic gap dynamic mainly shifted through the level of income disparity between subgroup and labor migration across income-status through occupation, education, and financial expansion (Jeong, 2008).

Sarntisart (2001) analyzed income inequality in Thailand from 1990-1999 using the Shorrocks index of order 2 to measure the overall income discrepancy and utilized the aggregate decomposable property to measure the contribution of each characteristic to overall inequality. According to this study, inequality in Thailand

increased from 1990 to 1992, decreased from 1992 to 1998, and increased again from 1998 to 1999[6].   Changes in income inequality were positively correlated with the income of the highest 10% group. High-income employees were the ones who gained the most from economic growth from 1990 to 1992, as well as from growth that occurred after the economic shock. Sarntisart (2001) explains that the increase in inequality from 1998 to 1999 (from 1.1113 to 2.5471) resulted from the relatively greater impact of adverse effects in rural areas and among members of the low-income group in Bangkok caused by the Asian economic crisis in 1997. The age group that was worst off was the 51-60 year olds who lost their jobs due to the crisis.

Labor mobility from the agricultural sector to the manufacturing sector, banking, real estate, and finance led to wages and non-farm profits comprising a larger share of total income. The increasing income gap among agricultural households and decreasing labor force highlights the need for assistance programs for the farming sector. The economic boom preceding the economic downfall, although improving the quality of life in Thailand, has been detrimental to income distribution. The economic policies in the late 1990's might have been more sustainable as poverty and income discrepancies were lower during that period. Lastly, analysis of human capital and land ownership shows that higher returns on education are still confined to Bangkok, and that the effect of decreasing land ownership for farming has been offset by the greater land rent returns that can provide greater earnings for small farm operators, therefore reducing income inequality(Sarntisart, 2001).

Chaiwat and Boonyamanond (2013) analyzed income inequality from 1986 to 2009 among 4 population age groups: 15-29, 30-44, 45-59, and those over 60 years old. They first used the Gini coefficient to analyze each age group and found that the income distribution was worst among the elderly. The authors presented a strong positive relationship between the rising elderly population and income inequality between different age groups, with a correlation coefficient of 0.9746. The income distribution improved among younger people aged 15-29 years was found to be due to higher education, higher labor demand and superior starting wages. The Shorrocks index was quite low in 1986 and 1988 at 2.8829 and 2.5538. Following a sharp spike, the value decreased further from 5.3758 in 1990 to 2.1335 in 2004. After that it surged again to 6.8755 in 2006 and 6.1786 in 2009. Shorrocks index decomposition showed that 98.0-99.2% of income disparity stemmed from income inequality within the same age group, especially individuals in the 30-44 years old and 45-59 years old groups. This mainly resulted from differences in the ability to earn between people living in urban and rural areas. Both the Shorrocks index and Gini Coefficient confirmed worsening income distribution among elderly. The explanation given was that some elderly earned higher income from their investments, while most of the elderly had to depend on their families or social pensions.

As discussed in the study of Chaiwat and Boonyamanond (2013), the direct tax rate is too low to help redistribute the economic gains among the population. Moreover, the tax incentive on business and real estate transactions mainly benefits

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[6] The data 1998 and 1999 data were that of the 2nd and 3rd quarter only.

the high-income group. This is demonstrated by the great contribution of inequality within the age group.

The study by Santhi (2013) addressed Kuznets's main assumption on the relationship between growth and inequality[7] -- that is, that the inverted-U shape relationship between growth and inequality mainly resulted from labor migration from the low-income production sector to the high-income production sector. The author applied Theil L index decomposition on the Socio-Economics Survey data of 1996, 2002, and 2009[8] to quantify the contribution of changes in population characteristics that are expected to have an effect on income distribution. He also calculated intertemporal decomposition. The empirical result provided that the Thai labor market had gone through a turning-point as the Thai economy changed from being export-led to a new focus on manufacturing and service during the 1990's. Thai household income per capita grew at 4.8% per year from 1996 to 2009.

Education contributed to 28.7% and income-status contributed to 24.6% of income growth, while the production sector contributed only 12.1%. During the economic shock (1996-2002), inequality decreased around 0.081% per year, and this mainly resulted from changes in education and household income status. After the crisis (2002-2009), inequality decreased at 1.327% per year. During that period, the household income-status and formal financial institution availability were the main engines of change, while the contribution attributed to education tapered down.

Over the 1996 - 2002 period, labor migration contributed 151.0%, 180%, and 806%[9] of inequality reduction in urban areas, rural area, and the overall country respectively, whereas the education effects were 328.3%, 410.8%, and 5279.9%. However, between 2002 and 2009, labor migration increased income inequality in urban areas and in the country as a whole, where 50.8% and 55.5% of increased inequality resulted from labor movement, compared to 41.3% of the decrease in equality in rural areas resulting from labor migration. Thai labor tended to move from the manufacturing sector to the service sector, which required a variety of skills and led to a high degree of income inequality, especially in urban areas. The allocation might have resulted from economic structure transformation.

Ariyapakamon and Stimanon (2016) applied Theil L index decomposition to Thai Labor Force Surveys (LFS) in 2001, 2007, and 2013 to examine income

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[7] Kuznets (1955) predicted that, during the initial period of economic growth, income inequality will rise, and then decrease thereafter due to labor movement to higher income-status, change in inequality between-groups, and changes in equality within a group. This led to the development of "Kuznets curve", which has the same shape as an inverted-U.

[8] The study range was separated into 2 periods: the Asian economic Crisis (1996-2002) and post-Asian economic (2002- 2009) periods. Household income per capita was used to determine the growth and inequality relationship, and the data of earners used to evaluate the redistributive effect from labor migration across production sectors.

[9] The proportionate contribution from Theil L index may be greater than 100% or lower than 0% as there are both negative and positive values.

inequality among the Thai labor force[10]. It was found that income was positively correlated with education attainment, skill level, and age (except for the age group 60 years and older). People in Bangkok had the highest of annual income per capita, while people in the northern region had the lowest. The result from labor sector decomposition showed that 64.4% of laborers were in the service sector, while 23.5% and 12.2% were in industrial sector and agricultural sector, respectively. The majority of both the labor force and income were in the service sector. In 2013, the Theil L index of labor sector equaled 0.300. The income share of service sector equaled 72.6%, while income share of industrial sector and agricultural sector equaled 22.1% and 5.4%, respectively. 87.68% of inequality arose from inequality among labor sectors, and 12.32% of inequality arose from inequality between labor sectors. Although the service sector had higher income, income in this sector also varied according to skill levels and other factors.

Kingnetr, Leurcharusmee, and Sriboonchitta (2019) studied income inequality in Thailand using the Socio-Economic Survey (SES) of 2015. The researchers decomposed aggregate inequality by income source, industry group, and household characteristics (regression based approach) using the Shorrocks index. According to the study, Shorrocks' index of Thai household income per capita equaled 1.079. Business profit accounted for 60.7% of inequality, while wages and salary accounted for 19.8%. The authors of the study emphasized the effect of inequality within the subgroup on aggregate income inequality. Households in the real estate, manufacturing and farming industries were those who faced the highest income inequality. The regression-based decomposition result shows that financial assets contributed to 10.9% of inequality in 2015, which was larger than other factors such as financial integration (6.2%), and education (4.3%). Inequality in financial assets and size of land possessed caused 13.2% and 2.7% of inequality among farmers, respectively, because owning land reduces the cost of production for farmers, and assets enable them to invest in new technology. Financial assets caused 32.0% of inequality among households in the manufacturing sector. Wealth inequality aggravated income inequality because assets increase investment opportunities for their owners, thus, generating higher income.

Wealth concentration in Thailand also raises concerns among policy makers. The Title Deed documents, including certificate utilization (NS. 3) and (NS. 3 K) from 399 land department offices, showed that plots of land larger than 100 rai were registered in only 0.03% of the total documents, whereas plots smaller than 14 rai were distributed among 94.4% of the total deeds in 2012. Holding title to land also had a positive relationship with household income. 70% of the 1st quintile group owned less than 20 rai, while 68% of 5th quintile owned more than 20 rai (NESDB, 2011 as quoted in Ananapibut, 2012).

In the study of Laovakul (2013), land deed title data for 2012 conducted by the Department of Land was collected and the land owners were separated into deciles and

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[10] The samples are categorized into subgroups according to age, education attainment, labor sector (agricultural, manufacturing and service), skill level (International Standard classification of Occupation), municipal area, and region.

quintiles according to their income. The author found that the decile ratio of the area held by the top and lowest rank was as high as 853.64, as the top decile own 61.48% of the total area, as compared to just 0.07% owned by the lowest decile. The concentration of land titles among the most wealthy supports the use of land and asset taxation to reduce the wealth gap.

The study of NESDC (2017) reported that the Gini coefficient of total assets decreased slightly from 0.6336 in 2013 to 0.6207 in 2017. D10 owned 34.7% of residential real estate property, while D1 owned only 3.4%. The Gini coefficient of residential property decreased slightly from 0.6740 to 0.6644 over 2013- 2017. During the same period, D10 held 22.9% of real estate property for business and farming, while D1 held only 7.9%, but the Gini coefficient increased from 0.8821 in 2013 to 0.8796 in 2017. This raised concern among Thai policy makers because real estate is a very important production factor that can generate income and act as debt collateral for future investment; this situation, then, would tend to widen the income gap between rich people and the rest of the population. Financial assets for savings such as deposits accounted for 70-80% of total financial assets overall, and housheolds in every decile had assets in this category. However, 71.1% of financial assets for investment were owned by only the top 10% of Thai people as measured by income, while 11.9% of such assets were owned by the lowest 80%.

Effect of taxation on inequality

Personal income tax is collected from an individual's earnings. Progressive tax rates are used to help redistribute economic gains from the rich to the poor. Most empirical findings indicate that personal income tax lowers income inequality. However, the impact of personal income tax is lessened due to tax exemption and tax avoidance. In addition, the tax effect may not be large enough to counteract changes in pre-tax income distribution (Bargain, Dolls, Neumann, Peichl, & Siegloch, 2011). Tax redistributes income by channeling the economic gains from higher to lower income groups, and by providing revenue for social welfare programs and for building infrastructure to enable future economic growth.

In 2017, the Thai government collected 2,802,955.410 million baht in revenue. The revenue from personal income tax equaled 312,959.496 million baht (12.69% of gross revenue) (MOF, 2018).

Graph 2.3 Thai government revenue classification and ratio of personal income tax revenue (PIT) to government revenue and GDP for fiscal years 1991-2020
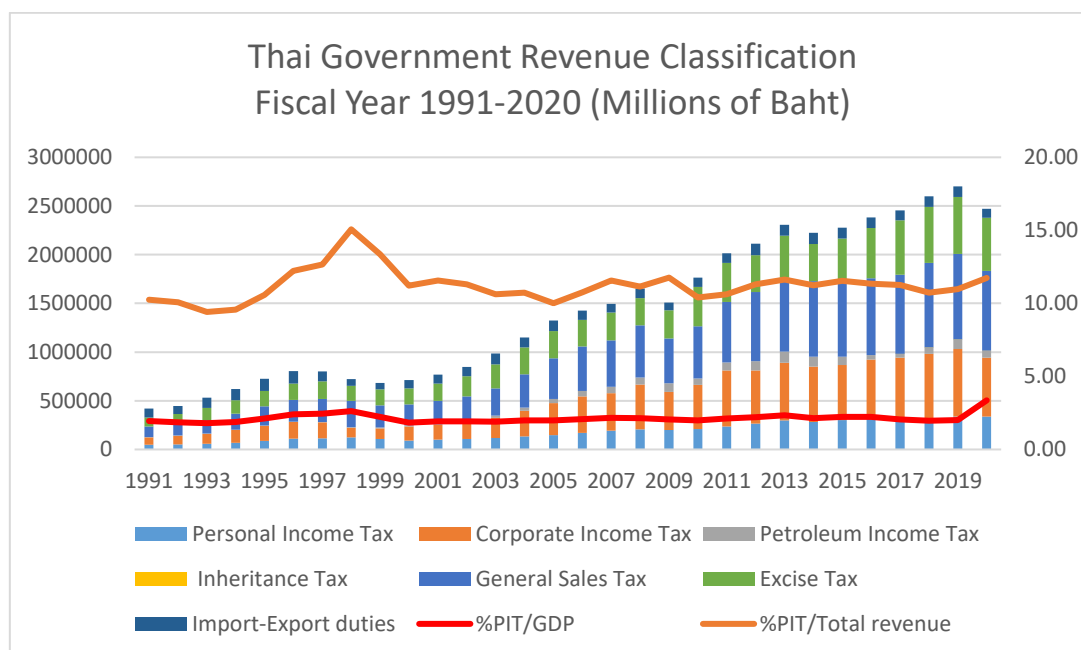
Despite the great uses of taxation, government move toward lower effective tax rates by directly reducing tax rates and by increasing the number of deductions and exemptions. These measures are promoted as tools to motivate labor participation and stimulate growth.

Tax exemptions and tax avoidance have been the major detrimental factors on redistributive impact of personal income tax. During the years 1996-2017, personal income tax structure in Thailand was revised towards higher tax thresholds, lower tax rates, and broader levels of tax exemptions and deductions, especially on RMFs, LMFs, donations, and provident funds, which are utilized primarily by people in the high-income group.

In Thailand, personal income tax is progressive and reduces inequality. Aemkulwat (2015) reported in his study of Thai tax incidence, which relied in part on data collected in the 2014 SES[11], that direct tax accounted for 10.92% of national income (NI). Personal income tax reduced the Gini Coefficient by 2.4% and reduced, Q5/Q1 from 11.5 to 11.0, and D10/D1 from 20.7 to 19.6, which was higher than other direct taxes. The total effect of central government tax revenue was an increase in

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[11] Aemkulwat (2015) analyzed the whole tax system and compare the result between before and after-tax income. The paper combine the data from 3 authorized sources: the Socioeconomic Survey (SES), the expenditure data from NI, value-added data from Input-Output Table and tax data from the Ministry of Finance. The authors commented that after tax income could provide a closer approximation of the disposable income.

income disparity. The calculation under the flexible demand and supply, and backward and forward tax shifting illustrates that central government tax revenue decreased the Gini Coefficient by 5.0%, Q5/Q1 to 10.36 and D10/D1 to 18.41. Viewing this result in light of the goal of the Tenth Development Plan (2007-2011) of decreasing D10/D1 to lower than 10, it appears that the tax revenue collected by central government may not yet allow the government to achieve that target.

The redistributive effect of income tax was lessened by the small tax base and large amounts of tax exemptions. Most income tax payers came from formal sector labor. The government proposed a great number of tax exemptions in order to encourage investment activities and stimulate economic growth. These tax exemptions, especially on LTF and RMF investment, are the main source of tax expenditure, and positively correlate with income. In addition, tax exemptions decrease both vertical and horizontal equity as they create differences in the tax burdens among people with same level of income (Jitsuchon and Plangpraphan, 2011).

Previous research findings have indicated that workers in each employment sector face different effective tax rates because of tax loopholes. Wages and salaries in the formal sector are usually deducted by employers, and workers in those sectors tend to earned higher income, while workers in the informal sector tend to earn less than the tax threshold and their income might not be properly recorded. More than half of all Thai workers are in the informal sector, which results in low numbers of tax filers. The small number of taxpayers is a result of tax filing loopholes and leads to underreporting (Ananapibut, 2012; Chandoevwit & Jawala, 2011; Jitsuchon & Plangpraphan, 2011).

Research findings demonstrate that both an increase in wages and an increase in the proportion of the labor force in the formal sector result in higher household tax liabilities (C. Santhi, 2013; Sarntisart, 2000). The study of Chandoevwit and Jawala (2011) indicates that, during the years 2000-2007, the effective personal income tax rate increased from 3.6 to 4.6%. State enterprise employees faced the highest effective tax rate (11.86%), followed by government employees (8.61%) and private employee (4.64%). The income of employers was approximately 1.5 times that of state enterprise employees, but their effective tax rate was only 1.98% in 2007.

Empirical analysis using the 2007 Socio-economic Survey showed that households that earn income mainly from business and farming activity tend to pay less tax than others with same level of income. Informal workers have low and fluctuating income, and, therefore, their incomes are generally lower than the tax threshold and harder to assess. Further, the major proportion of Thai workers earns less than the tax threshold. In addition, the high wealth concentration of rich households enables them to lower their tax burden via exemption and tax arbitrage. Despite earning higher incomes than other subgroups, the effective tax rate among employers is less than 2% (Chandoevwit & Jawala, 2011; Jitsuchon & Plangpraphan, 2011).

Ananapibut (2012) reported in his study that, in 2008, tax payers who had taxable income greater than 20 million baht deducted, on average, 574,231 baht from their assessable income via investment in LTFs, whereas this amount was 41,531 baht for those who had 150,000-200,000 baht in taxable income. In 2010, the total exemption from employment P.N.D. 90 and 91 filings was equal to 18.2% of

assessable income, and the effective tax rate was reduced to only 7.17%. Tax exemptions and tax avoidance have been the major detrimental factors on the redistributive impact of personal income tax. Although deductions and allowances have been introduced to alleviate tax burdens and stimulate investment and saving, these tend to benefit those with higher incomes and induce tax avoidance, which aggravates economic disparity. The personal and family allowance and exemption are the same for all income subgroups, but allowances and exemptions on RMFs, LMFs, donations, and provident funds are much higher among those in the top tax bracket.

The government revenue data from NSO (2015) and the Revenue Department (2015) demonstrates that in 2014, from a total Thai population of 65.7 million, 38.8 million were in the labor force. The number of tax filers was 10.3 million, but only 4 million people actually paid income tax because the tax free threshold is 150,000 baht/ year. Because of this, personal income tax revenue is equal to 16.24% of total tax revenue, and 2.14% of total GDP. The personal income tax revenue to GDP ratio in developed countries is around 8.8% in the OECD and 2.2% in Asia (Worldbank, 2016).

From the view of most researchers, personal income tax in Thailand is an ineffective form of redistributing economic gains because of the small number of tax payers, and the exemptions and deductions that tend to benefit high-income tax payers.

Statistics from the Revenue Department of Thailand show that only 0.22% of people in the top tax bracket have income higher than 4 million baht annually, while 72.53% of people in the lowest tax bracket have taxable income of less than 150,000 baht per year, all of which is exempted. The empirical study of the 2014 Socio-economic Survey data stated that personal income tax reduced the Gini Coefficient by 2.4% -- the most of all taxes -- and reduced the income ratio of Q5/Q1 from11.5 to 11.0, and D10/D1 from 20.7 to 19.6 (Aemkulwat, 2015b).

The analysis of 2009-2012 income tax returns (PND 90 and 91) shows that only 50% of PND 90 and 91 filers were actually subject to personal income tax. In fact, 75% of PIT was paid by people with assessable income greater than 1 million Baht per year[12]. The D10/D1 ratio of tax filers was as high as 58:1. With total expense and allowance deductions comprising 27.33% of assessable income, the tax base was decreased to 72.76% of assessable income. These deductions increased the income share of people with assessable income of more than 1 million baht per year (5% of tax filers) from 32% to 39%, and decreased the income share of the lowest tax bracket (85% of tax filers) from 47% to 39% (Chawanote & Laovakul, 2017).

Thai Personal income tax is a multiple income tax system, meaning that each income source is treated differently. Most tax revenue is collected from salaries and wages, which are subject to progressive tax rates, but income from interest and dividends is subjected to 15% withholding tax. People whose main income is from business deducted 81% of their total income because of business operation expense deductions, whereas people whose main income is derived from salary & wages deducted 17% from their assessable income.

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[12] There are five income tax brackets for assessable income: 1) 0-150,000 Baht per year 2) 150,001-500,000 Baht per year 3) 500,001-1,000,000 Baht per year 4) 1,000,001-4,000,000 Baht per year 5) more than 4,000,001 Baht per year. Assessable income = taxable income – deductions/exemptions.

The Thai government has introduced a great number of tax exemptions in order to encourage investment activity and stimulate economic growth. Tax exemptions, especially on LTF and RMF investments, which are positively related to income, cause large tax expenditures. In fact, it is estimated that, in 2017, the total tax expenditure equaled 108,200 million baht, or 0.72% of Thai GDP. The tax expenditure from saving and investment stimulus packages contributed 0.32% of GDP, or around 50,000 million baht (Muthitacharoen, 2017).

According to the study using 2012 tax returns conducted by Muthitacharoen and Phongpaichit (2020), 30.8% and 14.9% of tax payers in the top 20% of income distribution utilized LTF and RMF deductions, respectively, compared to only 0.2% and 0.1% respectively in the lowest 20%. The deductions for LTF and RMF contributions were much higher in the top income quintile, while the pattern of deductions on provident funds, life insurance, and mortgage interest were less concentrated. High-income tax filers also received higher tax benefits from these deductions. Tax deductions on LTF and RMF contributions reduced personal income tax liabilities of the top 20% by 2.5% and 1.9% respectively, whereas tax liabilities of the lowest 20% were reduced by only 0.5% and 0.4%. Deductions for LTF and RMF contributions also decreased personal income tax progressivity. Tax benefits in the form of non-refundable tax credit would reduce the negative impact of LTF and RMF deductions and increase overall tax progressivity.

The analysis of forms PND 90 and 91 from 2012 demonstrated that 77.89% of the deductions for LTF investments were claimed by people with assessable income of between 500,000 – 4,000,000 baht per year. The people in D10 deducted 150,458 baht, on average, for their LTF investments, compared to an average of around 5,000 baht among people in D1-D4. Tax deductions for charitable contributions and educational support were also the highest among people among the top 10% of tax filers with respect to income. It is clear that tax exemption and deduction comprise the majority of tax expenditure.

Although hampered by a small tax base together with widespread tax deductions and exemptions, personal income tax lessened income inequality. The post-tax income share of D1-7 increased from 27.1% to 29.1%, and the share of D10 decreased from 72.9% to 70.9% (Chawanote & Laovakul, 2017).

Personal income tax policy reform

On the policy side, personal income tax reform causes tax burdens to change over time. From 1996 to 2017, there was a decrease in marginal tax rates and an increase in the number and amounts of tax deductions and exemptions. The personal income tax rate is shown in Table 2.1. The deduction allowed for the calculation of PIT is presented in Table 2.2 and a summary of tax deductions and exemptions can be found in Table 2.3

Table 2.1 Thai personal income tax rate: 1996, 2007, and 2017

1996				
Taxable income	Net income of tax bracket	Tax rate	Tax liabilities	Accumulate tax burden
1-100,000	100,000	5	5,000	5,000
100,001-500,000	400,000	10	40,000	45,000
500,001-1,000,000	500,000	20	100,000	145,000
1,000,000-4,000,000	3,000,000	30	900,000	1,045,000
>4,000,000		37		>1,045,000
2007				
Taxable income	Net income of tax bracket	Tax rate	Tax liabilities	Accumulate tax burden
1-100,000	100,000	5	Exempted	0
100,001-500,000	400,000	10	4,0000	40,000
500,001-1,000,000	500,000	20	100,000	140,000
1,000,000-4,000,000	3,000,000	30	900,000	1,040,000
>4,000,000		37		>1,040,000
2017-present				
Taxable income	Net income of tax bracket	Tax rate	Tax liabilities	Accumulate tax burden
1-150,000	150,000	0	Exempted	0
150,001-300,000	150,000	5	7,500	7,500
300,001- 500,000	200,000	10	20,000	27,500
500,001-750,000	250,000	15	37,500	65,000
750,001- 1,000,000	250,000	20	50,000	115,000
1,000,001- 2,000,000	1,000,000	25	250,000	365,000
2,000,001- 5,000,000	3,000,000	30	900,000	1,265,000
>5,000,001		35		>1,265,000

Source: The Revenue Department (RD)

There are 8 categories of assessable income for personal income tax in Thailand, and income in each category is subject to difference allowances. Moreover, Thai personal income tax law treats people differently according to their occupations and sources of income. Table 2.2 presents the deductions allowed for the calculation of PIT by income categories[13]. In 2017, tax payers who earned income mainly from wages and salary and other assessable income under Revenue code section 40(1) and (20) --

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[13] Income from employment includes income derived from employment and income derived from post or form performance of work. Please see Appendix C for the personal income tax code of Thailand.

which is the majority of tax payers -- were able to deduct up to 50% from their assessable income, but not more than 100,000 baht. Other professions, such as physicians, engineers, or accountants who had income under section 40(6) were able to deduct 30%-60% without limit. Up to 70% of income derived from contract work could be deducted, and up to 80% of income from agricultural activity could be deducted. These preferential tax treatments do not conform to the horizontal equity of taxation because people with the same level of income were subjected to different tax liabilities.

Table 2.2 Deduction allowed for the calculation of PIT by source of income for tax year 2020

Type of Income	Deduction
a. Income from employment	40% but not exceeding 60,000 baht
b. Income received from copyright	40% but not exceeding 60,000 baht
c. Income from letting out of property on hire	
1) Building and wharves	30%
2) Agricultural land	20%
3) All other types of land	15%
4) Vehicles	30%
5) Any other type of property	10%
d. Income from liberal professions	30% except for the medical profession where 60% is allowed
e. Income derived from contract of work whereby the contractor provides essential materials besides tools	actual expense or 70%
f. Income derived from business, commerce, agriculture, industry, transport, or any other activities not specified in a. to e.	actual expense or 65% - 85% depending on the types of income

Source: www.rd.go.th

Between 1996 and 2007, the Thai government introduced a tax threshold of 100,000 baht, while the number of tax brackets and marginal tax rates remained unchanged. Additionally, a number of tax deductions and exemptions were introduced. For example, the government implemented deductions and exemptions on LTFs, RMFs and government pension funds. Taxpayers could now deduct contributions to LTFs, RMFs, provident funds, and pension funds up to a limit of 15% of their assessable income. These tax exemptions allowed deductions from assessable income of up to

300,000 baht for LTF contributions, and 300,000 baht for combined contributions to RMFs, provident funds and government pension funds. Under the new rules, taxpayers were able to deduct 1.5 times the value of sport charity contributions and 2 times the value of educational charity contributions.

Items of additional tax relief that were not proportionate to income included deductions for elderly parents (age 60 and over), parents' insurance payments, elderly allowance (age 65 and over), and terminal pay. These allowances reduce the tax burden as a whole. In addition, the Thai government also increased deduction limits on insurance payments, provident funds, housing loan interest and social security.

Between 2007 and 2017, the Thai government increased the tax threshold to 150,000 baht, and increased the number of tax brackets from 5 to 7. As a result, the marginal tax rate of some tax brackets was reduced. The marginal tax rate of taxable income between 100,000-150,000 baht was decreased from 10% to 5%, while the marginal tax rate of taxable income between 500,000-750,000 baht was decreased from 20% to 15%. The marginal tax rate for taxable income between 1 million and 2 million baht was also decreased, from 30% to 25%, while the marginal tax rate for taxable income between 4 million and 5 million baht was decreased from 35% to 30%. In addition, the top marginal tax rate, which applied to taxable income over 5 million baht, was decreased from 37% to 35%.

The personal allowance was also increased from 40% of assessable gross income, with a limit of no more than 60,000 baht, to 50% of assessable income with a limit of no more than 100,000 baht.

Tax deductions and exemption limits for payments to were increased to 500,000 baht on LTFs, and up to a combined total of 500,000 baht on RMFs, provident funds, government pension funds, Private Teacher Aid fund and pension insurance.

Apart from tax relief for house and car maintenance for those who were affected by flooding, there were also special tax promotions for things such as real estate purchases, domestic travel, OTOP purchases, and dining out. In fact, the government regularly introduces these policies on an ad hoc basis in order to stimulate the economy.

As of 2021, the deduction for LTF contributions had been replaced with deductions for contributions to Super Saving Funds (SSFs)[14]. Furthermore, the limits on deductible contributions to SSFs and RMFs, provident funds, government pension funds and Private teacher Aid funds have been increased from 15% of assessable income to 30% of assessable income; however, the total deductions for the aggregate contributions to all these funds, together with the amount contributed to pension insurance and Government Saving Funds must not exceed 500,000 baht annually. This increase in the deduction limit relative to assessable income is aimed at increasing the tax benefit for low and middle income tax payers, while limiting the tax benefit for high

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[14] Tax payers who purchases SSFs is required to hold their equities for at least 10 years instead of 7 years on LTFs. The deductions of SSFs can be claimed from tax year 2020 to 2024.

income tax payers. The private consumption related tax benefit has also been increased from 15,000 baht for the "Shop Chuay Chart" program to 30,000 baht for the "Shop Dee Mee Kuen" program.

These tax reforms may lessen the personal income tax burden over time. Tax exemptions related to LTFs and RMFs were introduced to stimulate economic growth, investment and savings, but they also provide tax advantages to high-income households who have investments and capital income.

This type of "tax relief" for individuals is a form of tax expenditure for the government. The resulting lower tax revenue could lower the availability of money to fund government subsidies for those in need, and might result in smaller budgets for infrastructure that benefit the whole country in the end.

Table 2.3 Summary of personal income tax deductions and exemptions in Thailand: 1996, 2007, 2017, and 2020

Change in personal income tax benefit	1996	2007	2017	2020
Deduction allowed for the calculation of PIT	40% of assessable income, but not exceeding 60,000 Baht	40% of assessable income, but not exceeding 60,000 Baht	50% of assessable income, but not exceeding 100,000 Baht	50% of assessable income, but not exceeding 100,000 Baht
Personal Allowance	30,000 Baht	30,000 Baht	60,000 Baht	60,000 Baht
Spouse Allowance	30,000 Baht	30,000 Baht	60,000 Baht	60,000 Baht
Child allowance (Child under 25 year of age)	15,000 Baht each plus 2,000 Baht if the child is studying in educational institute in Thailand (up to 3 children)	15,000 Baht each plus 2,000 Baht if the child is studying in educational institute in Thailand (up to 3 children)	30,000 Baht each (No limit)	30,000 Baht each (No limit) plus additional 30,000 Baht for second child onwards born after 2018 plus antenatal care and delivery expense up to 60,000 baht for a child born from 1st January 2019 onwards

Change in personal income tax benefit	1996	2007	2017	2020
Parents allowance	None	30,000 Baht for each of tax payer's and spouse's parents if such parent is above 60 years old and earn less than 30,000 Baht	30,000 Baht for each of tax payer's and spouse's parents if such parent is above 60 years old and earn less than 30,000 Baht	30,000 Baht for each of tax payer's and spouse's parents if such parent is above 60 years old and earn less than 30,000 Baht
Disable person or Incompetent Person Support	None	None	60,000 Baht for each qualified/incompetent person	60,000 Baht for each qualified/incompetent person
Life insurance premium paid by tax payer or spouse	Amount actually paid but not exceeding 10,000 Baht each	Amount actually paid but not exceeding 10,000 Baht each. The amount greater than 10,000 Baht can be deducted but not greater than taxable income or not exceeding 40,000 Baht	Amount actually paid but not exceeding 10,000 Baht each. The amount greater than 10,000 Baht can be deducted but not greater than taxable income or not exceeding 100,000 Baht plus pension insurance at the rate of 15% of taxable income but not exceeding 100,000 Baht**	Amount actually paid but not exceeding 10,000 Baht each. The amount greater than 10,000 Baht can be deducted but not greater than taxable income or not exceeding 100,000 Baht plus pension insurance at the rate of 15% of taxable income but not exceeding 100,000 Baht***

Change in personal income tax benefit	1996	2007	2017	2020
Approved provident fund contributions paid by taxpayer or spouse	None	Amount actually at the rate not more than 15% of assessable income*	Amount actually at the rate not more than 15% of assessable income**	Amount actually paid at the rate not more than 30% of assessable income***
Retirement mutual fund	None	Amount actually at the rate not more than 15% of assessable income *	Amount actually at the rate not more than 15% of assessable income**	Amount actually paid at the rate not more than 30% of assessable income ***
Government pension fund	None	Amount actually at the rate not more than 15% of assessable income *	Amount actually at the rate not more than 15% of assessable income**	Amount actually paid at the rate not more than 30% of assessable income***
Private teacher aid fund contribution	None	Amount actually at the rate not more than 15% of assessable income *	Amount actually at the rate not more than 15% of assessable income **	Amount actually paid at the rate not more than 30% of assessable income***
Long term equity fund	None	Amount actually at the rate not more than 15% of wage, but not exceeding 300,000 Baht	Amount actually at the rate not more than 15% of wage, but not exceeding 500,000 Baht	Replaced with the Super Saving Funds in 2019

Change in personal income tax benefit	1996	2007	2017	2020
National Saving Fund Contribution	None	None	Amount actually paid **	Amount actually paid***
Super Saving Fund(SSF)	None	None	None	Amount actually paid during 1 January 2020 to 31 December 2024 not more than 30% of taxable income and not exceeding 200,000 baht*** plus the purchasing of Super Saving Fund Extra (SSF-Extra) during 1 January 2020 to 30 June 2020 up to 200,000 Baht
Social insurance contribution paid by taxpayer or spouse	Amount actually paid	Amount actually paid but not exceeding 9,000 Baht	Amount actually paid but not exceeding 9,000 Baht	Amount actually paid but not exceeding 9,000 Baht
Home mortgage interest	Amount actually paid but not exceeding 100,000 Baht	Amount actually paid but not exceeding 100,000 Baht	Amount actually paid but not exceeding 100,000 Baht	Amount actually paid but not exceeding 100,000 Baht

Change in personal income tax benefit	1996	2007	2017	2020
Terminal pay	None	Not exceeding wage and salary of the last 30 days, but not exceeding 300,000 baht	Not exceeding wage and salary of the last 30 days, but not exceeding 300,000 baht	Not exceeding wage and salary of the last 30 days, but not exceeding 300,000 baht
Personal allowance (for taxpayer age 65 years and older)	None	190,000 Baht	190,000 Baht	190,000 Baht
spouse allowance (who is 65 years and older)	None	190,000 Baht	190,000 Baht	190,000 Baht
Insurance premium for elderly parent			amount actually paid but not exceeding 15,000 baht	amount actually paid but not exceeding 15,000 baht
Charitable contributions for educational purpose	None	2 times of contribution but not exceeding 10% of taxable income	2 times of contribution but not exceeding 10% of taxable income	2 times of contribution but not exceeding 10% of taxable income
Charitable contributions for sport activity	None	1.5 times of contribution but not exceeding 20% of taxable income	2 times of contribution but not exceeding 10% of taxable income	2 times of contribution but not exceeding 10% of taxable income

Change in personal income tax benefit	1996	2007	2017	2020
Charitable contributions	Amount actually donated but not exceeding 10% of the income after standard deduction and the above allowance	Amount actually donated but not exceeding 10% of the income after standard deduction and the above allowance	Amount actually donated but not exceeding 10% of the income after standard deduction and the above allowance	Amount actually donated but not exceeding 10% of the income after standard deduction and the above allowance
	None	None	- Amount actually paid for house repair, but not exceeding 100,000 Baht and for car maintenance not exceeding 30,000 baht for those who are affected by the flood during December1st 2016-May 31st, 2017.	Purchase and Installation of CCTV ; Debit card processing fee
Special tax promotion			A payment of first home buyer value not greater than 3,000,000 with a complete transfer of ownership during 13 October 2015 to 31 December 2016 may be deductible up to 20% of the purchase price for 5	A payment of first home buyer value not greater than 3,000,000 with a complete transfer of ownership during 13 October 2015 to 31 December 2016 may be deductible up to 20% of the purchase price for 5

Change in personal income tax benefit	1996	2007	2017	2020
			consecutive tax year (2016-2021)	consecutive tax year (2016-2021)
			-Special tax promotion up to 15,000 baht from "Shop Chuay chart" campaign	Shop Dee Mee Kuen: up to 30,000 baht for the purchasing of books, e-books and registered OTOP goods

*The amount contributing to RMF +Provident Funds+ Government Pension Funds+ Private Teacher Aid Funds must not exceed 300,000 baht

**The amount contributing to RMF +Provident Funds+ Government Pension Funds+ Private Teacher Aid Funds+National Saving Funds+ Pension Insurance must not exceed 500,000 baht

***The amount contributing to SSF+RMF +Provident Funds+ Government Pension Funds+ Private Teacher Aid Funds+National Saving Funds+ Pension Insurance must not exceed 500,000 baht

Source www.rd.go.th

2.3 Methodology

There are many conventional inequality indices such as decile dispersion ratio, Gini Coefficient, and Generalized Entropy Index. These indices provide numerical evidence on how income or other factors of interest are distributed among a population. Governments and organizations employ the Gini Coefficient to measure aggregate income inequality. However, the aggregate value is not sufficient to explain the causes of income inequality. Decomposition analysis can provide greater detail for policy implication.

The goal of the decomposition technique is to derive the factor contribution that is aggregately additive to the overall inequality index, and to yield a rational interpretation of factor components (Shorrocks, 1983, 2013). There are many conventional indices that are aggregately decomposable including Gini Coefficient (Sarntisart, 2020)[15] and Theil index family(Shorrocks, 1982, 2013). Shorrocks index, which is one of the Theil index family is applied in this study to measure the contribution of income source and population subgroup to aggregate inequality.

Let there be population N, with income vector y_i (I =1, 2,...,N) with average income equal to μ

For Thiel index family

$$I_\alpha = \left[\frac{1}{N}\right]\left[\frac{1}{\alpha(\alpha-1)}\right]\sum_{i=1}^{N}\left[\left(\frac{Y_i}{\mu}\right)^\alpha - 1\right] \text{ for } \alpha \text{ not equal to 0 or 1} \qquad (2.1)$$

The Shorrocks index, in which $\alpha=2$ is as follow

$$I_2 = \left[\frac{1}{2N}\right]\sum_{i=1}^{N}\left[\left(\frac{Y_i}{\mu}\right)^2 - 1\right] \qquad (2.2)$$

$$I_2 = \left(\frac{1}{2}\right)\left(\frac{1}{N}\right)\sum_{i=1}^{N}\left[\frac{Y-\mu}{\mu}\right]^2 \qquad (2.3)$$

$$I_2 = \left(\frac{1}{2}\right)\sum_{i=1}^{N}\left(\frac{\sqrt{Y-\mu}}{\mu}\right)^2 \qquad (2.4)$$

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[15] There are comments that Gini coefficients is not aggregately decomposable, or can be done with the residual term (Bourguignon, 1979; Lambert & Aronson, 1993) . One reason is that when ranking the observation from lowest to highest of income distribution to calculate the Gini Coefficient, the rank of the observation in the total population may differ from its rank in the population subgroup or income source (Sarntisart, 2011). Fei, Ranis, and Kuo (1978) (as quoted in Sarntisart (2011)) proposed the 'pseudo-Gini Coefficient' for the decomposition of Gini Coefficient. The decomposition of Gini Coefficient is beyond the scope of this study, but the recent work of Sarntisart (2020) shows that Gini coefficient is aggregately decomposable.

$$I_2 = \left(\frac{1}{2}\right) CV^2 \qquad\qquad (2.5)$$

$$CV = \frac{SD}{\mu} \qquad\qquad (2.6)$$

$$weighted\ SD = \sqrt{\frac{\sum_{i=1}^{N} w_i (y_i - \mu)^2}{\sum_{i=1}^{N} (w_i - 1)}}$$

y_i = household income per capita

μ = weighted average household income per capita

w_i = household weight

SD = standard deviation

CV = coefficient of variation

It must be noted that the range of the Shorrocks index (I_2) and other indices in the Theil family vary by the size of populations, thus, may not be able to compare across time periods in which the number of observation are not equal (Sarntisart, 2011)[16]. This study emphasizes on the comparison of Shorrocks index between scenarios within the same year and the contribution on aggregate inequality derived from the decomposition technic.

The aggregately decomposable property is preferred in much of the research in this field, and that is also true in this study, which analyzes inequality in Thailand in two dimensions. The first dimension is the factor contribution of income source. We compare the Shorrocks index under various income definitions and analyze the influence of each source of income on aggregate inequality. The second dimension is subgroup decomposition by employment status and by socio-economic class. The empirical results should help identify the group(s) of people facing inequality, and the relationships between subgroups. The empirical results from both types of inequality decomposition will be a useful guideline for policy implication to alleviate income inequality.

First, for the income source decomposition, we calculated the impact of each income source and income taxes on aggregate income inequality. The goal was to answer the research question regarding what percentage of income inequality arises from each source of income, and how personal income tax and corporate income tax affect overall income inequality in each period.

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[16] The minimum and maximum value of Theil family index are described and presented in Table 5.1 on page 102 of Sarntisart (2011).

Comprehensive income in this study equals the sum of earning, transfers, income in-kind, and accrued capital gains less deductions for personal income tax.

Earnings comprise labor earnings and capital earnings. The first component includes wages and salary, non-farm profit, and agricultural profit. Capital earnings include interest, dividends, and rents. Transfers are the sum of pensions, assistance and other transfers. We include both cash income and income in-kind. Personal income tax and corporate income tax are denoted as negative income.

Capital gains comprise both realized and unrealized capital gains. This inclusion of unrealized capital gains is a key element to understanding why income inequality persists. Asset inequality in Thailand is even greater than inequality of income. Assets are potential source of income as they generate revenue in the form of rent and dividends, and can also be realized for profit in the event of an increase in asset price. Unrealized or accrued capital gains will be estimated by the capitalization method. We expect to find that this income component plays a significant role in income distribution in Thailand.

Let i (i=1, n) denote household and p (p=1,...,P) denote income source. The total income equals

$$Y = \sum_{i=1}^{N} y_i^p$$

It is quite intuitive to think that the weighted sum of inequality from each source of income or I_p would be equal to aggregate income inequality. Normally, however, the weighted sum of I_p is greater than aggregate inequality.

$$I(Y) \leq \sum_p \frac{\mu_p}{\mu} I(Y_p) \qquad (2.7)$$

μ_p= mean income from source p

This is because the aggregate inequality involves not only the distribution of each income source, but also includes the interaction between income sources. Using the same principle of variance, Shorrocks' index (I_2) can be generalized into

$$I_2(Y) = \frac{\sigma^2(Y)}{\mu^2} = \frac{\sigma^2(Y^p) + \sum_{p \neq q} \rho_{p,q} \sigma(Y^p)(Y^q)}{\mu^2} \qquad (2.8)$$

In order to achieve the absolute contribution for each income source, half of the value of all interaction terms involving factor j is allocated to this factor (Shorrocks, 1982). Therefore, the contribution of income source j to total aggregate income inequality equals

$$S_p = \frac{COV(Y^p, Y)}{\mu^2(Y)} \qquad (2.9)$$

The percentage of inequality that occurs from income source p to total inequality (I_2) is defined as s_p^*, which equals

$$s_p^* = \frac{s_j(I_2)}{I_2(Y)} = \frac{COV(Y^p, Y)}{\sigma^2(Y)} \qquad (2.10)$$

In which
$$\sum_{j=1}^{J} s_p^* = 1$$

COV $(Y_p, Y) =$ covariance of income source k to comprehensive income

I(Y) $\quad = \quad$ aggregate inequality

S_p $\quad = \quad$ factor contribution of income source j

s_p^* $\quad = \quad$ proportional factor contribution

Second, for subgroup decomposition, the population from the Socio-economic Survey was sub-divided according to socio-economic status and work status. The within-group component tells us how much income inequality exists within socio-economic class and employment status. The between-group component shows us the level of income inequality between socio-economic classes and between work-status sub-groups.

The socio-economic class is defined based on the major income source, economic activity, and main occupation of the household.

The employment status describes the status of people with regard to economic activity.

Employment status consists of 8 subgroups;
1) Employer
2) Own account worker
3) Unpaid family worker
4) Government employee
5) State enterprise employee
6) Private employee
7) Member of cooperative group
8) Economically inactive

Socio-economic class is based on the source of income that contributes the largest share of total income according to the 2-digit code for socio-economic class defined by the International Standard Classification of Occupation 2008 (ISCO-08) by the International Labor Organization (ILO). Socio-economic class consists of 11 subgroups;
1) Farm operator (including marine culture) who mainly owns land
2) Farm operator (including marine culture) who mainly rents land
3) Fishery, forestry, Hunting, Agricultural Services
4) Entrepreneurs for non-agricultural business
5) Professional, Technician and Manager
6) Laborers in agriculture, Forestry and Fisheries
7) Laborers in Logistics, transportation and basic works

8) Clerical, sales and service workers
9) Production, construction and mining Workers
10) Pensioners and social welfare recipients
11) Capital earners

This study examines how income and assets are distributed among these population subgroups, and how they affect aggregate income inequality.

For subgroup decomposition, we divide total population into mutually exclusive m subgroups, m_i (i =1, 2, 3). Shorrocks index decomposition when a=2 is as follows:

$$I_2 = \sum_{m=1}^{M} p_m b_m I_{2m} + \left(\frac{1}{2}\right) \sum_{m=1}^{M} p_m [b_m^2 - 1] \qquad (2.11)$$

p_m =   population share of subgroup m (n_m/N)
b_m =   relative share of income/wealth of subgroup m (μ_m/μ)

Equation 2.11 shows the subgroup decomposition of the Shorrocks index (I_2). The first component represents inequality within the population subgroup, and the second component represents the inequality between population subgroups (Sarntisart, 2011; Shorrocks, 1983, 1984).

The within-group component measures the variation in income of people in the same subgroup. From equation 2.11, income inequality within each subgroup depends on three factors. The first factor is the share of the population (p_m). If the subgroup contains the majority of the population, the inequality within this subgroup would increase total inequality by a large proportion, while inequality among a minority group would impact total inequality to a smaller degree. The second factor is income share to the population income (b_m). The higher share of a group's income compared to the total, the higher the effect on total inequality. The third factor is the inequality within the subgroup itself (I_m). The higher the income inequality within each subgroup, the higher the income inequality in the total population.

The between-group component reflects the income disparity between subgroups. The between-group component uses subgroup mean income as a representative. It is possible to think of the between-group component as $I_2(\overline{w}^1, \overline{w}^2, ..., \overline{w}^m)$. This between-group component depends on the population share (p_m) and its relative share of total income (b_m). Larger population share and higher contribution of relevant income result in larger between-group component impact on total inequality. The value of between group component is usually much lower than the within group component because it use the average value of subgroup as a representative, which ignore the discrepancy of the population characteristic within the subgroup.

The decomposition result yields the population share, inequality within the population subgroup ($I_2{}^m$), the absolute contribution, which is aggregately additive with inequality between subgroups to the total inequality, and their proportionate shares relative to total inequality (% of I_2)

The advantage of SES is that it provides great detail on population characteristics and sources of household income, expenditures and assets. Labor

earnings, capital earnings, transfers, and tax are readily available in SES, but the other key component of comprehensive income, accrued capital gains, is not provided. Instead, accrued capital gains are estimated from household assets. The focus of this study is on accrued gains from real estate and financial investment like stocks and provident funds. The accrued capital gains estimation is developed from the study of Larrimore et al. (2013)

Accrued capital gains from real estate is calculated from the value of household real estate times the changes in land price index[17] provided by the Department of Treasury. The value of household real estate[18] and the change in land price index are matched in each year are matched at the province level. Accrued capital gains from real estate assets is calculated as the value of real estate held times annual change in land price index within the same province and time period.

$$AG\_RE_{iat} = \Delta lpi_{iat} \; x \; PV\_RE_{iat} \qquad\qquad (\,2.12)$$

AG_RE_{iat}	=	capital gains from land of household i in province a in year t
Δlpi_{iat}	=	change in land price index of province a in year t
PV_RE_{iat}	=	market value of real household estate per capita of household i in region a in year t
t	=	[1996, 2007, 2017]

For financial assets, we impute the accrued capital gains from the portion of financial assets held as investments[19]. These consist of stocks, bonds, debentures, mutual funds, long term mutual funds (LTF) and retirement investments like RMFs[20].

The accrued gains are imputed from the value of mutual fund, private fund (available from 1996), and retirement investments. We apply the 1-year average change in market capitalization calculated from market capitalization statistics provided by the Stock Exchange of Thailand (SET). The value of accrued capital gains from financial investment is calculated as the value of financial assets for investment held times the 1-year average change of year-on-year change in market

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[17] The land assessment price is revised every four years by the Department of Treasury. The price level is a reference for calculating specific business taxes and transaction fees. It is also applied by courts for calculating claims, and financial institutions use this price for valuing security.

[18] Please see the table of data variable from the Socio-economic Survey in Appendix A.

[19] Please see the table of data variable from the Socio-economic Survey in Appendix A.

[20] Larrimore et al (2016) imputed accrual gains from financial assets of the US population from changes in the S&P 500 for corporate equities and IMA rates of return for non-corporate equities. The comparable databases in Thailand would be the SET index and MAI index for corporate equities. However, households invest in money markets, financial markets and derivatives markets. They also allocate their funds to both debt and financial securities. Thus, using the change in stock exchange alone may not well represent the accrued capital gains from household investments. Thai investors who do not have a large sum of money can invest through mutual funds, and other retirement investments. The Thai government also offers tax incentives by allowing taxpayers to deduct contributions to LTFs and RMFs from assessable income[20] and exempting tax on capital gains.

capitalization in the respected time period (1996, 2007, and 2017) to account for the votality in the stock market.

$$AG\_FA_{it} = \Delta MCAP_t xPV\_FA_{it} \qquad\qquad (2.13)$$

AG_FA$_{it}$	=	capital gains from financial assets of household I at time t
ΔMCAP$_t$	=	1- year average change of Y-O-Y change in market capitalization from t-1 to t
PV_FA$_{it}$	=	present value of household financial assets for investment per capita
t	=	[1996, 2007, 2017]

The population from the Socio-Economic Survey is divided according to their household incomes; the within-group component tells us how much income or wealth inequality exists within the income quintile. The between-group component shows us the difference in income/wealth inequality between employment status groups and between socio-economic classes.

2.4 Data

This study uses the Socio-economic Survey Data of 1996, 2007, and 2017 provided by the National Statistical Office (NSO)[21]. SES is one of the most widely used authorized micro-data sources for research on the Thai economy, and has been utilized in research such as the studies of Aemkulwat (2015), Chandoevwit & Jawala (201), Jeong (2008), Jitsuchon & Plangpraphan (2011), Santhi (2013), and Sarntisart (2000). The relevant 20-year period covers major personal income tax reform and changes in wealth distribution in Thailand. The income unit in this study is household income per capita, and all of the values are in real terms, using 2015 as the base year.

The Socio-Economic Survey (SES) contains detailed information of Thai household economics and social information on Thai household income, expenditures, transfers, assets, liabilities, and access of social welfare program and public services. It also provides details of household member characteristics such as education, occupation, and employment status, as well as housing characteristics. Household personal income tax is recorded in non-consumption expenditure as direct taxes.

Previously, researchers have pointed out that the high-income group is underrepresented in the survey as rich people tend to under-report their income (Kingnetr et al., 2019). This study mitigates this issue by equalizing the income from the SES with the National Income Account, and equalizing personal income tax expenditure with the tax revenue statistics[22]. The accrued capital gains during a year

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[21] The survey covers permanent residence of private and non-institutional households in municipal, non-municipal and private household living in institutional residence. The temporary residences and households of foreign diplomats are not included in this survey.

[22] The National Income Account (NI) is conducted by the Office of National Economics and Social Development Council (NESDC), and the tax revenue statistics are provided by the Revenue Department of Thailand (RD).

are calculated from the value of household real property and financial assets for investment, including bonds, stocks, debentures, provident funds and retirement investment. The value of personal income tax from the SES of 1996 is recorded individually from other taxes, but the value of personal income tax from the SES of 2007 and 2017 is recorded together with local development tax, charges, fee, and fines. The value of personal income tax in this study is adjusted with the tax revenue statistic conducted by the department of revenue. The tax revenue statistics conducted by the revenue department shows that the value of tax revenue from other expenses were much smaller comparing to the value of personal income tax.

Income inequality is generalized in three income concepts. The first one is total income, which includes labor earnings, capital earnings, transfers, and in-kind income. The second one is disposable income, which equals total income minus personal income tax. The third one is comprehensive income, which is total income minus personal income tax plus net accrued capital gains from real estate and financial investments (Armour et al., 2013; Haig, 1921; Simons, 1938; Smeeding & Weinberg, 2001).

Table 2.4 shows average household annual income per capita and value of assets from 1996 to 2017[23] at the 2015 price level. Earned income comprises main income sources, which include wages, business profit, and farm profit. The value of real estate property was approximately 2.80 times total annual household income per capita, while the value of financial assets was approximately 1.43 times.

Table 2.4: Household Income per Capita: SES 1996, 2007, 2017

	Mean			Growth Rate (%)		
Year	1996	2007	2017	1996-2007	2007-2017	1996-2017
Number of Observation	25,110	43,055	43,210			
Wages	35,622.16	46,416.76	70,830.59	2.44	4.32	3.33
Business Profit	17,448.06	24,329.97	28,673.73	3.07	1.66	2.39
Farm Profit	10,658.29	12,961.68	14,044.55	1.79	0.81	1.32
Pensions	891.51	2,366.88	5,806.77	9.28	9.39	9.33
Transfers	5,471.09	8,768.45	9,376.88	4.38	0.67	2.60
Rents	809.99	1,080.03	1,229.15	2.65	1.30	2.01
Interest	916.50	1,196.28	1,018.53	2.45	-1.60	0.50
Imputed Rents	9,085.47	9,498.05	13,446.41	0.40	3.54	1.88
Unpaid Goods and Services	7,004.73	7,386.98	8,228.70	0.48	1.08	0.77
Transitory Income	1,320.09	2,265.08	1,998.42	5.03	-1.24	1.99
Personal Income Tax	3,245.19	3,617.12	3,990.35	0.99	0.99	0.99

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[23] Value of income and assets are deflated by 2015 headline consumer price index (www.bot.or.th)

	Mean			Growth Rate (%)		
Year	1996	2007	2017	1996-2007	2007-2017	1996-2017
Real Estate Property	282,219.80	268,218.80	458,396.50	-0.46	5.51	2.34
Financial Assets (Savings)	80,304.62	84,530.14	121,729.80	0.47	3.71	2.00
Financial Assets (Investment)	9,925.29	60,779.63	150,478.60	17.91	9.49	13.82
Financial Assets	90,229.92	145,309.80	281,255.40	4.43	6.83	5.56
Accrued Capital Gains (Real Estate)	17,215.41	21,384.47	31,755.42	1.99	4.03	2.96
Accrued Capital Gains (Financial Assets)	-115.13	8,764.42	22,526.64	N/A	9.90	61.17
Total Income	89,227.89	116,270.20	154,653.70	2.44	2.89	2.65
Disposable Income	85,982.69	112,653.00	150,098.30	2.49	2.91	2.69
Comprehensive Income	103,083.00	142,801.90	204,380.30	3.01	3.65	3.31
Effective Tax Rate (%)	1.03	1.11	1.77	0.71	4.76	2.62

Source: Socio-economic Survey (SES) of 1996, 2007, and 2017
    Land Price Index (Department of Lands
    Change in market capitalization (www.set.or.th)
    Tax revenue statistics (The Revenue Department of Thailand)
    The author's calculations

Annual wages rose at an average of 3.33% per year from 35,662 baht to 70,831 baht, while annual business profit rose at a rate of 2.39% per year from 17,448 baht to 28,674 baht. Annual farm profit rose 1.32% per year on average, from 10,658 baht to 14,045 baht. Earned income is obviously still an important income source for Thai households.

Transfers and pensions also contributed to a significant amount of household income per capita. Annual transfers increased at an average of 2.60% per year from 5,471 baht to 9377 baht, while annual pensions increased more rapidly at the rate of 9.33% per year from 891.51 baht to 5,807 baht. Annual imputed rents increased at 1.88% per year on average, from 9,085 baht to 13,446 baht. Imputed rents also increased purchasing power for those who owned their houses.

The value of household real estate per capita, which includes residential and business property for other purposes such as farming or business increased at 2.34 % per year on average, from 282,220 baht to 458,397 baht. The estimated accrued capital gains for property owners averaged 2.34% per year, rising from 17,215 baht to

31,775 baht as a result of real estate price appreciation between 1996 and 2017.   Real estate prices have been increasing, and these accrued capital gains can also be realized when a property is sold. Thus, it should be counted as household income and must be considered when discussing income inequality.

The value of household financial assets increased 5.56% per year from 90,230 baht to 281,255 baht. Unlike real estate property which seldom decreases in value, financial asset owners face the possibility of either gains or losses from their investments, as financial asset values are much more volatile. Financial asset owners lost, on average, 115.13 baht in 1996 (1,207 baht if only those who owned financial securities are counted) as the Asian economic crisis was looming, but they gained an average of 8,764 baht in 2007 and 22,257 baht in 2017.   Financial wealth was found to be mostly owned by the high-income group. Thus, when losses (gains) occurred, comprehensive income inequality decreased (increased). Thai people, especially those who have high-income, divert their savings to financial investment as a result of low savings interest, higher returns and government policies that are likely to increase the value of this category of investment. Such policies include tax exemption for financial investments and long term savings like RMFs and LTFs. As the value of financial wealth has continued to increase, accrued capital gains have an increasingly significant effect on income inequality, and, thus, should be included in the analysis.

Personal income tax remained quite stable during the relevant periods. Annual personal income tax expenditure per capita increased from 3,246 baht to 3,990 baht from 1996 to 2017, or around 1% per year. The effective tax rate was less than 2%. Although personal income tax is paid by high-income people, household income including labor and capital income and also accrued capital gains increased at much faster pace. Therefore, personal income tax did not significantly affect income distribution or income inequality.

Thai households earnings were derived primarily from their labor income, which included wages, business profit and farm profit, while personal income taxes paid were very small and remained quite stable due to an increased tax threshold, higher levels of exemption, and a small tax base that did not effectively cover labor in the informal sector. At the same time, the accrued capital gains from real estate and financial assets increased more rapidly, and these assets were concentrated among the high-income group. An interesting question arises regarding how the empirical results of research into income inequality are affected by broadening the definition of income – that is, by broadening the scope of how income is defined.

2.5 Result

This section contains two parts. First, the distribution of household income per capita in three definitions -- total income, disposable income (total income minus tax), and comprehensive income (disposable income plus net accrued gains) -- is presented, followed by the distribution of personal income tax by income decile, employment status, and socio-economic class. The values are reported in real terms

using 2015 as the base year[24]. Second, the Shorrocks index is applied across three income definitions and the results are compared. Then, we analyze the inequality decomposition result by income source, employment status, and socio-economic class.

Thai household income distribution

The decile distribution of household income per capita at the 2015 price level and decile dispersion ratio of Thai households in 1996, 2007, and 2017 are reported in Table 2.5. There are three income definitions: total income, disposable income, and comprehensive income. Household real income per capita increased as net accrued capital gains from real estate and financial investments were positive.

The decile distribution of household income per capita at the 2015 price level and decile dispersion ratio of Thai households in 1996, 2007, and 2017 are reported in Table 2.4. There are three income definitions: total income, disposable income, and comprehensive income. Household real income per capita increased as net accrued capital gains from real estate and financial investments were positive.

First, household total income per capita, which comprises labor income, capital income, income in-kind, and transitory income was considered. The income share of households in D1 remained quite stable at 1.64-1.65% in 1996, then increased to 1.87 in 2017, whereas income the share of D10 continuously decreased from 39.97% to 35.77%. All inequality indices also moved in the same direction over the 1996-2017 period. The decile dispersion ratio (D10/D1) decreased from 24.198 to 23.87, and 19.10 for the years 1996, 2007, and 2017, respectively. The Gini Coefficient also decreased from 0.511 to 0.500 and 0.462. However, the Shorrocks index increased from 1.268 to 1.594 from 1996 to 2007, and then decreased to 1.294 in 2017 as it is sensitive to the number of observations, and the distribution at the higher end (Sarntisart, 2011; Shorrocks, 2013). Sarntisart (2001) showed that, in 1996, the income share of the lowest 20% equaled 4.34%, while the top 10% share equaled 39.97%. The Gini coefficient of household real income per capita equaled 0.5045, and Shorrocks index equaled 1.2407. As shown in Table 2.4, income inequality in Thailand continuously decreased over the 1996-2017 period.

Second, we consider disposable income, which equals total income minus personal income tax. People in D1 to D9 gained a slightly higher share compared to total income because more than 75% of personal income tax was paid by people in D10. As a result, the income share of D10 decreased to 38.24, 37.64, and 34.67 in 1996, 2007, and 2017, respectively. The D10/D1 ratio also decreased to 22.30, 22.40, and 19.10 over the same periods. The Gini Coefficient decreased to 0.498, 0.491, and 0.454, and Shorrocks index decreased to 1.175, 1.560, and 1.292. Aemkulwat (2015) found that personal income tax decreased the D10/D1 ratio from 20.7 to 19.6, and decreased the Gini coefficient by 2.4% (from 0.490 to 0.478) in 2009. Personal

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[24] The headline CPI of 1996= 60.30, 2007 =83.9, and 2017= 100.85 (BOT)

income tax reduced income inequality as the majority of the tax burden was paid by people in the top income decile.

Third, we consider comprehensive income, which equals disposable income plus accrued capital gains from real estate and financial assets. Income inequality decreased in 1996 because people in the highest-income decile faced losses from their financial investments. The D10/D1 ratio decreased from 24.18 to 18.84, while the Gini coefficient decreased from 0.511 to 0.487. The Shorrocks index dropped from 1.268 to 1.106. In 2007, people in D1 to D5 gained a slightly higher share of income when accrued capital gains are included, thanks to an increase in real estate prices. People in D10 also gained a higher income share, rising from 39.06% to 39.15%

Table 2.5: The decile distribution and ratio of household income per capita from SES of 1996, 2007, and 2017

Mean	1996			2007			2017		
Decile	Total Income	Disposable Income	Comprehensive Income	Total Income	Disposable Income	Comprehensive Income	Total Income	Disposable Income	Comprehensive Income
D1	14,756.75	14,753.55	20,582.73	19,028.78	18,927.43	29,562.28	28,979.33	28,665.43	45,243.87
D2	23,193.55	23,186.25	30,844.77	31,166.47	31,062.69	44,154.81	47,229.58	46,888.71	66,030.87
D3	30,121.70	30,085.08	38,685.65	40,978.12	40,860.36	55,465.98	61,251.68	60,601.79	81,015.31
D4	37,945.46	37,928.12	47,666.62	51,599.07	51,420.92	68,911.00	75,986.13	75,350.15	100,083.40
D5	47,054.71	46,955.21	58,203.52	63,846.76	63,684.69	83,629.28	93,797.71	93,074.32	118,857.10
D6	58,720.17	58,503.59	71,014.57	79,898.41	79,418.82	102,676.10	115,318.00	114,287.50	141,887.50
D7	75,224.82	74,886.60	89,855.06	101,549.40	100,898.20	129,040.80	142,909.40	141,114.30	170,975.80
D8	101,443.90	100,670.30	119,457.70	133,151.50	131,974.50	165,975.70	181,673.50	179,248.70	224,558.20
D9	147,175.50	144,081.60	166,938.60	187,444.80	184,372.30	232,367.00	246,086.80	241,322.00	298,035.00
D10	356,853.00	328,970.30	387,805.70	454,131.40	424,002.50	586,676.90	553,604.00	520,706.50	797,568.60
Income Share	Total Income	Disposable Income	Comprehensive Income	Total Income	Disposable Income	Comprehensive Income	Total Income	Disposable Income	Comprehensive Income
D1	1.65	1.72	2.00	1.64	1.68	1.98	1.87	1.91	2.21
D2	2.60	2.70	2.99	2.68	2.75	2.94	3.06	3.13	3.23
D3	3.37	3.50	3.75	3.52	3.62	3.70	3.96	4.04	3.96
D4	4.25	4.41	4.62	4.44	4.56	4.60	4.91	5.02	4.89
D5	5.27	5.46	5.65	5.49	5.65	5.58	6.07	6.20	5.82
D6	6.58	6.80	6.89	6.88	7.05	6.86	7.46	7.61	6.94
D7	8.44	8.72	8.73	8.73	8.95	8.61	9.24	9.40	8.37
D8	11.37	11.70	11.58	11.45	11.71	11.07	11.75	11.94	10.99
D9	16.49	16.75	16.19	16.12	16.37	15.51	15.92	16.09	14.59
D10	39.97	38.24	37.60	39.06	37.64	39.15	35.77	34.67	39.00
D10/D1	24.18	22.30	18.84	23.87	22.40	19.85	19.10	18.16	17.63
Gini Coefficient	0.511	0.498	0.487	0.500	0.491	0.507	0.462	0.454	0.503
Shorrocks Index (I_2)	1.268	1.175	1.106	1.594	1.560	2.127	1.294	1.292	3.320

These changes occurred at the expense of decreased comprehensive income share among D6 to D10. The D10/D1 income ratio decreased from 23.87 to 19.85, comparing total income and comprehensive income. Nonetheless, the Gini coefficient increased from 0.500 to 0.507, and the Shorrocks index increased from 1.594 to 2.127. The impact of accrued capital gains became more prominent in 2017, as the share of financial assets for investment in D10 rose from 66.39% to 83.28%. Although the income share of D1 and D2 increased, the income share of D10 also increased from 35.77% to 39.00%; however, these changes occurred at the expense of a decreasing income share among D3 to D9. Although the D10/D1 income ratio decreased from 19.10 to 17.63 when income definition is changed from total and comprehensive income, the Gini coefficient increased from 0.462 to 0.503, and the Shorrocks index increased from 1.294 to 3.320.

Changing the income definition changes the inequality result. Accrued capital gains have a much larger impact on income inequality because they account for more than 20% of comprehensive income, while personal income tax accounts to less than 4%. In addition, capital gains are positively correlated with income, and concentrated among high-income earner, especially financial assets[25]. The changes seen in the Shorrocks index were also larger than those of the Gini coefficient because the index is more sensitive to changes in higher income definition (Sarntisart, 2001, 2011).

Personal Income Tax

In this section, personal income tax distribution is reported in three aspects: by decile distribution of household income, by socio-economic class, and by work status.

Table 2.6: The distribution of personal income tax liabilities and effective tax rates (%) by income class

Personal Income Tax	Mean			Share			Effective Tax Rate		
	1996	2007	2017	1996	2007	2017	1996	2007	2017
D1	3.20	101.36	313.90	0.01	0.28	0.69	0.02	0.60	3.68
D2	7.30	103.78	340.87	0.02	0.29	0.75	0.03	0.34	0.72
D3	36.62	117.76	649.89	0.11	0.33	1.43	0.12	0.29	1.05
D4	17.34	178.15	635.98	0.05	0.49	1.40	0.05	0.35	0.84
D5	99.50	162.07	723.39	0.31	0.45	1.59	0.21	0.25	0.77
D6	216.58	479.59	1,030.54	0.67	1.33	2.26	0.36	0.60	0.90
D7	338.22	651.17	1,795.14	1.04	1.80	3.94	0.44	0.63	1.25
D8	773.57	1,177.05	2,424.82	2.38	3.25	5.32	0.75	0.88	1.34
D9	3,093.89	3,072.51	4,764.81	9.53	8.49	10.46	2.04	1.62	1.92
D10	27,882.70	30,128.93	32,897.57	85.87	83.29	72.16	6.27	5.55	5.24
D10/D1	8,714.24	297.25	104.80						

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[25] See the distribution of accrued capital gains by income decile and subgroups in Appendix B.

Table 2.6 shows the decile distribution of personal income tax expenditure in real terms, at 2015 prices. The personal income tax burden in every income decile increased significantly, especially from 1996 to 2007. Personal income tax of those in D1-D8 increased more sharply than for those of D9-D10. This is consistent with what is known about the change in the Thai labor structure, with movement from the agricultural sector to manufacturing and service sectors, which led to a higher number of wage earners, and higher income (Aemkulwat, 2010). Most personal income tax was paid by people in the top 10% of household income distribution, but the share of tax paid by this group decreased from 85.87% to 72.165% over the period of study, while the personal income tax share of the lower 80% increased continuously. The interesting point is that personal income tax burden in D10 increased at a much slower pace, from 27,883 baht to 32,898 baht from 1996 to 2017, while that of households in D1 increased sharply from almost zero to 314 baht. These statistics illustrate that, although personal income tax was increasing, most changes occurred in the lower levels of income distribution. This may have resulted from tax exemptions and allowances on long term investments and insurance spending that benefitted high-income people. In other words, the effective tax rates in D9-D10 were decreasing, while those in D1-D8 were increasing. The effective tax rate in D10 also decreased from 6.27% to 5.24% from 1996 to 2017, while that of D1 increased from 0.02% to 3.68%.

Previous research has also found that the personal income tax burden of the top 10% was much higher than that of people in the rest of the income distribution. Chandoevwit and Jawala (2011) found that personal income tax was not absolutely progressive, as the rate fluctuated among D1-D5. The authors equalized the personal income tax burden with revenue statistics from the revenue department and distributed the tax burden according to wages and business income. In 2007, the effective tax rate increased from 0.60% in D1 to 1.87% in D8, and then the rate increased sharply to 4.17% and 7.24 among people in D9 and D10, respectively. Aemkulwat (2015) found that the effective rates of personal income tax in D1 to D9 were less than 2%, while people in D10 faced an effective tax rate equal to 5.2% in 2009.

The calculated personal income tax burden varies according to the calculation method, but the result and trends are in the same direction. Although high-income people faced higher effective tax rates, the personal income tax burden increased more rapidly among people who had lower incomes. Personal income tax increased because of an increase in wages and salaries in both private and government sectors, and a higher proportion of labor in the formal sector (Chandoevwit & Jawala, 2011)

Table 2.7 shows the distribution of personal income tax by work status. More than two-thirds of personal income tax was paid by labor in the formal sector: government employee, state enterprise employee, and private employee. Personal income tax of labor in the formal sector was higher than that of other groups because it is hard to avoid tax, as it is deducted from wages and salaries by employers. Although employers had higher income than some government employee and private employee, their personal income tax burden was smaller. Employers may be able to avoid tax, or their tax burden may not be recorded in the SES (Chandoevwit & Jawala, 2011)

Table 2.7: The distribution of personal income tax liabilities and effective tax rates (%) by employment status

Personal Income Tax Employment Status	Mean			Share			Mean		
	1996	2007	2017	1996	2007	2017	1996	2007	2017
Employer	1,389.18	5,248.90	5,933.83	12.88	8.98	4.44	0.43	1.54	1.56
Own Account worker	694.22	598.03	1,351.15	5.07	7.15	10.94	0.36	0.56	1.72
Unpaid Family Worker	489.12	741.54	1,245.20	0.31	0.54	0.63	0.25	0.67	0.77
Government employee	14,932.55	13,561.99	13,210.09	33.57	27.08	17.90	4.41	3.17	2.81
State Enterprise Employee	N/A[26]	34,992.34	26,958.27	0.00	6.99	3.78	N/A	8.06	4.75
Private Employee	4,643.48	5,384.59	6,776.93	29.58	30.22	36.09	1.52	1.32	1.90
Member of Cooperative Group	N/A	118.12	0.00	0.00	0.00	0.00	N/A	0.13	0.00
Economically Inactive	3,721.61	3,506.27	4,537.22	18.60	19.04	26.22	1.08	1.04	1.52

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[26] State enterprise employees were grouped in with government employees in the SES of 1996

State enterprise employee was the group that paid the highest tax and faced highest effective tax rate. The personal income tax burden of state enterprise employees (in 2015-adjusted prices) decreased from 34,992 baht in 2007 to 26,958 baht in 2017. The effective tax rate for this group also decreased from 8.06% to 6.41% over the same periods. Government employees also paid less tax as their personal income tax burden decreased in real terms from 14,933 baht to 13,210 baht from 1996 to 2017, and their effective tax rate also decreased from 4.41% to 2.81%. However, the personal income tax burden of private employees increased from 4,643 baht to 6,777 baht, while the effective tax rate fluctuated between 1.32% and 1.90%. The tax burden of employers increased sharply from 1996 to 2007, rising dramatically from 1,389 baht to 5,249 baht, and then increasing slightly to 5,934 baht. The effective tax rate for private employees equaled 1.56% in 2017

When comparing in real terms, it is obvious that personal income tax decreased, despite an increase in income, because the tax threshold was increased in combination with an increase in tax deductions and exemptions.

Table 2.8 reports the distribution of personal income tax by socio-economic status. The main contributor of personal income tax were professional, technician, and manager households followed by service workers, and non-farm entrepreneurs. However, the personal income tax burden of the professional, technician, and manager group was decreasing in real terms at 2015 price. Their tax burden decreased from 26,484 baht to 23,585 baht over 1996-2017, and their effective tax rate decreased slightly from 6.25% to 4.49%. Nonetheless, they still contributed the largest share among tax payers. Households in this group contributed 60.67% of tax paid in 2017. The personal income tax burden of service workers decreased sharply from 7,570 baht in 1996 to 2,650 baht in 2007, and then 2,500 baht in 2017. As a result, their share of personal income tax decreased from 28.06% to 8.86%. The personal income tax burden of non-farm entrepreneurs fluctuated from 2,420 baht in 1996 to 1,966 baht in 2007 before increasing to 2,437 baht in 2017. However, the contribution of this group decreased from 11.90% to 9.69%. During the same period, capital earners and pensioners/welfare recipient households paid higher personal income tax. In fact, income tax among capital earners rose sharply from 2,142.47 baht to 12,075 Baht from 1996 to 2017. The personal income tax among pensioners and welfare recipients also more than doubled from 981.15 baht to 2,080.52 baht over the same period. People in the agricultural sector and labor sector also paid higher income tax.

The effective tax rate of labor in the formal sector, which includes the professional, technician group, was the highest, but the effective tax rate for this group decreased from 6.25% in 1996 to 5.12% in 2007, and 4.49% in 2017. The effective tax rate of service workers also decreased from 2.83% to 1.23%. Conversely, the effective tax rate among passive income receivers increased. The effective tax rate among capital earners increased from 0.91% to 3.13%, and the effective tax rate among pensioners and welfare receivers increased from 0.34% to 2.61%. The effective tax rate among households in the agricultural sector, entrepreneurs, and labor remained quite low at less than 1.5%.

Table 2.8: The distribution of personal income tax liabilities and effective tax rates (%) by socio-economic status

Personal income tax	Average			Share			Effective tax rate (%)		
Socio-economic class	1996	2007	2017	1996	2007	2017	1996	2007	2017
Farmer (owned land)	55.43	189.97	602.45	0.45	0.99	1.54	0.06	0.41	0.75
Farmer (rent land)	26.76	223.69	692.09	0.03	0.25	0.37	0.01	0.39	0.88
Fishing, forestry, agricultural services	937.46	790.50	1,107.02	0.18	0.48	0.47	0.33	1.05	1.19
Entrepreneurs, trade and industry	2,419.91	1,965.56	2,436.95	11.9	10.56	9.69	0.78	0.82	1.12
Professional, technician, and manager	26,484.07	25,646.08	23,585.37	48.32	68.07	60.67	6.25	5.12	4.49
Labor (farm)	13.85	143.00	688.27	0.02	0.14	0.53	0.03	0.18	0.84
Labor(general)	237.69	218.09	1,227.37	0.23	0.05	0.64	0.17	0.21	0.96
Worker (service)	7,569.85	2,650.29	2,499.74	28.06	9.88	8.86	2.83	1.14	1.23
Worker (production)	1,497.25	976.59	2,465.39	7.35	3.58	7.66	0.81	0.69	1.33
Pensioner and welfare recipient	981.15	1,079.97	2,080.52	2.93	4.16	7.92	0.34	0.50	2.61
Capital earner	2,142.47	9,556.62	12,075.60	0.52	1.83	1.64	0.91	2.91	3.13

Over the past 20 years, wage earners, which include professionals and those in the service sector, were still the main contributors of personal income tax; however, their tax burden has been decreasing in real terms. This may be the result of lower marginal tax rates and higher tax thresholds that have resulted from personal income tax reform. During the same period, those who receive passive income from their capital or and social welfare paid higher tax. Nonetheless, their effective tax rate remained lower than that of wages earners. Capital earners may have also benefitted from increased tax deductions and exemptions on long-term investments, while low wage earners might not have been able to save and invest.

Income Inequality

Table 2.9 compares the value of the Shorrocks' index across three income definitions. The value of the Shorrocks index and other inequality indices depend heavily on the units of measurement (such as household or per capita), and income definition (Kingnetr et al., 2019). Both inequality indices move in the same direction. The empirical result shows that changes in income inequality when compared between comprehensive income and total income is greater than that of disposable income[27]. This is because accrued capital gains are concentrated among people in the top decile, and the amount of accrued capital gains is larger than the amount of personal income tax. Therefore, the effect of accrued capital gains on income inequality is much stronger than the effect of personal income tax. However, while accrued capital gains from real estate tend to be positive, as land prices tend to appreciate, accrued capital gains from financial securities can be positive or negative due to changing economic situations. In a year of gains (losses), comprehensive income inequality increases (decreases). Comparing over 1996-2017, the redistributive impact of personal income tax was diminishing, whereas the impact of accrued capital gains was becoming stronger.

Table 2.9 Income Inequality of Household Income per Capita

Income Type	Shorrocks (I2)			Δ%I$_2$			Gini Coefficient		
	1996	2007	2017	1996	2007	2017	1996	2007	2017
Total Income	1.268	1.594	1.294	-	-	-	0.511	0.500	0.462
Disposable Income	1.175	1.560	1.292	-7.30	-2.13	-0.15	0.498	0.491	0.454
Comprehensive Income	1.106	2.127	3.320	-12.72	33.45	156.57	0.487	0.507	0.503

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[27] Total income = labor income + property income + income in-kind + transitory income

Disposable income = total income - personal income tax

Comprehensive income = total income - personal income tax + accrued capital gains from real estate + accrued capital gains from financial investment

In 1996, the Shorrocks index of total income equaled 1.268. The Shorrocks index of adjusted SES data was smaller than that of Sarntisart (2001), who reported a Shorrocks index in 1996 of 1.279. Personal income tax drove down the Shorrocks index to 1.175 (-7.30%). People in the top income decile owned 67.85% of total financial investment and 34.61% of real estate property[28]. Although real estate owners gained around 6.1% per year from their real property, the financial asset owners incurred losses of around 1.16% from their investments due to a looming Asian economic crisis. As a result, accrued capital losses reduced the Shorrocks Index further to 1.106 (-12.72%). Income inequality in this period decreased as a result of these financial losses.

However, in the latter periods, asset owners gained both from their real assets and financial assets. In 2007, the Shorrocks index of total income equaled 1.594. Personal income tax reduced the Shorrocks index to 1.560 (-2.13%), but accrued capital gains increased it to 2.127 (+ 33.45%), as asset owners received 7.97% and 0.14% gains from real estate and financial asset price appreciation, respectively. In 2017, the Shorrocks index of total income equaled 1.294. Personal income tax reduced the Shorrocks index to 1.292 (-0.15%). Accrued capital gains, however, increased the Shorrocks index to 3.320 (+ 156.57%), as asset owners experienced asset value growth of 6.92% and 14.97% from real estate and financial asset price appreciation.

The distribution across three income scopes provided that the effect of accrued gains were much more prominent than the redistributive impact of income tax. Although the value gains of real estate property were more equally distributed than income among people in D1 to D5, around one-third of assets were owned by people in the top decile. The distribution of financial assets was more clustered in the top decile than were real assets. The accrued gains from real assets were much higher because real estate prices tends to appreciate more consistently, while the prices of financial securities are much more volatile and may create losses in some period. The change in inequality found when comparing between total income and comprehensive income was caused by the accrued gains from real property.

Undoubtedly, the limited impact of personal income tax on inequality was affected by the small number of tax-payers in combination with the high amount tax deductions and exemptions. A result of these factors is reduced government revenue that available to finance infrastructure or subsidies that contribute to economic growth and improve quality of life.

a) Factor Contribution Analysis

The factor contribution analysis quantifies the amount of comprehensive income inequality caused by each income source. Comprehensive income is the total income (current and non-current, and income in-kind) minus personal income tax plus net accrued gains. Tax is denoted as negative income, and net accrued gains can be either positive or negative. The effect of each income source depends on both share of income and distribution.

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[28] See the distribution of accrued capital gains in Appendix B

Over 1996-2017, the main income sources of Thai households were wages, business profit, and accrued capital gains from real estate. The income sources with highest income inequality were business profit, accrued capital gains from real estate property, and accrued capital gains from financial assets. The main drivers of income inequality were accrued capital gains from financial assets, accrued capital gains from real estate, and business profit. As the share of personal income tax diminished, so did its redistributive impact.

Table 2.10: The factor contribution of income sources on income inequality

Comprehensive Income	Income Share (%)			I_2^P			% of $I_2(s_P)$			
Income Source	1996	2007	2017	1996	2007	2017	1996	2007	2017	Average
Wages	34.56	30.98	34.66	0.269	0.277	0.242	24.33	13.01	7.30	14.88
Business profit	16.93	16.24	14.03	0.414	0.480	0.405	37.42	22.57	12.21	24.07
Farm profit	10.34	8.65	6.87	0.066	0.084	0.132	5.96	3.94	3.98	4.63
Pensions	0.86	1.58	2.84	0.012	0.033	0.038	1.09	1.56	1.14	1.26
Transfers	5.31	5.85	4.59	0.019	0.047	0.008	1.75	2.20	0.26	1.40
Rents	0.79	0.72	0.60	0.034	0.036	0.016	3.09	1.69	0.48	1.75
Interest	0.89	0.80	0.50	0.025	0.085	0.044	2.22	3.99	1.33	2.52
Imputed rents	8.81	6.34	6.58	0.070	0.093	0.041	6.34	4.38	1.23	3.98
Unpaid goods and services	6.80	4.93	4.03	0.054	0.013	0.003	4.88	0.60	0.10	1.86
Transitory income	1.28	1.51	0.98	0.016	0.107	0.008	1.42	5.01	0.23	2.22
Personal income tax	-3.15	-2.41	-2.23	-0.059	-0.057	-0.050	-5.32	-2.70	-1.52	-3.18
Capital gains from real estate	16.70	18.99	15.54	0.189	0.604	0.151	17.09	28.38	4.56	16.68
Capital gains from financial assets	-0.11	5.83	11.02	-0.003	0.327	2.281	-0.28	15.36	68.70	27.93
Total	100	100	100	1.106	2.127	3.320	100	100	100	100

In 1996, business profit contributed 37.42% of comprehensive income inequality, while wages and accrued capital gains from real estate contributed 24.33% and 17.09% of inequality, respectively. The majority of household income was earned from wages and business profit, but accrued capital gains also constituted a significant amount of income. Wages contributed 34.56% of comprehensive income, while accrued capital gains and business profit contributed 16.93% and 10.34%, respectively. The income source with highest disparity was business profit (I_2^P=0.414), followed by wages (I_2^P =0.269) and accrued capital gains from real estate (I_2^P =0.189). The factor contribution results resemble the empirical results of previous studies. Sarntisart (2001) also reported that the main culprits of total income inequality were wages and business profit, which contributed 46.08% and 41.27% of income inequality. However, using comprehensive income, this study points out the importance of accrued capital gains from assets on income inequality.

In 2007, accrued capital gains from real estate contributed 28.38% of comprehensive income inequality (I_2), while business profit and accrued capital gains and business profit contributed 22.57% and 15.36% of comprehensive income inequality, respectively. The top three income sources were the same as in 1996, but the share of wages decreased slightly from 34.56% to 30.98%, as the share of accrued capital gains increased from 16.70% to 18.99%. Business profit contributed 16.24% of household annual income per capita. However, the effect of accrued capital gains was higher than that of conventional income sources, as asset owners received gains from both real and financial assets. In addition, the inequality of accrued capital gains also increased from 1996. The income sources with highest inequality (I_2^p) were accrued capital gains from real estate (0.604), business profit (0.480), and accrued capital gains from financial assets (0.327).

In 2017, the main sources of comprehensive income inequality were accrued capital gains from financial assets, followed by business profit, and wages, respectively. Accrued capital gains from financial assets contributed 68.70% of I_2, while business profit and wages contributed 12.21% and 7.30% of I_2, respectively. Wages, accrued capital gains from real estate, and business profit were still the main sources of comprehensive income, with shares of 30.98%, 15.54%, and 14.03%, respectively. However, in 2017, financial assets for investment were more concentrated, as the D10 share increased from 66.39% to 82.38%, and the mean value increased from 57,966 baht to 187,743 baht from 2007 to 2017. As a result, the effect of financial assets was strikingly increased from 15.36% in 2007 to 68.70% a decade later. The income sources with the highest inequality (I_2^p) were accrued capital gains from financial assets (2.281), followed by business profit (0.405), and wages (0.242). In the same period, business profit and wages contributed 12.21% and 7.30% of comprehensive income inequality, respectively.

If we consider only total income, the main sources of inequality were business profit and wages. This result is consistent with the work of Kingnetr et al (2019), who found that 60.7% and 19.8% of total income inequality in 2015 stemmed from business profit and wages, respectively. Their regression-based approach also revealed that financial assets contributed 13.2% and 32.0% of inequality among agricultural and manufacturing sectors, respectively. They also emphasized that land ownership provided an advantage for farmers as they can use the rental money to invest in machines and other technology. From 1996 to 2017, the share of personal income tax decreased from 3.15% to 2.23%. The redistributive impact of personal income tax was also diminished, from 5.32% to 2.70%, and then to 1.52% in the years 1996, 2007, and 2017, respectively. Aemkulwat (2015) found that personal income tax reduced income inequality by 2.14% in 2009.

Factor contribution of income sources on aggregate income inequality identifies the main forces affecting aggregate income. The contribution of main income sources such as business profit and wages to aggregate inequality were found to be smaller than those discussed in previous literature because accrued capital gains – which were not counted in income in that previous literature -- contributed a significant amount of income and were concentrated among income earners in the top income decile. The primary contribution of this study is that it covers a wider range of income, and demonstrates more clearly the relationship between wealth concentration

and income inequality. Asset owners received income not only in the form of property income like rents, interest or dividends. Also, capital gains should not be recognized as income only when assets are sold. Income should also include accrued capital gains, whether realized or not. Thus, when comprehensive income, which includes accrued capital gains, is considered instead of total income, which does not, the importance of inclusion of accrued capital gains as a component of income can clearly be seen. Further, the effects of accrued capital gains on income inequality are clearly demonstrated to be more significant than money income like wages and business profit reported in previous literature. The other point of concern is personal income tax, as its redistributive impact was found to be small and decreasing. Personal income tax has failed to keep up the growth of both money income and capital gains due to small tax base, increasing tax threshold, and increasing deductions and exemptions that were mostly enjoyed by the high-income group (Aemkulwat, 2015; Ananapibut, 2012; Muthitacharoen, 2017).

b) Subgroup decomposition

Subgroup decomposition analyzes the groups of population that face income inequality. This study generalizes subgroup decomposition in two aspects: work status and socio-economic class. The share of each subgroup on aggregate income inequality depends on population share (p_m), relative income share (b_m), and inequality of each subgroup (I_2^m).

1) Inequality decomposition by work status

Table 2.11 shows the distribution of household annual comprehensive income per capita. Government employees had the highest income per capita in 1996, but state enterprise employees moved into the top spot in 2007 and 2017 after this group was separated from the government employee group after 1996. The top three sectors with the highest comprehensive income in 2017 were state enterprise employees, employers, and government employees.

However, the share of income depends on both income level and the number of individuals in the population. The income share of the economically inactive group continuously increased from 16.78% to 28.82% due to growing numbers of individuals in the group. The other important earners during the period of study were own-account workers and private employee, whose income shares equaled 27.395 and 24.03%, respectively.

A previous study of structural change in Thailand's labor force reported that the annual growth of wages in Thailand equaled 2.1%, while the GDP growth rate equaled 4.6% over the period of 1990-2008. In the formal sector, state enterprise employees had the highest average wage at 22,449 baht per month, followed by government employees and private employees, whose monthly incomes equaled 14,065 baht and 7,449 baht respectively in 2008. The wages for state enterprise, government and private employees increased at 2.3%, 1.7%, and 2.5% respectively (Aemkulwat, 2010). This study includes accrued capital gains in the definition of income in order to estimate the effect of wealth on household income. The empirical result using comprehensive income instead of total income yields higher household income per capita and slightly higher growth rate of income.

Table 2.11: Comprehensive Income distribution by employment status

Comprehensive Income	Average Comprehensive Income			Share (%)			Growth Rate (%)		
Work Status	1996	2007	2017	1996	2007	2017	1996-2007	2007-2017	1996-2017
Employer	87,378.73	287,747.10	438,249.20	25.50	11.88	7.31	11.44	4.30	7.98
Own Account worker	84,658.95	108,717.70	151,740.90	19.45	31.37	27.39	2.30	3.39	2.82
Unpaid Family Worker	102,152.30	117,739.00	135,728.00	2.03	2.07	1.53	1.30	1.43	1.36
Government employee	200,747.60	255,730.60	308,706.70	14.21	12.33	9.32	2.23	1.90	2.07
State Enterprise Employee	N/A	362,149.10	509,168.70	0.00	1.75	1.59	N/A	3.47	3.47
Private Employee	109,869.40	146,698.70	202,504.30	22.04	19.87	24.03	2.66	3.28	2.95
Member of Cooperative Group	N/A	96,268.30	70,851.60	0.00	0.03	0.00	N/A	-3.02	-3.02
Economically Inactive	106,650.40	157,842.10	223,725.30	16.78	20.69	28.82	3.63	3.55	3.59

The Employers group had the most rapid income growth rate among all employment statuses. Comprehensive household income per capita of state enterprise employee households grew at 3.15% per year from 362,149 baht to 509,169 baht from 2007 to 2017. Comprehensive household income per capita of employers increased rapidly over the 1996-2007 period, at 12.66% per year, before slowing down to 3.98% per year over the 2007-2017 period. Comprehensive household income per capita of employers increased from 84,379 baht in 1996 to 438,249 baht in 2017, while the incomes of government employee households grew at a rate of 2.57% per year from 200,748 baht to 308,767 baht over the period of 1996-2017.

The comprehensive income per capita of economically inactive annual households increased by 3.59% per year from 106,650 baht to 223,725 baht. The most concerning group comprised unpaid family workers, whose incomes were not only the lowest, but also increased at the lowest pace. Their annual income increased only 1.36% per year, from 102,152 baht to 135,728 baht.

These statistics point out that wealth concentration can lead to greater income inequality as incomes of the rich households increased at faster pace. In addition, those households also owned assets that generated a significant amount of income, even as they enjoyed benefits from tax exemptions, while wage and salary earners depended on their labor income that increased much more slowly and which was subject to income tax. Personal income tax and tax administration should be revised to apply not only to wages earned, but also income from other sources such as e-commerce and capital gains. Although the majority of personal income tax is paid by high-income households, income and economic gain is not fairly redistributed to the whole population as income from assets becomes more significant. Tax on wealth such as real estate tax and capital gains tax might lead to redistribution of economic gains to those in need.

Table 2.12 reports the Shorrocks index decomposition by employment status, which comprises eight subgroups. Government employees, state enterprise employees, and private employees are counted in the formal labor sector, while employers, own-account workers, unpaid family workers, and the economically inactive are counted in the informal labor sector (NSO, 2015)[29].

More than 95% of income inequality was caused by inequality within employment status; however, the study indicates that the inequality between employment statuses became smaller over time. The main contributors to income inequality were the economically inactive, employers, and private employees. The effects of inequality in most of the employment statuses were decreasing as a result of an increasingly larger effect from the economically inactive group.

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[29] The socio-economic survey (SES) in 1996 had only 6 work statuses: employer, own account worker, unpaid family worker, government employee, private employee, and economically inactive.

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Table 2.12: Comprehensive Income inequality decomposition by employment status

I₂ of Comprehensive Income / Employment status	Population Share (%)			I₂^Employment			Absolute I₂			%of I₂		
	1996	2007	2017	1996	2007	2017	1996	2007	2017	1996	2007	2017
Employer	30.08	6.19	3.41	1.640	2.168	2.687	0.354	0.495	0.421	32.03	23.27	12.69
Own Account worker	23.68	43.24	36.89	0.681	0.686	1.166	0.109	0.156	0.237	9.84	7.35	7.14
Unpaid Family Worker	2.05	2.64	2.30	1.220	0.623	0.855	0.025	0.010	0.009	2.23	0.48	0.26
Government employee	7.29	7.22	6.17	0.422	0.853	0.971	0.117	0.180	0.137	10.55	8.45	4.12
State Enterprise Employee	0.00	0.72	0.64	0.000	0.396	2.505	0.000	0.017	0.099	0.00	0.79	2.99
Private Employee	20.68	20.30	24.26	0.699	1.206	1.797	0.164	0.235	0.428	14.84	11.04	12.89
Member of Cooperative Group	0.00	0.05	0.00	0.000	0.379	0.165	0.000	0.000	0.000	0.00	0.00	0.00
Economically Inactive	16.22	19.64	26.33	1.711	4.431	6.140	0.297	0.966	1.937	26.85	45.41	58.34
Within-group							1.066	2.058	3.268	96.33	96.77	98.43
Between-group							0.041	0.069	0.052	3.67	3.23	1.57
Population	100.00	100.00	100.00	1.106	2.127	3.320	1.106	2.127	3.320	100.00	100.00	100.00

The effect of income inequality among the economically inactive group became continuously larger from 1996 to 2017. This is because the group's population share (p_m), relative income share to the total population (b_m), and the inequality within the subgroup (I_2^m) were continuously increasing. The population's proportion of members who were economically inactive increased from 16.22% to 26.33%, and their income share increased from 16.78% to 28.82% (Table 2.10). The income inequality among economically inactive households was higher than the aggregate inequality and continuously increasing. The Shorrocks index of this group increased sharply from 1.711 in 1996 to 6.140 in 2017, while the aggregate inequality increased from 1.106 to 3.320 over the same period. As a result, the share of overall inequality from this group increased from 26.85% to 58.34% over the period 1996-2017.

The second largest contributor to comprehensive income inequality was employers. They faced the highest income inequality, second only to the economically inactive group. The Shorrocks index of employers ($I_2^{Employer}$) increased from 1.640 to 2.687 over the 1996-2017 period. However, the group's population share ($p_{employer}$) decreased, and the group's relative income share ($b_{employer}$ see Table 2.10) was found to be decreasing. As a result, the share of inequality from this group decreased from 32.03% to 12.69%.

The third largest contributor to comprehensive income inequality was the private employee group. This group's population share ($p_{private}$) increased slightly from 20.68% to 24.26%, and its income share ($b_{private}$) changed slightly from 22.04% to 24.03%. The group's contribution to overall inequality fluctuated between 11.04% and 12.895 during the period of study.

The empirical results are slightly different from those of previous literature. Sarntisart (2001) measured household income inequality per capita, finding that the Shorrocks index among unpaid family workers equaled 1.9978, and the Shorrocks index among own-account workers and private employees equaled 1.4679 and 1.4196, respectively. The difference is due to different definitions of income being used. Sarntisart (2001) also found that income inequality among employers drove up inequality between 1992 and 1996 by 44.62%. By including accrued capital gains, the empirical results of this study determined that 32.03% of income inequality occurred among employers, while 26.85% and 14.84% occurred among the economically inactive and private employees, respectively.

Households in the economically inactive group had the highest income inequality because these households vary from the elderly, who depend on pensions and transfers from their relatives, to those who do not participate in the labor market but who earn most of their income from assets. Moreover, there was a strong relationship identified between increasing income inequality and the current aging society (Chaiwat & Boonyamanond, 2013).

2) Inequality decomposition by Socio-economic class

Table 2.13 Comprehensive income distribution by Socio-economic class

Comprehensive income	Average Comprehensive Income			Share			Growth rate (%)		
Socio- economic class	1996	2007	2017	1996	2007	2017	1996-2007	2007-2017	1996-2017
Farmer (owned land)	60,178.59	105,291.30	169,677.30	15.47	13.25	9.67	5.22	4.89	5.32
Farmer (rent land)	64,830.48	88,538.83	126,626.00	2.27	2.4	1.5	2.87	3.64	3.40
Fishing, forestry, agricultural services	88,451.06	72,204.41	99,881.32	0.54	1.06	0.95	-1.83	3.30	0.61
Entrepreneurs, trade and industry	149,674.00	184,875.80	220,720.20	23.16	23.97	19.57	1.94	1.79	1.96
Professional, Technician, and manager	251,059.40	330,178.60	422,584.90	14.42	21.16	24.23	2.52	2.50	2.64
Labor (farm)	45,941.70	68,731.30	86,117.60	2.58	1.66	1.48	3.73	2.28	3.19
Labor(general)	56,558.78	79,813.35	106,424.70	1.73	0.45	1.23	3.18	2.92	3.21
Worker (service)	137,472.40	140,333.90	169,822.50	16.04	12.62	13.42	0.19	1.93	1.06
Worker (production)	80,085.77	97,905.28	142,701.30	12.37	8.67	9.89	1.84	3.84	2.93
Pensioner and welfare recipient	95,153.46	125,597.70	168,965.70	8.95	11.69	14.34	2.56	3.01	2.91
Capital earner	320,502.30	662,654.30	1,231,708.00	2.45	3.06	3.73	6.83	6.40	6.96

Table 2.13 shows the distribution of household annual comprehensive income per capita. Capital earners had the highest comprehensive income due to the high level of accrued capital gains from their assets (Please see Table C1.2 and Table C1.3 in the Appendix C1). Professional, technician, and manager households came in the second place, followed by non-farm entrepreneur households. However, the professional and non-farm entrepreneurs contributed the highest share of income due to the relatively larger population compared to capital earners. From 1996 to 2017, the income share of non-farm entrepreneurs decreased from 23.16% to 19.57%, while the share of professionals increased from 14.42% to 24.23%. At the same time, the income share of capital earners increased slightly from 2.45% to 3.73% due to the small amount of population in this socio-economic class. During the period of study, the income share of pensioners and welfare receivers also increased from 8.95% to 14.34%, which conforms to the larger share of aging population reported in previous studies (Chaiwat & Boonyamanond, 2013).

The comprehensive income of capital earner households underwent rapid income growth of 6.96% per year thanks to increases in asset prices and returns on assets. The group's comprehensive income doubled in real terms every 10 years from 320,502.30 baht in 1996 to 1,231,708.00 baht in 2017. Capital earners had the highest share of real estate property and financial assets. The associated capital income and capital gains provided them with notable returns. This highlights the importance of wealth on economic well-being and income inequality.

During the 1996-2017 period, annual household comprehensive income per capita of professional, technician, and manager households increased at a rate of 2.51% per year from 251,060 baht to 422,584 baht. While executives enjoyed rapid increases in wages and salaries, low-skilled workers in the service sector did not. In fact, their annual wages grew much more slowly than GDP. From 1990 to 2008, Thai GDP increased on average by 4.6% per year, while average wage rates in the service sector increased at only around 1.9% per year (Aemkulwat, 2015). During the period of rapid economic growth in the 1990s, before the Asian economic crisis in 1997, the manufacturing sector in Thailand greatly benefitted from the FDI and financial liberalization. Highly-skilled white-collar workers were in a very high demand, especially those who worked in financial institutions, banking, insurance, and real estate, whereas labor in the agricultural sector received smaller incomes due to lower economic efficacy (Sarntisart, 2001). The comprehensive income of non-farm entrepreneurs increased at 1.84% per year from 149,674 baht to 220,720 baht.

Those who were in the agricultural sector seemed to get left behind. Labor in the agricultural sector had the lowest income in all periods of study. Although agricultural worker income grew at 3.04% per year, their income was only around one-fifth of the professional, technician, and manager group. Thus, they could hardly keep up. Land owning farm operator income increased at the fastest rate among all socio-economic classes at 5.06% per year over the 1996-2017 time frame, while those who had to rent their land enjoyed more limited income growth of 3.24% over the same period. Owning land, which is an important production factor, helped increase income in this group. Households in agricultural service such as mining and fishery were the groups that needed to be concerned. Their real income faced the smallest growth of all the socio-economic classes. They even faced losses in real terms, measured at -1.83% over the 1996-2007 time period.

Table 2.14 Comprehensive Income inequality decomposition by socio-economic class

I_2 of Comprehensive income	Population Share (%)			I_2^{SEC}			Absolute I_2			%of I_2		
Socio-economic Class	1996	2007	2017	1996	2007	2017	1996	2007	2017	1996	2007	2017
Farmer (owned land)	26.49	18.86	11.65	0.954	1.759	3.159	0.086	0.123	0.181	7.78	7.71	14.02
Farmer (rent land)	3.62	4.07	2.41	0.509	0.651	0.928	0.007	0.009	0.010	0.66	5.54	0.80
Fishing, forestry, agricultural services	0.63	2.20	1.95	0.902	0.929	5.434	0.004	0.005	0.032	0.38	3.09	2.48
Entrepreneurs, trade and industry	15.95	19.43	18.12	1.372	2.307	2.617	0.461	0.738	0.648	41.71	46.33	50.08
Professional, technician, and manager	5.92	9.60	11.72	0.461	0.499	0.387	0.162	0.250	0.178	14.62	15.67	13.73
Labor (farm)	5.78	3.61	3.51	0.234	0.230	0.246	0.003	0.002	0.002	0.24	1.30	0.16
Labor(general)	3.16	0.85	2.37	0.195	0.208	0.180	0.002	0.001	0.002	0.17	3.79	0.12
Worker (service)	12.03	13.48	16.15	0.367	0.290	0.280	0.078	0.041	0.042	7.09	2.56	3.24
Worker (production)	15.93	13.27	14.16	0.358	0.265	0.262	0.034	0.019	0.026	3.11	1.21	1.99
Pensioner and welfare recipient	9.70	13.94	17.34	0.582	1.474	0.807	0.048	0.119	0.081	4.35	7.48	6.27
Capital earner	0.79	0.69	0.62	1.004	3.704	0.605	0.077	0.158	0.010	6.92	9.91	0.77
Within-group							0.963	1.464	1.212	87.04	91.90	93.66
Between-group							0.143	0.129	0.082	12.96	8.10	6.34
Total Population	100.00	100.00	100.00	1.106	1.594	1.294	1.106	1.594	1.294	100	100	100

There are two factors that lead to the persistence of income inequality in Thailand. First, as the Thai economy has moved its focus from the agricultural sector to the manufacturing and service sectors, the economic growth has not occurred equally. People with high education and skills that are in high demand have received a larger portion, while people with lower skills were left behind. Although the Thai labor force as a whole has high education attainment, the skills of that labor force do not match up well with market demand, which requires labor with vocational education and knowledge of science and technology. Most Thai graduates, unfortunately, have more general knowledge.

Secondly, wealth concentration leads to income inequality as asset prices rapidly appreciate. From the empirical results, those who do not participate in the labor market have higher income than general wage earners. This is because asset owners receive capital income in the form of rents and realization of capital gains. Rich people continue to invest and accumulate assets, while people in the lower income distribution groups may struggle to save or just to make ends meet. The Thai government has attempted to solve this problem by reforming tax on real estate, and has started to collect inheritance tax; this is something which should be studied further in order to determine how these government policies can help mitigate income inequality

Table 2.14 shows Shorrocks' index decomposition by socio-economic class during the 1996-2017 period. Approximately 90% of inequality arises from inequality within a given socio-economic class. The contribution of the socio-economic class to total population depends on three factors: the population share (p_m), the relative income share (b_m), and the inequality within the subgroup (I_2^m). Approximately 90% of income inequality identified in this study was caused by inequality within a socio-economic class. The main contributor of inequality was the group comprising entrepreneur, professional, technician, and manager households, followed by farm owners who owned their land.

Comprehensive income inequality in most socio-economic classes moved in the same direction as aggregate income inequality, except for labor in agriculture, logistics, and production workers. Income in these group increase much slower than other group that had higher income. Economic gains did not trigger down into lower part of income distribution (Sarntisart, 2000). Sarntisart (2000) reported that the Shorrocks index of total household income per capita was highest among entrepreneurs (1.6299) followed by farm operator who own their land (1.3019), and economically inactive household (0.7996). However, when accrued capital gains were included the result differ as accrued capital gains contributed to significant amount of income especially the high-income group and capital earners.

Entrepreneurs in trade and service sectors contributed approximately 50% of the aggregate income inequality thanks to their significant share of both population and income, and the high inequality among the population subgroup. The population share of entrepreneurs ($p_{entrepreneur}$) increased from 15.95% in 1996 to 18.12% in 2017, was the largest among the entire population. Their relative income share ($b_{entrepreneur}$) decreased slightly from 23.16% to 19.57% (table 2.10).); however, the Shorrocks index of the entrepreneur group continuously increased and remained higher than

aggregate inequality in all periods. The Shorrocks index of this subgroup ($I_2^{Entrepreneur}$) increased from 1.372 to 2.617 over the period of 1996-2017. This reflects the income inequality between small and large entrepreneurs. This conforms to the study of Kingnetr et al. (2019) which also pointed out the role of assets on income inequality. Larger investors with more assets and capital have several advantages over small entrepreneurs. Specifically, they have lower capital rental cost, so their profit margins are higher. In addition, their assets also provide better financial opportunity for return on investment.

Professionals, technicians, and managers comprised the second largest contributor to income inequality. Although the Shorrocks index in this socio-economic class ($I_2^{professional}$) slightly decreased from 0.461 to 0.387, the force from other factors increased. Their population share ($p_{professional}$) increased from 5.92% to 11.72%, and their relative income share ($b_{professional}$) increased from 14.42% to 24.23% during the time period 1996-2017 (Table 2.12). Although the contribution of the professional, technician, and manager group fluctuated between 13.73% and 15.67%, the effect was larger relative to their population share of approximately 10%.

Farm operators who own their land increasingly contributed to aggregate income inequality. Their population share ($p_{farm\_ownland}$) decreased from 26.49% to 11.65%, and their average income was lower than other socio-economic classes, thus, their relative income share ($b_{farm\_ownland}$) decreased from 15.47% to 9.67%. However, the Shorrocks index of population for this socio-economic class increased sharply from 0.954 in 1996 to 1.759 in 2007, and 3.159 in 2017. As a result, the group's contribution to aggregate inequality increased from 7.78% to 14.02% over the period of study. The lower population and relative income share among farm operators conforms to previous studies of Thai economic structural change. The Thai economy has been transforming from agriculture to manufacturing, and, most recently, to a service economy, especially in tourism and hospitality sectors, and the demand for high-skilled labor in the real estate and financial sectors has been rising (Aemkulwat, 2010; Otsubo, 2015; Sarntisart, 2000).

The population share of pensioners and social welfare recipients ($p_{pensioner}$) increased from 9.70% to 17.34%, as did their relative income share ($p_{pensioner}$), which rose from 8.95% to 14.34%, reflecting the trend of an increasingly aging population (Aemkulwat, 2010; Chaiwat & Boonyamanond, 2013). Although the capital earners had much larger comprehensive income than other socio-economic classes, and had much higher inequality ($I_2^{Capital}$) in 2007, which is the year of large financial gains, their population share ($p_{capital}$) was less than 1%, and their relative income share ($b_{capital}$) was less than 4%. Therefore, their contribution remained smaller than entrepreneur and professional groups.

Inequality index decomposition by socio-economic class demonstrates that most comprehensive income inequality stemmed from the entrepreneur group. The high Shorrocks index indicates that income and wealth of the population in this group varied in a considerable degree. This situation also affected farm owners because land is one of the most important production factors. The rising inequality in these socio-economic classes, as along with their contribution to overall inequality, points out the relationship between assets and income inequality.

2.6 Concluding remarks and policy implication

This study analyzes the elements of income inequality in Thailand using the Shorrocks index decomposition technique in three aspects. The first aspect is decomposition by income source. The second aspect is decomposition by employment status, and the third aspect is decomposition by socio-economic class. The main data set in this study is from the Socio-economic Surveys (SES) of 1996, 2007, and 2017 conducted by the National Statistical Office (NSO). The income definition in this study is comprehensive income, which includes accrued capital gains for asset owners. The study contributes to the field of the literature by demonstrating the effect of wealth on income inequality and the reallocation effect of personal income tax.

Firstly, the factor contribution of income source indicates that wealth inequality is closely related to and significantly affects income inequality. This study estimated the accrued capital gains from real estate property and financial assets for investment that comprise potential income for asset owners. The statistics show that both assets are positively correlated with income. Real estate property seems to be better distributed among the population because low and middle income households have ownership of residential and farming property (Armour et al., 2013; Benjamin et al., 2017; NESDC, 2017). However, asset ownership still leads to higher income inequality. Real estate prices tend to appreciate, but accrued capital gains still contribute to widening the income gap, even assuming equal gains (as a percentage) for all property. For example, assuming 5% price appreciation, a property valued at 100,000 baht would generate a gain of 5,000 baht, while a property valued at 1 million baht would generate a gain of 50,000 baht. As a result, the accrued capital gains from real estate widen the income gap between high and low-income earners, despite being more equally distributed.

The distribution of financial asset for investment[30] is extremely concentrated among high-income people. People in D10 held approximately two-third of assets in 1996 and 2007, and their share increased to more than 80% in 2017. Unlike real estate property, financial securities owners may face gains or losses from their investments because the returns are highly volatile and heavily dependent on economic conditions. The Shorrocks index of accrued capital gains from financial securities (I_2^{FA}) is the highest in all periods, which can be explained by the high volatility in asset prices and returns from financial investments and asset concentration in the country.

Wealth and income are positively correlated. Wealth concentration stems from income inequality, but it also intensifies inequality in the future in numerous ways. Wealth owners receive capital income, and can realize their gains by selling their assets. In addition, assets that are production factors can reduce costs for the

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[30] Financial assets for investment include bonds, stocks, debentures, LTFs, RMFs, and provident funds

owners, which results in higher profit margins and other business advantages. Additionally, asset owners can use the assets as collateral for debt to fund further investment, while those who have no capital assets have to depend on their cash and disposable income (Kilenthong, 2016).

After accrued capital gains, business profit and wages were the most significant drivers of income inequality. Both income sources constitute around half of total money income. The empirical results are consistent with the work of Sarntisart (2001) and Kingnetr et al. (2019). The Shorrocks index of business profit (I_2^B) was the second highest among all money income, which may result from higher risk of business (Kingnetr et al., 2019), and the large revenue gap between small and large businesses. The inequality of wages seems to result from wage gaps between workers in different sectors and wage gaps between low and high skilled workers. The increasing share of GDP contributed by manufacturing and service sectors leads to higher returns for factors of production; thus, the income of workers in these sections of the economy has increased, while those working in agricultural sector have been left behind (Aemkulwat, 2010; Sarntisart, 2000). Wages and salaries of highly skilled workers are much higher than those of low skilled workers because their skills such as finance, science and technology are in high demand in the labor market. Although members of the Thai labor force have attained good education levels, most of them have broad general knowledge, while the skills in demand in Thailand are those related to vocational degrees. In addition, some jobs may be replaced by the development of AI in the near future.

Another main focus in this study is personal income tax. Over the 1996-2017 time frame of the study, the redistributive impact of personal income tax was limited and decreasing. The decile distribution of personal income tax demonstrates that people in D10 contribute approximately 80% of tax liabilities. However, the contribution of D10 is decreasing, while the contributions of D1 to D8 are increasing. One reason could be that workers are receiving higher wages and salaries as they achieve better education and transition from the agricultural sector to manufacturing and service sectors, as mentioned in the previous studies (Aemkulwat, 2010; Jeong, 2008; Santhi, 2013; Sarntisart, 2000). In addition, their wages and salaries are usually recorded, and taxes are deducted by their employers, which results in higher personal income tax (Chandoevwit & Jawala, 2011). The other reason could be that rich people have enjoyed the benefits of tax reform that has increased opportunities for deductions from their assessable income for making long term investments in LTFs, RMFs, and provident funds. Therefore, their personal income taxes have increased less proportionately than their income, and the effective tax rate has gradually decreased. Both labor structure transformation and tax policy reform mitigate the impact of personal income tax on income inequality.

In the second section, decomposition by employment status indicates that comprehensive income inequality among economically inactive households has been rising, as has their contribution to overall income inequality. The high-income

inequality among this group is expected because populations in this subgroup range from those who are unemployed, elderly and retirees who depend on social welfare and transfers from their relatives, to capital earners who receive passive income from their investments. This is consistent with the findings of the study of Chaiwat and Boonyamanond (2013), which found the highest income inequality among those aged 60 years and older due to the disparity of their earnings. More than 90% of inequality stems from inequality within the employment status, and the trends have been moving upward, which implies a rising income gap among people in the same subgroup.

Entrepreneurs had the highest amount of comprehensive income and real estate property. State enterprise came in second place in terms of comprehensive income, and they owned the highest amount of financial securities. The interesting point here is that state enterprise employees paid five times more personal income tax than entrepreneurs, which does not conform to the principle of vertical equity in taxation, which states that people with higher ability to pay should pay higher amount of tax(Musgrave, 1990). More than half of personal income tax was paid by people working in the formal sector, which includes government employees, state enterprise employees, and private employees; this is despite the fact that they constituted only one-third of the total population. Wages and salaries of this group flow continuously, are usually recorded, and taxes are deducted from this income by their employers, whereas those who work in the informal sector tend to have low and fluctuating income, and may not file tax returns. The effective tax rates of state enterprise employees (4.75%) and government employees (2.81%) were much higher than those of entrepreneurs (1.56%), which is in accordance with the study of Chandoevwit and Jawala (2011). This addresses the importance of income recording, and highlights the need for effective tax administration that includes people in the informal sector, and which can match the potential looming rise of a gig economy, which is a free market system where organizations and independent workers engage in short-term work arrangements.

In the third section, decomposition by socio-economic class also indicates that 50% of comprehensive income inequality in Thailand stemmed from inequality among entrepreneurs in the trade and service sectors, despite the fact that it comprises less than 20% of the population share ($p_{entrepreneur}$). This is mainly because of the rising inequality in this group's Shorrocks index of this socio-economic class. $I_2^{Entrepreneur}$ was higher than the aggregate value in all periods, and increased rapidly over the years 1996-2017.

Capital earners had the highest amount of comprehensive income and accrued capital gains thanks to their assets and accrued capital income. However, their share of aggregate income inequality is not prominent because the population share ($p_{capital}$) of this group is less than 1%. These statistics also demonstrate that assets are highly concentrated in the hands of a small group of people. Therefore, we should be aware that this asset concentration could lead to higher income inequality in the future. Inequality within the socio-economic class (I_2^{SEC}) in most of socio-economic classes

was found to be increasing, except for farm operators who rent land, and low and middle skilled workers, which remain quite stable.

Personal income tax liabilities of professionals, technicians, and managers are the highest, followed by workers in the service and production sectors, but the effective tax rates of both groups are decreasing because the Thai government has increased the tax-free threshold and decreased marginal tax rates. In addition, the amount of tax deductions and allowances have also increased. The empirical result shows that the personal income tax liabilities of capital earners and entrepreneurs are only as much as workers in the service sector, who earn less than 15% of entrepreneurs' income. Wages and salaries are taxed progressively, while capital income such as dividends are taxed at a constant rate, and some types of capital gains are tax-exempt. Although basic deductions such as personal allowance and child allowance are equally exercised regardless of income level to relieve tax burden, investment-related deductions and exemptions such as LTFs and RMFs are positively correlated with income and mostly benefit investors who already have high income and do not need this type of assistance. Personal income tax reform in the past put an emphasis on increasing motivation for tax compliance and economic activity that stimulates growth. However, the government should reevaluate whether the economic gains actually achieved are worth the loss of government revenue and the heightened inequality that could potentially impede future economic growth.

The policy implications from this study are as follows:

First, tax can be applied to relieve income inequality in many aspects. Taxes levied on assets could help reduce wealth concentration and might alleviate income inequality. For example, land and building tax would help reduce asset speculation because it increases the cost of holding assets, and tax rates on business property should be much higher and much more progressive than those on residences and farming property.

Second, tax structures can also be improved to suit the changing income channels. Tax on income should be uniformly applied regardless of its source. Capital income such as stock dividends that are predominantly earned by the rich should be taxed progressively, like wages and salaries. The exemptions and deductions for long-term investment should be revised with respect to determining whether an increase in investment is worth the tax expenditure and potential long term damage that may result from income inequality. Further, the technology of big data could be used to help expand the personal income tax base to include those in the informal sector, and to keep pace with the increasing emergence and development of e-commerce and the gig economy.

Third, the income gap between small and big business calls for policies that assist SMEs to thrive in highly competitive market conditions. Governments should provide equality of financial opportunity and credit access to make these small entrepreneurs equally competitive with high net worth companies that have better

credit and receive lower-interest loans. Tax exemptions for SMEs alone may not be sustainable in long term because this would, of course, reduce government revenue.

Fourth, the government should assist low and middle income earners to save and invest more by increasing their financial literacy and providing them better financial access.

It is challenging to find the ideal data set that represents the entire population because each data set has both pros and cons. Survey data like SES includes a large sample size, and cover a very wide range of categories, ranging from income, expenditures, and assets to other population characteristics such as dwelling type, employment status, and education attainment. However, this data source has been criticized based on the idea that the high-income group is under-represented. Tax return data may better represent high-income people, but the sample size is much smaller as it contains only data from tax filers. This paper attempts to solve this issue by referencing the survey data to the national statistics, including national income account and tax revenue statistics.

Another challenging point is the estimation of capital gains. Real estate prices vary according to location and other related factors such as size, infrastructure, surrounding environment and personal judgement. Business property tends to yield higher returns than residential or farming property. Returns on financial assets also depend on numerous factors, including type of asset, economic conditions, and portfolio hedging. High-income people tend to receive a higher return due to better portfolio management and other related benefits for big investors. They also tend to have better financial literacy, and usually have financial experts to help them manage their wealth.

The value of income and assets in this study is the real value of household per capita because some value of income, expenditure and assets from the SES are available only at the household level. It is assumed that resources are usually shared among people living in the same household who are family members. However, the inequality from this study may not fully reflect the inequality of individuals such as wage inequality in the labor market.

This study can be viewed as a starting point that illustrates the relationship between wealth concentration and income inequality. A combination of data sets that more accurately represent the populations in the entire distribution would make the result more accurate. Improved panel data that includes changes in household asset value and the statistics on real estate price and financial capitalization would also help increase accuracy.

The future research of inequality based on the value of net wealth could yield an interesting result since debt can lower the purchasing power especially among low income group. The results in this study show that accrued capital gains are the major contributor to aggregate inequality. The tax that included income from all source such as comprehensive income tax may have greater impact on income

inequality than normal income tax that focus on money income. Economists have been discussing about the comprehensive income tax even though it may be subject to many limitations (Alm, 2018). The simulation of comprehensive income tax can be done to compare the reallocative effect with the personal income tax

Chapter 3

Inequality in Household Real Estate Ownership and the Effect of Property Taxes on Income Inequality in Thailand

ABSTRACT

This study analyzes the inequality of real estate ownership of Thai households, and provides a simulation model of land and building tax from 2007 to 2017. The analysis is done under three scenarios: previous real estate taxes, land and building tax (the first 50MB of housing and primary residence is exempted), and land and building tax, without exemption. The data were sourced from the Socio-Economic Survey (SES) of 2007, 2011, and 2017. The inequality analysis was done using Shorrocks Index (I_2) decomposition by income decile, region and community type. Real estate property and economic development in Thailand are still concentrated among high income households in the greater Bangkok metropolitan region. The empirical results show that the share of real estate ownership of D10 decreased from 43.07% in 2007 to 41.70% in 2017, while the share of income increased from 35.20% to 37.20%. Households in metropolitan Bangkok owned around 3 times more real estate than those in other regions, and the average income and real estate value of urban households were twice as much as those of rural households. Inequality of both income and real estate ownership moved in the same direction, but the inequality in real estate ownership is greater. Household income inequality increased from 1.478 in 2007 to 2.601 in 2011, then dropped to 1.237 in 2017, while real estate inequality increased from 22.571 to 59.084, then dropped to 12.110 during the same periods. Land and building tax can be used more effectively to reduce income inequality than local development tax and building and land tax in combination, and the exemption can be abandoned without reducing the redistributive impact. More than 90% of inequality in real estate stemmed from households in the top quintile, and those in urban regions. More than 77% of inequality in real estate occurred in Bangkok Metropolis. Land and building tax can help reduce the overall tax burden for a majority of the population due to exemption on farmland and housing, but it has the effect of increasing the tax burden for high income people or people living in the primary cities due to tax on business property. In 2017, land and building tax would have increased the effective tax rate of D10 from 0.38% to 0.55%, and the effective tax rate would have increased to 0.59% if there had been no exemption. However, the effective tax rate of D1 would have decreased from 0.19% to 0.13%, but would have increased to 0.24% without the existing exemption on housing and farming property. The effective tax rate of households in Bangkok Metropolis would have increased from 0.40% under the previous tax regimen to 0.50% had a land and building tax been in place. The effective tax rate among urban households would also have increased from 0.24% to 0.26%, while those of rural households would have decreased from 0.17% to 0.08%. However, if the exemptions were not available, the effective tax rate

would be higher than under the previous tax regimen. It is estimated that the total tax revenue would have increased from 33.02 billion baht to 37.6 billion baht had the land and building tax been enacted in 2017, and would have increase to 41.60 billion baht if all real estate property were taxed. This study supports the use of land and building tax because it can raise more revenue for local governments, alleviate the tax burden for low- and middle-income households, and reduce income inequality.

3.1 Introduction

Nowadays, in urban areas, people are cramming themselves and their families into smaller houses that cost more and more every year, or they are having to pay rents that keep rising. In the rural areas, farmers are losing their farming property to big investors. Many small businesses have to bear the burden of rents. In contrast, there are a handful of people who live a pleasant life from capital income generated by their real property. This is what is called land concentration. But why does it matter?

Land and buildings comprise fundamental needs because people need places to live, places to grow produce or raise livestock, and places to run businesses. Real property also comprises a form of saving or wealth that provides financial stability that can be passed on to descendants. Land is one of the basic capital elements of economic activity. When land remains unused, or when it is just sold, passing from hand to hand for the profit, the country is losing the opportunity for actual production that leads to economic growth.

This situation raises concern among governments and authorities around the world, including in Thailand. Researchers attempt to provide numerical evidence to illuminate the situation, but wealth is not like income, which can be tracked easily via accounting, because the market values of real property are constantly changing and subjective. Thus, it is harder to tax than income.

Property tax is classified as a direct tax because it is levied on the value of property and paid by the owner. Property tax is not only a tax on wealth, but it is also considered as a benefit tax, which is paid in return for service received from in an area. Thus, taxes on real estate are normally collected by the local government because the property is immobile, and the tax revenue is used to finance public services and infrastructure such as electricity and water supply, waste management, police service, schooling, and building and maintaining the roads. In addition, the better living environment attracts people to live and business to operate in the area, which in turn increases the property values. Despite these salient benefits of property tax and the financial need for building a better community, local governments in Thailand have almost never collected enough revenue to operate.

Prior to 2020, real estate tax in Thailand comprised local development tax (henceforth, LDT), which is levied on residential and farming property, and building and land tax (henceforth, BLT), which is levied on business property, and rental property. LDT is based on the property value, but that value is based on the years 1978-1981, and the tax structure is regressive. There are also numerous of

exemptions. It is not surprising that it generates less than 1% of local government revenue. BLT is calculated from income flow (rents), which is quite high (12.5% of annual rent), and is considered by the authority. It also raise concerns about the violation of horizontal equity of taxation, where properties of equal value are taxed differently (Chaihard, 2012). Due to the outdated assessment and complex tax administration, local government was unable to collect enough revenue from the two forms of real estate tax. More than half of local government revenue still comes from the central government despite the decentralized policy stated in the Constitutional Act of the Kingdom of Thailand (B.E. 1997 and B.E. 2007).

After a lengthy discussion and a long period of consideration and voting among researchers and government, land and building tax (henceforth, LBT was finally enacted on January 1st 2020. LBT replaced LDT and BLT as it is levied on residential property, farming property, business property. The unused land is also taxed at higher progressive rate. It is expected that LBT will generate higher income for local government and reduce land concentration and land speculation problem, provided the use of up-to-date assessment of property values and cooperation between local authorities and the local citizenry. However, government still must be concerned about this transition and its impact on some economically vulnerable groups. Thus, the decision was made to exempt the residences and farmland valued at less than 50 million baht, which accounts for 99% of the relevant property in Thailand. With this exemption, will LBT still surpass those previous real estate taxes? And what would happen if LBT were to be levied without these exemptions?

Previous studies on real estate ownership in Thailand, such as the work of (Chaihard, 2012; Greeta, Panvisid, Teswanitch, & Somsak, 2016); Laovakul (2016a) focused on land size distribution. Nonetheless, the value of real estate is also important. Large plots of farm land in remote rural areas may have only a fraction of the value of a business property in the capital. LBT, which is the tax on real property in Thailand at present, is based on the property value. So, we need a connection between ownership of land value and the amount of tax burden.

In addition, the value or price of the property is now used as a tax base for real estate tax in the country; however, the ability to meet the tax obligation depends on the income flow. Wealth is a stock value, while income is a flow; in other words, some households can be asset rich, but face temporary low income flow. In that case, tax is regressive. Furthermore, there could be people who might be unable to pay tax when affected by an adverse economic shock or loss from economic activity. This study also helps analyze and clarify the relationship between household income and asset distribution.

This study has two objectives. The first is to demonstrate the existing inequality in the distribution of household real estate ownership. Shorrocks index (I_2) decomposition by subgroup is applied to provide greater detail on this inequality in land ownership by income decile, region, and community type from 2007 to 2017[31]. The second objective is to compare the tax incidence of the previous real estate tax structure, and the estimated tax progressivity, redistributive impact and revenue

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[31] The time period in this thesis article is different from the other two articles because the data on the value of household real estate property in the Socio-Economic Survey (SES) conducted by the National Statistical Office (NSO) first became available in 2006.

potential if LBT were to be applied.   The estimation is done under three scenarios: 1) Old real estate tax structure (LDT plus BLT), 2) land and building tax (LBT), and 3) land and building tax without exemption for residential and farming property (LBT (NE)). The data is from the Socio-Economic Survey (SES) of 2007, 2011 and 2017, conducted by the National Statistical Office (NSO).

This study contributes to the field of literature by adding numerical evidence on household real estate ownership, and demonstrating the changing patterns that have been occurring in Thailand during the past 10 years. The majority of available research on inequality of land ownership is based on the size of land, but the analysis in this study is based on the property value, which is equally, if not more important in terms of purchasing power. It also contributes to the literature in this field by comparing the two real estate tax regimens with respect to tax liabilities, effective tax rate, redistributive impact on income inequality, and revenue. The effective tax rate based on annual income can help determine the ability of property owners to pay the tax.

However, there are some limitations due to the nature of household survey statistics, which some claim under-represents the high-income group. The value from the SES is equalized using the national income account (NI), land appraisal prices from the Land Department of Thailand, and Business and Industry Census, conducted by the National Statistical Office (NSO), to mitigate the potential for under-surveying of high income households.   Note that the property tax revenue statistics are retrieved from the local revenue statistics from the Department of Local Administration (DLA). Another limitation is that the value of unused land is not included in this study. Higher inequality in real estate ownership and higher estimated tax revenue would be expected if the complete data of real estate value were to be available.

The rest of the study continues as follows. The second section presents the related literature and information relating to wealth concentration and inequality in land distribution. The third section discusses the property tax regimen in Thailand. The fourth section presents the research methodology, which is Shorrocks index (I_2) and its decomposition by population subgroup, followed by the summary statistics in the fifth section. The sixth section presents the empirical results, which comprise two sub sections. In the first sub-section, income and real estate inequality measured by Shorrocks Index (I_2) decomposition by population subgroup (by income decile, region, and community type) is presented together with the inequality of post property tax income from the study's three scenarios. The second subsection presents the distribution of real estate tax incidence from the three study scenarios, and the estimated revenue that would have resulted had land and building tax been in place from 2007-2017. The discussion of results and policy implications are presented in the final section.

3.2 Literature review

1) Land distribution in Thailand

Thailand has a total area of 320,696,887 rai or 513,120 sq.km. As of 2018, 55.73% of the total area was used for agricultural activity, 32.63% of the area was forest land, and 5.84% of the total area comprised living area and build-up.

The northern region is the largest region in the country. It accounts for 33.06% of the total area, with 24.09% of the country's agricultural land and 22.72 % of its living

area. The northeastern region is the second largest region in the country, but accounts for a whopping 41.43% of the agricultural land and 32.52% of the living area. The central region is the third largest region, accounting for just 13.55% of the total area, but contributing 23.52% of the living community space and 11.89% of agricultural land.

From 2007 to 2017 the urban and built-up area expanded from 4.63% to 5.84% of the total, while the agricultural area expanded from 52.66% to 55.73%. In 2018, the central region had the highest concentration of urban areas (10.15%), followed by the eastern region (8.73%), and northeastern region (5.78%). The northeastern region had the highest concentration of agricultural area (70.17%), followed by the eastern region (62.03%) and the southern region (61.20%). The urban and built-up areas and the agricultural areas comprise the parts of Thailand that are used for economic activity.

Table 3.1 The type of land use in Thailand 2017/2018

Type of land Use	Size (rai)					
	North	Northeast	Central	East	South	Total
Urban and Built-up Land	4,259,380	6,095,420	4,408,831	1,875,246	2,105,124	18,744,001
Agricultural Land	43,064,465	74,052,057	21,244,118	13,329,202	27,047,832	178,737,674
Forest Land	55,448,017	17,501,845	14,577,092	4,839,833	12,289,746	104,656,533
Water Resources	1,738,539	3,850,691	1,547,658	627,349	1,609,375	9,373,612
Miscellaneous	1,517,279	4,033,950	1,672,741	816,182	1,144,915	9,185,067
Total	106,027,680	105,533,963	43,450,440	21,487,812	44,196,992	320,696,887
Type of land Use	Share of the country (%)					
	North	Northeast	Central	East	South	Total
Urban and Built-up Land	22.72	32.52	23.52	10.00	11.23	100.00
Agricultural Land	24.09	41.43	11.89	7.46	15.13	100.00
Forest Land	52.98	16.72	13.93	4.62	11.74	100.00
Water Resources	18.55	41.08	16.51	6.69	17.17	100.00
Miscellaneous	16.52	43.92	18.21	8.89	12.46	100.00
Total	33.06	32.91	13.55	6.70	13.78	100.00
Type of land Use	Share within the region (%)					
	North	Northeast	Central	East	South	Total
Urban and Built-up Land	4.02	5.78	10.15	8.73	4.76	5.84
Agricultural Land	40.62	70.17	48.89	62.03	61.20	55.73
Forest Land	52.30	16.58	33.55	22.52	27.81	32.63
Water Resources	1.64	3.65	3.56	2.92	3.64	2.92
Miscellaneous	1.43	3.82	3.85	3.80	2.59	2.86
Total	100.00	100.00	100.00	100.00	100.00	100.00

The land administration system in Thailand was introduced by King Chulalongkorn in 1872, and the official land title system started in 1901. The certificate of land ownership is issued by the Department of Land (DOL) regional and district offices. As of July 2019, there were 37,947,843 land plots registered with the Department of Lands. The total size of these land plot equals 128,455,508 rai 2 ngan 54.90 sq.wa of land, with a total appraisal value of 32,979,306,881,206.00 baht (Department of Lands, 2019)

Table 3.2 The change in land use in Thailand from 2006 to 2018

Type of land Use	Size (rai)			Share (%)		
	2006/2007	2010/2013	2017/2018	2006/ 2007	2010/ 2013	2017/ 2018
Urban and Built-up Land	14,842,513.00	16,521,933.00	18,744,001.00	4.63	5.15	5.84
Agricultural Land	168,887,202.00	174,306,042.00	178,737,674.00	52.66	54.35	55.73
Forest Land	117,502,287.00	109,260,949.00	104,656,533.00	36.64	34.07	32.63
Water Resources	7,933,415.00	8,982,751.00	9,373,612.00	2.47	2.80	2.92
Miscellaneous	11,531,470.00	11,625,212.00	9,185,067.00	3.60	3.62	2.86
Total	320,696,887.00	320,696,887.00	320,696,887.00	100.00	100.00	100.00

Source: The survey of land use in Thailand conducted by Land Development Department (LDD)
https://www.ldd.go.th/www/lek_web/web.jsp?id=18671
Retrieved on May 12th, 2021

Greeta et al. (2016) reported that land use for agricultural purpose was becoming increasingly concentrated. There were 62.83 million people in Thailand with 27.72 million people working in the agricultural sector. The data from Agricultural Census shows that there were 130,290,717 rai of land for agricultural purpose, but around 2,290,823 rai were left unused. 42.36% of farming households owned no land or had less than 9 rai of farming property, which is less than the estimated 19 rai per household needed in order to support the cost of living. Gini Coefficient of land ownership by size increased from 23.66% in 1930 to 37.35% in 2003. During the study period, the Gini coefficient increased from 27.86% to 42.32% in the northern region, increased from 28.29% to 42.11% in the central region, increased from 30.49% to 38.37% in the southern region, and increased from 25.59% to 31.80% in the northeastern region. The study pointed out that the rice pledging policy increased rice prices and motivated big investors to accumulate land in order to take advantage of the economies of scale in producing rice.

However, a report from (NESDC, 2016) showed that agricultural land distribution in Thailand was improving, and more was being more equally distributed. For example, the percentage of households owning no agricultural land decreased from 18.42% in 2006 to 10.46% in 2015. The largest percentage of households that owned land held between 10-19 rai in total. The percentage of households in this group (10-19 rai) increased from 24.91% in 2006 to 28.79% in 2015. The ratio of

household owning more than 40 rai decreased from 9.88% to 7.2% during the same period.

Pieces of land larger than 100 rai comprised only 0.03% of the total number of deeds, whereas the lands smaller than 14 rai made up 94.4% of the total number of deeds[32] in 2011. Ananapibut (2012) found that holding title to land also has a positive relationship with household income. 70% of the 1st quintile group owned less than 20 rai, while 68% of 5th quintile owned more than 20 rai.

Table 3.3 The total number of land plots, categorized by size[33] and assessment price from 1901 to July 2019

Type[34]	Number of Land Plot	Area			Total Appraisal Value[35] (Baht)
		Rai	Ngan	Sq. Wah	
Title Deed (Chanote)	33,799,161	103,298,428	1	30.02	31,926,378,501,019.20
Nor.Sor.3 Gor	2,978,418	14,403,703	2	23.83	1,052,928,380,186.75
Nor.Sor. 3	1,014,986	9,288,953	1	76.00	N/A
Possessory Right	155,278	1,454,423	1	25.05	N/A
Total	37,947,843	128,455,508	2	54.90	32,979,306,881,206.00

Source: The department of Thailand (DOL)

The analysis of the inequality in land distribution in Thailand based on title of land deed data collected by the Land Department of Thailand in 2012 showed that land ownership in Thailand is quite concentrated. Although there are 15.9 million land owners, 7.89 million of them own less than 1 rai of land. The Gini Coefficient of

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[32] The Title Deed documents include certificate utilization (NS. 3) and (NS. 3 K) from 399 land department office.

[33]   1 rai= 1,600 sq.m.
    1 ngan = 400 sq.m.
    1 sq.wah =4 sq.m.
    1 acre=2.56 rai

[34] Chanote entitles full property rights to the owner to sell, mortgage, transfer, or use it.

Nor Sor. 3 Kor is a piece of land that has exact boundaries measured by the Department of Land and a full title deed to the property can be requested. The owner can deal with it in the same manner as land with a Title Deed.

Nor Sor. 3 is the same as Nor Sor. 3 Kor, but the piece of land has not yet been surveyed by the department of land; thus, it has no exact boundary. A 30-day public notice is required before it can be sold.

Possessory right has not been validated by Department, but tax payments to the Local Administrative Office are still obligatory.

[35] The appraisal price is use as a tax base to calculate taxes and fees on legal transaction. The price is the price of land, not including the value of infrastructure built in the area. The selling price can differ from the appraisal price.

title to land deeds equaled 0.886 in 2012[36]. Based on land distribution by decile, the top 10% of land owner held 61.48% of the area registered in the title land deeds, while the lowest 10% held only 0.07%. The share of small owners who had less than 1 rai was 59.56% in the central region, 44.9% in the northern region, 37.23% in the northern region, and 43.3% in the southern region. The top decile of land owners held 61.48% of the land, while the remaining 38.52% was distributed among the other nine deciles. The D10/D1 among land owners equaled 853.64. For Bangkok, land owners in the top decile owned 80% of the land in the deed, and the D10/D1 ratio equaled 134.78 (Laovakul, 2016b).

For general households, the primary residence is the main source of wealth because it is a fundamental need and widely owned. In the United States, the data from the panel Survey of Income Program Participation (SIPP) shows that the primary residence accounted for 34.5% of household wealth, while other real estate property accounted for a further 2.9% in 2016 (Eggleston & Munk, 2018). The statistics from the SES in 2017 shows that, in 2007, 85% of Thai households owned their houses, but that figure had decreased to 82% in 2017.

The analysis using the Socio-Economic Survey (SES) data indicates that inequality in real estate ownership is higher than inequality in income, and that inequality in real estate property for agricultural and business purposes is higher than that of residential property. From 2006 to 2009, inequality in residential property decreased, while inequality in business property slightly increased. The Gini Coefficient of residential property decreased from 0.718 in 2006 to 0.703 in 2007, and to 0.679 in 2009. The Gini coefficient of real estate for business and agricultural purpose equaled 0.882 in 2006 and 2007, and increased slightly to 0.884 in 2009. The Gini coefficient of income was equal to 0.511, 0.497, and 0.485 in 2006, 2007, and 2009, respectively. More than 50% of residential property was owned by households in D9 and D10 of income decile, and more than 50% of real estate for other purposes was household in D8 to D10 (Laovakul, 2013, 2016a; NESDC, 2016).

From 2013 to 2019, inequality in residential property slightly decreased, but inequality in other type of real estate increased. The Gini coefficient of residential property was highest at 0.6814 in 2015 and lowest at 0.6644 in 2017. Meanwhile, the Gini coefficient of agricultural and business property increased from 0.8821 in 2013 to 0.8929 in 2019. 97.7% of residential property were primary residences, and residences for vacation comprised 2.3%. Households in D10 of income decile owned 34.7% of residential property, while households in D1 owned 3.4%. However, 63.9% of vocational residences were held by households in D10, which also owned 22.9% of real estate for agricultural and business purpose, while D1 owned 7.3% (NESDC, 2020).

The problem of land concentration and rising real estate prices were also exacerbated by the investment promotion policy that allowed foreigners to rent and own real estate in the country. According to Thailand's Land Code Act, foreigners are allowed to own up to 49% of the unit area in a condominium, and those who invest more than 40 million baht are allowed to own land up to 1 rai. Under the Board of Investment (BOI) Scheme, a foreigner is allowed to control Thai businesses,

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[36] The author's calculation from the title to land survey of 2012, conducted by Land department of Thailand (Laovakul, 2013).

which includes the property rights belonging to that company. The Thai government is very concerned about the problem of land concentration in Thailand because it can aggravate income inequality in the country. The capital accumulation among high income groups provides financial advantage for future investment.

2) The conventional assumptions about property tax

Property tax incidence can be analyzed under three main assumptions: the traditional view, benefit tax and capital tax (Hyman, 2005; Rosen & Gayer, 2005; Zodrow, 2001). The amount of tax borne by economic agents depends on the assumption that are chosen. The traditional view (or classic view) assumes that the supply of land is fixed, while the supply of capital is perfectly elastic. Thus, all tax on land is shifted to the landowner in the form of reduced land price. Tax on capital and facilities is shifted to tenants or consumers in the form of increased rents to offset the amount of property tax (Netzer, 1966; Simon, 1943).

The benefit tax is based on the Tiebout model, in which individuals maximize their utility by settling in the jurisdiction that offers the best local public service at the cheapest cost (Tiebout, 1956). Property tax is just a price to pay for the local public service, so it causes no economic distortion and does not affect income distribution (Hamilton, 1975). The capital tax view provides that property tax causes misallocation of capital since capital tends to flow out from the area that enacts high property tax to other areas that offer lower tax packages (Mieszkowski, 1972; Zodrow, 2001). In Thailand, the property tax policy is homogenous across country as it is set by the central government; therefore, we adopt the traditional view of property tax in this study.

Property tax has many advantages. First, it can provide a reasonable stream of revenue if the assessment of the property values are up-to-date and the tax compliance is high. This is because land price tends to appreciate as a result of economic growth and property development. Second, it provides fairness and income redistribution. Following the benefit view, property tax is paid in order to receive benefits from residing in the jurisdiction. In addition, as wealth is positively correlated with income, the property tax is mostly paid by high income groups, who may able to avoid income tax. However, property tax also has some disadvantages. First, it is quite difficult to administer, especially in developing countries, where land appraisal is not carried out and updated on a regular basis, and the tax collection is based on the judgement of the local authority. This reduces the property tax revenue in many countries. Second, the property tax is based on wealth, not income flow. This leads to an issue of liquidity constraint. For example, some retirees may not have enough cash flow to pay their property taxes, or some property owners may not be able to afford the tax if affected by an unexpected economic shock. In addition, property tax is much easier to notice comparing to income taxes, which are normally deducted, or value-added taxes, which are included in the selling price (Bahl & Martinez-Vazquez, 2007; OECD & Korea Institute of Public Finance, 2016).

3.3 Property taxes in Thailand

The ratios of property tax to GDP in developing countries, including Thailand, is lower than those of developed countries. As of 2018, the share of property tax to GDP in Thailand equaled 0.208, while the average for OECD countries equaled

1.856. The number is higher in Japan (2.59), the United States (2.997), Great Britain (3.861), and France (4.126).

Local government revenue in Thailand comes from 4 sources: local levied revenue, surcharge tax and shared tax, non-tax revenue, and government subsidy. Despite the decentralization policy, local governments are highly dependent on revenue from the central government and are, thus, lacking freedom of authority. Around 50% of the local government revenue comes from surcharge taxes and shared tax revenue such as VAT, excise tax, and property transfer fees that are collected by the central government and allocated to the local governments who provide resources used to produce goods and services for the local communities. The share of subsidy increased from 38.99% in fiscal year 2007 to 39.59% in fiscal year 2017, while the share of own-collected revenue fluctuated around only 10% during the same period. Such high financial dependency of local governments on budget allocations from the central government could hamper efforts to promote the decentralization policy.

Graph 3.1: Share of property tax revenue to GDP among OECD countries and Thailand in 2018
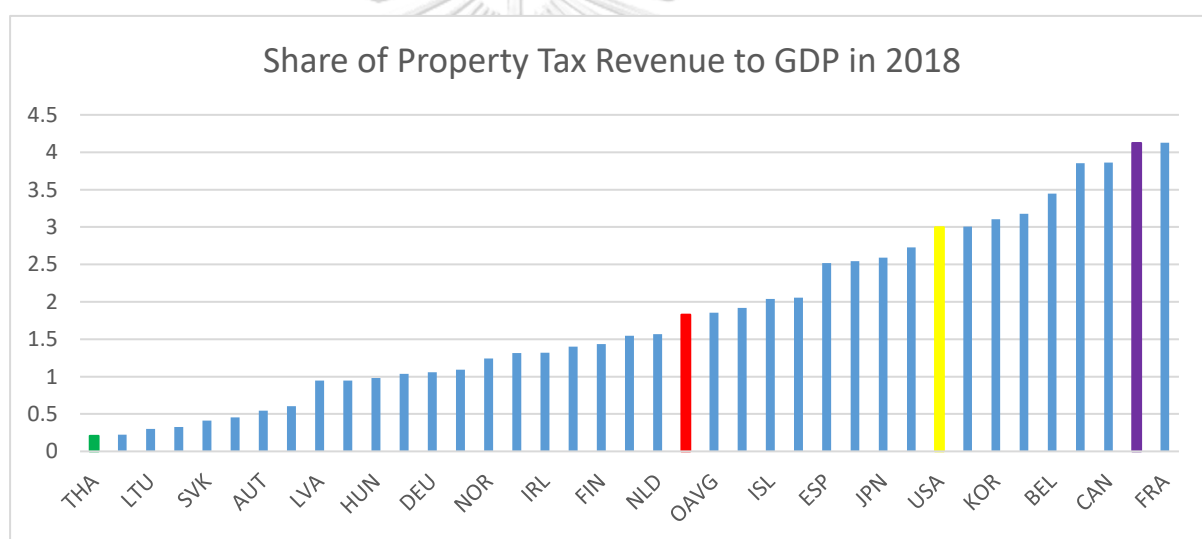
Source: Property tax revenue as a percentage of country GDP
Retrieved from OECD data https://data.oecd.org/tax/tax-on-property.htm
Property tax revenue as a percentage of country GDP of Thailand is the author's calculation

Property taxes previously levied on real estate that were collected by local government in Thailand up to 2019 comprised local development tax (LDT) and Building and land tax (BLT). LDT is levied on land for agricultural purpose and residential areas. Tax revenue from LDT is extremely low compare to other taxes collected by the local government as most residential property is exempted and land for agricultural purpose is taxed at only 5 Baht per Rai. BLT is levied on the value of land and buildings, focusing on buildings and facilities for business purposes. Despite the rising value of real property, the taxes combine to contribute less than 10% of the total revenue, and the share is decreasing. The ratio of BLT to total revenue decreased from 4.37% in fiscal year 2007 to 3.73% in fiscal year 2011, and then, in

2017, increased to 5.30%. The share of LDT was much smaller; it increased slightly from 0.32% to 0.37% from 2007 to 2011 before dropping by more than half to 0.14% in 2017.

Chaihard (2012) pointed out that the use of outdated assessment prices seriously hampers tax revenue collection from LDT. From the author's calculation, the statutory tax rate equals 0.0055-0.0095% of the appraised land value. However, the effective tax rate to the land appraisal price in Bangkok equaled just 0.0039% during 1992-1995; it equaled 0.0022 during 1996-1999, and 0.0053 during 2000-2003[37]. The effective tax rate in other selected provinces equaled 0.0053% during 1992-1995.

Graph 3.2 The structure of Thai local government revenue, fiscal years 2007-2019
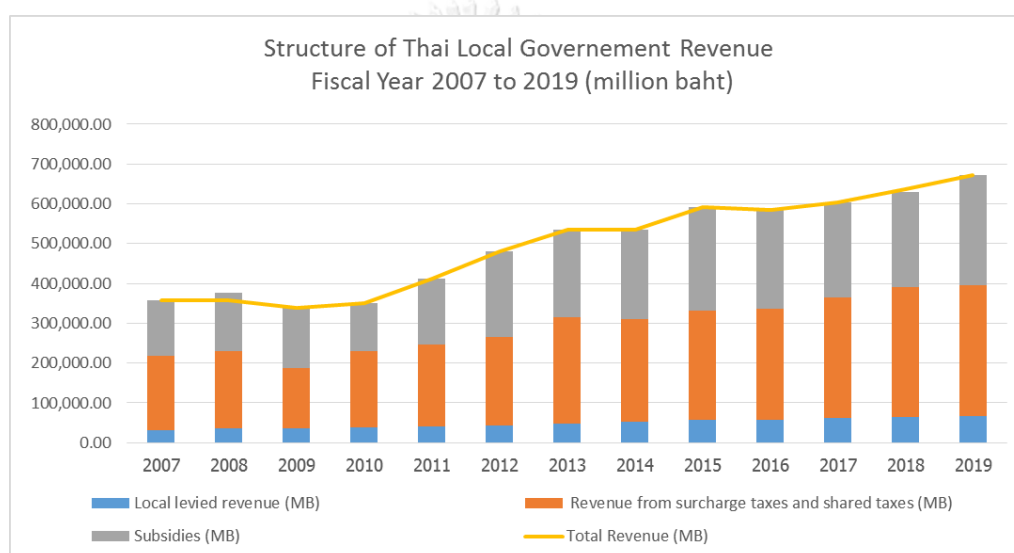
Source: Department of Local Administration
(http://www.dla.go.th/work/money/index.jsp)
Source The local government revenue survey conducted by Department of Local Administration (DLA) www.dla.go.th

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[37] Land appraisal is done every 4 years by the Treasury Department. The land appraisal price is used to calculate tax and other financial obligations for legal matters.

Graph 3.3: Real estate tax revenue data, fiscal years 2007- 2019
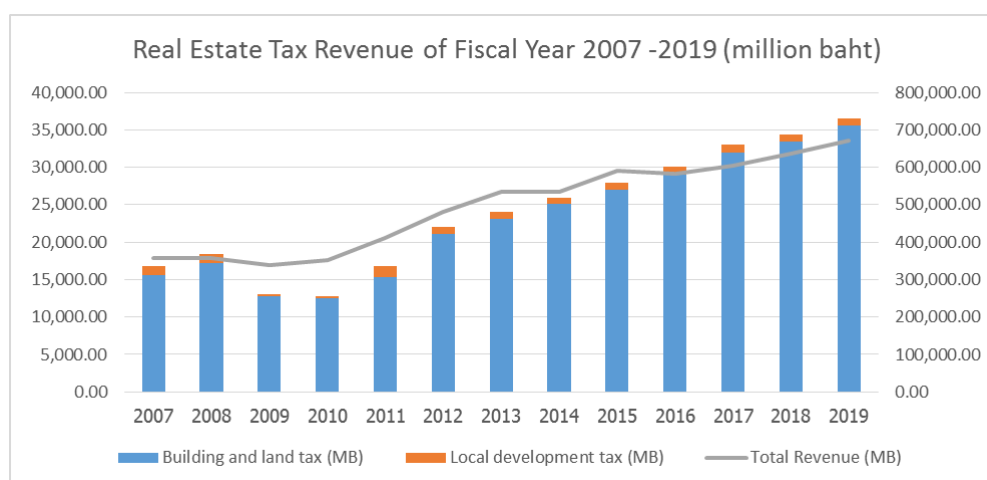
Source: Department of Local Administration (www.dla.go.th)
Fiscal Policy Office (www2.fpo.go.th)
<u>Note</u>   Full data are provided in Appendix C

BLT, which comprises 12.5% of annual returns, can be too high businesses to afford because the price of the property situated on the land has been rising much faster than land prices.   The statutory tax rate of building and land tax equals 0.0045-0.0095% of the appraisal price, but the effective tax rate in Bangkok equaled 0.2105% during 1992-1995; it equaled 0.1807% during 1996-1999, and rose to 0.45% during 2000-2003. The average building and land tax in selected provinces equaled 0.45% during 1992-1995[38].

The pitfalls of the previous property tax structure are as follows (MOF, 2016 and Permpoonwiwat, C. K., 2009):

<u>Local maintenance tax</u>

1) The base was calculated according to the data from 1978-1981, while the actual land price was increasing and should have been estimated every 4 years.
2) There were 34 tax bracket which resulted in a regressive tax structure.

<u>Building and Land Tax</u>

1) Rents are subjected to double taxation with personal income tax
2) The tax amount is subject to discretion of the local authorities, and is not standardized.
3) The tax rate is as high as 12.5%, or equal to approximately 6 weeks of rent.

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[38] The effective tax rate might slightly higher than the real one because the author did not deduct depreciation before calculating building and land tax liabilities.

The Land and building tax bill was approved on June 7, 2016, but it has been postponed and revised many times due to conflicts of interest and concerns of major business holders.

Reason for introducing tax on land and building

1. To improve the existing tax structure
2. To stimulate land development and investment
3. To increase local government authority and increase transparency

The following outcomes are expected by the government:

1. Reduced inequality
   - The tax structure is progressive as more valuable assets are subjected to higher tax
2. Increased efficacy
   - Stimulate practical usage and development of land
   - Stimulate redistribution of titles to land
   - Reduce speculation by levying higher taxes on unused land and increasing the tax rate every 3 years.
   - Standardizing the calculation of tax by reducing the discretion of authorities
3. Increased local government revenue
   - It is expected that the government will be able to collect 64,290 million Baht from this tax reform instead of 38,318 million Baht expected from the current tax regime
4. Promotion of citizen participation
   - Encourage inspection by the local residents to ensure that the local government fairly collects taxes by requiring that the appraised value of land and buildings must be declared by the local government before 1st February of each tax year.
   - Encourage residents to ensure that tax revenue is spent according to actual need

The tax base is calculated using the appraisal value of land and facilities (if any). The tax is levied on land and buildings including apartment units. However, land for farming owned by households with a value of less than 50 million baht, and primary residences valued at less than 50 million baht are exempted. Public lands that are not used for business purposes, such as embassies or common areas of residences are also exempted. The revenue department mentioned that this new tax bill is not going to negatively affect those in need as 99.99% of farming area and 99.96% of main residences will be exempt (DLA, 2018); however, some researchers are concerned that the cost of holding real estate may discourage middle income earners from investing in property as they may not have sufficient capital to invest, effectively blocking this group from putting their saving into real estate. Furthermore, those who are unable to afford tax liabilities may have to sell their land to large investors. This type of redistribution may actually result in higher land concentration. In addition, due to lower tax rates and exemptions for agricultural property, some people may reduce their LBT

burden by turning their unused land into contemporary agricultural plantations. Such activity may not be counted as effective land use expected by policy makers.

Laovakul (2016b) simulated the LBT revenue based on the proposed tax structure in 2016 in chosen districts in Bangkok, some of the sub-district municipalities in Chiang Mai, provincial administrative organization (PAO) in Nonthaburi provinces, and some other representative municipalities based on property values in 2014. It is estimated that the real estate tax revenue collected would have increased from 3.65 million baht to 140.72 million baht from the selected districts in Bangkok , from 0.23 million baht to 33.94 baht in the selected sub-district municipalities in Chiang Mai province, and from 0.13 to 3.94 baht from the selected PAO in Nonthaburi provinces. The LBT revenue collected from the selected municipalities would have increased revenue from taxes on real estate in 2015 from 148.561 million baht to 1,124.77 million baht.

LBT has been in place since 2020, and property owners were required to make their initial tax payment before the end of August 2020. However, Thai government announced a 90% reduction of LBT liabilities for tax year 2020 in order to relieve some of the adverse economic effects from Covid-19. Instead, that tax payment, scheduled for the end of August 2020, was postponed to October 31st, 2021. In normal situation, the property owner would be notified of the amount of tax due in February, and pay the tax in March or April.

Table 3.4 Land and building tax structure for 2020-2021

Property Value (million Baht)	Tax rate (%)	Accumulate Tax Burden (Baht)
Land for farming purpose (owned by business unit)		
0-75	0.01	<7,500
75-100	0.03	<30,000
100-500	0.05	<250,000
500-1,000	0.07	<700,000
>1,000	0.1	>1 million
Residential Property		
0-50	0.02	<10,000
50-75	0.03	<22,500
75-100	0.05	<50,000
>100	0.1	>100,000
Unused Land and others (Business, Industry, and Others)		
0-50	0.3	<150,000
50-200	0.4	<800,000
200-1,000	0.5	<5 million
1,000-5,000	0.6	<8 million
>5,000	0.7	>35 million

Source: The Ministry of Finance (2018)

Remark:
1)   Thai government exempts land and building tax on the following properties
-       Land for agricultural purposed owned by individual and local government value 50 MB
-       Main residential property value less than 50 MB and other residential property value less than 10 MB
2)   All house and condominium unit are taxed as residential property. House and condominium registered for business purposes like shop, restaurant, and Airbnb, are taxed at the same rate as business unit.
3)   Tax on unused land is increased by 0.3% every 3 years but not greater than 3%

There have been problems regarding the appraisal of property value and tax administration during the early transitional period. The Finance Department of BMA reported that, from August 1st to 27th, 2020, they had collected 597 million baht in LBT from 2.8 million title of land deed holders, 1 million condominium unit owners, and 3 million residential unit owners. However, some provinces failed to collect enough revenue due to the Covid-19 tax abatement. For example, the municipalities in Nan province were able to collect only 4 million baht instead of the expected 90 million baht. The municipalities in Patong (Phuket) expected to collected less than 25 million baht (or less than 50% of tax revenue) because majority of land owners do not reside in Patong, and the majority of postal notices had been sent back because there was no recipient (www.prachachat.net, 2020).

3.4 Methodology

This study consists of two sections. The first section presents data regarding the inequality of household income and real estate distribution by value, and a comparison of post-real estate tax inequality under three scenarios. The inequality is measured by Shorrocks Index (I_2) decomposition by population subgroups: income quintile, region, and community types.

The second section presents real estate tax incidence and a comparison of tax revenue in each scenario. The data is from the Socio-Economic Surveys (SES) of 2007, 2011, and 2017. The value is reported at the 2015 price level. It is assumed that property tax is paid by the owner.

The analysis in this study is done under three scenarios, as follows:
1) Property tax (PT) which comprises local development tax (LDT) and Building and land tax (BLT)
2) Land and building tax as proposed by the government (LBT)
3) Land and building tax without exemption (LBT(NE))

Shorrocks index (I_2) and Inequality decomposition by population subgroup

There are many conventional inequality indices such as decile dispersion ratio, Gini Coefficient, and Generalized Entropy Index. These indices provide numerical evidence on how income or other factors of interest are distributed among a population. Governments and organizations employ the Gini Coefficient to measure aggregate income inequality. However, the aggregate value is not sufficient to explain the causes of income inequality. Decomposition analysis can provide greater detail for understanding policy implications.

The goal of the decomposition technique is to derive the factor contribution that is aggregately additive to the overall inequality index, and to yield a rational interpretation of factor components (Shorrocks, 1983, 2013). There are many conventional indices that are aggregately decomposable including Gini Coefficient (Sarntisart, 2020)[39] and Theil index family(Shorrocks, 1982, 2013). Shorrocks index, which is one of the Theil index family is applied in this study to measure the contribution of income source and population subgroup to aggregate inequality.

Let there be population N, with income vector y_i (I =1, 2, …, N) with average income equal to μ

For Thiel index family

$$I_\alpha = \left[\frac{1}{N}\right]\left[\frac{1}{\alpha(\alpha-1)}\right]\sum_{i=1}^{N}\left[\left(\frac{Y_i}{\mu}\right)^\alpha - 1\right] \quad \text{for } \alpha \text{ not equal to 0 or 1} \quad (3.1)$$

The Shorrocks index, in which $\alpha=2$ is as follow

$$I_2 = \left[\frac{1}{2N}\right]\sum_{i=1}^{N}\left[\left(\frac{Y_i}{\mu}\right)^2 - 1\right] \quad (3.2)$$

$$I_2 = \left(\frac{1}{2}\right)\left(\frac{1}{N}\right)\sum_{i=1}^{N}\left[\frac{Y-\mu}{\mu}\right]^2 \quad (3.3)$$

$$I_2 = \left(\frac{1}{2}\right)\sum_{i=1}^{N}\left(\frac{\sqrt{Y-\mu}}{\mu}\right)^2 \quad (3.4)$$

$$I_2 = \left(\frac{1}{2}\right)CV^2 \quad (3.5)$$

$$CV = \frac{SD}{\mu} \quad (3.6)$$

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[39] There are comments that Gini coefficients is not aggregately decomposable, or can be done with the residual term (Bourguignon, 1979; Lambert & Aronson, 1993) . One reason is that when ranking the observation from lowest to highest of income distribution to calculate the Gini Coefficient, the rank of the observation in the total population may differ from its rank in the population subgroup or income source (Sarntisart, 2011). Fei et al. (1978) (as quoted in Sarntisart (2011)) proposed the 'pseudo-Gini Coefficient' for the decomposition of Gini Coefficient. The decomposition of Gini Coefficient is beyond the scope of this study, but the recent work of Sarntisart (2020) shows that Gini coefficient is aggregately decomposable.

$$weighted\ SD = \sqrt{\frac{\sum_{i=1}^{N} w_i (y_i - \mu)^2}{\sum_{i=1}^{N} (w_i - 1)}}$$

y_i	=	household income per capita
μ	=	weighted average household income per capita
w_i	=	household weight
SD	=	standard deviation
CV	=	coefficient of variation

It must be noted that the range of the Shorrocks index (I_2) and other indices in the Theil family vary by the size of populations, thus, may not be able to compare across time periods in which the number of observation are not equal (Sarntisart, 2011)[40]. The comparison across time period may need to be evaluate together with the inequality index that have the definite minimum and maximum value. This study applied Shorrocks index between the different scenarios within the same year, so the number of observation remain the same in each time period and the comparison is applicable.

The aggregately decomposable property is preferred in much of the research in this field, and that is also true in this study. This study provides analysis of subgroup decomposition by income decile, region, and community type. The empirical results should help identify the group(s) of people facing inequality, and the relationships between subgroups. The empirical results from inequality decomposition will be a useful guideline for policy implementation to alleviate income inequality.

There are numerous aspects that could be employed in the subgroup decomposition analysis such as household size, education level, or economic status. This type of study sheds light on the structure of inequality situation and patterns (Cowell, 1984; Mookherjee & Shorrocks, 1982).

The first section presents the comparison of pre- and post-real estate tax household income inequality, and the inequality in real estate distribution from 2007 to 2017. The total inequality is measured using Shorrocks Index (I_2), and the detailed analysis is done by the decomposition by population subgroup. This 10-year period was chosen to demonstrate the change in income inequality and wealth concentration in the country. The total population from the Socio-economic survey (SES) is categorized by

- Income decile
- Region: Bangkok metropolis, central region (excluding Bangkok Metropolis), north, northeast, and south

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[40] The minimum and maximum value of Theil family index are presented in Table 5.1 on page 102 of Sarntisart (2011).

- Community type: rural (living outside municipal area), and urban (living in the municipal area)

Shorrocks index (I_2) decomposition by population subgroup is employed to measure the inequality between income decile, region, and community type (Sarntisart, 2011; Shorrocks, 1984, 2013).

For static decomposition, the total population is divided into mutually exclusive m subgroups, m_i (i =1, 2, 3). Shorrocks index decomposition when a=2 is as follow

$$I_2 = \sum_{m=1}^{M} p_m b_m I_{2m} + \left(\frac{1}{2}\right) \sum_{m=1}^{M} p_m [b_m^2 - 1] \qquad (3.7)$$

p_m =   population share of subgroup m (n_m/N)
b_m =   relative share of income/wealth of subgroup m (μ_m/μ)

Equation 3.7 shows the subgroup decomposition of the Shorrocks index (I_2). The first component represents inequality within the population subgroup, and the second component represents the inequality between population subgroups (Sarntisart, 2011; Shorrocks, 1983, 1984).

The within-group component measures the variation in income of people in the same subgroup. From equation 3.7, income inequality within each subgroup depends on three factors. The first factor is the share of the population (p_m). If the subgroup contains the majority of the population, the inequality within this subgroup would increase total inequality by a large proportion, while inequality among a minority group would impact total inequality to a smaller degree. The second factor is income share to the population income (b_m). The higher share of a group's income compared to the total, the higher the effect on total inequality. The third factor is the inequality within the subgroup itself (I_m). The higher the income inequality within each subgroup, the higher the income inequality in the total population.

The between-group component reflects the income disparity between subgroups. The between-group component uses subgroup mean income as a representative amount. It is possible to think of the between-group component as $I_2(\overline{w}^1, \overline{w}^2, ..., \overline{w}^m)$. This between-group component depends on the population share (p_m) and its relative share of total income (b_m). Larger population share and higher contribution of relevant income result in a larger between-group component impact on total inequality. The contribution of the between group component is usually lower than the within group component because it use only the average value of the subgroup to calculate the inequality and does not account for the discrepancy between population within the subgroup.

The decomposition result yields the population share, inequality within the population subgroup ($I_2{}^m$), the absolute contribution, which is aggregately additive with inequality between subgroups to the total inequality, and their proportionate shares relative to total inequality (% of I_2)

The second part presents the real estate tax incidence, comparing the distribution of real estate tax liabilities, effective tax rate and tax progressivity, and

finishes by provide the comparison of tax revenues simulated from our data under the following 3 scenarios:

1) Property tax (PT) which comprises local development tax (LDT) and Building and land tax (BLT)
2) Land and building tax as proposed by the government (LBT)
3) Land and building tax without exemption (LBT(All))

The Thai government grants exemption for residential and farming property valued at less than 50 million baht, which accounts for about 99% of the property. The third scenario is added to demonstrate the full effect of LBT. First, the tax liabilities and progressivity by income decile are compared. Then, changes in income inequality between pre and post-tax income are measured:

$$R_p = \left(\frac{I_{post} - I_{pre}}{I_{pre}} \right) x\ 100 \qquad (3.8)$$

R_p =   Inequality reduction by each property tax regime
          (p= PT, LBT, and LBT (all))
I_2^{pre} =   Income inequality of pre-tax income
I_2^{post} =   Income inequality of post-tax income

The limitation is that the value of real estate in this study comprises only residential property and farming and business property, but does not include the value of the unused land. Should such data become available, more LBT revenue could be expected because the unused land is taxed at higher and more progressive rates than residential and farming properties.

3.5 Data

The main data source of this study is the socioeconomic survey data (SES) of 2007, 2011, and 2017 which includes data on both household income and assets[41]. It is anticipated that the degree of asset inequality would increase during the period of study, and that these assets would generate capital gains due to price appreciation and generate capital income such as interest, dividends, and rents. Rising asset inequality could lead to persistent income inequality, despite economic growth. This paper focuses on the value of real estate in order to analyze the effects of real estate property tax.

Household income from SES is calibrated with National Income Account (NI) provided by Bank of Thailand (BOT). The values of household real estate for dwelling and other purposes are adjusted with the Land appraisal price as of July 2019 provided by the Land Department of Thailand, and the value of land and infrastructure in the business sector from the 2007 and 2017 Industrial Census, and the 2011 Business and Industrial Census conducted by the National Statistical Office (NSO). This process mitigates the problem of high income groups being under-surveyed.

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[41] The National Statistical Office (NSO) has been collecting the data on household assets and liabilities in addition to household characteristic, income, and consumption data since 2006.

LDT and BLT data from the Department of Local Administration allocated according to the ratio of farm and rental income. LBT liabilities are calculated from the standardized value of household income and assets to compare the change in inequality and tax revenue.

The value is reported in real terms, using 2015 as base year (2015=100).

Table 3.5: Household income and assets data from SES of 2007, 2011, and 2017

Variable	Mean			Share to Annual Income		
	2007	2011	2017	2007	2011	2017
Number of households	43,055	42,083	43,210			
Total household income	386,476.80	393,316.70	446,129.90	100.00	100.00	100.00
Value of housing	791,078.60	739,661.20	936,685.40	231.23	228.76	255.64
Value of farming property	250,939.50	296,958.00	366,598.40	64.93	75.50	82.17
Value of business property	320,309.70	351,994.80	483,111.10	82.88	89.49	108.29
Value of total real estate property	1,362,328.00	1,388,614.00	1,786,395.00	366.50	358.68	427.37
Previous property taxes						
Local development tax (LDT)	16.38	65.17	48.69	0.01	0.02	0.01
Building and land tax (BLT)	806.57	805.78	1,067.71	0.13	0.12	0.19
Total property tax (LDT+BLT)	822.95	870.95	1,116.41	0.14	0.13	0.20
Land and building tax						
Land and building tax on housing	31.03	9.14	0.18	0.00	0.00	0.00
Land and building tax on farming property	0.05	0.23	2.05	0.00	0.00	0.00
Land and building tax on business property	1,157.63	1,433.32	1,755.72	0.10	0.09	0.17
Total land and building tax (LBT)	1,188.71	1,442.69	1,757.95	0.10	0.09	0.17
Land and Building Tax without exemption						
land and building tax on housing	191.36	159.79	187.84	0.05	0.05	0.05
Land and building tax on farming property	25.09	29.97	41.33	0.01	0.01	0.01
Total land and building tax (LBT)	1,374.09	1,623.08	1,984.89	0.16	0.15	0.23
Post tax income						

Variable	Mean			Share to Annual Income		
	2007	2011	2017	2007	2011	2017
Post previous property tax income	385,653.90	392,445.70	445,013.50	99.76	99.58	99.55
Post land and building tax income	385,288.10	391,874.00	444,371.90	99.79	99.62	99.59
Post land and building tax income(without exemption)	385,102.70	391,693.60	444,145.00	99.74	99.56	99.54
Number of negative income household (without exemption)	39	134	133	0.09	0.32	0.31

Source   1. *Socio-economic Surveys 2007, 2011, and 2017 conducted by NSO*
2. *Value of land title issued by the Land Department of Thailand as of July 2019*
3. *2007 and 2017 Industrial Census conducted by the National Statistical Office (NSO)*
4. *2011 Business and Industrial Census conducted by the National Statistical Office (NSO)*
5. *Local government revenue surveys 2006-2017 by the Revenue Department (RD)*
The author's calculation.

Table 3.5 reports the average value of household annual income and real estate property from 2007 to 2017. In relevant 10 years, average annual household income increased from 386,477 baht to 446,130 baht. The value of household real assets also increased, but at a higher rate than income. The average total value of real estate property increased from 1,362,328 baht to 1,786,395 baht. The total value of real estate property increased from 3.97 times to 4.87 times household annual income, with a sharp rise in the value of housing and real estate property for business purposes during 2011- 2017

House and residence contributed 50% of household real estate. Average residential value increased from 791,078.60 baht in 2007 to 739,661.20 baht in 2011, and then increased more sharply to 936,685.40 baht in 2017. The value of housing increased from 2.31 to 2.55 times annual income. From 2007 to 2011, the value of framing property also increased from 250,939.50 baht to 366,598.40 baht, and the ratio increased from 64.93% to 82.17% of annual income. The value of business property increased from 320,309 baht in 2007 to 351,994.80 baht in 2011, and then increased sharply to 483,111.10 baht in 2017. The ratio of business property to annual income increased from 82.88% to 108.29% of annual income.   The first scenario analyzes previous property taxes, which is the sum of LDT and BLT. The data demonstrates that the majority of the revenue from tax on real estate is contributed by BLT. The LDT burden remained low throughout the period, with an effective tax rate of 0.01%-0.02%. The BLT burden increased from 806.57 baht to 1,067.71 baht, and its effective tax rate increased from 0.13% to 0.19%. The total real estate tax burden increased from 822.95 baht in 2007 to 1,116.41 baht in 2017, and the effective rate of real estate taxes increased from 0.14% to 0.20%[42]. The real estate tax burden remained low despite the rapid increase in property value,

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[42] The effective tax rate equals property tax burden divided by total household annual income.

demonstrating the adverse effect on tax revenues resulting from the out-of-date assessment and tax administration discussed earlier by tax economists in the country.

The second scenario analyzes the LBT Implemented in 2020, in which primary residential dwellings and farming property valued at less than 50 million baht – comprising 99.99%[43] of relevant properties -- are exempted. Despite the generous exemption, LBT would have generated higher revenue than LDT and BLT combined. The average tax revenue collected from housing and farming property would be much lower than LDT, but the tax revenue from business property would be higher. Under the second scenario, the estimated tax burden increases from 1,188.71 baht in 2007 to 1,757.95 baht in 2017. Although LBT burden would be higher than under the previous tax law, the effective tax rate of LBT would be lower, as most home and farm owners would have been exempted. From 2007 to 2017 the effective tax rate is estimated to increase from 0.10% to 0.17%. The effective tax rate is lower than those of property taxes because most homeowners and farm owners would not have been taxed, and most LBT would have been collected from the business property owners, who live in households with higher income.

The third scenario analyzes LBT when all real estate property is included regardless of value. Under this scenario, there would be an increase in tax revenue collected from housing and farming property, but tax on business property would remain the same. House owners are expected to pay around 200 baht to 1,000 baht per 1 million baht of house value (tax rate 0.02%-0.1% of property value), and farm owners are expected to pay around 100 baht to 1,000 baht per 1 million baht of value of farming property (tax rate 0.01%-0.1%). During 2007 to 2017, the estimate tax burden for home owners would have fluctuated from 159.79 baht to 191.36 baht, with an effective tax rate of 0.05%. The estimate tax burden for farm owners would have increased from 25.09 baht to 41.33 baht during the same period. In 2017, the average tax liabilities per household would increase from 1,116.41 baht to 1984.89 baht, and the effective tax rate would increase slightly from 0.20% to 0.23%.

These statistics show that if all real property were taxed, most households should be able to contribute to their local governments since less than 1% of households are confronted with negative income in the model. Instead of exemptions based on property value, the government could choose to offer tax relief or postpone the tax payments for economically vulnerable groups such as retirees, beneficiaries who inherit real property as part of an estate, or those who live in the area of development projects who are subject to fast appreciating property value, or households facing losses from their farm and business activities[44]. People can also choose to sell their real property and use the sale proceeds to invest in other assets that

[43] The author's calculation from SES data

[44] In 2006, the National Statistical Office (NSO) started to record negative income from farm and business profit. In this study, those values were replaced with zero. However, some households are subjected to LBT and do not have enough income to pay for tax liabilities. This also results in higher effective tax rate in the first quintile.

yield higher returns or ones which do not require periodic tax payments assessed on the capital value of those assets.

The simulation suggests that LBT would be a better choice than the previous property taxes (LDT and BLT) in many respects. Comparing year by year, LBT would generate higher revenue, but the effective tax rate for the overall population would only slightly increase because most of the tax would be collected from business owners and high income individuals. LBT would raise higher tax revenue, cover wider range of property and reduce tax avoidance. Although the tax burden would rise, it would still be less than 1% of household annual income, even if all property were subjected to taxation; therefore, household purchasing power should not be significantly affected. Local government can use this tax revenue to finance local public services, which in turn add to the value of properties in the area. The higher tax burden would also deter price speculation and would stimulate practical land use and investment, resulting in economic growth. Government can offer special tax relief for those in need such as retirees who own property but do not have enough money to pay the tax (Collier, Glaeser, Venables, Manwaring, & Blake, 2017).

Table 3.6 presents the decile distribution of income and real property. Thai households in the SES survey are divided into 10 deciles according to annual household income. Household average annual income of the lowest decile increased from 64,699 baht to 77,641 baht over 2007-2017, whereas those of the top decile decreased from 1,618,398 baht to 1,534,346 baht in real terms during the same period. The rate of income growth among D1-D8 was lower than D9 and D10 as reflected by the lower income share in 2017 as compared to 2007. The income share of the lowest decile gradually decreased from 2.07% to 1.52%, while the income share of the top decile gradually increased from 35.20 % to 37.46%. The D10/D1 ratio of household annual income continuously rose from 16.92 to 24.62.

The value of household real property, which comprises housing, farming property, and business property has continuously risen, especially from 2007 to 2017, for households in D1 to D9, but the average value of real estate property of the top decile decreased slightly. The estimated average value of real estate of households in the lowest decile increased from 370,749 baht in 2007 to 522,601 baht in 2017. However, the estimated average value of real estate of households in the top decile decreased slightly from 6,981,998 baht to 6,631,438 baht over 2007-2011, and then increased slightly to 6,838,390 baht in 2017. The share of real estate property of households in D1-D3 decreased, while the share of the real property of those in D4 to D10 increased. The share of real property of the top decile also dropped slightly. The D10/D1 ratio also increased from 12.81 to 16.29 over 2007-2017. The empirical result is similar to the study of Laovakul (2013), which reported that more than 50% of residential property was owned by the top 20% of individuals as measured by income distribution, and more than 50% of the real estate for agricultural purpose was owned by the top 30%.

The results may differ when the analysis uses varying land sizes and different population groups. Laovakul (2016a) found that among title deed holders, the D10/D1 ratio of real estate property equaled 853.64 in 2012, but the calculation in that study was based on size of the land, while the calculation in this study is based on

property value. The author found that the D10/D1 ratio of land size in the selected municipalities was equal to 262.84, but fell to 71.64 when the factor was changed to land value. The observations also differ because juristic persons are not included in this study.

Table 3.6 household income and real estate by income decile from SES of 2007, 2011 and 2017

	Mean			Proportion		
	2007	2011	2017	2007	2011	2017
Household Annual Income						
D1	64,699.23	69,718.91	77,640.80	2.07	1.93	1.52
D2	113,845.00	119,302.80	129,243.00	3.31	3.23	2.66
D3	152,417.00	155,511.80	168,153.60	4.27	4.05	3.50
D4	192,864.60	194,401.80	209,468.80	5.09	5.05	4.65
D5	241,251.70	238,687.90	257,898.20	6.33	6.14	5.77
D6	299,898.40	291,343.20	315,096.60	7.63	7.44	7.07
D7	376,967.40	360,827.20	388,564.90	9.23	9.11	9.37
D8	493,950.00	460,277.00	492,880.20	11.41	11.07	11.35
D9	695,735.90	642,211.10	676,672.70	15.47	15.05	16.64
D10	1,618,398.00	1,573,032.00	1,534,346.00	35.20	36.93	37.46
D10/D1	16.92	19.08	24.62			
Total Value of Real Estate Property						
D1	370,749.60	385,369.70	522,601.10	3.37	3.02	2.55
D2	513,197.00	529,800.60	707,945.20	4.23	4.06	3.63
D3	582,974.30	621,622.60	799,859.60	4.64	4.59	4.16
D4	663,842.60	620,358.00	870,123.20	4.97	4.57	4.83
D5	759,741.00	678,820.70	984,717.40	5.65	4.94	5.51
D6	826,163.20	806,669.10	1,117,097.00	5.96	5.83	6.26
D7	960,064.70	1,028,731.00	1,175,000.00	6.67	7.35	7.08
D8	1,367,273.00	1,241,495.00	1,561,304.00	8.96	8.46	8.98
D9	1,978,374.00	1,969,319.00	2,492,035.00	12.48	13.07	15.30
D10	6,981,998.00	6,631,438.00	6,838,390.00	43.07	44.10	41.70
D10/D1	12.81	14.54	16.29			

<u>Source</u> 1. *Socio-economic Surveys 2007, 2011, and 2017 conducted by NSO*
2. *Value of land title issued by the Land Department of Thailand as of July 2019*
3. *2007 and 2017 Industrial Census conducted by the National Statistical Office (NSO)*
4. *2011 Business and Industrial Census conducted by the National Statistical Office (NSO)*
5. *Local government revenue survey 2006-2017 by the Revenue Department (RD)*
The author's calculation.

Compared to income, real property seems to be more equally distributed, but the gaps between deciles in income and value of real property owned has been

increasing. Households in D5 to D9 gained higher shares of real estate at the expense of the decreasing shares among households in D1 to D4 and D10.

Farm land contributes to a majority of real assets for farmers in the lower part of the distribution. There are also households that incurred business losses that moved into the lower decile of income distribution. Primary residence also provides a major contribution to the real estate holdings of low- and middle-income households (Eggleston & Munk, 2018; NESDC, 2017). Household income may fluctuate, but the value of these real estate assets generally still hold or appreciate.

This study focuses on the household real estate in terms of value. The limitation of this study is that data regarding the value of unused land may not be included in the SES. If such data is available, higher inequality in real estate distribution could be expected. The inequality of real estate in terms of land size or real property owned by juristic persons is expected to be higher as found in the study of (Laovakul, 2013, 2016b).

Table 3.7 presents the household income and real estate property data for each region of Thailand. The population share between regions changed only slightly during the study period. The Central region had the highest share of households in all three periods, followed by the southern and northern regions. The population share in these regions accounts for almost 20% of the total population. Only 5% of households live in the Bangkok metropolis, and another 15% live in the southern region.

Households in Bangkok metropolis had the highest average income, followed by households in the central region in 2007, and by households in the southern region in 2011 and 2017. Bangkok metropolis household annual income increased from 807,895.80 baht in 2007 to 828,331.10 baht in 2011, and then dropped to 756,194 baht in 2017. Households in the northern part of the country had the lowest average income in all periods, with an increase from 280,964.10 baht to 315,478.90 baht during the period of study.

Households in Bangkok also had the highest average real estate value, followed by households in the southern region. However, the average real estate value of Bangkok metropolis households decreased in real terms from 4,095,260 baht to 3,985,288 baht. In 2007 and 2011, households in the northern region had the lowest average value of real property, but the value increased sharply from 967,905 baht in 2011 to 1,502,999 baht in 2017. Average real estate value of households in central, southern, and northern regions also increased, but at a slower rate than that of households in the northern region.

Table 3.8 presents the average annual income and real property value of households in urban and rural areas. The population share of urban areas increased from 31.78% to 46.72%, conforming to both economic development and the labor migration from the agricultural sector to the manufacturing and service sectors found in the previous study (Aemkulwat, 2010; Santhi, 2013).

Households in the urban areas had higher income and real estate holdings than households in the rural areas. From 2007 to 2017, average income of households in

the municipal areas increased from 580,010.10 baht to 541,933.60 baht, while average income of household outside municipal areas increased from 296,325.80 baht to 362,116.60 baht.

The average value of real property in municipal areas decreased from 2,275,592 baht to 2,208,374 baht, but the average value of real property outside of municipal areas increased from 936,914 baht to 1,416,348 baht.

Table 3.7 Household income and real estate by region, from SES of 2007, 2011 and 2017

Region	Population Share (%)			Average Annual Income			Average Real Estate Value		
Year	2007	2011	2017	2007	2011	2017	2007	2011	2017
Bangkok Metropolis	5.69	5.84	5.48	807,895.80	828,331.10	756,194.80	4,095,260.00	4,004,585.00	3,985,288.00
Central	28.85	29.21	28.56	425,477.60	372,968.80	488,275.30	1,140,795.00	1,005,380.00	1,327,277.00
North	24.93	24.59	23.83	280,964.10	293,717.30	315,478.90	959,432.80	967,905.90	1,502,999.00
Northeast	26.40	25.92	26.46	269,136.30	308,047.10	335,890.30	932,510.60	1,116,637.00	1,421,870.00
South	14.13	14.44	15.67	408,822.10	462,949.70	445,488.40	1,178,287.00	1,445,486.00	1,816,637.00

Table 3.8 Household income and real estate by community type, from SES of 2007, 2011 and 2017

Year	Population Share (%)			Average Annual Income			Average Real Estate Value		
	2007	2011	2017	2007	2011	2017	2007	2011	2017
Urban	31.78	36.19	46.72	580,010.10	536,669.80	541,933.60	2,275,592.00	2,010,024.00	2,208,374.00
Rural	68.22	63.81	53.28	296,325.80	312,021.70	362,116.60	936,914.10	1,036,215.00	1,416,348.00

3.6 Result

3.6.1 Inequality

This study compares income inequality of total annual household income and asset distribution. The redistributive impact is analyzed by comparing pre- and post-tax income inequality, applying the previous property tax regime, LBT, and LBT (NE)[45]. First, the analysis of inequality in pre and post-income and real estate measured by Shorrocks Index (I_2) is presented. The Gini Coefficient is also reported to compare with authorized data. Then, inequality within and between population subgroup -- income quintile, region, and community type -- are measured using Shorrocks Index subgroup decomposition.

Table 3.9: Income and wealth Inequality from SES of 2007, 2011, and 2017

Inequality Index	Gini Coefficient			Shorrocks Index (I2)		
Year	2007	2011	2017	2007	2011	2017
Total income	0.479	0.484	0.461	1.478	2.601	1.237
Post previous property tax income	0.497	0.484	0.461	1.476	2.552	1.239
Post land and building tax income	0.496	0.483	0.459	1.436	2.421	1.232
Post land and building tax income (without exemption)	0.496	0.483	0.459	1.436	2.421	1.232
Total real estate	0.735	0.727	0.729	22.571	59.084	12.110

The author's calculation.

Table 3.9 shows the comparison of income inequality using the Gini Coefficient and Shorrocks index (I_2). Both inequality indices move in the same direction. The Gini Coefficient of household income conforms with the value from Thailand's Poverty and Inequality report (NESDC, 2017). Unlike the Gini Coefficient, which ranges between zero and one, Shorrocks index (I_2) maximum value depends on the population number and is more sensitive to changes in the upper level of the distribution and aggregately decomposable. The redistributive result from Shorrocks index is larger than that of the Gini Coefficient. This is due to the fact that Shorrocks index is sensitive to change in the upper tail of the distribution. More than half of real property is owned by people in the top income quintile, so the majority of property taxes are paid by households in this group (Sarntisart, 2011; Shorrocks, 2013).

Income inequality rose from 1.478 in 2007 to 2.601 in 2011, and dropped to 1.237 in 2017. Empirical research suggests that labor movement, education attainment, and technological disruption affect income inequality. An increase in income inequality during 2007-2011 resulted from an increase in wages of highly skilled labor and an accumulation of assets that generated unearned income

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[45] Post property tax income = Total income - LDT - BLT

Post land and building tax income = Total income - LBT liabilities

Post land and building tax income (without exemption) = Total income - LBT(NE) liabilities

(Aemkulwat, 2010). A decrease in income inequality during 2011-2017 could have resulted from a diminishing wage gap between low- and high-skilled labors; however, the wage gap between high-skilled and low-skilled labor actually persisted. Technology replaced some routine jobs of low- and middle-skilled labor, driving wages down (Wasi, Paweenawat, Ayudhya, Treeratpituk, & Nittayo, 2019).

After deducting property tax, household income inequality decreased from 1.478 to 1.476 in 2007, and decreased from 2.601 to 2.552 in 2011, but increased from 1.237 to 1.239 in 2017. The empirical result demonstrates that LBT can better reduce income inequality than the previous tax regimen. Under LBT, income inequality would have decreased to 1.436, 2.421, and 1.232 in the same periods. Collecting tax from all property owners does not reduce the redistributive effect of LBT.

The empirical result indicates that real property was more poorly distributed than income. Shorrocks Index (I_2) increased from 22.571 in 2007 to 59.084 in 2011 before decreasing to 12.110. The changes in Shorrocks index were in the same direction as the decile distribution. From 2007 to 2011, the share of real estate holdings among households in D1-D6 decreased, while the share among D7-D10 increased. Then, from 2011 to 2017, the real estate share of D4-D9 increased at the expense of real estate share of D1-D3 and D10. The Gini Coefficient of real estate ownership decreased from 0.735 in 2007 to 0727 in 2011, and then increased to 0.729 in 2017 respectively. NESDC (2017) reports that the Gini coefficient of residential property equaled 0.6270, and the Gini coefficient of farming and business property equaled 0.8796 in 2017. These empirical results are in the same range as those of previous studies. Laovakul (2013) found that the Gini coefficient of residential property equaled 0.703, and that the Gini coefficient of other real estate equaled 0.882 in 2007. NESDC (2020) reported that the Gini coefficient of residential property equaled 0.6644, and that the Gini coefficient of other real property equaled 0.8796 in 2017.

The analysis of inequality by subgroup decomposition in the following part will help explain changes in aggregate income and wealth inequality.

Table 3.10: Changes in income inequality, from SES of 2007, 2011, and 2017

Redistributive Impact (%)	Gini Coefficient			Shorrocks Index (I2)		
	2007	2011	2017	2007	2011	2017
Property taxes	3.76	0.00	0.00	-0.14	-1.88	0.16
Land and building tax	3.55	-0.21	-0.20	-2.84	-6.92	-0.40
Land and building tax (without exemption)	3.55	-0.21	-0.20	-2.84	-6.92	-0.40

Table 3.10 illustrates that the redistributive impact of LBT, with and without exemption, is higher than that of property taxes. In 2007, LBT reduced income inequality by 2.84%, while property taxes reduced inequality by 0.14%. In 2011, LBT drove down inequality by as much as 6.92%, while property taxes reduced the income gap by 1.88%. In 2017, LBT lowered inequality by 0.4%, whereas property taxes increased inequality by 0.16%. The simulation results suggest that LBT can better reduce inequality, and that the tax structure is more progressive than the

previous property taxes (LDT and BLT). However, the redistributive impact of LBT does not significantly differ, regardless of whether there is or is not any exemption on farming and housing property. This is due to the fact that the LBT rate is very low. For example, without exemption, the house owner would have to pay 200 Baht per 1 MB of their house value, up to 50 MB.

Inequality of real estate ownership is much more pronounced than income inequality, and aggregate inequality is influenced by inequality in the top income decile because households in this subgroup own more than 40% of total real estate. Their effect on real estate inequality is stronger than on income inequality. The Shorrocks index (I_2) of real estate ownership among D10 increased from 9.377 in 2007 to 27.994 in 2011, and then dropped to 6.573 in 2017 (Table C4). Their share of total inequality increased from 91.72% to 97.67%, before dropping to 86.61% in the same years. Shorrocks index (I_2) of real estate ownership increased from 22.571 in 2007 to 59.084 in 2011, and then dropped to 12.110 in 2017.

Table 3.11: Inequality decomposition by income decile, from SES of 2007, 2011, and 2017

Type of Income/ Assets	Total Income	Post Property Taxes Income	Post Land and Building Tax Income	Post Land and Building Tax Income (without Exemption)	Total Real Estate
2007					
I(2)	1.478	1.436	1.436	1.436	22.571
D1	0.01	0.01	0.01	0.01	0.03
D2	0.00	0.00	0.00	0.00	0.06
D3	0.00	0.00	0.00	0.00	0.10
D4	0.00	0.00	0.00	0.00	0.13
D5	0.01	0.01	0.01	0.01	0.33
D6	0.01	0.01	0.01	0.01	0.25
D7	0.02	0.02	0.02	0.02	0.48
D8	0.04	0.04	0.04	0.04	1.92
D9	0.12	0.13	0.13	0.13	1.30
D10	61.15	60.33	60.33	60.33	91.72
Between Group	38.64	39.46	39.46	39.46	3.68
2011					
I(2)	2.601	2.552	2.421	2.421	59.084
D1	0.01	0.01	0.01	0.01	0.03
D2	0.00	0.00	0.00	0.00	0.04
D3	0.00	0.00	0.00	0.00	0.09
D4	0.00	0.00	0.00	0.00	0.03
D5	0.00	0.00	0.00	0.00	0.05
D6	0.00	0.00	0.00	0.00	0.07

Type of Income/ Assets	Total Income	Post Property Taxes Income	Post Land and Building Tax Income	Post Land and Building Tax Income (without Exemption)	Total Real Estate
D7	0.01	0.01	0.01	0.01	0.16
D8	0.01	0.02	0.02	0.02	0.15
D9	0.07	0.07	0.07	0.02	0.47
D10	79.64	79.32	78.34	78.34	97.67
Between Group	20.26	20.58	21.55	21.55	1.25
2017					
I(2)	1.237	1.239	1.232	1.232	12.113
D1	0.01	0.01	0.01	0.01	0.08
D2	0.00	0.00	0.00	0.00	0.19
D3	0.00	0.00	0.00	0.00	0.21
D4	0.00	0.00	0.00	0.00	0.30
D5	0.00	0.00	0.00	0.00	0.32
D6	0.01	0.01	0.01	0.01	0.88
D7	0.01	0.01	0.01	0.01	0.70
D8	0.03	0.03	0.03	0.03	1.43
D9	0.14	0.14	0.15	0.15	4.87
D10	64.36	64.50	64.51	64.53	86.61
Between Group	35.43	35.28	35.27	35.25	4.41

Note: See Table C3 and C4 in Appendix C for detailed analysis of inequality decomposition of household total income and real estate ownership by income class based on data from SES of 2007, 2011, and 2017

Source   1. Socio-economic Survey 2007, 2011, and 2017 conducted by NSO
          2. Value of land title issued by the Land Department of Thailand as of July 2019
          3. 2007 and 2017 Industrial Census conducted by the National Statistical Office (NSO)
          4. 2011 Business and Industrial Census conducted by the National Statistical Office (NSO)
          5. Local government revenue surveys 2006-2017 by the Revenue Department (RD)
          The author's calculation.

The within-group component of inequality in real estate ownership is higher than that of income in all income deciles. This shows that the value of household real estate ownership varies even within the same income class.

Table 3.12 presents the inequality decomposition of pre- and post-tax income and real estate among Thai households by regional area, which comprises Bangkok metropolis, the central region, northern region, northeastern region, and southern region.

The majority of inequality occurred within the regions. From 2007 to 2011, the highest income and real estate inequality occurred in Bangkok metropolis, followed by the central region, but then was outpaced by the central region in 2017. More than 90% of income inequality occurred within the regions (within group component). The aggregate income within the region (I_2^{Region}) moved in the same direction as the aggregate income inequality, except for the northern region, where I_2 decreased from 1.349 to 0.667, and the southern region, where I_2 increased from 0.701 to 1.420 from 2007 to 2017. In 2007 and 2011, income inequality in Bangkok

metropolis was the highest among all regions in the country. $I_2^{Bangkok}$ increased from 1.639 in 2007 to 3.791 in 2011, before dropping to 0.947 in 2017 (Table B5).

Table 3.12: Inequality decomposition by region, from SES of 2007, 2011, and 2017

Type of income/ assets	Total income	Post Previous property Tax	Post land and building tax	Post land and building tax (without exemption)	Real estate
2007					
I(2)	1.478	1.476	1.436	1.436	22.571
Bangkok Metropolis	52.22	52.13	50.98	50.96	80.04
Central	16.87	16.93	17.39	17.40	8.16
North	9.35	9.39	9.50	9.51	8.01
Northeast	8.70	8.70	8.96	8.96	1.73
South	6.94	6.96	7.17	7.17	0.97
Between	5.92	5.89	6.00	6.00	1.09
2011					
I(2)	2.601	2.552	2.421	2.421	59.084
Bangkok Metropolis	63.58	64.71	61.90	61.08	95.34
Central	11.91	10.30	12.61	12.61	1.26
North	3.66	3.72	3.91	3.91	0.45
Northeast	8.41	8.60	9.06	9.06	1.04
South	9.50	9.68	10.25	10.25	1.57
Between	2.94	2.98	3.08	3.08	0.34
2017					
I(2)	1.237	1.239	1.232	1.232	12.110
Bangkok Metropolis	28.15	28.15	27.72	27.71	77.81
Central	37.75	37.80	38.09	38.09	5.69
North	4.87	4.86	4.83	4.83	8.24
Northeast	10.74	10.74	10.79	10.79	2.54
South	14.61	14.61	14.76	14.77	4.77
Between	3.88	3.84	3.82	3.81	0.95

Note: See Tables C5 and C6 in Appendix C for detailed analysis of inequality decomposition of household total income and real estate ownership by region, from SES of 2007, 2011, and 2017

    Source   1. Socio-economic Survey 2007, 2011, and 2017 conducted by NSO

    2. Value of land title issued by the Land Department of Thailand as of July 2019

    3. 2007 and 2017 Industrial Census conducted by the National Statistical Office (NSO)

    4. 2011 Business and Industrial Census conducted by the National Statistical Office (NSO)

    5. Local government revenue survey 2006-2017 by the Revenue Department (RD)

    The author's calculation.

Although households in Bangkok metropolis accounted for less than 6% of the total population (p^m), their impact on total inequality was quite prominent because their income levels were much higher than those of households in other regions. The share of inequality among households in Bangkok metropolis increased from 52.22% in 2007 to 63.58% in 2011. However, in 2017, the top source of inequality changed from Bangkok to the central region, which accounted for 37.75% of aggregate income inequality. Although in 2017, I_2^{South} equaled 1.420 and $I_2^{central}$ equaled 1.287, the impact from the central region was larger because its population share was almost double that of the southern region (28.56% VS 15.67%) and its average income was also higher.

In 2007, LDT and BLT helped reduce income inequality between regions from 5.92% to 5.89%, while LBT increased the share of inequality between regions to 6.00%. In 2011, all three real estate tax regimens increased the share of inequality between regions from 2.94% to 2.98% and 3.00%. However, in 2017, property taxes reduced the share of inequality between regions from 3.88% to 3.84%, and LBT decreased the share of between-groups to 3.81%. The impact of LBT on inequality between regions was also higher than it had been under the previous tax regimen, and lifting tax exemptions doesn't alter its impact on income inequality.

Real estate ownership was much more concentrated in Bangkok than was income. More than 75% of inequality in real estate value stemmed from Bangkok. This can be explained by the concentration of business property in the city. Land prices in central Bangkok and metropolitan business areas rapidly appreciated due to high economic growth and price speculation. Amidst low interest rates, many residential projects were built, and people bought these properties in search of higher returns from their savings and price speculation, which create false demand. The pattern of inequality in real estate was also similar to changes found in income inequality.

Table 3.13 reports the inequality decomposition by community type. The majority of income and real estate inequality stemmed from the inequality within groups and moved in the same direction as inequality in urban areas.

Shorrocks index of the urban areas (I_2^{Urban}) increased from 1.454 in 2007 to 3.343 in 2011, before dropping to 1.244 in 2017. Its share of aggregate inequality increased from 70.42% to 86.59%, and then dropped to 69.36% in the same years (Table B5). Income inequality in the rural areas moved in the opposite direction from total income inequality. I_2^{Rural} decreased from 0.944 to 0.775, before increasing to 1.022 in the period of study. Although the population share (p^m) of the urban areas was only half that of the rural areas, the average income and inequality within the urban areas was much higher than in the rural areas. Thus, inequality was found to be more influenced by inequality among urban household.

Table 3.13: Inequality decomposition by community type, from SES of 2007, 2011, and 2017

Type of income/ assets	Total income	Post Previous property Tax	Post land and building tax	Post land and building tax (without exemption)	Real estate
2007					
I(2)	1.478	1.476	1.436	1.436	22.571
Urban	70.42	70.35	70.35	69.53	93.51
Rural	25.63	25.72	25.72	26.45	6.03
Between	3.95	3.94	3.94	4.02	0.46
2011					
I(2)	2.601	2.552	2.421	2.421	59.084
Urban	86.59	86.35	85.60	85.60	98.15
Rural	11.96	12.19	12.88	12.88	1.75
Between	1.45	1.47	1.53	1.53	0.10
2017					
I(2)	1.237	1.239	1.232	1.232	12.110
Urban	69.36	69.36	69.18	69.18	91.90
Rural	29.00	29.02	29.21	29.21	7.90
Between	1.63	1.62	1.61	1.61	0.20

Note: See Tables C7 and C8 in Appendix C for detailed analysis of inequality decomposition of household total income and real estate ownership by community type, from SES of 2007, 2011, and 2017

Source 1. Socio-economic Survey 2007, 2011, and 2017 conducted by NSO

2. Value of land title issued by the Land Department of Thailand as of July 2019

3. 2007 and 2017 Industrial Census conducted by the National Statistical Office (NSO)

4. 2011 Business and Industrial Census conducted by the National Statistical Office (NSO)

5. Local government revenue survey 2006-2017 by the Revenue Department (RD)

The author's calculation.

The share of income inequality between urban and rural area decreased from 3.95% in 2007 to 1.45% in 2011, and then increased slightly to 1.63% in 2017. Both previous property taxes and LBT reduced inequality between rural and urban areas from 3.95% to 3.94% in 2007, but if land and building tax had been levied on all property (3rd scenario), it would have increased inequality between urban and rural regions to 4.02%. In 2011, the previous property taxes increased $I_2^{between}$ from 1.45% to 1.47%, but the impact of LBT was larger as it increased $I_2^{between}$ further to 1.53%. In 2017, previous property taxes increased $I_2^{between}$ from 1.63% to 1.62%, while LBT decreased $I_2^{between}$ slightly more to 1.61%. LBT decreased income inequality in the urban areas, but increased inequality in the rural areas. The impact of LBT was found to be stronger than that of the previous combination of property taxes.

Inequality in real estate ownership also followed the same trend as income inequality, but to a higher degree. Inequality of real estate ownership in the urban areas (I_2^{Urban}) increased from 23.802 in 2007 to 76.483 in 2011, and then dropped to 15.590 in 2017. The aggregate inequality in real estate ownership increased from 22.571 to 59.084, and then dropped to 12.113 during the same period. However, inequality of real estate ownership in the rural areas (I_2^{Rural}) gradually decreased from 4.219 to 2.857 from 2007 to 2011 (Table B6). More than 90% of aggregate inequality stemmed from households in the urban regions, but the contribution from the rural areas rose because the real estate value increased (Table 4.10). Inequality between urban and rural areas contributed less than 1% of inequality in real estate ownership

3.6.2 Tax Liabilities

Table 3.14 demonstrates the decile distribution of tax liabilities and effective tax rate among Thai households in 2007, 2011, and 2017. Household property tax burden is calculated under three scenarios; previous property tax (LBT plus BLT), LBT, and LBT (NE). Property data is from the local government revenue surveys conducted by the revenue department (RD). As LBT had not been enacted during the time of the study, tax burdens are estimated from the value of real estate recorded in the SES surveys. Land and building taxes, both with and without exemption, are calculated from the value of household assets, which includes housing, farming, and business property. The effective tax rate is the amount of property tax burden in each scenario divided by total household annual income, which includes money income, income in-kind, and transitory income.

The property tax burden fluctuated among the D1 to D3 groups, and then gradually increased as income increased. In 2017, the property tax burden increased from 154.76 baht in D1 to 779.85 baht in D8, and then it rose sharply to 1,750 baht and 5,367 baht in D9 and D10, respectively. The effective tax rate also fluctuated among the D1 to D7 groups, and then continuously increased in D8 and D9, and rose sharply in D10. The fluctuation of the effective tax rate might have resulted from the low income among the first three deciles, and the tax burden on farming property. In 2017, the effective tax rate equaled 0.19% for D1 and equaled 0.38% for D10.

The LBT burden would be lower than the property tax burden for 80% of the households because the first 50 million baht of dwellings and farming property value is exempted. Comparing year by year, LBT burden would have been lower than that of property taxes. In 2017, households in D1 would have had to pay only 82.43 baht per year instead of 154.76 baht. However, LBT would have increased the tax burden for D9 and D10 due to the value of their businesses and high priced properties. The LBT burden for D10 would have increased to 12,028.22 baht. The overall effective tax rate would have decreased slightly for household in D1-D8, but increased for those in D9 and D10. In 2017, the effective tax rate of households in D10 would have increased from 0.38% to 0.55%. Apart from D1, the effective tax rate of LBT increases as income increases, which signifies a progressive structure.

Table 3.14: Household property taxes liabilities by income decile, from SES of 2007, 2011 and 2017

	Mean			Effective tax rate (%)		
	2007	2011	2017	2007	2011	2017
Previous Property Tax (Local Development Tax plus Building and Land Tax)						
D1	88.69	83.92	154.76	0.13	0.14	0.19
D2	130.22	125.68	273.74	0.11	0.11	0.21
D3	146.82	175.99	202.54	0.10	0.11	0.12
D4	196.52	190.15	326.65	0.10	0.10	0.16
D5	227.87	248.71	493.35	0.09	0.10	0.19
D6	325.79	248.27	458.45	0.11	0.09	0.15
D7	370.74	408.48	693.55	0.10	0.11	0.18
D8	740.09	581.69	779.85	0.15	0.13	0.16
D9	1,498.80	1,083.11	1,750.01	0.21	0.16	0.25
D10	5,667.62	6,123.21	5,367.90	0.32	0.29	0.38
Land and Building Tax						
D1	25.43	60.88	82.43	0.06	0.04	0.13
D2	43.19	37.85	70.59	0.04	0.03	0.06
D3	76.49	62.79	92.06	0.05	0.04	0.05
D4	86.02	77.84	174.78	0.04	0.04	0.08
D5	213.20	108.74	172.67	0.09	0.05	0.07
D6	189.24	120.33	272.67	0.06	0.04	0.09
D7	256.96	280.55	337.74	0.07	0.08	0.09
D8	496.24	397.58	775.65	0.10	0.08	0.16
D9	1,122.78	1,008.97	2,257.26	0.16	0.15	0.32
D10	11,402.60	13,384.91	12,028.22	0.43	0.41	0.55
Land and Building Tax (without exemption)						
D1	86.93	125.87	157.31	0.16	0.15	0.24
D2	124.23	123.18	157.60	0.11	0.11	0.12
D3	167.06	159.24	184.11	0.11	0.10	0.11
D4	187.99	177.20	274.92	0.10	0.09	0.13
D5	326.93	216.51	281.03	0.13	0.09	0.11
D6	319.13	246.19	396.81	0.11	0.08	0.13
D7	406.02	435.80	476.70	0.11	0.12	0.12
D8	717.09	589.19	960.74	0.15	0.12	0.20
D9	1,414.74	1,286.46	2,541.33	0.20	0.20	0.37
D10	12,179.01	14,051.21	12,645.04	0.47	0.45	0.59

In the third scenario, LBT was levied on all real property regardless of its value. It was found that the LBT (NE) would have only slightly raised the tax burden and effective tax as the tax rates are quite low. The sharp rise in the tax burden would have occurred among the D8 to D10 groups due to the value of their houses, which comprise the main assets (Armour et al., 2013; Larrimore et al., 2016a). The tax burden of D10 would have increased slightly to 12,345.04 baht. The effective tax rate of the lowest income decile would have increased from 0.19 % to 0.24%, and the effective tax rate of the top income decile would have increased from 0.38% to 0.59%.

The effective tax rate in D1 would have been higher than D1 to D7 because households in D1 receive less income than the other income deciles in the respective year while their property values remained constant or even increased. Households that incurred losses from their businesses are also included in this lowest decile, but they are still obligated to pay real estate tax. These households are 'asset rich, but cash poor' and may not be able to meet the obligation.

This study supports the use of LBT, which is based on the value of both land and infrastructure, so it matches changes in property value. The effective tax rate is more progressive than the previous property taxes (LDT and BLT) as a result of land concentration in the country. In addition, the effective tax rates for the lower half of the distribution range were also lower as most of the tax would be collected on businesses and high value property. Therefore, LBT would raise more revenue for the local government while lowering income inequality. This study focused solely on residential dwellings and farming and business property. As previously mentioned, higher effective tax rate and more progressive tax structures are expected if the data on unused land were to be available for inclusion in this model.

Table 3.15 Household property tax liabilities by region, from SES of 2007, 2011 and 2017

	Mean			Effective tax rate (%)		
	2007	2011	2017	2007	2011	2017
Previous Property Tax (Local Development Tax plus Building and Land Tax)						
Bangkok Metropolis	3,444.23	3,679.31	3,565.37	0.28	0.29	0.40
Central	648.80	732.66	811.95	0.14	0.11	0.15
North	545.38	551.56	940.12	0.18	0.16	0.32
Northeast	303.94	228.43	486.12	0.07	0.06	0.11
South	673.51	1,082.98	920.68	0.12	0.20	0.14
Land and Building Tax						
Bangkok Metropolis	6,720.03	9,570.80	7,858.22	0.28	0.21	0.50
Central	626.27	435.79	779.15	0.09	0.07	0.11
North	660.42	536.10	1,422.13	0.09	0.08	0.20
Northeast	418.49	611.80	668.06	0.07	0.08	0.07
South	362.70	669.25	665.71	0.06	0.09	0.10

	Mean			Effective tax rate (%)		
	2007	2011	2017	2007	2011	2017
Land and Building Tax (without exemption)						
Bangkok Metropolis	7,216.23	9,998.49	8,263.90	0.33	0.25	0.55
Central	793.98	589.07	973.92	0.14	0.12	0.16
North	793.81	670.93	1,603.14	0.15	0.14	0.27
Northeast	550.38	762.11	856.18	0.14	0.15	0.15
South	533.32	857.34	934.11	0.11	0.14	0.18

Table 3.15 reports household real estate tax liabilities by region from 2007 to 2017. The real estate tax burden in Bangkok metropolis was much higher than in other regions because the price of property was higher. Changing from previous property taxes to LBT more than doubles the tax burden in Bangkok metropolis in all three periods, but the tax burdens in other regions do not vary much.

In 2007, the real estate tax burden in Bangkok metropolis would have increased from 3,444.23 baht to 6,720.03 baht if LBT had been applied instead of LDT and BLT. Further, the tax burden would have increased to 7,216.23 baht if all residences and farming properties had been taxed regardless their value. The real estate tax burden in the northeastern region would have increased from 303.94 baht to 418.49 baht and 550.38 baht respectively for the three relevant years of the study. Households in the southern region would have benefitted from LBT as their tax burden would have decreased from 673.51 baht under the previous tax regimen to 362.70 baht under the LBT. If all property had been taxed, however, the average tax burden would have increased to 533.32 baht. The average tax rate in Bangkok metropolis remained quite constant as the majority of the LBT burden would have been distributed among high income households. The average tax rate of households in other regions will decrease if LBT is enacted, though the average tax rate might increase slightly if the exemption is lifted.

In 2011, the real estate tax burden in Bangkok metropolis would have increased from 3,979.31 baht to 9,570.80 baht if LBT had been applied instead of LDT and BLT. The tax burden would have increased to 9,998.49 baht if all residences and farming property had been taxed regardless of their value. However, general households still would have benefitted from LBT because the increase in tax burden would have occurred among high income households, who owned the majority of the business property. As a result, if LBT had been applied, the effective tax rate in Bangkok metropolis would have decreased from 0.29% to 0.21%, but would have increased slightly to 0.25% if all house and farming property had been taxed. Households in the central and southern regions are those who would benefit from LBT as their tax burden and effective tax rate would decrease. Even if all real estate had been taxed, the effective tax rate in the central region would still have decreased from 732.66 baht under the previous property tax scenario to 589.07 baht under the LBT (NE) scenario. That region's effective tax rate would have decreased slightly from 0.11% to 0.07%. The real estate tax burden in the southern region would have

been cut by almost half, from 1,082.98 baht to 669.25 baht, and the effective tax rate would have decreased from 0.20% to 0.09% if LBT had been applied.

In 2017, LBT would have doubled the real estate tax burden for households in the Bangkok metropolis area from 3,565.37 baht (property taxes) to 7,858.99 baht (LBT). The average tax rate would also have increased from 0.40% to 0.50%. If tax exemptions had been lifted, the average tax burden would have increased further to 8,273.90 baht, and the effective tax rate would have increased to 0.55%. Real estate tax burden in the northern and northeastern regions also would have increased. Households in the southern region were still the group that would have benefitted from LBT even if all real property had been taxed. Their estimated tax burden would have decreased from 920.68 baht (property taxes) to 665.71 baht (LBT), and the effective tax rate would have decreased from 0.14% to 0.10%. However, if there had been no exemptions, the effective tax rate would have increased from 0.14% to 0.18% as low-income households would have been subject to real estate tax on their houses and farming property.

The effective tax rate of property taxes (scenario 1) and LBT (scenario 2) are quite close, but if there is no exemption for house and farm property valued at less than 50 million baht (scenario 3), then the effective tax rate will increase because of the increased tax burden among low income households.

The majority of the LBT burden was incurred from business property, which is more concentrated in Bangkok metropolis, while the small housing and farming property in the southern region are mostly exempted, resulting in a lower tax burden and effective tax rate. The empirical result demonstrates that LBT would help relieve the tax burden on the owners of properties that are required for a fundamental need, while increasing tax revenue from business property. This could help reduce income inequality as well.

Table 3.16 Household property tax liabilities by community type, from SES of 2007, 2011 and 2017

	Mean			Effective tax rate (%)		
	2007	2011	2017	2007	2011	2017
Previous Property Tax (Local Development Tax plus Building and Land Tax)						
Urban	1,774.16	1,719.34	1,660.57	0.20	0.19	0.24
Rural	379.86	389.84	639.21	0.11	0.10	0.17
Land and Building Tax						
Urban	2,954.70	3,329.00	3,051.57	0.17	0.15	0.26
Rural	366.08	372.97	623.53	0.07	0.06	0.08
Land and Building Tax (without exemption)						
Urban	3,252.58	3,576.94	3,317.25	0.22	0.20	0.32
Rural	499.06	515.05	816.50	0.13	0.12	0.15

Table 3.16 shows the household real estate tax burden data from the SES of 2007, 2011, and 2017. Households in urban areas were subjected to higher tax than those in the rural areas throughout the periods in all three scenarios because the value

of the former's real estate was more than twice that of those in the rural areas (see Table 3.8). The real estate tax burden continuously increased during the period of study, but the effective tax rate decreased during 2007-2011 before rising to a higher level in 2017. The tax burden of urban households almost doubles when changing from property taxes (scenario 1) to LBT (scenario 2), whereas, the real estate tax burden of rural households decreases slightly. However, in the third scenario, where LBT is collected without exemptions, the average tax burden is higher than in the first scenario.

In 2007, if LBT had been in force, the average tax burden of urban households would have increased from 1,774.16 baht to 2,954.70 baht, while that of rural households would have decreased from 379.86 baht to 366.08 baht. Despite an increase in tax burden, the effective tax rate would have decreased from 0.20% to 0.17% for urban households, and from 0.11% to 0.07% for rural households. However, if LBT had been levied on all property, the tax burden of urban households would have doubled to 3,252.58 baht, and that of rural households would have increased to 499.06 baht. The effective tax rate would equaled 0.22% and 0.13% for urban and rural households, respectively.

In 2011, if LBT had been in force, the average tax burden of urban households would have increased from 1,719.34 baht to 3,329.00 baht, while that of rural households would have decreased from 389.84 baht to 372.97 baht. Despite these differing outcomes in tax burden, the effective tax rate would have decreased for both groups -- from 0.19% to 0.15% for urban households, and from 0.10% to 0.06% for rural households. However, if LBT had been levied on all property, then the tax burden on urban households would have doubled to 3,579.94 baht, and that of rural households would have increased to 515.05 baht. The effective tax rate would have equaled 0.20% and 0.12% for urban and rural households, respectively.

In 2017, if LBT had been in force, the average tax burden of urban households would have increased from 1,660.57 baht to 3,051.57 baht, and the effective tax rate would have increased from 0.24% to 0.26%. However, rural households would still have benefitted from the LBT exemption, as their tax burden would have decreased from 639.21 baht to 623.53 baht, and their effective tax rate would have decreased from 0.10% to 0.06%. But if LBT had been levied on all property, the tax burden of urban households would have doubled to 3,317.25 baht, and that of rural households would have increased to 816.50 baht. The effective tax rate would have increased to 0.32% and 0.15% for urban and rural households, respectively.

From 2007 to 2017, the real estate tax burden of urban households was decreasing, while that of rural households continuously increased, with a sharp rise from 2011 to 2017. The effective tax rate decreased from 2007 to 2011, but increased to an even higher level in 2017. LBT results in a higher tax burden for urban households but lower tax burden for rural households. Nonetheless, the effective tax rate is lower than the previous property taxes. On the other hand, if the government decided to collect LBT regardless the property value, the tax burden as well as the effective tax rate would increase to levels higher than the previous property taxes.

Table 3.17 presents a comparison of tax revenue under the three scenarios in the study; property taxes (LDT plus BLT), LBT with exemption, and LBT (NE).

Table 3.17: Estimated tax revenue

Tax Revenue		(Billion Baht)	
Year	2007	2011	2017
Local development tax (LDT)	1.41	1.44	0.94
Building and land tax (BLT)	19.06	17.84	32.08
Previous property taxes (LDT and BLT)	20.47	19.27	33.02
Land and building tax	21.6	28.80	37.6
Land and building tax (Without exemption)	25.00	32.40	41.60

Source: Local development tax and building tax revenue data are retrieved from the local government revenue information collected by the Department of Local Administration (DLA) www.dla.go.th).

The author's calculation

Land and building tax revenue with and without exemption are from the author's calculation

In the first scenario, the majority of real estate tax revenue came from BLT, which decreased from 19.06 billion baht in 2007 to 17.84 baht in 2011 before rising sharply to 32.08 billion baht in 2017. LDT revenue increased from 1.41 billion baht in 2007 to 1.44 billion baht in 2011 before dropping to 0.94 billion baht in 2017. As a result, total tax revenue decreased slightly from 20.47 billion baht in 2007 to 19.27 baht in 2011, before rising to 33.02 billion baht in 2017.

In the second scenario, LBT would have generated greater revenue for local governments. Despite the first 50 million baht of house and farm property being exempted, LBT would have raised more revenue than the previous property taxes throughout the period of study. Total tax revenue in 2007 would have increased from 20.47 billion baht to 21.6 billion baht in 2007, and tax revenue in 2011 would have increased from 19.27 billion baht to 28.80 billion baht. In 2017, local government in Thailand would have collected 37.6 billion baht instead of the 33.02 billion baht it collected from the actual previous tax regimen.

In the third scenario, if LBT (NE) were to have been applied, the total tax revenue would have been much higher. Local government would have collected around 4 billion baht more in revenue than under statutory LBT (scenario 2). The estimated tax revenue would have increased from 25 billion baht in 2007 to 32.40 billion baht in 2011, and then to 41.60 billion baht in 2017.

Even though unused land is not included in the calculation of this study, the estimated LBT revenue is still much higher than the revenue total under the previous taxes on real estate. If loopholes can be plugged, the database updated, and tax administration simplified, local government could become more independent and have more revenue available to improve the quality of life of their residents. In addition, the higher tax burden encourages the residents to participate in local government policy and to insist on local government transparency.

3.7 Concluding remarks and policy implication

This study analyzes the inequality of household real estate ownership. Income and real estate inequality are measured by Shorrocks index (I_2), and the detailed analysis of inequality by income decile, region and community type are done by Shorrocks index decomposition by population subgroups. The analysis is done under three scenarios: the previous property tax regime (building and land tax plus local development tax), land and building tax, and land and building tax without exemptions. It is expected that implementation of land and building tax will raise more revenue for local governments, but this is not realistic due to the existing exemption on the vast majority of houses and farm land. Thus, the third scenario was added to demonstrate the full effect of land and building tax if it were to be implemented without these exemptions, and to enhance the possibility of applying this new real estate tax to all property owners.

The value of household real estate increases more rapidly than income because households accumulate most of their wealth in the form of real property, and the price of real estate tends to increase. Housing accounts for more than 50% of household real estate, followed by business property and farming property. Although the size of business property may be less than that of farming property, business property prices are much higher. The ratio of total value of real estate over annual income increased from 3.67 times to 4.27 times.

The decile distribution shows that real estate ownership is more concentrated than income, but the trend is not consistent. The share of real estate among D10 decreased from 43.07% to 41.70%, while share of income increased from 35.20% to 37.46%. The share of real estate among D1 was slightly higher than income thanks to the value of their residences and farming properties. Nonetheless, households in D1-D4 were losing their share of real estate value as D5-D9 were gaining. Housing is the primary source of household wealth, especially the lower and middle income groups (Eggleston & Munk, 2018). Middle income household gain their share from an increase in house prices, while high income households may divert their investments to financial assets in addition to real property.

Households in Bangkok metropolis have much higher income and real estate than most others in Thailand. The annual household income and total real estate of Bangkok household was twice as much as those of central region households, which came in second place. However, the average income and real estate gap was reducing, and the regional gap became smaller as well, which might be explained by the smaller households in Bangkok metropolis. Although the population in the capital is denser than in regional areas, some of the residents are laborers who migrated into the city to find jobs, and who may not purchase a house or settle down, but will send money to their families in their hometowns. Income and real assets of households in the central region and southern region were much greater than those of the north and northeast. Statistics from the Land Development Department (LDD) show that urban areas are more concentrated in the central and eastern regions (the eastern region is included in as part of the central region in SES and in this study). Household in the central region gained economically from industry development due to stimulus efforts such as the Eastern Economic Corridor (EEC). The southern region also benefitted from the

influx of tourism that created demand for hotels, resorts, and bungalows, as well as other facilities to accommodate travelers. The majority of land in the southeastern region comprises farm land, and half of the northern region is still forested. The price of farm land is much lower than that of business property

Around 30% of Thai households are living in urban areas. They have more income than households in rural areas, but their income has increased at a slower rate, and their average real estate value decreased slightly over the period of study. The value of income and real estate of households in the rural areas increased more rapidly thanks to the economic development that has started to spread from the urban areas, which have become increasingly saturated.

The inequality analysis using Shorrocks Index (I_2) demonstrates an increase in inequality of both household income and real estate, but the inequality in real estate is much higher. Moreover, changes in income and real estate ownership inequality moved in the same direction. Shorrocks index (I_2) of household annual income increased from 1.478 in 2007 to 2.601 in 2011 before dropping down to 1.237. Change in real estate ownership were larger. Shorrocks Index (I2) of real estate ownership increased from 22.571 in 2007 to 59.084 in 2011, then dropped down to 12.110 in 2017. The redistributive impact of LBT was larger than that of property tax, and collecting LBT from all property, without exemptions, did not hamper its redistributive impact. The property tax is much smaller than LBT, and even increased income inequality in 2017.

The inequality within the subgroup depends on the share of population (p^m), the relative share of income/wealth of the subgroup (b^m), and inequality within the subgroup (I_2^m), while inequality between subgroups depends on population share (p^m) and relative income or wealth of the subgroup (b^m).

The majority of income and real estate inequality stemmed from inequality among households in the top decile, and the total inequality also moved in the same direction with inequality in this group because their income and real estate ownership are much higher than the rest of the distribution, and the inequality within the group is also higher. Around 60% of income inequality stemmed from inequality within the top decile, and inequality between groups contributed to almost 40% of income inequality. The old property tax slightly reduced inequality between income classes from 35.43% to 35.23% in 2017, while LBT would have slightly increased inequality between income classes to 35.25% in the same period. More than 90% of inequality in real estate ownership stemmed from households in the top income quintile. Inequality of real estate ownership was also much higher than inequality in other income in every income class. The empirical results demonstrate that real estate ownership varies more than income.

In 2007 and 2011, 52.22% and 63.58% of income inequality occurred in Bangkok metropolis, respectively, while 80.04% and 95.34% of inequality of real estate ownership occurred in the capital. The central region became the highest contributor of income inequality in 2017 with the share of 37.75%, whereas the share of Bangkok metropolis reduced by more than half to 27.71%. This can be explained by a decrease in household income and real estate among Bangkok metropolis households. Nonetheless, Bangkok metropolis still contributed to 77.81% of real

estate ownership inequality. All three tax regimens help reduce income inequality between regions, and the redistributive impact of LBT is slightly greater than the old tax regimen.

More than 60% of income inequality and more than 90% of real estate inequality stemmed from households in urban areas because they had higher average income and real estate wealth. Property tax increased income inequality between urban and rural areas in all three scenarios.

The majority of property taxes are paid by households in the top income decile. The effective tax rate increased from 2007 to 2017, but the tax structure was neither completely progressive nor regressive as the tax rate of D1 was higher than those of D2 to D7. This is because the relative value of their real estate holdings, such as farm land, to annual income was higher than those in D2 to D7. An increase in effective tax rate was seen from D8 to D10 as the share of business property increased. LBT would have helped cut the tax burden and the effective tax rate by half for household in D1 to D8 thanks to exemption on the primary house and farm land valued at less than 50 million baht. The tax burden of D9 would have increased slightly, but the tax burden of D10 would have more than doubled as a result of tax collected from business property that was mostly owned by this income class. But if LBT is collected without exemption, the tax burden would further increase for all income deciles. The effective tax rate for the whole observation was lower than 0.5% of annual household income, except for the top decile in 2017.

The property tax burden in Bangkok metropolis was approximately 5 times that of the southern and central regions, even though the value of household real estate was only 3 times higher. The effective tax rate among Bangkok metropolis households also increased continuously from 2007 to 2017, conforming to the rising property prices and rapid economic growth in the region. LBT would have doubled the tax burden for Bangkok and other metropolitan households. Households in the southern and central region would have benefitted from LBT as their tax burden would have been reduced by the exemption on housing and farming property. But if the tax exemption is lifted, the real estate tax burden will increase in all regions.

In the first scenario, taxes on real estate collected by local government comprise building and land tax (BLT) and local development tax (LDT). BLT is levied on business property at the rate of 12.5% of annual returns on the property, which violates the principle of horizontal equity because properties of the same value are taxed differently (Chaihard, 2012). LDT is levied on residential and farming property, but the appraisal price used as the tax base dates back in 1978-1981. In addition, most of the property is exempted. Statistics show that 95% of real estate tax revenue is collected from BLT, and 5% is collected from LDT. The effective tax rate of BLT increase from 0.13% to 0.19% as returns on property increase, but the effective tax rate of LDT stalls at 0.01%-0.02%. The effective tax rate among D10 increased from 0.14% to 0.20% in the first scenario.

In the second scenario, LBT raises more revenue than did the old property tax, but the effective tax rate is lower. Most LBT revenue would be collected from owners of business property, which is concentrated among high income earners. Tax revenues collected on housing and farming property is lower than that collected under LDT because most property is actually exempted under LDT. The empirical evidence demonstrates that LBT could raise more revenue while relieving tax burden on fundamental needs like primary residences and farm land for general households.

In the third scenario, when exemptions are removed, the average tax burden increases around 15% thanks to additional tax collected from residential and farming property. The effective tax rate remains stable at 0.05% of annual income for home owners, and 0.01% for farm owners. The simulation projects that less than 0.001% of the total households would be unable to meet the new tax obligations. Instead of granting exemptions for property based on value, local government could, instead, grant exemptions for those who are financially vulnerable, such as retirees, household located in the areas of rapid development with corresponding rising property values, or in the case of economic upheaval.

The real estate tax burden on urban households from the previous property tax was around three times that of rural households due to the difference in ownership of business property, and higher real estate prices. Their effective tax rate would have increased from 0.24% under previous property tax regime to 0.26% under LBT, and would have increased further to 0.32% from LBT (NE). The real estate tax burden of rural households would be reduced if LBT were applied, thanks to exemption on residential and farming property, but if the exemption were not available, their tax burden would increase as their residences and farm land would now be taxed.

The estimation of tax revenue demonstrates that the majority of tax revenue on real estate is generated by BLT. In addition, LDT is also decreasing in real terms. Despite the exemption on residential property and farm land valued at less than 50 million baht (99% of the property), LBT still raises more revenue for local governments than the previous tax regimen. And the tax revenue would increase further if the exemptions are lifted. It is estimated that the local government revenue from real estate tax would increase from 33.02 billion baht to 37.6 billion baht should LBT be applied, and would increase to 41.60 billion baht if it were applied without exemptions.

The policy implications from this study are as follow:

1. Inequality in real estate ownership is higher than that of income. The problem can be persistent because land price tends to appreciate. The effective tax rate of the previous real estate tax, especially local development tax, was very low due to outdated values and absence of standardized administration. Therefore, the cost of holding unused land is very low, and presents the opportunity to acquire land for the purpose of price speculation. This study supports the use of LBT because it raises the holding cost for investors, and stimulates development of the land. However, it might

discourage people from savings in the form of real estate or buying a piece of land for the future use, such as building a house or planting crops.

2. LBT may help reduce income inequality more effectively than the previous property tax. The effective tax rate for low- and middle-income households is lower because residential and farming properties, which are the primary real assets, are exempted. The effective tax rate of high-income households is increased because the business property is mostly owned by high income households, and the tax rate on business property is higher and more progressive. LBT can also raise more revenue for local governments with a lower effective tax rate because it covers all types of property, thus, the tax base is broader. To achieve greater efficacy, updated appraisal prices and the standardized tax administration are required.

3. LBT can be applied without exemptions. The empirical result shows that more than 99.99% of households would be able to pay LBT even without the existing first 50 million baht exemption. Instead of basing exemptions on property value, tax exemptions should be based on the needs of economically vulnerable groups such as retirees, people living in the rapid developing areas such as in the EEC area or along the BTS lines, where land prices may increase much more rapidly, or households/tax payers that incur investment losses. The government should consider special tax treatment for these groups, such as special exemptions or deferred payments within reasonable limits. Furthermore, temporary relief in cases of economic upheaval, like the 90% reduction in tax to support the economy during the Covid-19 pandemic, may be considered for specific situations and limited time periods.

4. Land and building tax may aggravate the problem of asset concentration. People who cannot afford to pay tax and do not have enough financial resource for investment on their property may have to sell their property to the investors and land developer who have already owned a vast amount of real estate in the country. The government may provide a financial support or credit access for people in these group to develop or invest in their property.

The challenge in this study related to the data available on the household real estate ownership because real estate prices are very subjective and depend on many surrounding factors. The actual price is known only when a transaction occurs. The data from the Socio-economic survey include only real property owned by households, and may not include the value of unused land or business property owned by a juristic person. Thus, actual tax revenue can be higher than the study model projects.

The limitation in this study is that the value of household real estate ownership is recorded as the total value. It is possible that household owned real estate in more than one jurisdiction, so the value per piece of land is lower than the aggregate value. Less than 1% of total value of real estate exceed the 50 million baht exemption, but the simulation result in the third scenario may be higher due to the progressive tax structure.

This study contributes to the literature in the field by demonstrating the distribution of household real estate ownership based on value, which reflects potential purchasing power. It also provides numerical evidence on the efficacy of land and building tax to those who are interested in the topic; such information may be useful to the Thai governmental authorities for future improvements to the new tax regimen. Adoption of land and building tax would prompt the government and related authorities to update and record the price of real estate, which can be used to provide a more accurate result in the future.

Chapter 4

The Effect of Tax Policy Reform on Personal Income Tax Liabilities in Thailand

Abstract

This study analyzes the effects of personal income tax policy reform in Thailand on the personal income tax liabilities of Thai taxpayers between 1996 and 2017. During those 21 years, the marginal tax rate decreased, while the amount of allowances, deductions, and exemptions were increased. This study utilizes pooled cross section data of the Socio-Economic Surveys (SES) of 1996, 2007, and 2017. The Heckman Selection Model is applied in this study, and AIC and BIC values are used to judge the goodness of fit. This study contributes to the field by estimating changes in personal income tax liabilities resulting from key policy changes in the Thai personal income tax regimen at the individual level over a 21-year period. It also provides analysis by occupation subgroup to demonstrate the effect of unequal taxation among the population. The empirical results from the pooled data demonstrate that personal income tax policy reform increased the probability of an individual owing personal income tax, but decreased the amount of tax paid on average. A decrease in marginal tax rate reduced average individual income tax liabilities for every 1,000 baht of assessable income by 21.67 baht in 2007, and by 27.18 baht in 2017, as compared to personal income tax (PIT) in 1996. The allowances and deductions relating to elderly dependents reduced PIT by 22,536.82 baht in 2017. The results of regression by occupation group shows that professionals comprised the largest percentage of tax payers (57.41%), followed by capital earners (32.79%), and laborers (27.37%). The PIT of professionals increased by 319.41 baht for every 1,000 baht increase in AGI, while the PIT of laborers increased by 373.43 baht. The changes in tax structure helped reduce PIT for professionals by 155.30 baht, and by 235.92 baht for laborers in 2017 as compared to 1996. Deductions on insurance helped decrease PIT by 3,247.42 baht for welfare recipients, and by 2,252.77 baht for professionals in 2017. Deductions on long term financial investments decreased PIT among farmers and entrepreneurs. An increase in the elderly allowance helped reduce the tax burden for professionals, laborers, and welfare recipients. Also, the effect of changes in the PIT regimen were largest among professionals and laborers because the main income for these groups is from wages and salary. Deductions that are positively correlated with income helped motivate the desired behavior, such as an increase in insurance purchases and charity contributions. The empirical results show that the effect of tax policy reform depends on both the share of itemizer and level of income.

Keywords: Personal income tax reform, income tax elasticity, developing countries

4.1 Introduction

From 1996 to 2017, personal income tax policy in Thailand moved toward lower tax rates with higher allowances, deductions, and exemptions. The income tax threshold was gradually increased, whereas marginal tax rates were decreased. Moreover, the government increased tax allowances related to personal expenses and child & elderly care in order to relieve tax burden brought on by increasing cost of living and dependency ratio. Tax deductions and exemptions for health insurance and long term investments, which include long-term equity funds (LTF), retirement mutual funds (RMF), and other provident funds, were used to motivate long term saving and stimulate economic growth from financial investment. On one hand, these changes in the personal income tax regimen can change the spending and saving behavior of tax payers; on the other hand, the deductions and exemptions that are correlated with income level, such as LTF, and RMF deductions, may reduce tax progressivity. In addition, these tax benefits are counted as tax expenditure that could be used to provide subsidies for those in need (Ananapibut, 2012; Muthitacharoen, 2017; Muthitacharoen & Phongpaichit, 2020).

Personal income tax in Thailand captures mostly income from wages and salary. As a result, the majority of tax payers are wages earners. Income of those working in the informal sector may not be fully recorded and may be lower than the tax threshold (Jitsuchon & Plangpraphan, 2011). In addition, different occupations receive different and unequal deductions from their assessable income. Therefore, this study aims to investigate how changes in tax policy affect the income tax burden for each occupation group. It is expected that those who are wage earners, such as professionals and laborers, will be found to experience the highest impact from changes in personal income taxation.

Research in tax elasticity can be done in two ways. First, a researcher can measure the behavioral response or elasticity of taxable income, capital gains, savings, or charity contributions with respect to changes in a tax regimen. Second, a researcher can measure tax revenue elasticity to demonstrate the effect from behavioral responses to personal income tax liability or tax revenue collected by the government. This approach to the study of tax elasticity has rarely been done, yet is important because it demonstrates the effects of changes in tax policy in the final stage. This, then, is a literature gap to be filled.

The objective of this study is to estimate the effect of changes in a personal income tax regimen on the personal income tax burden, which is tax revenue for the government. The study contributes to the field by demonstrating how changes in personal income tax policy affect personal income tax liabilities of individuals. This study makes use of pooled cross-sectional data of Thai household from the Socio-Economic Surveys (SES) provided by the National Statistical Office (NSO) for the years 1996, 2007, and 2017. This 21-year period covers major changes in personal income tax policy. The key policy changes in this study comprise the lowering of marginal tax rates, higher tax thresholds, increasing limits for personal, spouse, child, and elderly allowances, and higher limits on deductions and exemptions for insurance premiums, charity contributions, and long-term investments. The analysis is done in two sections. First, the model on the pooled population is regressed in order to select

the model that best fits with the data using Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC) values. The robustness check is performed by comparing the OLS, Tobit regression and the Heckman Selection Model. The result shows that the probability of having personal income tax burden is not random, and the error term in the selection equation and regression are correlated. Therefore, the Heckman Selection model is applied in this study. Then, the regression analysis is run by occupation group to demonstrate the effect of personal income tax policy reforms on each occupation subgroup.

This study contributes to the field by filling the gap on "the other side" of the equation of tax elasticity, and focuses on the effect at the individual level. Much research has been done on how changes in tax policy affect household behavior, but there is still much to learn about the end result of these changes, which is how much income tax the individuals have to pay, and how changes in tax policy increase or decrease the amount of revenue collected. The empirical results in this study provide numerical evidence on how tax allowances, deductions, and exemptions affect personal income tax elasticities. The results from Tobit Heckman Selection Model are used to estimate the changes in personal elasticity with respect to the key changes in the Thai personal income tax regimen from 1996 to 2017, which led to changes in the tax burden and personal income tax revenue. It is also important to note that while most of the research in personal income elasticity is done at the aggregate level, the analysis in this study is done at the individual level.

This study is organized as follows: Section 2 presents related theories and background knowledge regarding the effect of tax policy changes on tax revenue elasticity, tax expenditure, and changes in Thai personal income tax policy. Section 3 describes the methodology used in the TOBIT model and the Heckman Selection Model to estimate the changes in tax revenue in response to changes in tax policy. Sections 4 presents summary statistics of Thai household annual income per capita and the distribution of personal income tax. Section 5 reports the empirical results of changes in tax revenue elasticity, and additional analysis by occupation group. Finally, the conclusion and policy implications are presented in Section 6.

4.2 Literature review

1) Elasticity of personal income tax

Research in tax elasticity usually deals with 2 type of elasticities (Creedy & Gemmell, 2010). The first is income tax elasticity, which analyzes the effect of change in exogenous variables such as changes in the tax rates on taxable income. The latter is tax revenue elasticity, which measures the effect of independent variables on the amount of personal income tax paid. This type of analysis focuses on the policy implication. For example, one might be interested in whether decreasing the marginal income tax rate decreases or increases tax revenue, and how deductions and exemptions would alter the revenue collected.

Change in tax revenue is a mixed result of policy effects and household behavioral responses. Household behavioral responses involve elasticity of taxable income and tax revenue elasticity. When there is a change in statutory tax rules, the amount of revenue collected is affected by two mechanisms. For the first, the policy effect, when tax rate increases, the amount of tax revenue increases. For the second,

the behavioral effect, changes in tax rates alter the elasticity of taxable income (ETI). Specifically, if taxable income increases, the tax revenue increases. Considering only the structural part, revenue elasticity with respect to changes in taxable income decreases as income increases within a tax bracket, but there is a surge in elasticity as an individual moves to a higher tax bracket (Creedy & Gemmell, 2013).

Personal income tax revenue does not depend only on tax rates and household income, it is also influenced by other tax policy elements like deductions and exemptions, and other surrounding factors such as inequality (Creedy & Gemmell, 2004, 2010, 2013; Hutton & Lambert, 1980; Ram, 1991; Tanzi, 1969).

Tanzi (1969), Caminada and Gourwaard (1996) and Creedy and Gemmell (2013) focused on the effect of household income on personal income tax burden. Hutton and Lambert (1980) modified the Tanzi (1969) model by adding income tax rates, tax allowances, and number of tax payers to their model. Hutton and Lambert, (1980), Lambert (1982), and Ram (1991) include income inequality in their calculations.

Tax revenue varies according to tax rate, allowances and number of tax payers. Hutton and Lambert (1980) calculated tax revenue elasticity of the UK from the Inland Revenue statistics over fiscal years 1973-1977. The findings demonstrate that tax revenue elasticity decreased from 1.91 to 1.72 from 1973/4 to 1975/6, and then increased to 1.83 in 1977/8. The empirical findings also indicate that allowances are major contributors to tax revenue elasticity. For example, in 1975/6, the allowance term in elasticity is equal to 1.64 and the total elasticity is equal to 1.72. When the percentage change in allowances is lower than the percentage change in income growth, revenue elasticity drops.

Tax structural reform can inadvertently lower the tax revenue collected if the government assumes constant pre-tax income and household behavior. Caminada and Goudswaard (1996) analyzed the revenue effect of the 1990 "Oort" tax reform in the Netherlands. At that time the government abandoned deductions for social security, reduced personal exemptions by 38%, reduced the number of tax brackets from 9 to 3, and lowered the marginal tax rates to 35%, 50%, and 60% respectively (compared to the previous maximum tax rate of 70%). However, the pre-tax income did not remain constant. It increased at the rate of 2.3%, 3.9%, 4.5% and 3.4% during 1990-1993. The actual personal income tax revenue decreased by 0.59% in 1990, and by up to 3.79% in 1993 when compared to that in 1989. The tax revenue elasticity decreased from 1.475 in 1989 to1.220 in 1990. Lowering the personal exemption caused a 54.9% decrease in tax revenue elasticity, and the broadening tax structure caused a 15.1% decrease. The authors pointed out that a decrease in tax revenue elasticity with respect to income leads to decreased extra revenue that could have been collected from an increase in the pre-tax income, and the income-related deductions reduce the revenue that could have been collected due to a smaller increase in taxable income.

Reducing marginal tax rates with the same threshold has a positive effect on tax revenue. Elasticity of taxable income (ETI) decreases at a slower pace for all income levels, and the lower MTR has the effect of increasing tax revenue collected (Creedy & Gemmell, 2013).

Changes in personal income tax regimens affect household behavior in many ways, such as changing the levels of charitable contributions, insurance purchases or financial investment. These changes result from the combination of income effect and

price effect, and tend to be stronger among high-income tax payers who face high marginal tax rates.

Auten, Sieg, and Clotfelter (2002) analyzed the effect of US tax reforms in 1981 and 1986, which resulted in lower marginal tax rates, and which changed the number of tax brackets. The data used in this study comprised a panel of tax returns of 1979-1993 provided by the Internal Revenue Service. The statistics show that the amount of charitable contribution is positively correlated with income; thus, the amount of contribution is negatively correlated with the tax price because of the progressive tax rate. From 1980 to 1986, the weighted average income increased from 68,774 USD to 85,803 USD, and the average amount of charitable contributions increased from 1,750 USD to 2,255 USD. The tax price of charity increased from 0.686 to 0.761 during the study period. The elasticity of charitable giving with respect to persistent income and transitory income during 1980-1992 equal 0.87 and 0.29, while the elasticity of charitable giving with respect to their persistent and transitory tax price equaled -1.26 and -0.40 respectively. The empirical result from pooled OLS regression demonstrated that the income elasticity equaled 0.89, and the price elasticity equaled -0.69. The authors pointed out that tax payers are more responsive to persistent changes in the price of giving; that is, a persistent increase in income would result in higher charity contributions, while a decrease in marginal tax rate would reduce the amount of charity contribution.

Changes in tax policy affect household behaviors; thus, they influence the household portfolio composition and the tax revenue that the government collects (Burman & Randolph, 1994; Dowd, McClelland, & Muthitacharoen, 2015; Poterba & Samwick, 2003).

Households facing higher marginal tax rate tend to allocate their funds to tax advantaged accounts such as tax-exempt bonds, tax-deferred accounts and corporate stock. Poterba and Samwick (2003) examined the changes in US household portfolio composition from the Surveys of Consumer Finances (SCF) of 1983, 1989, 1992, and 1995 which covers the Tax Reform Act 1986, and Omnibus Budget Reconciliation Act of 1993 (OBRA93)[46]. It was found that the probability of owning each type of financial asset increases with level of household income and net worth, especially with respect to financial equity (directly held), tax-deferred equity and bonds, and interest-bearing accounts. The PROBIT coefficient of owning publicly traded stock in 1998 increased from 0.195 to 0.213 when annual income increased from 15,000 USD to more than 250,000 USD. This coefficient also increased from 0.478 to 1.926 when net worth increased from 50,000 USD to greater than 1,000,000 USD. The ownership probability also increased with age and level of education. The findings from PROBIT regression show that the probability of holding equity that was less heavily taxed (both directly held and held in mutual fund), and tax-deferred equity and bonds are positive and statistically significant with an increase in MTR. The findings from the TOBIT regression show that a 10 percentage point increase in marginal tax rate would increase

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[46] The Tax Reform Act 1986 lowered the marginal tax rate of the top income bracket from 50% in 1986 to 28% in 1988, and limited the tax rate on realized gains to 28%. The Omnibus Budget Reconciliation Act of 1993 (OBRA930) raised the top marginal tax rate to 39.6% (36% plus 10% surtax)

the share of tax-exempted bonds in the portfolio by 18.4% in 1998, and would decrease the share of interest bearing accounts by 3.2%.

Capital gains realization is positively correlated with permanent income, but negatively correlated with current income. Burman and Randolph (1994) analyzed the effect of the US Economic Recovery Tax Act (ERTA) 1981 on household capital gains realization. The findings indicate that a 1% temporary decrease in the temporary tax rate would increase gains realization by 6.42% (ε_t =-6.42), and a 1% decrease in permanent tax rate would increase gains realization by 1.8% (ε_p = -0.18). The amount of gains realization declines with age from 20 to 59, and then increases for the 60-69 year old group, and gains realization is higher among retirees.

In addition, long-term realization is more responsive to changes in tax rates than the decision to realize gains. Dowd et al. (2015) examined the effects of persistent tax changes from the transitory ones. The researchers estimated gains realization from a panel data of tax returns from 1990 to 2008 which covered 2 main tax acts: the Economics Growth and Tax relief Reconciliation Act of 2001(EGTTRA) and the Jobs and Growth Tax relief Reconciliation Act (JGTRRA) in 2003 using Tobit type II. The inverse Mill ratio was calculated from the PROBIT regression. Apart from general population characteristics such as age, marital status, and family size, the model included variables to increase the model's validity. For instance, the number of short-term transactions and a dummy variable for short-term losses were added to address the incentives from carryover loss. The dummy variable for years was used to account for the macroeconomics shock that affected the entire population. They also add instrument variables such as the "first dollar" marginal tax rate and the maximum combination of state and federal tax rates that were uncorrelated to level long-term realization, but correlated with the present and future tax rates. The findings indicate that the elasticity of persistent tax changes is equal to -0.79, and the transitory tax change is equal to -1.2. The transitory result is smaller than the estimates from models in previous works. It was also found that the elasticity on long run capital proceeds from other types of assets such as trusts and partnerships is larger than -1, while the elasticity on mutual fund proceeds is almost zero.

The Thai personal income tax regimen has been moving toward lower tax rate with higher tax benefits for quite some time. The level of allowances, deductions and exemptions has been gradually increasing. This sort of personal income tax reform aims to relieve the tax burden for low- and middle-income tax payers, and the lower tax rates are intended to broaden the tax base and increase tax compliance.

From1988 to 2003[47], the personal income tax elasticity with respect to income among Thai people gradually decreased as a result of personal income tax reform. Personal income tax elasticity among the low income group decreased from 0.181 in 1988 to 0.002 in 2003 (a decrease of 0.171), whereas the elasticity of the middle income group decreased from 0.810 to 0.019 (a decrease of 0.791), and the personal income tax elasticity of the high income group decreased from 0.475 to 0.347 (a decrease of 0.121) over the same period.

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[47] From 1988 to 2003, the marginal tax rate decreased from 7%-55% (top bracket >2 million baht) to 5%-35% (top bracket >4 million baht). The personal allowance increased from 13,000 baht to 30,000 baht. The deductions on insurance premium and home mortgage interest also increased from 7,000 baht to 10,000 baht each.

Professional employees had the highest personal income tax elasticity, followed by general employees, and they are also the groups that benefited the most from the changes in the personal income tax regimen (Wannajitjaroon, 2008).

Despite personal income tax reform, the effective tax rate of the Thai population still increased during the study period. From 2003 to 2011, the effective tax rate for people in the lowest income decile increased from 0.09% to 0.46%, while that of people in D10 increased from 4.66% to 6.09%. The amount of insurance premiums paid increase from 0.06% to 1.52% of total income, and the share of home mortgage interest paid also increased from 0.06% to 1.52% over the same period. However, the charitable contributions decreased from 0.24% to 0.09%.

Changes in the personal income tax burden were estimated using the Tobit model and demonstrated that, in 2011, if an average worker's wages and salary were to increase by 10,000 baht, then that person was estimated to pay 408.90 baht more in personal income tax, but if that individual were in the top income decile, his or her personal income tax burden would increase by 697.00 baht.

Personal income tax liabilities also increase with age and higher education attainment, holding all else equal. On average, it was found that, for each year added to a person's age, his or her personal income tax would increase by 93.5 baht, or by 939.3 baht if he or she were the top income decile. Furthermore, each added year of education led to a 703.8 baht increase in the tax burden among those who had income. The rationale for these findings is that people gain more experience as they get older, and those with higher education levels are more productive.

Charitable contributions were found to have no significant effect on the tax burden, while an increase in insurance payments of 10,000 baht was related to a 100 baht increase in personal income tax for the middle class (Limkrayarot, 2015).

Although child allowance and deduction on home mortgage interest apply equally to all tax payers, those with higher incomes still gained greater benefit because they have higher marginal tax rates.

 2) Tax expenditure

The government provides for tax deductions and allowances to alleviate tax burden and stimulate investment and saving. Personal and family allowances and exemptions are uniform across all income levels. However, some tax deductions and exemptions increase with the income level, benefitting high-income tax payers. It also should be kept in mind that these tax benefits are tax expenditures or lost revenue that could have been used to provide subsidies for the less privileged or to finance infrastructure that benefits long term economic growth.

Tax expenditure is the loss of revenue that could have been collected from statutory tax structure but was not due to tax subsidies or tax incentives proposed to benefit particular class of population, industry or activities The United States, Canada, United Kingdom and OECD countries routinely project tax expenditure in order to estimate the revenue losses from the special tax provision. Actually, these tax credits, deductions and exemptions are one form of government spending (Burman, 2003; Surrey, 1985; Treasury, 2016).

In the United States, exclusion of employer-paid health insurance, exemptions of imputed rental income and capital gains, the mortgage interest deduction, and deduction of non-business state and local taxes are in the top 10 income tax expenditures (Burman, 2003 and US department of the treasury, 2015). Deductions for

mortgage interest, state and local tax, property tax, and charitable contributions are mostly utilized by households with annual income of $100,000 and over. Child tax credits and dependent care deductions are primarily utilized by those in the middle-income class, and Earned income tax credit (EITC) is mostly claimed by low income households (Joint committee on Taxation, 2015). Feldstein (2015) estimated that if the government limited the total income tax exemptions and deductions to only 2% of adjusted gross income, $141 billion in personal income tax revenue would have been collected.

Thai personal income tax law contains five major tax deductions: deductions for mortgage interest, insurance premiums, provident fund contributions, LTF (long-term equity fund) contributions, and RMF (retirement mutual fund) contributions. The deductions for mortgage interest and insurance premiums are capped at 100,000 baht each. The deduction on provident fund and RMF contributions is limited to15% of assessable income or 500,000 baht, and the LTF contribution deduction is also limited to15% of assessable income or 500,000 baht[48]. These deductions are tax subsidies that the Thai government uses to promote long term saving and increasing the stability of the financial market. The majority of these deductions are claimed by high-income people, especially the deductions for LTF and RMF contributions.

The Thai government has introduced a great number of tax exemptions in order to encourage investment activity and stimulate economic growth. Tax exemptions, especially for LTF and RMF investments, which are positively related to income, result in large tax expenditures.

The analysis of 2009-2012 income tax returns (PND 90 and 91) shows that only 50% of PND 90 and 91 filers were actually subject to personal income tax. In fact, 75% of PIT was paid by people with assessable income greater than 1 million baht per year. The total expense and allowance deductions comprised 27.33% of assessable income; the tax base was decreased to 72.76% of assessable income. These deductions increased the income share of people with assessable income of more than 1 million baht per year (5% of tax filers) from 32% to 39%, and decreased the income share of the lowest tax bracket (85% of tax filers) from 47% to 39% (Chawanote & Laovakul, 2017).

It is estimated that in 2010, the total exemptions from employment P.N.D. 90 and 91 filings were equal to 18.2% of assessable income, and the effective tax rate was reduced to only 7.17%. Allowances and exemptions on RMF and LMF investments, donations, and provident fund contributions were much higher among the top tax bracket taxpayers. For example, in 2008, it is estimated that the tax payer who had taxable income greater than 20 million baht deducted 574,231 baht from his or her assessable income for LTF investment, whereas this amount is only 41,531 baht for those who had 150,000-200,000 baht in taxable income (Ananapibut, 2012). In 2017, the total tax expenditure equaled 108,200 million baht, or 0.72% of Thai GDP. The

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[48] Tax deductions on LTF were replaced with tax deductions on SSF (Super Saving Fund) commencing Tax year 2020. Tax payers are required to hold and invest in the SSF fund for at least 10 years (instead of 7 years for LTF). Tax payers can deduct up to 30% of their taxable income, but not exceeding 200,000 baht, and not exceeding 500,000 baht when combined with RMF and other provident funds. The deductions on RMF have also been increased from 15% to 30% of taxable income, but not exceeding 500,000 baht when combined with other provident funds.

tax expenditure from saving and investment stimulus packages contributed 0.32% of GDP, or around 50,000 million baht (Muthitacharoen, 2017).

An analysis using 2012 personal income tax returns by Muthitacharoen and Phongpaichit (2020) shows that 75.4% of these deductions were granted to the top quintile of tax payers, while only 24.6% were granted to those in the other four quintiles. The percentage of tax payers with LTF and RMF deductions was much higher among the top quintile (30.8% for LTF deduction and 14.9% for RMF deduction), while the percentage of these deductions was less than 0.5% in the lowest quintile. The taxpayers in the top income quintile also received greater benefits from these two deductions. The amount of subsidies on LTF and RMF deductions equaled 2.5% and 1.9% of net of expense income, respectively, for the top quintile, while the subsidies claimed by those in the other four quintiles totaled less than 1%. Tax deductions for mortgage interest, insurance premiums, and provident fund contributions helped increase tax progressivity because the percentage of beneficiaries does not vary much between income quintiles. However, the deductions for LTF and RMF investments decreased tax progressivity because the majority of the beneficiaries were those with high income as they received much larger subsidies and paid much lower after-tax investment prices.

These major tax deductions decreased the number of personal income tax payers; however, the percentage of Thai people who benefitted from them was pretty small. As of 2014, the Thai population equaled 65.7 million people, with 38.3 million employed in the labor market. There are only 10.3 million P.N.D. 90 and 91 filers, but the number of tax payers was only 4 million. Among the tax filers, 3.66% were exempt because their income was lower than the tax threshold of 150,000 baht[49]. Further, 70% of tax filers also had no liabilities because of low taxable income.

Previous studies show that tax allowances, deductions and exemptions decrease personal income tax for tax payers and lower tax revenue. However, the population share of tax payers is very small compared to the whole population. This study aims to examine how these deviations from the statutory tax rates affect the population as a whole.

Previous research findings indicate that laborers in each employment sector face different effective tax rates because of tax loopholes. Wage and salary deductions are usually handled by employers of laborers in the formal and they tend to earn higher income, while laborers in informal sector tend to earn less than the tax threshold and their income might not be properly recorded. More than half of Thai laborers are in the informal sector, which results in a low number of tax filings. The small number of taxpayers is a result of loopholes in tax filing and underreporting (Ananapibut, 2012; Chandoevwit & Jawala, 2011; Jitsuchon & Plangpraphan, 2011).

Over 2000-2007, the effective rate of personal income tax increased from 3.6 to 4.6% (Chandoevwit, 2011). Research findings demonstrate that an increase in wages and a higher proportion of the labor force in the formal sector result in increased household tax liabilities (C. Santhi, 2013; Sarntisart, 2000).

The empirical analysis using the Socio-economic Survey 2007 shows that households that earn income mainly from business and farming activities tend to pay less tax than do others with same level of income. Informal laborers have low and fluctuating income; therefore, their income is lower than the tax threshold and harder

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[49] www.thaipublica.org

to assess. Moreover, a major proportion of other laborers also earn less than the tax threshold. Importantly, the high wealth concentration among rich households enables them to lower their tax burden via exemptions and tax arbitrage. Despite earning greater income than other subgroups, effective tax rates among employers is less than 2% (Chandoevwit & Jawala, 2011; Jitsuchon & Plangpraphan, 2011).

This study also provides additional analysis by occupation group to demonstrate the horizontal inequity in taxation caused by personal income tax policy.

3) Personal income tax policy reform in Thailand

Over 1996-2017, there was a decrease in marginal tax rates and an increase in the number and amount of tax deductions and exemptions. A summary of personal income tax structure over 1996- 2020 is shown in Tables 4.1, and tax allowance by income category is presented in Table 4.2. The summary of changes in deduction and exemption is presented in Table 4.3.

Table 4.1 Thai personal income tax rate: 1996, 2007, and 2017

1996				
Taxable income	Net income of tax bracket	Tax rate	Tax liabilities	Accumulate tax burden
1-100,000	100,000	5	5,000	5,000
100,001-500,000	400,000	10	40,000	45,000
500,001-1,000,000	500,000	20	100,000	145,000
1,000,000-4,000,000	3,000,000	30	900,000	1,045,000
>4,000,000		37		>1,045,000
2007				
Taxable income	Net income of tax bracket	Tax rate	Tax liabilities	Accumulate tax burden
1-100,000	100,000	5	Exempted	0
100,001-500,000	400,000	10	4,0000	40,000
500,001-1,000,000	500,000	20	100,000	140,000
1,000,000-4,000,000	3,000,000	30	900,000	1,040,000
>4,000,000		37		>1,040,000
2017-present				
Taxable income	Net income of tax bracket	Tax rate	Tax liabilities	Accumulate tax burden
1-150,000	150,000	0	Exempted	0
150,001-300,000	150,000	5	7,500	7,500
300,001- 500,000	200,000	10	20,000	27,500
500,001-750,000	250,000	15	37,500	65,000
750,001- 1,000,000	250,000	20	50,000	115,000
1,000,001- 2,000,000	1,000,000	25	250,000	365,000
2,000,001- 5,000,000	3,000,000	30	900,000	1,265,000
>5,000,001		35		>1,265,000

Source: The Revenue Department (RD)

Table 4.2 Deduction allowed for the calculation of PIT by source of income for tax year 2020

Type of Income	Deduction
a. Income from employment	40% but not exceeding 60,000 baht
b. Income received from copyright	40% but not exceeding 60,000 baht
c. Income from letting out of property on hire	
1) Building and wharves	30%
2) Agricultural land	20%
3) All other types of land	15%
4) Vehicles	30%
5) Any other type of property	10%
d. Income from liberal professions	30% except for the medical profession where 60% is allowed
e. Income derived from contract of work whereby the contractor provides essential materials besides tools	actual expense or 70%
f. Income derived from business, commerce, agriculture, industry, transport, or any other activities not specified in a. to e.	actual expense or 65% - 85% depending on the types of income

Source: www.rd.go.th

There are 8 categories of assessable income for personal income tax in Thailand, and income in each category is subject to difference allowances. Moreover, Thai personal income tax law treats people differently according to their occupations and sources of income. Table 4.2 presents the deductions allowed for the calculation of PIT by income categories[50]. In 2017, tax payers who earned income mainly from wages and salary and other assessable income under Revenue code section 40(1) and (20) -- which is the majority of tax payers -- were able to deduct up to 50% from their assessable income, but not more than 100,000 baht. Other professions, such as physicians, engineers, or accountants who had income under section 40(6) were able to deduct 30%-60% without limit. Up to 70% of income derived from contract work could be deducted, and up to 80% of income from agricultural activity could be deducted. These preferential tax treatments do not conform to the horizontal equity of taxation because people with the same level of income were subjected to different tax liabilities

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[50] Income from employment includes income derived from employment and income derived from post or form performance of work. Please see Appendix C for the personal income tax code of Thailand.

Table 4.3 Summary of personal income tax deductions and exemptions in Thailand: 1996, 2007, 2017, 2020

Change in personal income tax benefit	1996	2007	2017	2020
Deduction allowed for the calculation of PIT	40% of assessable income, but not exceeding 60,000 Baht	40% of assessable income, but not exceeding 60,000 Baht	50% of assessable income, but not exceeding 100,000 Baht	50% of assessable income, but not exceeding 100,000 Baht
Personal Allowance	30,000 Baht	30,000 Baht	60,000 Baht	60,000 Baht
Spouse Allowance	30,000 Baht	30,000 Baht	60,000 Baht	60,000 Baht
Child allowance (Child under 25 year of age)	15,000 Baht each plus 2,000 Baht if the child is studying in educational institute in Thailand (up to 3 children)	15,000 Baht each plus 2,000 Baht if the child is studying in educational institute in Thailand (up to 3 children)	30,000 Baht each (No limit)	30,000 Baht each (No limit) plus additional 30,000 Baht for second child onwards born after 2018 plus antenatal care and delivery expense up to 60,000 baht for a child born from 1st January 2019 onwards

Change in personal income tax benefit	1996	2007	2017	2020
Parents allowance	None	30,000 Baht for each of tax payer's and spouse's parents if such parent is above 60 years old and earn less than 30,000 Baht	30,000 Baht for each of tax payer's and spouse's parents if such parent is above 60 years old and earn less than 30,000 Baht	30,000 Baht for each of tax payer's and spouse's parents if such parent is above 60 years old and earn less than 30,000 Baht
Disable person or Incompetent Person Support	None	None	60,000 Baht for each qualified/incompetent person	60,000 Baht for each qualified/incompetent person
Life insurance premium paid by tax payer or spouse	Amount actually paid but not exceeding 10,000 Baht each	Amount actually paid but not exceeding 10,000 Baht each. The amount greater than 10,000 Baht can be deducted but not greater than taxable income or not exceeding 40,000 Baht	Amount actually paid but not exceeding 10,000 Baht each. The amount greater than 10,000 Baht can be deducted but not greater than taxable income or not exceeding 100,000 Baht plus pension insurance at the rate of 15% of taxable income but not exceeding 100,000 Baht**	Amount actually paid but not exceeding 10,000 Baht each. The amount greater than 10,000 Baht can be deducted but not greater than taxable income or not exceeding 100,000 Baht plus pension insurance at the rate of 15% of taxable income but not exceeding 100,000 Baht***

Change in personal income tax benefit	1996	2007	2017	2020
Approved provident fund contributions paid by taxpayer or spouse	None	Amount actually at the rate not more than 15% of assessable income*	Amount actually at the rate not more than 15% of assessable income**	Amount actually paid at the rate not more than 30% of assessable income***
Retirement mutual fund	None	Amount actually at the rate not more than 15% of assessable income *	Amount actually at the rate not more than 15% of assessable income**	Amount actually paid at the rate not more than 30% of assessable income ***
Government pension fund	None	Amount actually at the rate not more than 15% of assessable income *	Amount actually at the rate not more than 15% of assessable income**	Amount actually paid at the rate not more than 30% of assessable income***
Private teacher aid fund contribution	None	Amount actually at the rate not more than 15% of assessable income *	Amount actually at the rate not more than 15% of assessable income **	Amount actually paid at the rate not more than 30% of assessable income***
Long term equity fund	None	Amount actually at the rate not more than 15% of wage, but not exceeding 300,000 Baht	Amount actually at the rate not more than 15% of wage, but not exceeding 500,000 Baht	Replaced with the Super Saving Funds in 2019

Change in personal income tax benefit	1996	2007	2017	2020
National Saving Fund Contribution	None	None	Amount actually paid **	Amount actually paid***
Super Saving Fund(SSF)		None	None	Amount actually paid during 1 January 2020 to 31 December 2024 not more than 30% of taxable income and not exceeding 200,000 baht*** plus the purchasing of Super Saving Fund Extra (SSF-Extra) during 1 January 2020 to 30 June 2020 up to 200,000 Baht
Social insurance contribution paid by taxpayer or spouse	Amount actually paid	Amount actually paid but not exceeding 9,000 Baht	Amount actually paid but not exceeding 9,000 Baht	Amount actually paid but not exceeding 9,000 Baht
Home mortgage interest	Amount actually paid but not exceeding 100,000 Baht	Amount actually paid but not exceeding 100,000 Baht	Amount actually paid but not exceeding 100,000 Baht	Amount actually paid but not exceeding 100,000 Baht

Change in personal income tax benefit	1996	2007	2017	2020
Terminal pay	None	Not exceeding wage and salary of the last 30 days, but not exceeding 300,000 baht	Not exceeding wage and salary of the last 30 days, but not exceeding 300,000 baht	Not exceeding wage and salary of the last 30 days, but not exceeding 300,000 baht
Personal allowance (for taxpayer age 65 years and older)	None	190,000 Baht	190,000 Baht	190,000 Baht
spouse allowance (who is 65 years and older)	None	190,000 Baht	190,000 Baht	190,000 Baht
Insurance premium for elderly parent			amount actually paid but not exceeding 15,000 baht	amount actually paid but not exceeding 15,000 baht
Charitable contributions for educational purpose	None	2 times of contribution but not exceeding 10% of taxable income	2 times of contribution but not exceeding 10% of taxable income	2 times of contribution but not exceeding 10% of taxable income
Charitable contributions for sport activity	None	1.5 times of contribution but not exceeding 20% of taxable income	2 times of contribution but not exceeding 10% of taxable income	2 times of contribution but not exceeding 10% of taxable income

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Change in personal income tax benefit	1996	2007	2017	2020
Charitable contributions	Amount actually donated but not exceeding 10% of the income after standard deduction and the above allowance	Amount actually donated but not exceeding 10% of the income after standard deduction and the above allowance	Amount actually donated but not exceeding 10% of the income after standard deduction and the above allowance	Amount actually donated but not exceeding 10% of the income after standard deduction and the above allowance
			- Amount actually paid for house repair, but not exceeding 100,000 Baht and for car maintenance not exceeding 30,000 baht for those who are affected by the flood during December1st 2016-May 31st, 2017.	Purchase and Installation of CCTV ; Debit card processing fee
Special tax promotion	None	None	A payment of first home buyer value not greater than 3,000,000 with a complete transfer of ownership during 13 October 2015 to 31 December 2016 may be deductible up to 20% of the purchase price for 5 consecutive tax year (2016-2021)	A payment of first home buyer value not greater than 3,000,000 with a complete transfer of ownership during 13 October 2015 to 31 December 2016 may be deductible up to 20% of the purchase price for 5 consecutive tax year (2016-2021)

Change in personal income tax benefit	1996	2007	2017	2020
			-Special tax promotion up to 15,000 baht from "Shop Chuay Chart" campaign	Shop Dee Mee Kuen: up to 30,000 baht for the purchasing of books, e-books and registered OTOP goods

Note*The amount contributing to RMF +Provident Funds+ Government Pension Funds+ Private Teacher Aid Funds must not exceed 300,000 baht

**The amount contributing to RMF +Provident Funds+ Government Pension Funds+ Private Teacher Aid Funds+National Saving Funds+ Pension Insurance must not exceed 500,000 baht

***The amount contributing to SSF+RMF +Provident Funds+ Government Pension Funds+ Private Teacher Aid Funds+National Saving Funds+ Pension Insurance must not exceed 500,000 baht

Source www.rd.go.th

Between 1996 and 2007, the Thai government introduced a tax threshold of 100,000 baht, while the number of tax brackets and marginal tax rates remained unchanged. Additionally, a number of tax deductions and exemptions were introduced. For example, the government implemented deductions and exemptions on LTFs, RMFs and government pension funds. Taxpayers could now deduct contributions to LTFs, RMFs, provident funds, and pension funds up to a limit of 15% of their assessable income. These tax exemptions allowed deductions from assessable income of up to 300,000 baht for LTF contributions, and 300,000 baht for combined contributions to RMFs, provident funds and government pension funds. Under the new rules, taxpayers were able to deduct 1.5 times the value of sport charity contributions and 2 times the value of educational charity contributions.

Items of additional tax relief that were not proportionate to income included deductions for elderly parents (age 60 and over), parents' insurance payments, elderly allowance (age 65 and over), and terminal pay. These allowances reduce the tax burden as a whole. In addition, the Thai government also increased deduction limits on insurance payments, provident funds, housing loan interest and social security.

Between 2007 and 2017, the Thai government increased the tax threshold to 150,000 baht, and increased the number of tax brackets from 5 to 7. As a result, the marginal tax rate of some tax brackets was reduced. The marginal tax rate of taxable income between 100,000-150,000 baht was decreased from 10% to 5%, while the marginal tax rate of taxable income between 500,000-750,000 baht was decreased from 20% to 15%. The marginal tax rate for taxable income between 1 million and 2 million baht was also decreased, from 30% to 25%, while the marginal tax rate for taxable income between 4 million and 5 million baht was decreased from 35% to 30%. In addition, the top marginal tax rate, which applied to taxable income over 5 million baht, was decreased from 37% to 35%.

The personal allowance was also increased from 40% of assessable gross income, with a limit of no more than 60,000 baht, to 50% of assessable income with a limit of no more than 100,000 baht.

Tax deductions and exemption limits for payments to were increased to 500,000 baht on LTFs, and up to a combined total of 500,000 baht on RMFs, provident funds, government pension funds, Private Teacher Aid fund and pension insurance.

Apart from tax relief for house and car maintenance for those who were affected by flooding, there were also special tax promotions for things such as real estate purchases, domestic travel, OTOP purchases, and dining out. In fact, the government regularly introduces these policies on an ad hoc basis in order to stimulate the economy.

As of 2021, the deduction for LTF contributions had been replaced with deductions for contributions to Super Saving Funds (SSFs)[51]. Furthermore, the limits on deductible contributions to SSFs and RMFs, provident funds, government pension funds and Private teacher Aid funds have been increased from 15% of assessable income to 30% of assessable income; however, the total deductions for the aggregate contributions to all these funds, together with the amount contributed to pension insurance and Government Saving Funds must not exceed 500,000 baht annually. This increase in the deduction limit relative to assessable income is aimed at increasing the

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[51] Tax payers who purchases SSFs is required to hold their equities for at least 10 years instead of 7 years on LTFs. The deductions of SSFs can be claimed from tax year 2020 to 2024.

tax benefit for low and middle income tax payers, while limiting the tax benefit for high income tax payers. The private consumption related tax benefit has also been increased from 15,000 baht for the "Shop Chuay Chart" program to 30,000 baht for the "Shop Dee Mee Kuen" program.

These tax reforms may lessen the personal income tax burden over time. Tax exemptions related to LTFs and RMFs were introduced to stimulate economic growth, investment and savings, but they also provide tax advantages to high-income households who have investments and capital income.

This type of "tax relief" for individuals is a form of tax expenditure for the government. The resulting lower tax revenue could lower the availability of money to fund government subsidies for those in need, and might result in smaller budgets for infrastructure that benefit the whole country in the end.

4.3 Methodology

TOBIT Model (Creedy & Gemmell, 2004; Greene, 2012; Hutton & Lambert, 1980; McDonald & Moffitt, 1980; Wooldridge, 2006, 2010)

The study estimates the effect of changes in the personal income tax regimen on personal income tax liabilities. The dependent variable is personal income tax liabilities (henceforth PIT). The data from the Socio-economic survey (SES) has advantages over income tax filings because SES contains a larger number of observations, and other population characteristics and value of assets. The statistics show that the majority of Thai households have no tax liabilities due to having income less than the tax threshold as a result of low income and tax benefits. As a result, a significant portion of the study's dependent variable, personal income tax liabilities, are clusters at zero.

This type of data distribution results in corner solution response where the majority of dependent variables are clustered at zero. Using OLS coefficient is biased and underestimates the marginal effect of the independent variable (Wooldridge, 2006, 2010). OLS regression results in a negative value rather than zero for non-tax payers. The econometric regression model that usually be applied for this type of data is Tobit regression (Wooldridge, 2006, 2010).

Tobit regression allows examination of the features of distribution of Y given X like P (y=0| X) or E (lynx, y>=0) (Wooldridge, 2006, 2010).

The TOBIT coefficient can also be disaggregated to explain the changes in dependent variables. Change in value of the dependent variable when the dependent variables clusters at zero is comprised of two interrelating parts. The first part is the change in probability of exceeding the limit multiplied by the expected value of Y if above the limit. The second part is the change in Y that is above the limit, multiplied by the probability of exceeding the limit (McDonald & Moffitt, 1980).

Let pit_i denote the personal income tax burden of individual i; the structural form of the TOBIT model is

$$pit_i^* = X\beta + \varepsilon_i \qquad (4.1)$$

Where $\varepsilon_i \sim N(0, \sigma^2)$. pit^* is a latent tax burden variable that is observed for a value higher than zero. Therefore, we have

$$pit_i = \begin{cases} pit^*, & pit_i > 0 \\ 0, & pit_i = 0 \end{cases}$$

The coefficient from the TOBIT regression is the marginal effect of household characteristic X on the latent variable pit*. In order to estimate the value of pit and measure the magnitude of X on the actual household tax burden, pit, it is necessary to calculate further from the following equation:

The personal income tax liabilities would equal

$$E[pit] = \Phi\left(\frac{X_i\beta}{\sigma}\right)\left[X_i\beta + \sigma\lambda\left(\frac{x\beta}{\sigma}\right)\right] \qquad (4.2)$$

$$\text{Where } \lambda\left(\frac{x\beta}{\sigma}\right) = \frac{\emptyset\left(\frac{X_i\beta}{\sigma}\right)}{\Phi\left(\frac{X_i\beta}{\sigma}\right)}$$

λ is the inverse mill ratio. $\emptyset$ stands for pdf function and Φ stands for cdf function of tax burden (b) estimated at $\mathbf{X\beta}/\sigma$. The source of OLS bias occurs from two parts. The first part is the probability of having pit greater than zero ($\Phi\left(\frac{X_i\beta}{\sigma}\right)$) or when the observation is not censored. The second part comes from the probability of selection ($\lambda\left(\frac{x\beta}{\sigma}\right)$). OLS would be unbiased and consistent only when the probability of selection equals 1 (no observation is being censored) and the probability of being selected does not depend on the value of X, which is not the case in our study, where the probability of having personal income tax burden depends on the value of assessable gross income.

The tax revenue elasticity, then, equals

$$\frac{\partial E[b]}{\partial x_k} = \Phi\left(\frac{X_i\beta}{\sigma}\right)\beta_k \qquad (4.3)$$

However, the Tobit type I assumes the same mechanism for both the probability of being taxed, P(y>0|X) and the expected value of pit$_{ij}$, E (pit|X, pit>0), which may not always valid. In order to distinguish these two mechanisms, this study applies the selection model proposed by Heckman (1976).

From the Tobit model, the regression equation is

$$pit_i^* = X\beta + \varepsilon_i \qquad \text{if } S_i=1$$

when we assume the relationship between personal income tax burden (pit) and the set if independent variables X.

The dependent variable pit, is not always observed. The dependent variable for observation i is observed only if an individual's personal income tax is greater than zero. Let W be a matrix of independent variables that determines the probability of entering the personal income tax system (s_i), and γ the vector of selection coefficients. S_i is the selection of dummy variables

The selection equation is

$$S_i = \gamma W_i + u_i \qquad S_i=(0,1) \qquad (4.4)$$

$$S_i = 1 \qquad if \quad \gamma W_i + u_i > 0$$
$$S_i = 0 \qquad if \quad \gamma W_i + u_i \leq 0$$

Assuming
$$\varepsilon_i \sim N(0,\sigma)$$
$$u_i \sim N(0,1)$$
$$\text{Corr } (\varepsilon_i, u_i) = \rho$$

And X is strictly a subset of W

$\hat{\gamma}$ is estimated from the equation 4.4 in the first stage probit

$$S_i = \gamma W_i + u_i$$
$$\lambda(W, \hat{\gamma}) = \frac{\phi(W, \hat{\gamma})}{\Phi(W, \hat{\gamma})}$$

Then, the Heckman regression equation is

$$pit_i^* = X\beta + \delta\lambda(\hat{\gamma}W_i) + \varepsilon_i \qquad (4.5)$$

In the first step, all observations are used to determine the probability of being selected (S_i) with the Probit regression and compute the Inverse Mills Ratio (λ). Then, the selected observations ($S_i=1$) are used to regress pit_i with X_i and λ.

The Inverse Mills Ratio (λ) accounts for the expected value of the error term in the regression equation conditional on being selected. If the Inverse Mills Ratio is statistically significant, it can be implied that the selection is not random with respect to y, and the correlation between ε_i and u_i is not equal to zero ($\rho \neq 0$). Thus, the Tobit coefficients are biased, and these two equations cannot be regressed individually, as in OLS (Certo, Busenbark, Woo, & Semadeni, 2016; Heckman, 1976, 1979; Kennedy, 2008; Wooldridge, 2010).

Tanzi (1969) and Koester and Komendi (1989) estimated tax liabilities based only on income. Ram (1991) developed the regression equation from the original work of Tanzi (1969) by adding the quadratic terms of income per capita and inequality. The proposed model is

$$\ln T_i = a + b\ln Y_i + c(\ln Y_i)^2 + d(INEQ)_i + U_i$$

T_i = tax liabilities per capita for state i
Y_i = adjusted gross income per capita
$INEQ_i$ = Gini-coefficient of state i
u_i = stochastic disturbance term

Later, the quadratic term was dropped from the model because it was found to be statistically insignificant. However, ignoring inequality might lower the tax elasticity; thus, tax revenue is estimated from the following equation instead (Ram, 1991).

$$\ln T_i = a + b\ln Y_i + d(INEQ)_i + U_i$$

Reed and Rogers (2011) used pooled state regression to estimate tax revenue and marginal tax rates in the United States. The model includes tax variables and state dummy variables to allow for state specific characteristics.[52]

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[52]

$$Tax\ revenue_{st} = \left(\beta_{0,s} + \sum_{s=2}^{50} \beta_{0,s}D_s\right) + \left(\beta_1 + \sum_{s=2}^{50} \beta_{1,s}D_s\right) x\ Income_{st} + \sum_{k=1}^{50} \beta_{2,k}X_{k,st}$$
$$+ \sum_{r=1}^{R} \beta_{3,r}(X_{r,st} x\ Income_{st}) + e_{st}$$

Tax revenue elasticity also depends on tax rates, deductions and allowances (Hutton & Lambert, 1980)[53]. Tax structural reform that ignores the growth of income and behavioral change can result in lower revenue than what could have otherwise been collected from the extra income (Caminada & Goudswaard, 1996).

Previous studies of personal income tax elasticity such as those of (Caminada & Goudswaard, 1996; Fries, Hutton, & Lambert, 1982; Reed et al., 2011); Tanzi (1969) were done at the aggregate level, which considers the change in total tax revenue with respect to changes in GDP. This study aims to fill the literature gap by making assessments at the individual level. This study estimates the elasticity of personal income tax among the Thai population in response to changes in tax policy over a 21-year period using the pooled cross section data from SES of 1996, 2007, and 2017. This study uses assessable gross income as the main independent variable in the model, and

$$MTR_s = \frac{\partial Tax\ revenue_s}{\partial Income_{st}} = \left(\beta_1 + \sum_{s=2}^{50} \beta_{1,s} D_s\right) + \sum_{r=1}^{R} \beta_{3,r} X_{st}$$

$\beta 1,s$ = income coefficient of state S

$\beta 2,s$ and $\beta 3,s$ = average tax effect of state S

The data is from US Census Government finance historical data of all 50 states for 1997-2004 except for 2001 and 2003 (data was unavailable). This equals 1,300 observations. This study estimates marginal tax rates from personal income tax, corporate income tax, sales tax, property tax, and other taxes. The overall country MTR is the summation of MTR from every revenue source.

Personal income tax revenue is calculated from US TAXSIM model. The personal income tax variables include tax rates on wages, interest, dividends, capital gains, mortgage, pensions, maximum tax rate on ordinary income, and maximum tax rate on capital gains.

[52] $\beta_{3,s}$ for MTR_Wages x INCOME = 0.003946 (T stat= 5.98), and the average state income= 4.2

[53] Hutton and Lambert (1980)

$$\eta = 1 + \frac{\sum_{j=1}^{p}(m_j - m_{j-1})\beta_j N_j}{T} + \frac{\sum_{j=0}^{p} m_j A_j}{T}$$

η = tax revenue elasticity, m = tax bracket, β= tax threshold,

T = total tax revenue

A= Untaxable income of tax payer who is in tax bracket j

N= number of tax payer in tax bracket j

If a country had the tax structure in which $T^i,...,T^n$ I are combined to equal total tax revenue

$$\eta = \sum_{i=1}^{n} \frac{(T)^i}{T}$$

incorporates other variables that are expected to affect tax liabilities through tax allowances, deductions, and exemptions, which include number of children and elderly dependents, charity contributions, insurance premiums, financial investments, and home ownership. The basic model is also extended by adding cross terms between time dummy variables and key independent variables affected by changes in personal income tax policy such as increases in allowance and deduction limits.

The effect of tax policy reform over time is measured by the coefficient on the year dummy variables and interaction terms between the year dummy variables and household money income. The regression model estimates the influence of each variable on the amount of tax paid by each household. The independent variables affecting personal income tax liabilities are assessable gross income, insurance expenses, charity contributions, number of children and elderly dependents, value of financial investments, and house ownership. The other control variables include sex, age, years of education, and community type.

The model of pooled TOBIT regression is

$$\text{pit}_{it}^* = \alpha_0 + \boldsymbol{\alpha y_{it}} + \boldsymbol{\beta x_{it}} + \delta_1 d07_{it} + \delta_2 d17_{it} + \boldsymbol{\gamma z_{it}} + \varepsilon_i \qquad (4.6)$$

pit_{it}^*	=	latent personal income tax burden observed from TOBIT equation
$\boldsymbol{y_{it}}$	=	vector related to income, expenditure, and wealth
$\boldsymbol{x_{it}}$	=	vector related to exogenous characteristic
$y07_{it}$	=	year dummy variables (=1 if the data is from SES of 2007, =0 otherwise)
$y17_{it}$	=	year dummy variables (=1 if the data is from SES of 2017, =0 otherwise)
$\boldsymbol{z_{it}}$	=	cross term between year dummy variable and independent variable affected by changes in personal income tax policy
αs	=	conformable vectors of coefficients on income, expenditure, and wealth
βs	=	conformable vectors of coefficients on exogenous variable
δs	=	conformable vectors of coefficients on year dummy variable
γs	=	conformable vectors of coefficients on the effect of the policy change in year t comparing to 1996

This study estimates the effect of changes in tax policy over 1996-2017. The objective is to identify how changes in tax policy, such as increasing the tax threshold, affect the amount of personal income tax. The marginal change and the elasticity of personal income tax liabilities with respect to the independent variable in year t equals $\alpha_{it} + \gamma_{it.}$

The pooled regression provides a higher degree of freedom compared to separate regression for each period, thus allowing for more personal characteristics and tax variables to be included in the regression. The pooled regression also allows the average effect to be estimated across time, and minimizes false correlation from individual regression. By pooling the data, it is assumed that the effect over the 21-year period represents the relationships between these factors and tax revenue for the specific time period (Reed et al., 2011).

The data distribution may not be identical between each period. Thus, time dummy variables are included to allow for different intercepts across time. The interaction term between time dummies is variable and explanatory variables of interest are included to estimate the effect of change in income composition, labor status, and tax policy.

Empirical Model

In order to analyze the effect of tax policy reform on the household tax burden, the following econometric model is proposed, and the estimation is done by TOBIT regression.

The first model (equation 4.7), Model(1), is a simple pooled regression without time effect. The empirical model is

$$
\begin{aligned}
pit_{it} = \ &\alpha_0 + \alpha_1 AGI_{it} + \alpha_2 charity_{it} + \alpha_2 insurance_{it} + \alpha_4 Investment_{it} \quad (4.7) \\
&+ \beta_1 PC\_children_{it} + \beta_2 PC\_elderly_{it} + \beta_3 age_{it} + \beta_4 male_{it} \\
&+ \beta_5 married_{it} + \beta_6 education_{it} + \beta_7 house_{it} + \beta_8 municipal_{it} \\
&+ \varepsilon_i
\end{aligned}
$$

pit*$_{it}$ is the latent variable of personal income tax liabilities estimated from the pooled TOBIT model of 1996, 2007, and 2017, where i represents e individuals and t represents time period (t=1996, 2007 or 2017).

The elasticity of personal income tax revenue with respect to the independent variable is estimated from the conformable vectors of coefficient ***as*** and *βs*. The vectors of control variables consist of size of the household, home ownership, age, sex, marital status, years of education, and community type, where $\varepsilon_{i,t}$ is the error term.

In the second model (equation 4.8), Model (2), we further examine how the difference in tax threshold, and the amount of deduction and exemptions affect personal income tax revenue. First, we add year dummy variable y07 and y17 to measure the effect of tax policy in 2007 and 2017, comparing those to 1996. Then, we add the interaction term between the year dummy variables and the independent variable affected by changes in tax policy. These independent variables comprise assessable gross income (PC_AGI), number of children (PC_children), number of elderly dependents (PC_elderly), charity expense (PC_exp_charity), insurance expense (PC_exp_insurance), and value of financial investment (PC_FA_Invest), which are the independent variables that were affected by changes in the personal income tax regimen from 1996 to 2017.

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$$
\begin{aligned}
pit_{it} = \ &\alpha_0 + \alpha_1 AGI_{it} + \alpha_2 charity_{it} + \alpha_2 insurance_{it} \\
&+ \alpha_4 Investment_{it} + \beta_1 PC\_children_{it} + \beta_2 PC\_elderly_i \\
&+ \beta_3 age_{it} + \beta_4 male_{it} + \beta_5 married_{it} + \beta_6 education_{it} \\
&+ \beta_7 house_{it} + \beta_8 municipal_{it} + \delta_1 y07_{it} + \delta_2 y17_{i,t} \\
&+ \gamma_1 y07_{it} AGI_{it} \quad + \gamma_2 y07_{it} * charity_{it} + \gamma_3 y07_{it} \quad (4.8) \\
&* insurance_{it} + \gamma_4 y07_{it} * PC\_children_{it} + \gamma_5 y07_{it} \\
&* PC\_elderly_{it} + \gamma_6 y07_{it} * Investment_{it} + \gamma_7 y17_{it} \\
&* AGI_{it} + \gamma_8 y17_{it} * charity_{it} + \gamma_9 y17_{it} * insurance_{it} \\
&+ \gamma_{10} y17_{it} * PC\_children_{it} + \gamma_{11} y17_{it} * PC\_elderly_{it} \\
&+ \gamma_{12} y17_{it} * Investment_{it} + \varepsilon_i
\end{aligned}
$$

For the Heckman Selection Model, the selection equation is

$$
\begin{aligned}
S_{it} = \; & \alpha_0 + \alpha_1 AGI_{it} + \alpha_2 charity_{it} + \alpha_2 insurance_{it} + \alpha_4 Investment_i \\
& + \beta_1 PC\_children_{it} + \beta_2 PC\_elderly_{it} + \beta_3 age_{it} \\
& + \beta_4 male_{it} + \beta_5 married_{it} + \beta_6 education_{it} + \beta_7 house \\
& + \beta_8 municipal_{it} + \delta_1 y07_{it} + \delta_2 y17_{i,t} + \gamma_1 y07_{it} AGI_{it} \\
& + \gamma_2 y07_{it} * charity_{it} + \gamma_3 y07_{it} * insurance_{it} + \gamma_4 y07 \\
& * PC_{children_{it}} + \gamma_5 y07_{it} * PC_{elderly_{it}} + \gamma_6 y07_{it} \\
& * Investment_{it} + \gamma_7 y17_{it} * AGI_{it} + \gamma_8 y17_{it} * charity_{it} \\
& + \gamma_9 y17_{it} * insurance_{it} + \gamma_{10} y17_{it} * PC_{children_{it}} \\
& + \gamma_{11} y17_{it} * PC_{elderly_{it}} + \gamma_{12} y17_{it} * Investment_{it} \\
& + formal_i + \varepsilon_i
\end{aligned}
$$

(4.9)

And the Heckman regression equation is

$$
\begin{aligned}
pit_{it} = \; & \alpha_0 + \alpha_1 AGI_{it} + \alpha_2 charity_{it} + \alpha_2 insurance_{it} \\
& + \alpha_4 Investment_{it} + \beta_1 PC\_children_{it} + \beta_2 PC\_elderly \\
& + \beta_3 age_{it} + \beta_4 male_{it} + \beta_5 married_{it} + \beta_6 education_{it} \\
& + \beta_7 house_{it} + \beta_8 municipal_{it} + \delta_1 y07_{it} + \delta_2 y17_{i,t} \\
& + \gamma_1 y07_{it} AGI_{it} + \gamma_2 y07_{it} * charity_{it} + \gamma_3 y07_{it} \\
& * insurance_{it} + \gamma_4 y07_{it} * PC_{children_{it}} + \gamma_5 y07_{it} \\
& * PC_{elderly_{it}} + \gamma_6 y07_{it} * Investment_{it} + \gamma_7 y17_{it} * AG_i \\
& + \gamma_8 y17_{it} * charity_{it} + \gamma_9 y17_{it} * insurance_{it} \\
& + \gamma_{10} y17_{it} * PC_{children_{it}} + \gamma_{11} y17_{it} * PC_{elderly_{it}} \\
& + \gamma_{12} y17_{it} * Investment_{it} + \delta\lambda_i + \varepsilon_i
\end{aligned}
$$

(4.10)

From the Heckman Selection equation, the dummy variable formal is used as an additional selection criteria since wages and salary workers in the formal sector are recorded by the employers and the previous literature shows that workers in the formal sector tend to pay higher personal income tax than those in the informal sector (Chandoevwit & Jawala, 2011; Jitsuchon & Plangpraphan, 2011).

The conformable vector of coefficient δs compares the tax revenue elasticity in 2007 and 2017 with the elasticity in 1996. If the sign of δ is negative, the tax revenue elasticity is lower than that of 1996.

From the interaction terms, the conformable vector of coefficient γs represents the effect of changes in tax policy in year t compared to 1996. The elasticity of tax revenue with respect to the repressors in year t equals $(\alpha_k + \gamma_k)$. For example, the effect of introducing the tax threshold of 100,000 baht in 2007 is estimated from $(\alpha_1 PC_{AGI_{it}} + \gamma_1 y07_{it} * PC_{AGI_{it}})$, and the effect of increasing the deduction limit on financial investment to 500,000 baht in 2017, compared to no deduction in 1996, is estimated from $(\alpha_4 Investment_i + \gamma_{10} y17_i * Investment_i)$. This model is also used in OLS regression to compare the result.

In the addition analysis, this model is regressed on the population subgroups, categorized by occupation sectors into 5 groups in order to compare the effect of changes in personal income tax policy on different occupations.

The total population is categorized according to their socio-economic class into
- Farmers
- Entrepreneurs

- Professionals (High-skilled workers)
- Laborers (Low-skilled workers)
- Welfare recipients
- Capital earners

Model selection process

  The goodness of fit between candidate models in this study is judged by Akaike information criterion (AIC) and the Bayesian information criterion (BIC). AIC and BIC are statistical values used to compare regression models under the maximum likelihood estimation framework.

  AIC and BIC are defined as follow:

AIC = -2*ln(likelihood) +2*k

BIC = -2*ln(likelihood) +ln(N)*k

Where k= number of parameters and N= number of observations

  AIC is asymptotically unbiased and rewards goodness of fit while putting a penalty on overfitting (Akaike, 1974). AIC puts a penalty when the model complexity is amplified by increasing the number of k, which will be offset by the explanatory power (ln(likelihood)). BIC is valid when the number of observations (N) is considerably larger than the number of parameters in the model (k), which conforms to the nature of this study. BIC puts a penalty when the number of observation (N) and the number of parameters (k) are increased, which will be offset by an increase in explanatory power (ln(likelihood)). The model with the lowest value of AIC and BIC will be chosen (Akaike, 1974; Sawa, 1978; Statacorp, 2015).

  Table 4.4 shows the correlation coefficients between personal income tax liabilities from the pooled SES data of 1996, 2007, and 2017. The correlation coefficients indicate a positive correlation between personal income tax liabilities and assessable gross income (AGI), charity contribution, insurance premium, and financial investment, but negative correlation with the number of children and elderly dependents in the household

Table 4.4 Correlation coefficient of personal income tax liabilities and other independent variables

	pit	AGI	charity	insurance	investment	children	elderly	age
pit	1.000							
AGI	0.293	1.000						
charity	0.165	0.200	1.000					
insurance	0.216	0.334	0.198	1.000				
investment	0.100	0.086	0.092	0.087	1.000			
children	-0.063	-0.139	-0.117	-0.157	-0.024	1.000		
elderly	-0.028	-0.063	0.061	-0.030	0.021	-0.289	1.000	
age	-0.001	-0.065	0.054	-0.030	0.019	-0.204	0.660	1.000
education	0.207	0.289	0.135	0.275	0.065	-0.058	-0.168	-0.318
male	0.004	-0.006	-0.028	-0.010	0.000	0.041	-0.101	-0.105
married	0.004	-0.012	-0.037	-0.013	0.003	0.182	-0.166	-0.154
house	-0.015	-0.086	0.010	-0.045	0.009	0.085	0.211	0.398
municipal	0.073	0.142	0.066	0.127	0.030	-0.131	-0.005	-0.048
y07	0.008	0.002	0.023	-0.065	-0.001	0.042	-0.058	-0.041
y17	-0.003	0.049	0.059	0.211	0.020	-0.166	0.158	0.161
formal	0.108	0.124	0.024	0.138	0.005	-0.002	-0.302	-0.407

	education	male	married	house	municipal	y07	y17	formal
education	1.000							
male	0.026	1.000						
married	0.004	0.507	1.000					
house	-0.228	-0.008	0.088	1.000				
municipal	0.260	-0.063	-0.083	-0.251	1.000			
y07	0.046	0.011	0.026	-0.013	0.111	1.000		
y17	0.071	-0.092	-0.078	0.021	0.100	-0.632	1.000	
formal	0.316	0.097	0.047	-0.314	0.111	0.010	-0.031	1.000

4.4 Data

This study uses data from the Socio-Economic Survey of 1996, 2007, and 2017 provided by the National Statistical Office (NSO). This survey provides details on household income from each source and other characteristics of household members. Income and expenditure from SES are adjusted with the National Income account (NI), and tax expenditure is equalized with the tax revenue statistics from the Revenue Department. Income, expenses and asset values are addressed using 2015 price levels.

In order to correct any problem with underreporting that might occur, the data from the Socio-economic Survey (SES) is equalized with the data in the National Income Account (NI) and the personal income tax revenue from the Revenue Department. Values in this study are value of household per capita addressed at the 2015 price level.

According to the P.N.D. 90 and 91, income from the following sources are subject to personal income tax:
- Earnings from wages and salaries, including employment welfare before any deduction for taxes, provident payments, or social insurance
- Earnings from business, industry or professions other than farming
- Earnings from farm business
- Transfer from pensions, annuities or welfare and assistance from other persons outside the household
- Work compensation
- Earnings from asset/property rental, such as non-agricultural land/house rental, or earnings from license and copyright and interests
- Earnings from investment (non-participation in business operation) such as dividends or interest from shares, bonds, stocks, etc.

The definition of the variables used in the regression is presented in Table 4.5. The value of income, expenditures, and assets are in thousand baht for an ease of interpretation.

Table 4.5 Definition of the variables[54]

Name	Definition
Dependent Variable	
pit	Amount of personal income tax liabilities (Baht)
Key Independent Variables	
AGI	Amount of money income excluding interest and dividends (in thousand baht)
charity	Amount of annual charity expense (in thousand baht)
insurance	Amount of d annual insurance expense (in thousand baht)
investment	Amount of financial assets for investment purpose, such as bonds, stocks, mutual funds, RMF, and LTF (in thousand baht)

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[54] The table of data variable from the Socio-Economic Survey is in Appendix A

Name	Definition
Other Control Variables	
PC_children	Number of children in the household (age<15 years old)
PC_elderly	Number of elderly resident s in the household (age>60 years old)
house	=1 if owning house
age	age of a person
male	=1 if a person is male
married	=1 if a person is married
education	years of education
municipal	=1 if living in the municipal area
formal	=1 if working in the formal sector

The value of assessable gross income (AGI) includes all money income receive from wages and work compensation, business profit, farm profit, rents, pensions and transfers, and transitory income received in 12 months. In this analysis, investment income (interest and dividends) is excluded in order to avoid endogeneity with financial investments as it is assumed that a tax payer has already paid the withholding tax levied on interest and dividend income. AGI represents annual money income minus income from interest and dividends. It is expected that an increase in AGI would increase both the probability of having personal income tax burden and the amount of PIT.

Charitable contributions (Charity) is the total amount of money or material contribution to NGOs and other qualified charitable organizations in 12 months. The deduction for charitable contributions are limited to 10% of taxable income, and not all charitable contributions can be itemized. Nonetheless, it is expected that the deductions for charitable giving may encourage people to file their tax returns; therefore, increasing the probability of having personal income tax. The decrease in the amount of PIT payable might be significant among people with high levels of taxable income.

Insurance expense (Insurance) is the total amount of money spent on insurance premiums in 12 months. The deductions for insurance premium payments may help encourage people to file their tax returns and increase the probability of having personal income tax. The decrease in the amount of PIT payable might be significant among people with high levels of taxable income

Investment is the value of financial assets for investment purposes, such as bonds, stocks, mutual funds, RMFs, and LTFs. It is expected that people with higher amounts of assets would also have a higher share of capital-related income that is taxed at a lower rate (10%-15% VS 5%-35% for wages), and provides tax benefits due to tax deductions on long term investments and contributions to provident funds. The observation with higher amounts of financial assets have lower PIT compared to households with no assets (Chandoevwit & Jawala, 2011), but the percentage of itemizers in this category is very small (Muthitacharoen & Phongpaichit, 2020). Although the magnitude may be small, these tax benefits are widely discussed because they are the leading tax expenditure in the country. Thus, the policy effect is included in this study.

The Number of child dependents (PC_children) is the number of dependent children in the household on a per capita basis. It is assumed that child allowances will

be divided among earners. Although the child allowance helps reduce taxable income, it is questionable whether the allowance is high enough to significantly alter tax burden.

The Number of elderly dependents (PC_elderly) is the allowance for elderly dependents living in the taxpayer's household. Allowances relating to elderly dependents are much larger than child allowances; therefore, a significant decrease in the amount of PIT among households with elderly dependents is expected.

"House" is equal to one if the members of the household under observation own their house. The Thai government offers a tax deduction for home mortgage interest of 100,000 baht and the 20% deduction of the purchased price for first time home buyer. Home buyers who have mortgage obligations are highly motivated to file their tax returns, but the amount of the tax burden reduction is dependent on each taxpayer's marginal tax rate. In addition, home owners may have to reserve more cash to provide for home maintenance and other related expenses. It is expected that home owners will have a higher probability of incurring personal income tax burden, but these deductions may not high enough to significantly reduce the amount of tax liabilities.

Age is expected to positively correlate with both the probability of having personal income tax and the amount of tax liabilities.

Males are expected to have higher tax burdens than females.

"Married" represents the observations who are married. It is expected that married tax filers would have a lower amount of PIT compared to those who are single because they would entitle to deduct the spouse relating allowance from their assessable income.

"Education" represent years of education attainment by the observation. The probability of having personal income tax liabilities is expected to increase with the level of education attainment. However, the amount of tax liabilities may be negatively correlated with level of education because people with higher levels of education may have better financial literacy, and thus, can better manage their income and expenses to maximize their tax benefits and decrease the amount of their tax burden.

"Formal labor sector" is used as a selection criterion. It is expected that laborers who work in the formal sector are more likely to have PIT because their income is recorded; thus, it is more difficult for laborers in this sector to avoid tax. However, the tax benefit granted to tax filers are the same whether they are working in the formal labor sector or informal labor sector. For example, medical professions who work in the public sector or work as a freelance are subjected to the same amount of allowance deduction. Thus, the formal sector labor is expected to increase the probability of having personal income tax, but not affect the amount of tax burden.

Y07 and Y17 are the dummy variables representing the year of observation in the SES. Thai personal income tax reform has been moving toward a broader tax base with higher numbers and amounts of tax allowances, deductions and exemptions. It is expected that personal income tax policy in 2007 and 2017 will be found to have increased the probability of having personal income tax burden, but may have reduced the amount of tax liabilities due to higher amounts of allowances, deductions and exemptions.

Table 4.6 reports the summary statistic of income expense and general characteristics from pooled SES of 1996, 2007, and 2017, and the comparison statistics between tax payers and non-tax payers. The pooled data contain 111,375 observations with 30,325 tax payers (27.23%) and 81,050 non-tax payers (72.77%). Overall, tax payers have higher average income, expenditures, and financial investment values than non-tax-payers. The annual money income from the pooled data source equaled 100,878.90 baht, and the assessable gross income (AGI) equaled 99,831 baht. The assessable gross income of tax payers equaled 170,794 baht (98.53% of money income) which is around 2.73 times that of non-tax payers. Tax payers generally contributed more to charity organizations and purchased more insurance. Tax payers contributed 1,797.44 baht (1. 04% of money income) annually to charity organizations, while the non-tax payers contributed 1,055.54 baht (1.45% of money income) annually. The average insurance purchases equaled 2,137.41 baht or 2.14% of money income. The average insurance premium among tax payers equaled 3,979.49 baht (2.33%), while those of non-tax payers equaled 1,424.92 baht (1.97%).

Table 4.6 Summary statistics of household income, expenditures and general characteristics from Pooled SES of 1996, 2007, and 2017 data

Variable	Mean			Ratio		
	Total	Tax Payer	Non-tax Payer	Total	Tax Payer	Non-tax Payer
Number of Observations	111,375	30,325	81,050	100.00	27.23	72.77
Personal Income Tax	3,824.32	13,711.75	0.00	3.79	7.91	0.00
Charity Contributions	1,262.46	1,797.44	1,055.54	1.25	1.04	1.45
Insurance Purchases	2,137.41	3,979.49	1,424.92	2.12	2.30	1.96
Financial Assets for Investment	75,718.49	203,636.70	26,241.56	75.06	117.48	36.02
Assessable Gross Income	99,831.50	170,794.00	72,384.23	98.96	98.53	99.36
Money Income	100,878.90	173,341.30	72,851.56	100.00	100.00	100.00
Number of Children	0.23	0.18	0.24			
Number of Elderly	0.15	0.15	0.15			
Living in the Municipal Area	0.31	0.53	0.22			
Age	51.73	51.88	51.67			
Male	0.72	0.69	0.73			
Married	0.77	0.76	0.77			
Years of Education	10.55	12.23	9.89			
Owning a house	0.85	0.78	0.87			
Working in the formal Sector	0.29	0.39	0.25			

Source Socio-Economic Survey (SES) of 1996, 2007, and 2017
The author's calculation
The value of income, expenditures and assets are in 2015 price level

The statistics also show that tax payers invest and save more in financial assets. The average value of financial investment among tax payers equaled 203,636.70 baht, while that of non-tax payers equaled 26,241.56 baht. Tax payers had 7.76 times more financial assets for investment. This positive relationship between financial investment and income conforms to the analytical result of Ananapibut (2012); (Chawanote & Laovakul, 2017; Muthitacharoen & Phongpaichit, 2020).

There is also a higher number of tax payers in municipal areas. The statistics show that 53% of tax payers in the pooled observation lived in municipal areas, while only 22% of non-tax payers did so. Previous research has demonstrated that people living in urban areas tend to have higher income than those living in rural areas (Sarntisart, 2001). Limkrayarot (2015) also found that 26.7% of the population in Bangkok and 19% of the population of the southern region of Thailand, which are the regions with highest money income per capita, were in the top 10% of income distribution in 2011. However, the northern region, which had the lowest income per capita, had only 12.97% of residents in the top 10% of income distribution.
Non-tax payers had slightly more children than tax payers (0.24 VS 0.18), but the number of elderly residents in the households was similar. Tax payers had an average 12 years of education, or almost 2 more years than non-tax payers. The average age of the household head was 51.73 years old; 72% of them were married, and 85% of them owned the house in which they lived.

The percentage of tax payer increased continuously from 12% in 1996 to 33% in 2007, and 55% in 2017. The percentage of labor in the formal sector was also higher than the non-tax payer (39% VS 25%). The higher ratio of tax payers to non-tax payers might be explained by higher laborer income and labor migration from the informal to the formal sector (Aemkulwat, 2010; Sarntisart, 2000).

The average personal income tax liabilities from the pooled data equaled 3,824 baht, or 3.79% of money income, while those of tax-payers equaled 13,711 baht or 7.91% of their money income.

Table 4.7 presents the summary statistics of the Socio-Economic Survey data (SES) of 1996, 2007, and 2017. Average annual money income increased from 71,817.60 baht in 1996 to 130,980.20 baht in 2017, while the assessable gross income increased from 70,901.10 baht to 129,961.70 baht over the same period. The value of financial investment also increased sharply from 9,925.29 baht to 150,478.60 baht.

From 1996 to 2017, Thai people purchased more insurance. The value of insurance purchases increased from 551.07 baht (0.77% of money income) to 3,990.35 baht (3.05% of money income). This trend resembles that uncovered in the study of Limkrayarot (2015), which reported an increasing share of insurance purchases, rising from 0.06% in 2002 to 1.18% in 2011. This may have resulted from an increase in income and motivation from tax incentives. The average charitable contribution also increased from 551.07 baht (0.77% of money income) in 1996 to 3,990.35 baht (3.05% of money income) in 2017. An Table 4.7 presents the summary statistics of the Socio-Economic Survey data (SES) of 1996increase in income result in the higher amount of charitable contributions.

The number of children decreased from 0.27 to 0.17 as a result of a decreasing birth rate in the country, which fell from 1.64% in 1996 to 1.06% in 2017 (NESDC, 2020). The number of elderly residents in households increased slightly from 0.11 to

0.21 reflecting the contemporary trend of an aging society reported in the study of Chaiwat and Boonyamanond (2013).

Table 4.7 Summary statistics of household income, expenditures and general characteristics of the Socio-Economic Surveys of 1996, 2007, and 2017

	Mean			Ratio		
Variable	1996	2007	2017	1996	2007	2017
Number of Observation	25,110.00	43,055.00	43,210.00			
Personal Income Tax	3,245.19	3,617.12	4,555.47	4.52	3.72	3.48
Charity Contribution	633.51	1,393.28	1703.33	0.88	1.43	1.30
Insurance Purchase	551.07	1,720.82	3,990.35	0.77	1.77	3.05
Financial Asset for Investment	9,925.29	60,546.46	150,478.60	13.82	62.34	114.89
Assessable Gross Income	70,901.10	95,923.78	129,961.70	98.72	98.77	99.22
Money Income	71,817.60	97,120.06	130,980.20	100.00	100.00	100.00
Number of Children	0.27	0.23	0.17			
Number of Elderly	0.11	0.14	0.21			
Living in the Municipal Area	0.17	0.3	0.44			
Age	48.96	51.31	54.65			
Male	0.79	0.72	0.64			
Married	0.8	0.78	0.73			
Year of Education	9.33	10.78	11.42			
Owning the house	0.87	0.85	0.82			
Working in the formal sector	0.28	0.28	0.31			

Source: Socioeconomic surveys (SES) of 1996, 2007, and 2017
The author's calculation
The value of income, expenditures and assets are in 2015 price level

The education attainment increased from 9.33 to 11.42 years during the period of study. The share of households living in the municipal area increased from 17% to 44%, and the ratio of people working in the formal sector increased slightly from 028 to 0.31 conforming to the labor migration and urbanization patterns found in the study of (Aemkulwat, 2010; Aemkulwat C & Amornvatana C, 2016; Sarntisart, 2000), but the ratio of home owners decreased slightly from 0.87 to 0.82.

4.5 Result

   This section presents the empirical results from the pooled data of the Socioeconomic surveys (SES) of 1996, 2007, and 2017. The value of assessable gross income, expenses, assets, and personal income tax liabilities are addressed in real terms using 2015 as the base year. First we compare the goodness of fit between the two candidate models.

<u>Model Selection</u>

The regression results from all three candidate models -- Model (1), Model (2), and OLS -- are presented together with the value of Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), used to evaluate the goodness of fit.

Table 4.8 the regression result from Tobit regression and OLS

VARIABLES	Tobit Model (1)	Tobit Model (2)	OLS (Pooled) Model (2)
AGI	53.2162***	155.3857***	81.4334***
	(0.2806)	(0.8151)	(1.4512)
charity	671.5296***	9.7207	-101.8699***
	(56.6119)	(81.1243)	(36.3605)
insurance	1,952.6979***	3,846.1784***	2,645.2211***
	(48.1020)	(171.2631)	(87.9459)
investment	1.9256***	0.2029	1.2494
	(0.1092)	(2.2922)	(1.0987)
PC_children	3,691.9472***	-13,605.8096***	2,865.3118***
	(1,364.3635)	(3,183.1480)	(813.4398)
PC_elderly	-42,453.3705***	-52,726.7777***	623.4429
	(1,315.5859)	(3,624.8403)	(908.9028)
age	909.0924***	801.4951***	105.6863***
	(25.1746)	(25.1026)	(8.7234)
education	3,630.9043***	3,258.8818***	641.9984***
	(70.9660)	(68.8668)	(27.5708)
male	-3,546.7238***	-1,248.5585**	-65.1599
	(638.8256)	(633.7254)	(238.1285)
married	13,117.0314***	11,854.7770***	225.4208
	(705.1581)	(699.0547)	(261.4183)
house	-2,346.8073***	-2,847.1002***	2,049.6377***
	(732.9994)	(717.1998)	(281.1637)
municipal	1,295.1846**	-940.2206*	681.3074***
	(557.1663)	(545.5673)	(220.1927)
y07		12,100.0904***	-1,451.7069***
		(1,358.7347)	(466.5488)
y17		28,593.8270***	-328.8530
		(1,279.6973)	(457.9718)

VARIABLES	Tobit Model (1)	Tobit Model (2)	OLS (Pooled) Model (2)
y07_AGI		-113.1735***	-54.2406***
		(2.0379)	(1.6975)
y07_charity		576.3400***	977.9666***
		(158.8793)	(71.3504)
y07_insurance		105.4696	-699.5820***
		(205.6973)	(102.7799)
y07_investment		14.1462***	11.8401***
		(2.3724)	(1.1403)
y07_children		21,812.6934***	1,944.0271*
		(3,883.6555)	(1,133.2576)
y07_elderly		4,611.8940	-4,033.3174***
		(4,032.3929)	(1,090.4615)
y17_AGI		-122.2473***	-55.8665***
		(1.6286)	(1.5966)
y17_charity		1,168.1387***	1,386.5011***
		(131.9872)	(61.6816)
y17_insurance		-2,781.2120***	-2,166.2679***
		(180.0054)	(91.7702)
y17_investment		1.4722	0.3560
		(2.2944)	(1.1000)
y17_children		28,826.2095***	-278.2051
		(3,728.2268)	(1,162.9523)
y17_elderly		15,776.0459***	-2,805.8072***
		(3,752.7154)	(1,014.7832)
sigma	59,881.2644***	58,072.4549***	
	(244.6639)	(238.1029)	
Constant	-142985.9455***	-150714.0090***	-17,978.5522***
	(1,803.1037)	(2,002.2395)	(672.5286)
Observations	111,375	111,375	111,375
AIC	840,405.2000	836,596.8000	2,609,434.0000
BIC	840,539.9000	836,866.2000	2,609,694.0000
R-squared	0.017	0.0215	0.1785

Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Model (1) is a base model used to evaluate the effect of tax benefits on personal income tax liabilities (PC_pit). In Model (2), the conformable coefficients on year dummy variables and the interaction terms between year dummy variables (y07 and y17) and key independent variables are added to evaluate the effect of these tax benefits together with the effect of changes in personal income tax policy in 2007 and 2017 compared to 1996. The personal income tax benefits evaluated in this study are children allowance, elderly allowance, charitable contribution, deduction on life insurance purchases, and the deductions on long-term savings and investments. The result of

Model (1) and Model (2) are from Tobit regression. We also perform OLS regression on model (2) to compare the coefficients.

From the pooled data of SES of 1996, 2007, and 2017, there are 111,375 observations. 81,050 are left censored at pit equal zero, while 30,325 observations are uncensored. This means that only 27.23% of those observed were tax-payers.

The value of AIC and BIC are lowest in Model (2) under Tobit regression. Therefore, the data fit with this model is superior to Model (1) and OLS regression. Model(2) has lower AIC and BIC value than Model(1), which shows that the model can better predict the effect of changes in tax policy across time when year dummy variables and cross terms are added. The OLS coefficient is biased as it does not account for the probabilities of having personal income tax (pit) greater than zero (Wooldridge, 2006)

Regression results and robustness checks

Table 4.8 presents the regression from the Heckman selection model. The Heckman Selection model comprises two stages: the selection equation using Probit regression and the OLS of pit with the independent variables that met the criterion in the first stage ($S_i=1$), and the Inverse Mills Ratio (λ) obtained from the Probit regression in the first stage.

Column (1) presents the regression from the Heckman selection equation (equation 4.9). All of the variables are statistically significant except the change in personal income tax policy related to charitable contributions and insurance premiums in 2007. The factors that increase the probability of entering the personal income tax system are assessable gross income (AGI), charity contribution (charity), insurance premiums (insurance), financial assets for investment (Investment), age, being married, educational attainment, living in a municipal area, and working in the formal sector. The factors that reduce the probability of entering the personal income tax system are higher number of child or elderly dependents, being male, and owning a house.

In 2007, the lower marginal tax rate and an increase in the tax threshold (y07_AGI) reduced the probability of having to pay tax, while changes in deductions on insurance premiums (y07_insuracne) and child and elderly allowances (y07_children and y07_elderly) increased the probability of incurring a personal income tax burden. In 2017, all changes in tax policy significantly affected the probability of incurring a personal income tax burden. Changes in PIT structure (y17_AGI) and an increase in deductions on long term investment (y17_investment) reduced the probability of incurring personal income tax. Changes in deductions on insurance premiums (y17_insuracne) and child and elderly allowances (y17_children and y17_elderly) increased the probability of incurring a personal income tax burden.

The changes in the PIT threshold and marginal tax rates increased the amount of taxable income exempted; thus, reducing the probability of having a personal income tax burden. The changes in deductions for insurance premiums and child and elderly allowances helped motivate people to purchase more insurance and send their tax returns to itemize these tax benefits. As a result, these policy changes helped increase the probability of entering the personal income tax system.

The coefficient on the dummy variable formula and the coefficient on inverse Mills ratio (lambda) are statistically significant at p<0.001. This signifies that the

probability of incurring personal income tax burden is not random, and the coefficients of Tobit and OLS are biased (Greene, 2012; Heckman, 1976; Kennedy, 2008; Wooldridge, 2010). Therefore, the coefficients from the Heckman regression equation are used to estimate the result of changes in personal income tax policy on the personal income tax burden (pit_i).

Table 4.9 The regression result from Heckman Selection Model

VARIABLES	(1) Heckman Selection	(2) Heckman Regression	(3) Tobit Coefficient	(4) OLS (Tax payer) Model (2)
AGI	0.0016***	70.4350***	33.7390***	164.7650***
	(0.0000)	(5.4018)	(0.1911)	(4.3798)
charity	0.0019*	29.7309	2.1107	-341.2287**
	(0.0011)	(133.6651)	(17.6143)	(156.5729)
insurance	0.0100***	-114.1393	835.1242***	4,245.0346***
	(0.0022)	(230.5697)	(37.0501)	(241.6281)
investment	0.0001***	4.5308*	0.0441	-6.7170**
	(0.0000)	(2.4898)	(0.4977)	(2.8147)
PC_children	-0.5667***	13,363.3839**	-2,954.242***	-11,530.9486**
	(0.0537)	(6,237.1480)	(689.3986)	(4,544.7611)
PC_elderly	-0.5448***	27,294.2220***	-11448.61***	14,899.9792**
	(0.0528)	(6,581.6195)	(784.3731)	(5,945.3937)
age	0.0102***	86.6342*	174.0294***	246.9432***
	(0.0004)	(51.1813)	(5.4352)	(30.1131)
education	0.0591***	-1,047.7738***	707.604***	1,331.8590***
	(0.0012)	(258.6768)	(14.6641)	(82.8616)
male	-0.0564***	1,863.3778*	-271.1006**	672.8969
	(0.0104)	(968.2213)	(137.5881)	(755.4230)
married	0.1527***	-4,433.4607***	2574.039***	419.5176
	(0.0108)	(1,138.0020)	(151.6761)	(832.4080)
house	-0.0451***	3,520.7204***	-618.1935***	1,513.2074*
	(0.0116)	(1,091.0514)	(155.6285)	(843.7253)
municipal	0.2336***	-10,516.4502***	-204.1509*	-260.1004
	(0.0093)	(1,238.7238)	(118.5407)	(658.5578)
y07	0.2323***	-15,680.3147***	2627.304***	4,710.2417**
	(0.0223)	(2,323.0879)	(294.4755)	(1,975.8598)
y17	0.6188***	-29,108.8931***	6208.604***	7,133.7389***
	(0.0217)	(2,719.4288)	(276.1863)	(1,870.1692)
y07_AGI	-0.0011***	-21.6709***	-24.5735***	-130.9238***
	(0.0001)	(5.5729)	(0.4450)	(4.7699)
y07_charity	-0.0011	2,305.2902***	125.1412***	3,158.8697***
	(0.0019)	(197.6339)	(34.5065)	(226.8757)
y07_insurance	0.0163***	1,248.4227***	22.9007	-1,523.7141***
	(0.0027)	(278.4719)	(44.6674)	(270.5098)

VARIABLES	(1) Heckman Selection	(2) Heckman Regression	(3) Tobit Coefficient	(4) OLS (Tax payer) Model (2)
y07_investment	-0.0001	2.8429	3.0716***	19.0303***
	(0.0000)	(2.5724)	(0.5151)	(2.8778)
y07_children	0.2807***	2,136.6132	4736.21***	18,252.2663***
	(0.0648)	(6,825.4297)	(841.3954)	(5,352.4882)
y07_elderly	0.1373**	-24,993.8173***	1001.385	-27,279.6007***
	(0.0568)	(6,547.0082)	(875.3716)	(6,379.7075)
y17_AGI	-0.0015***	-27.1799***	-26.5437***	-123.2514***
	(0.0001)	(5.6339)	(0.3557)	(4.6707)
y17_charity	0.0070***	1,708.2915***	253.639***	2,644.3773***
	(0.0019)	(182.0475)	(28.6923)	(198.9785)
y17_insurance	0.0082***	-24.3206	-603.8871***	-3,724.2487***
	(0.0025)	(244.9693)	(38.9625)	(248.8417)
y17_investment	-0.0001**	-3.7666	0.3196674	8.3081***
	(0.0000)	(2.4938)	(0.4982)	(2.8168)
y17_children	0.5826***	-16,689.1816**	6259.061***	15,561.0141***
	(0.0646)	(6,951.6498)	(806.3954)	(5,070.3923)
y17_elderly	0.1461***	-22,536.8190***	3425.467***	-21,228.5584***
	(0.0542)	(6,267.4380)	(814.0336)	(6,039.5616)
formal	0.1654***			
	(0.0103)			
lambda		-63,577.2808***		
		(5,015.7350)		
Constant	-2.4235***	105,605.5448***		-41,878.0689***
	(0.0329)	(12,121.5070)		(2,562.4524)
R-squared	0.1253	0.2526	0.0215	0.2551
Observations	111,375	111,375	111,375	30,325

Standard errors in parentheses
*** p<0.01, ** p<0.05, *p<0.1
Note -The Tobit coefficients are calculated from the Tobit regression of Model (2) in Table 4.7.
- OLS (taxpayer) coefficients are calculated from the OLS regression of Model (2) using only observation that have pit_i greater than zero.

Column (2) to Column (4) of Table 4.9 present the coefficients of the Model (2) from the Heckman Selection Model, Tobit regression and OLS (only tax payers) to compare the results and perform the robustness checks. Column (2) presents the coefficients of the dependent variables from the Heckman regression equation using Model (2), but the inverse Mills ratio (λ) estimated from the selection stage (column (1)) is included to absorb the expected value of the error term conditioned on the probability of being selected. Column (3) presents the Tobit coefficients from the Tobit

regression in Table 4.7 using pooled observations. Column (4) presents the OLS coefficients using only the taxed observations.

Heckman coefficients are differ in direction from Tobit coefficients and OLS (taxpayer) coefficients. The Tobit coefficients (Column (3) Table 4.8) account for both the probability of entering personal income tax system and the amount of tax liabilities (McDonald & Moffitt, 1980; Wooldridge, 2006). However, the value of correlation between the error term in the first and second stage of Heckman Selection model is not equal to zero. The Inverse Mills Ratio (λ) from the Heckman selection model is also statistically significant. This means that these two procedures should be estimated by the different equations, and we cannot perform only the OLS regression, which does not account for the self-selection process (Certo et al., 2016; Heckman, 1976, 1979). The probability of having personal income tax liabilities and the expected value of tax liabilities are determined differently. The robustness check confirms that the Heckman selection model is more suited to estimating the effect of tax policy changes in this study.

In Column (2), the regression from the Heckman regression equation shows that the partial effects of assessable gross income, number of elderly dependents, years of education, being married, owning a house, and residing in an urban area are statistically significant at the P<0.001 level. Number of children is statistically significant at the P<0.05 level, and value of financial assets for investment, age, and gender are statistically significant at the P<0.1 level. Charitable contributions and insurance expenses are not statistically significant. For the policy effect, the amount of assessable gross income (AGI), charitable contributions, insurance premiums, and number of elderly dependents are statistically significant at the P<0.001 level for the 2007 data, and the amount of assessable gross income (AGI), charitable contributions, number of children and elderly dependents are statistically significant at the P<0.001 level for the 2017 data.

Table 4.10 Marginal effect of tax policy reform on household personal income tax

Heckman Regression	Effect of the policy in the respective year compared to 1996		Marginal changes in PIT with respect to the regressor in the respective year		
Dy/Dx	2007	2017	1996	2007	2017
AGI	-21.67***	-27.18***	70.44***	48.76***	43.26***
Charity	2,305.29***	1,708.29***	29.73	2,335.02***	1,738.02
Insurance	1,248.42***	-24.32	-114.14	1,134.28	-138.46
Investment	2.84	-3.77	4.53	7.37	0.76
Children	2,136.61	-16,689.18	13,363.38	15,499.99	-3,325.80
Elderly	-24,993.82***	-22,536.82***	27,294.22***	2,300.40***	4,757.40***

Column (2) of Table 4.10 shows that when assessable gross income increases by 1,000 baht, PIT increases by 70.44 baht, *ceteris paribus*. Having children or elderly dependents in the household are positively correlated with a higher amount of PIT. Having one more child in the family is correlated with a 13,363.38 baht increase in the amount of PIT, *ceteris paribus*, and having one more elderly dependent is correlated with a 27,294.22 baht increase in the amount of PIT, *ceteris paribus*. It is possible that

people who have children or elderly dependents in their families have higher expenses than those who do not. Families with children or elderly dependents need to reserve more cash for regular expenses such as tuition fees, clothes, caregiver costs, or potential emergency situations such as medical expenses. As a result, they are less likely to divert their cash savings to investment, insurance purchases, or home mortgages that could lower the amount of PIT. Although child and elderly allowances are universally applied, these tax benefits are not large enough to relieve tax burden.

Personal income tax liabilities increase as people get older. However, each year of higher education attainment is estimated to lower PIT by 1,047.77 baht, holding all else equal. The regression result implies that, when comparing two individuals with the same level of income who are similar in all other factors, the person with better financial literacy (which is associated with higher levels of education attainment) can better take advantages of tax benefits to lower his or her tax burden. In addition, highly skilled professionals also receive greater tax benefits. For example, physicians who have more years of education can deduct higher amounts of personal allowances (60% of assessable income) than normal wage earners (50% of assessable income, limited to a maximum of 100,000 baht). Position allowances are also exempted. Those who live in municipal areas pay 10,516.45 baht less in PIT compared to those living outside a municipal area.

Married taxpayers are estimated to have lower PIT than single tax payers by 4,433.46 baht, *ceteris paribus*. It is possible that married people deduct the spouse allowance or may jointly file tax returns with their spouses to lower their PIT. Males are expected to have higher PIT than females by 1,863.38 baht, *ceteris paribus*. A home owner is expected to pay 3,520.72 baht more in personal income tax than a non-home owner, *ceteris paribus*. The deduction on home mortgage interest of 100,000 baht only applies, not to all home owners, but only to those who have a home mortgage, and the deduction may not be high enough to relieve the personal income tax burden.

On average, personal income tax liabilities in 2007 are estimated to have been 15,680.31 baht lower than in 1996, and personal income tax liabilities in 2017 are estimated to have been 29,108.89 baht lower than in 1996. The changes in personal income tax policy in 2007 and 2017 significantly lowered the tax burden among tax payers.

The effect of policy changes is measured by the coefficient between year dummy variables (y07 and y17) and key independent variables. Changes in policy relating to assessable gross income (AGI), charitable contributions, and elderly dependents significantly altered the amount of PIT in both 2007 and 2017. Changes in deductions for insurance premiums significantly altered the amount of PIT only in 2007, and changes in the child allowance significantly altered the amount of PIT only in 2017. Changes in deductions on long term financial investments did not significantly alter the amount of PIT in either period. The policy effects resulting from changes in personal income tax regimen are presented in Table 4.9.

In 2007, there was an exemption from tax on the first 100,000 baht of taxable income. The empirical results show that this policy helped lower PIT by21.67 baht for every 1,000 baht increase in AGI as compared to 1996. As a result, PIT increased by only 48.76 baht instead of the 70.44 baht for every 1,000 baht increase in income which would have been expected without the exemption, holding all other things equal. The 30,000 baht allowance for elderly parents and 190,000 baht personal allowance for each

tax payer and spouse aged 65 years or older helped lower PIT by 24,993.82 baht compared to 1996. As a result, PIT increased by only 2,300 baht instead of 27,294.22 baht per senior taxpayer, holding all other things equal. The universally applied tax benefit significantly lowered the amount of PIT for all tax payers.

In 2007, charitable contributions for educational purposes and sports activities were increased to 2 times and 1.5 times the amount of contribution, respectively, but the deductions were still limited to 10% of taxable income. An increase of 1,000 baht in charitable contributions is correlated with 2,305 baht rise in PIT compared to 1996. Previous studies have shown that when income increases, people tend to contribute more to charity because they are more able to do so, and are also because they are motivated by the tax incentives (Auten et al., 2002; Limkrayarot, 2015; Wannajitjaroon, 2008). People may contribute more to charity, but not all contributions can be itemized.

Deductions on insurance were increased from 10,000 baht to 40,000 baht, and an increase of 1,000 baht in insurance expenditure is correlated with 1,248.42 baht rise in PIT compare to 1996. Insurance premiums paid is positively correlated with income (Muthitacharoen & Phongpaichit, 2020). People purchase larger amount of insurance in order to manage their future health cost and smooth their consumption after retirement; tax incentives are also very effective in increasing demand for insurance (Courtemanche & He, 2009). It is possible that the amount of insurance purchased exceeds the deduction limit.

From 2007 to 2017, the tax threshold increased from 100,000 baht to 150,000 baht, and the marginal tax rates were reduced. It is estimated that these changes reduced the 2017 PIT burden by 27.18 baht compared to 1996. A 1,000 baht increase in AGI is expected to increase PIT by only 43.26 baht, holding all else equal. An increase of 1,000 baht in charitable contributions is expected to correlate with a 1,708.29 baht increase in PIT compared to 1996. It is possible that people are now becoming more aware of the benefit available under this policy, and are submitting evidence of charitable contributions to lower their tax burdens.

In 2017, child allowances were increased from 15,000-17,000 baht per child (up to 3 children) to 30,000 baht per child without limit. Having 1 more dependent child helped reduce PIT by 16,689.18 baht, holding other things equal. Tax payer can also deduct an additional 15,000 baht for the amount of insurance premium for their elderly parent. Having 1 more elderly dependent in the family led to a 22,536.82 baht reduction in PIT compared to 1996. It is possible that tax payers themselves are now elderly and utilize the personal allowance of 190,000 baht instead of 100,000 baht for taxpayers of working age. The empirical result implies that an increase in child and elderly allowances in 2017 helped relieve the tax burden of those who were able to claim them.

From 2007 to 2017, deductions limits for insurance premiums were increased from 50,000 baht to 100,000 baht plus 100,000 baht for pension insurance, and the maximum deductions on long term investments were increased from 300,000 baht to 500,000 baht (also limited to 15% of AGI). However, deductions on insurance had no significant effect in this period.

Deductions for long term investments (LTFs, RMFs and provident funds) have no significant effect on the amount of PIT. The previous research shows that these deductions -- especially those for LTFs and RMFs -- are exercised mostly by those in the top income tax bracket (Ananapibut, 2012; Muthitacharoen & Phongpaichit, 2020). Low and middle income tax payers may not be able to afford to invest, so the policy

effect from deductions for long term investments is quite limited. This study also faced a limitation regarding the amount of long term investment. The amount of investment in this study is the value of financial assets for investment, which may not fully represent the amount of contributions in the respective years.

Additional Analysis

Personal income tax law in Thailand treats income from each source differently. The majority of personal income tax payers are people who earn income from wages and salary. In addition, people in different occupations are subject to different tax treatments, as mentioned earlier. In this section, we estimate how changes in personal income tax policy differ across occupational groups. The pooled observations from the SES of 1996, 2007, and 2017 are categorized into 6 occupational groups: farmers, entrepreneurs, professionals (high-skilled workers), laborers (low skilled workers), welfare recipients and capital earners.

Table 4.11 presents the population shares from the pooled observations by occupation group of SES 1996, 2007, and 2017. Wage earners contributed 43.31% of the total observations. Laborers contributed 32.47% of the total observations, and professionals contributed 10.84% of the total observations. Entrepreneurs contributed 20.78%, and the capital earners contributed to 0.88% of total observation. Welfare recipients contributed 18.08%, while farmers contributed 16.95% of the total observations. The professionals group has the highest share of tax payers at 57.41%, followed by capital earners at 32.79% and laborers at 27.37%. Entrepreneurs, despite having high income, comprised a lower share of tax payers at 26.06%. Welfare recipients and farmers had lower shares of tax payers at 19.87% and 16.65% respectively

Table 4.11 The population shares by occupation from pooled SES of 1996, 2007, and 2017

Occupation	Farmers	Entrepreneurs	Professionals	Laborers	Welfare Recipient	Capital Earner
Non-tax payers (pit=0)	15,731	17,113	5,141	26,269	16,138	658
Tax payers (pit>0)	3,142	6,030	6,931	9,898	4,003	321
Total	18,873	23,143	12,072	36,167	20,141	979
Population Share (%)	16.95	20.78	10.84	32.47	18.08	0.88
% of tax payers	16.65	26.06	57.41	27.37	19.87	32.79

Source: Pooled data from SES of 1996, 2007, and 2017

Table 4.12 presents the marginal effects of personal income tax liabilities with respect to independent variables from the Heckman regression equation[55]. With respect to the marginal effect of assessable gross income (AGI) among wage earners, the AGIs of professionals and laborers are much higher than the AGIs of other occupation groups, which conforms to the fact that people in these groups receive higher wages and salary than other groups and that they are more likely to be in the formal sector. Although professionals have higher income than laborers, the marginal effect of AGI among laborers is higher than among professionals. If assessable gross income increases by 1,000 baht, the personal income tax liabilities among the laborer group increase by 373.43 baht, while the tax liabilities of professionals increase by only 319.41 baht, *ceteris paribus*. Some assessable incomes are exempted from PIT, such as position allowance and meeting allowance(The Revenue Deapartment of Thailand, 2020), and these forms of compensation are more prevalent among high-skilled workers than among general laborers. Some professionals such as physicians, lawyers, engineers, and accountants can deduct personal expenses without limit, while normal wage and salary earners can only deduct up to 100,000 baht. Professionals also own a much higher amount of assets than laborers. As a result, parts of professionals' AGIs may come from assets such as rents, interest or dividends, which are taxed at lower rates. Moreover, professionals are more likely to purchase insurance and invest in long term funds to smooth their consumption and lower their tax burden.

The marginal effect of AGI is lower among capital earners and welfare recipients than among wage earners. This is because capital income is taxed at much lower rates than income from wages and salary. The realized capital gains from mutual funds and transactions in the stock exchange of Thailand are also exempted. The marginal effect from the AGI of farmers and entrepreneurs is not statistically significant. People in these two groups receive higher deductions on personal allowances (80% for farmers and 60%-70% for entrepreneurs) than do wage earners. The majority of farmers have low income; thus, their taxable incomes may still lower than the tax threshold.

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[55] The coefficients from the selection stage of Heckman Selection model is present in Table... Appendix C

Table 4.12 The regression of personal income tax liabilities from Heckman selection equation by occupation group from pooled SES of 1996, 2007, and 2017

VARIABLES	Coefficient Farmer	Coefficient Entrepreneur	Coefficient Professional	Coefficient Laborer	Coefficient Welfare Recipient	Coefficient Capital Earner
AGI	73.6679***	16.6503	319.4095***	373.4258***	116.6398***	264.0112*
	(9.8849)	(10.5233)	(16.1768)	(16.4374)	(34.4375)	(153.1719)
charity	-3,245.2290**	-707.9971*	-617.1756	389.6071	-181.2459	840.3257
	(1,593.3673)	(387.4919)	(618.0256)	(408.3610)	(362.6836)	(571.8951)
insurance	-3,051.8906***	-1,328.7840**	2,251.0059***	-724.7984*	3,676.1681***	-1,212.9592
	(877.5334)	(611.0014)	(577.9456)	(372.5268)	(879.5581)	(1,799.4848)
investment	185.1892***	84.7473***	16.0961*	-6.1496	1.3611	11.4773**
	(56.5681)	(24.4369)	(8.4767)	(11.4548)	(17.9256)	(5.4906)
PC_children	14,984.5508	18,582.9204	24,294.2688*	5,425.3060	15,904.6113	43,044.0913
	(10,559.2630)	(19,123.0429)	(12,949.4933)	(5,052.1061)	(22,325.9326)	(106,558.1540)
PC_elderly	-9,261.8862	4,079.4631	27,050.0091	8,483.1320	43,268.8680***	-14,698.9278
	(8,478.6069)	(20,218.3077)	(18,095.9036)	(6,860.1539)	(12,392.0761)	(52,443.3948)
age	67.9493	-497.0986***	1,057.8021***	208.2704***	37.1108	888.6315
	(57.9508)	(191.9826)	(182.5309)	(38.6100)	(65.0040)	(566.2571)
education	320.6888*	-2,045.8257***	2,005.6389***	621.4813***	681.6505	3,085.6604
	(191.6641)	(777.2328)	(533.6925)	(133.0136)	(543.7721)	(1,878.7591)
male	-141.7364	-597.1919	-411.3781	-45.4390	78.9462	1,604.6970
	(571.8515)	(3,324.7812)	(2,875.3787)	(880.4332)	(1,345.9638)	(11,272.6807)
married	1,124.1739	-10,608.7521**	3,041.2967	4,118.5910***	1,997.3872	-392.7771
	(1,360.6592)	(4,354.4415)	(3,119.2221)	(920.6320)	(2,279.6170)	(11,262.4194)
house	-1,326.1742	823.5008	6,143.8148**	1,220.6129	-315.0261	12,365.4397
	(1,677.9186)	(3,288.8251)	(2,969.3589)	(920.5337)	(2,611.1793)	(18,361.1117)
municipal	814.4124	-23,925.9072***	906.7141	6,818.6564***	-2,111.9421	25,173.5066

VARIABLES	Coefficient Farmer	Coefficient Entrepreneur	Coefficient Professional	Coefficient Laborer	Coefficient Welfare Recipient	Coefficient Capital Earner
	(560.8078)	(5,759.2068)	(3,326.2248)	(994.4120)	(2,113.0536)	(21,240.2063)
y07	5,599.7706	-63,060.4889***	21,609.3715***	4,712.3354*	21,011.2214	66,583.0886
	(10,340.9364)	(13,057.8255)	(7,223.8850)	(2,586.4092)	(14,837.6944)	(67,746.9875)
y17	7,495.1819	-102555.7593***	23,206.2867***	34,992.2388***	19,467.9476	84,996.7865
	(15,074.8794)	(20,272.7037)	(7,029.1680)	(3,100.4784)	(18,351.2211)	(70,332.6200)
y07_AGI	-68.0017***	-18.0853	-141.2001***	-82.0020***	-81.6777**	-141.7621
	(8.3700)	(11.0824)	(16.2914)	(14.0137)	(31.9893)	(143.8454)
y07_charity	3,713.8896**	2,945.3642***	2,895.5218***	-59.9002	1,052.3115**	-727.3112
	(1,626.2109)	(712.3288)	(689.4906)	(488.6694)	(448.2867)	(677.1327)
y07_insurance	3,283.6268***	833.6860	-0.5396	724.4222*	-2,660.7862***	2,608.9413
	(891.9955)	(682.6344)	(624.4212)	(434.8454)	(988.2383)	(2,293.4480)
y07_investment	-177.8392***	-83.1629***	-6.7497	3.8455	8.3581	-7.3476
	(56.3351)	(24.5714)	(8.5466)	(11.7234)	(18.0048)	(5.3592)
y07_children	-16,558.8204	-8,992.1521	-11,137.6472	18,435.2135***	-14,613.5328	-40,515.0784
	(10,494.3641)	(21,799.9361)	(16,785.7430)	(6,107.0038)	(23,464.8298)	(117,867.0323)
y07_elderly	4,212.9945	34,235.4734	-49,582.4999**	-1,584.7728	-38,278.3913***	16,963.1714
	(8,068.4935)	(23,284.1374)	(19,970.2251)	(7,590.8232)	(13,650.1977)	(53,787.4863)
y17_AGI	-58.8877***	-2.7464	-155.2951***	-235.9235***	-66.1797**	-158.8940
	(10.1200)	(10.9310)	(15.8826)	(15.1797)	(28.9548)	(144.5623)
y17_charity	3,330.2716**	1,173.9291**	4,168.5809***	-464.2085	1,387.0626***	-2,246.4607**
	(1,620.7110)	(528.3193)	(691.4248)	(455.7137)	(398.4425)	(1,126.8474)
y17_insurance	3,214.6379***	96.4859	-2,252.7651***	938.7553**	-3,247.4183***	2,182.9945
	(867.9838)	(622.9903)	(592.4649)	(391.9313)	(894.8704)	(1,881.4226)
y17_investment	-181.3147***	-84.4586***	-13.7624	5.5246	-1.5307	-11.3818**
	(56.6046)	(24.4720)	(8.4844)	(11.4714)	(17.9252)	(5.5077)
y17_children	-16,203.3349	-31,937.8162	-1,979.7853	3,966.9362	-13,618.6086	-25,902.4781
	(10,844.8947)	(22,391.8316)	(17,260.1871)	(5,987.6159)	(22,677.6742)	(116,771.3963)

VARIABLES	Coefficient Farmer	Coefficient Entrepreneur	Coefficient Professional	Coefficient Laborer	Coefficient Welfare Recipient	Coefficient Capital Earner
y17_elderly	7,511.1133	21,423.3670	-45,960.8613**	-12,505.8080*	-41,586.4509***	-4,868.3911
	(8,032.1879)	(21,304.0916)	(19,300.1599)	(7,113.3335)	(13,969.3427)	(53,302.5526)
lambda	6,714.2770	-140216.3230***	26,322.8540*	43,612.3889***	117.6983	96,722.8221*
	(10,130.0408)	(30,037.7583)	(14,723.5700)	(3,856.3809)	(11,734.5540)	(56,175.7070)
Constant	-21,416.8907	319,054.4470***	-161937.2263***	-118098.5727***	-34,505.6267	-285524.7357*
	(32,624.2540)	(69,375.9741)	(27,756.1449)	(8,819.4410)	(41,883.1114)	(168,037.0251)
Observations	18,873	23,143	12,072	36,167	20,141	979

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Charity contributions are estimated to lower tax burden among entrepreneurs and farmers. Insurance expenses are estimated to lower tax burden among farmers, entrepreneurs and laborers, but are actually correlated with an increase in tax burden among professionals and welfare recipients. Investment is also found to be positively correlated with the amount of PIT among farmers, entrepreneurs, and capital earners,

Having one more child is correlated with a 24,294.27 baht increase in the amount of PIT among professionals, holding all else equals. Having child dependents incurs higher expenses and requires more cash on hand; as a result, parents become more risk averse and lower their investment and other expenses that could lower their PIT burden. Having one more elderly dependent in the household is correlated with a 43,268.87 baht increase in the amount of PIT among welfare recipients, holding all else equals. Welfare recipients are those who do not actively participate in the labor market and mostly depend on pensions and social transfers, and some of welfare recipients themselves are elderly. People in this group are less likely to hold cash for their daily expense and less likely to invest.

Age, years of education, and being married are estimated to lower the amount of PIT among entrepreneurs, but increase the amount of PIT among professionals and laborers. Entrepreneurs have more channels to report their income, while the effect of age and education are statistically significant because the wages and salary of these taxpayers are highly dependent on their performance and experience.

PIT of professionals and laborers is estimated to have been higher in 2007 and 2017, while that of entrepreneurs is estimated to have been lower. But changes in personal income tax regimen as a whole are only statistically significant among entrepreneurs, professionals and laborers.

The changes in PIT structure reduced PIT among professionals, laborers, welfare recipients and farmers. In 2007, for every 1,000 baht increase in AGI, professionals are estimated to have received the largest reduction of 141.20 baht, followed by laborers with an 82.00 baht reduction, and welfare recipients with an 81.68 baht reduction in PIT compared to 1996, holding other factors constant. In 2017, the PIT among laborers fell by 235.92 baht, while that of professionals was reduced to 155.30 baht. The empirical results show that an increase in the tax threshold from 100,000 baht in 2007 to 150,000 baht in 2017 helped lower the personal income tax burden for those in the lower tax bracket. This change also lowered the amount of PIT among welfare recipients by 66.18 baht for every 1,000 baht increase in AGI compared to 1996.

Deductions for charitable contributions are positively correlated with an increase in PIT in 2007, but helped reduce the tax burden among capital earners in 2017. It is possible that people are motivated by changes in tax policy to contribute more to charity; however, parts of their charitable contributions may not be tax-deductible, and the qualifying deductions for charitable contributions are also limited to a maximum of 10% of taxable income. As a result, tax payers are motivated to increase their charitable contributions, but may not always receive tax deductions from those contributions.

The deduction limit for insurance premiums was increased from 10,000 baht in 1996 to 50,000 baht in 2007, and then to 200,000 baht in 2017. Professionals benefitted from these increases in allowed deductions as their PIT liabilities decreased by 2,252.77 baht in 2017 for every 1,000 baht of insurance premium paid, which counteracted the positive relationship between insurance premiums and PIT (2,251.01-2,252.77).

Welfare recipients who purchased insurance in 2007 are estimated to have decreased their personal income tax burden by 2,660.79 baht in 2007 and by 3,247.42 baht in 2017, holding all other things equal. But the deductions on insurance are still smaller than the positive relationship between insurance premiums of 3,676.17 baht. Deductions for insurance premiums are correlated with an increase in PIT among farmers and laborers. Farmers may have already deducted the personal allowance from their AGI; thus, they may not receive the tax benefit from deductions for insurance premiums paid.

The deductions on long term investment and contributions to provident funds of up to 300,000 baht were introduced in 2007, and then the limit was increased to 500,000 baht in 2017. This policy helped reduced PIT liabilities among entrepreners and farmers in 2007 and 2017, and reduced PIT liabilities among capital earners in 2017. But deductions on these financial investments did not statistically alter PIT liabilities among other occupation groups. This may have resulted from the fact that the share of itemizers in this category is quite small relative to the total population. The other reason could be that the amount of financial assets for investment, which is based on the value of stocks held, is used to represent the value of financial investments due to data limitations.

An increase in elderly allowance reduced the personal income tax burden among professionals and welfare recipients in both 2007 and 2017, and reduced the tax burden among laborers in 2017. The personal income tax burden among professionals is estimated to have decreased by 49,582.50 baht in 2007, and by 45,960.86 baht in 2017 compared to tax burden of 1996. Welfare recipients are estimated to have received a tax benefit of 38,278.39 baht in 2007 and 41,586.45 baht in 2017 for each elderly dependent in the household, which may include the tax payers themselves. Laborers are estimated to have received a tax benefit of 12,505.81 baht in 2017.

The effect of elderly allowance was more prevalent than tax benefits that correlate with income, like deductions on insurance and investment. However, changes in child allowance did not statistically alter PIT liabilities in any occupation group except for an increase in the positive relationship between the number of child dependents and PIT among laborers in 2007.

Additional analysis provides evidence that professionals and laborers are the groups most affected by changes in personal income tax structure because their main incomes are mostly from wages and salaries. Welfare recipients are also highly affected because their incomes are recorded by employers and organizations that grant them the transfers. They are also less likely to participate in the activities that could help lower their tax burden, like insurance purchasing and long-term investment. Welfare recipients and retirees tend to be more risk averse than other groups because of their high dependency on transfer income. Those who already receive higher deductions on their expenses, like farmers (80% deduction of assessable income) and entrepreneurs (30%-70% of assessable income), are less affected by changes in the personal income tax regimen. Entrepreneurs and capital earners may face lower marginal tax rates thanks to a high ratio of capital-related income, which is taxed at lower rates than labor earnings, or may even be exempted. Tax benefits that are universally applied, such as elderly allowances, help relieve the tax burden for a majority of the population, while the effects of deductions on insurance are mostly confined to high income groups like professionals and entrepreneurs. The benefits from tax allowances, deductions, and

exemptions are positively correlated with income, whether they are equally applied or income-dependent, because those who are in higher tax brackets have lower tax price (1-MTR) on their activity than those in the lower tax brackets.

4.6 Concluding remarks and policy implications

This study analyzes the effect of personal income tax reform on personal income tax liabilities in Thailand over a 21-year period using pooled-cross section data of the Thai population from the Socio-economic Surveys (SES) of 1996, 2007, and 2017 conducted by the National Statistical Office (NSO). The pooled cross section enables us to increase sample size and measure changes occurring during the period of study. A significant share of the observations do not have personal income tax liabilities. As a result, the OLS coefficient is biased and inconsistent (McDonald & Moffitt, 1980; Wooldridge, 2006). Calculated AIC and BIC values are used to select the best fit from among the candidate models. This study also includes additional analysis by occupation groups to demonstrate variations in the effects of personal income tax reform because personal income tax laws in Thailand treat income from each source and people in each occupation differently.

Tobit regression analysis is usually applied to this type of data to measure the marginal changes and elasticities of personal income tax burdens with respect to changes in personal income tax policy. The Heckman Selection Model is applied in order to test whether the selection mechanism and the estimation of expected value of personal income tax burden are identical and can be estimated with the same equation like in Tobit regression. The robustness check shows that the correlation between the error terms in the selection stage and the regression stage differ significantly from zero, which means that the probability of entering the personal income tax system and the expected value of tax burden itself cannot be estimated within the same equation of Tobit regression. Thus, this study applied the Heckman Selection to estimate the personal income tax liabilities. The Inverse Mill Ratio (λ) from the first stage of Heckman Selection is included in the regression equation to helps absorb the correlation of the error terms between the selection and the regression stage (Greene, 2012; Heckman, 1976, 1979).

The 21-year period of study contains major changes in the personal income tax structure of the country. During the period, higher tax thresholds and lower marginal tax rates together with higher limits on deductions and exemptions were all enacted. Tax allowances, deductions, and exemptions changed the amount of tax revenue that would have otherwise been collected. There are two categories of tax benefits. The first category of benefits consists of allowances for tax payers, spouses, children, elderly dependents, and house mortgage interest, which are equally applied to tax payers who meet the requirements. Thus, this category of benefits provides tax burden relief for the majority of Thai tax payers. The second category of benefits consists of deductions and exemptions for insurance premiums, and contributions to LTFs, RMFs, and provident funds, which are positively correlated with income. The deduction limit on insurance premiums was increased from 10,000 baht to 200,000 baht, and the limit on deductions for long term investment was increased from 50,000 baht each for LTF and other long term investments (RMF or provident fund) in 2007 to 500,000 baht each in 2017. Past research has found that the deductions on long term investment, especially the deduction for LTF investments, were much greater in the top income tax bracket.

Most of the beneficiaries of these tax deductions -- especially those for LTF and RMF investments -- are tax payers in the high income brackets (Ananapibut, 2012; Chawanote & Laovakul, 2017; Muthitacharoen & Phongpaichit, 2020).

From 1996 to 2017, annual money income increased from 71,817.60 baht to 130,980.20 baht (at the 2015 price level). The average personal income tax liabilities increased from 3,245.19 baht to 4,555.47 baht, but the effective tax rate decreased from 4.52% to 3.48%. Charitable contributions increased from 633.51 baht (0.88% of money income) to 1,703.33 baht (1.03% of money income), and insurance purchases increased from 555.07 baht (0.77% of money income) to 3,990.35 baht (3.05% of money income).

The value of financial assets for investment, which includes the value of stocks, mutual funds, and provident funds, also increased rapidly, from 9,925.29 baht (13.82% of money income) to 150,478.60 baht (114.89 % of money income). The value of financial assets also accumulated due to an increase in income, additional investment, and returns on capital. People also redirected their savings from deposit accounts to financial markets seeking higher returns.

The number of children per household decreased, while the number of elderly dependents increased. Taken together with the fact that average age also increased shows that Thailand has been moving toward an aging society, as discussed in the study of (Aemkulwat, 2010). The percentage of married taxpayers also decreased, as well as the percentage of home owners. However, the years of education increased as a result of an increase in compulsory years of education. The percentage of labor in the formal sector also increased.

Only 27.73% of the total observations had personal income tax liabilities. Tax payers had higher income than non-tax payers. The average assessable gross income (AGI) equaled 170,794.00 baht for tax payers, and 72,384 baht for non-tax payers. Tax payers contributed more to charity and purchased higher amounts of insurance. Tax payers also possessed a higher value of financial assets than non-tax payers (203,636.70 baht VS 26,241 baht).

Laborers (low-skilled workers) comprise the largest occupation group at 32.47% of the total population. Entrepreneurs made up 20.78%, and professionals (highly skilled workers) accounted for 10.84% of the total population. Professionals comprised the highest share of tax payers at 57.41%, followed by capital earners (32.79%), and laborers (27.37%). Personal income taxes are mostly levied on wages and salary; thus, they are mostly levied on professionals and laborers who receive income mainly from wages and salary. Because they are working in the formal sector, wages and salaries are usually recorded by the employer or other organization, and the personal income tax of these groups of tax payers is usually deducted from periodic wage and salary payments. Transactions and income of the capital earners are also recorded in the system, but capital income is taxed at constant and lower rate than wages and salary.

Past research in personal income tax elasticities, such as the work of (Creedy & Gemmell, 2010); Creedy and Gemmell (2013), Ram (1991); (Reed et al., 2011), and Tanzi (1969) was done at the aggregate level, in which PIT is regressed on GDP and other factors like marginal tax rates and income inequality. This study aims add to the field by doing the analysis at the individual level. There are two models in this study. Model (1) is a basic model that regresses personal income tax liabilities (PIT) on

assessable gross income (AGI) and other factors that relate to changes in the personal income tax regimen. These key independent variables are charitable contributions, insurance premiums, and the value of financial assets, number of children, and number of elderly dependents. In Model (2), the year dummy variables and the cross terms between year dummy variables and key independent variables are added to measure the effects of changes in tax policy across time periods. The Model(2) is also used in the OLS regression. Tobit regression of Model (2) yielded the lowest values of AIC and BIC indicating best goodness of fit; therefore, it was used in this study. In the robustness check, the results from the Heckman Selection Model provide that the probability of entering the personal income tax system is not random; therefore, the Tobit coefficients are also biased. Thus, the regression results from the Heckman Selection Model are used to estimate the effect of personal income tax reform on the personal income tax burden in Thailand from 1996 to 2017.

In the first stage of the Heckman Selection Model, the employment sector (formal VS informal) is added as a selection criterion, significantly increasing the probability of having personal income tax burden. This supports the evidence previously found in the studies of Chandoevwit and Jawala (2011) and Jitsuchon and Plangpraphan (2011). The results from the Probit regression provide the probability of having an increased personal income tax burden, along with the amount of assessable gross income (AGI), charitable contributions, insurance premiums, value of financial assets from investment, age, and education attainment. People who are married, living in a municipal area, or working in the formal sector were also more likely to have personal income tax burden. Having children or elderly dependents, or owning a house reduced the probability of having to pay income tax.

The changes in the personal income tax regimen in 2007 and 2017 also increased the probability of being included in the income tax system. This resulted from both the personal income tax reform and behavioral changes such as migration from the informal to the formal sector. However, the broadened tax base may not always have resulted in higher tax liabilities.

The effects of the policy changes in 2007 and 2017 on the probability of being taxed were in the same direction. The changes in PIT structure, and the deductions on long term saving and investment (LTFs, RMFs, and provident funds) reduced the probability of having a personal income tax burden, while an increase in allowances relating to children and elderly dependents, and deductions on insurance premiums increased the probability of being taxed.

From the second stage of the Heckman Selection Model, the regression results provide that if assessable income increased by 1,000 baht, PIT increased by 70.44 baht, holding other variables constant. This conforms to the nature of progressive tax rates. The results from the selection stage show that having children or elderly dependents helped lower the probability of being taxed, but once a taxpayer passed the selection criteria, having children or elderly dependents is correlated with a higher income tax burden. Having one child dependent in the family increases PIT by 13,363.38 baht, while having one elderly dependent in the family increases PIT by 27,294.22 baht. Taking care of children and elderly dependents entails incurring expenses such as tuition fees, clothes, or health care on a regular basis. It is possible that families with children and elderly dependents have to reserve more cash for these expenses instead

of diverting their earnings to other activities that help reduce their personal income tax, such as spending on insurance or investments.

Married people have a higher probability of being taxed, but tax payers who are married pay 4,433.46 baht less PIT compared to tax payers who are single. Married people benefit from filing jointly, and from deductions related to spouses such as spouse allowance, elderly allowance, and insurance premiums. Home owners pay 3,520 baht more PIT than non-home owners. The deductions on mortgage interest may reduce the probability of being taxed for low- and middle-income groups, but the interest deduction is not large enough to lower PIT. When people are one year older, their PIT increases by 86.63 baht on average. In contrast to previous studies of this topic using Tobit regression (Limkrayarot, 2015; Wannajitjaroon, 2008), one additional year of education correlates to a decrease of 1,047.77 baht in PIT. This may be because people with higher education levels may have a better financial literacy and can better reduce their tax burden.

Changes in the PIT regimen in 2007 and 2017 increased the probability of being taxed compared to 1996, but these changes reduced the overall tax burden compared to the PIT in 1996. On average, tax payers paid 15,680.31 baht less PIT in 2007 and 29,108.89 baht less PIT in 2017 compared to 1996. It is estimated that a 1,000 baht increase in AGI increased PIT by 70.43 baht, holding all other variables constant. An increase in the tax threshold from zero in 1996 to 100,000 baht in 2007 decreased PIT by 21.67 baht, and a further increase of the tax threshold to 150,000 baht in 2017 decreased PIT by 27.18 baht compared to the PIT burden of 1996. These changes in personal income tax structure lowered the revenue that would otherwise have been collected from an increase in income, which was also reported in the studies of (Creedy & Gemmell, 2004, 2013; Wannajitjaroon, 2008).

An increase in deductions on charity contributions and insurance premium are correlated with an increase in PIT. Previous studies have shown that when income increases, people tends to contribute more to charity because they are able to contribute more and are also motivated by tax incentives (Auten et al., 2002; Limkrayarot, 2015; Wannajitjaroon, 2008). In addition, the total deductions are still limited at 10% of taxable income, and the charity must be contributed to the listed organization specify in the tax laws.

An increase in the deductions on insurance premium significantly increase the probability of having personal income tax burden. Insurance premiums paid is positively correlated with income (Muthitacharoen & Phongpaichit, 2020). People also buy higher amounts of insurance in order to reduce their future health expenditures and smooth their consumption after retirement; tax incentives are also very effective in increasing the demand for insurance (Courtemanche & He, 2009).

In 2007, the Thai government introduced a large number of deductions relating to elderly, ranging from 30,000 baht each for parents of tax payers to 190,000 baht for tax payers aged 65 and over. In 2017, a deduction of 15,000 baht for health insurance of elderly parents was added. This policy helped increase the probability of having personal income tax burden, but decreased the tax burden by 24,993.82 baht in 2007 and by 22,536.82 baht in 2017, compared to the PIT of 1996. This policy was effective in both motivating people to send their tax returns, and relieving the overall tax burden of tax payers.

The effects of changes in tax policy depend on both the amount of benefit and the percentage of itemizers affected. The deductions on long term investment (LTFs, RMFs, and provident funds) had no significant effect on the probability of having personal income tax burden and the amount of tax burden because these deductions were mostly itemized by those who are in the top income tax bracket, which is a very small fraction of the total population. This policy contributes to large amount of tax expenditure, but the benefit were claimed by the high income earners (Ananapibut, 2012; Chawanote & Laovakul, 2017; Muthitacharoen, 2017; Muthitacharoen & Phongpaichit, 2020). The other reason could due to the data limitation because the amount of investment and contributions to provident funds are not available in the SES, so this study use the value of financial assets for investment, which may not fully reflect the amount of long term investment that can be itemized.

It is become harder to avoid tax due to the technological advancement and improvement in tax administration, as a result, people are paying more attention to these tax benefits to reduce their tax liabilities. The empirical results show that the deductions for charitable contributions and insurance premiums effectively motivates people to increase the desired economic activities, like contributing to charity, buying insurance, and invest for their long term savings. These 'tax relief' may also encourage people to file their tax returns. However, amount of deductions still depends on the value of AGI, and may not enough to compensate for the increase in PIT caused by an increase in assessable gross income.

Additional analysis by occupation group demonstrates that people in different occupation groups were differently affected by changes in the PIT regimen. The coefficients of professional and laborers group are larger than the others because their incomes are higher and are usually recorded.

When AGI increases by 1,000 baht, the PIT of laborers increases, on average, by 373.43 baht, while that of professionals increases by 319.41 baht. However, the change among entrepreneurs is not statistically significant. The empirical results conform to the study of Chandoevwit and Jawala (2011), who found much lower effect among entrepreneurs than among government and private employees. The lower marginal tax rates in 2007 are estimated to have reduced PIT by 141.20 baht for professionals and 82.00 baht for laborers. The PIT structure in 2017 is estimated to have reduced PIT by 155.30 baht for professionals and 235.92 baht for laborers, respectively. Raising the tax threshold significantly reduced the personal income tax burden among wage earners, especially those in the lower tax bracket, like farmers and welfare recipients.

An increase in deductions on charitable contributions supporting educational and sports activities reduced PIT among capital earners by 2,246.46 baht in 2017. But this policy is positively correlated with PIT among other occupation groups. This deduction limit is positively correlated with income. Capital earners have higher taxable income and the amount of deduction may high enough to significantly lower their tax burden.

An increase in the deduction limit for insurance premiums decreased PIT for professionals by 2,252.57 baht and by 3,247.42 baht for welfare recipients in 2017. The deductions for insurance expenses can significantly reduce the income tax burden among high income earners because such deductions lower the after-tax price of insurance purchases for those in higher income tax brackets. The deductions for

insurance costs are quite high relative to the income of welfare recipients, so the tax burdens of welfare recipients who purchased insurance were lower than the burden of those who did not. However, the PIT of farmers and laborers was positively correlated with the amount of insurance premiums paid. Nonetheless, this policy is effective in motivating people to purchase more insurance.

An increase in tax allowances related to elderly dependents significantly reduced the tax burden among professionals and welfare recipients in 2007 and 2017. Laborers started to benefit from this policy in 2017. Elderly allowances are estimated to have reduced the PIT burden by 49,582.50 baht for professionals and by 38,278.39 baht for welfare recipients in 2007. The elderly allowances in 2017 reduce PIT by 45,960.86 baht for professionals, by 41,586.46 baht for welfare recipients, and by 12,505.81 baht for laborers. The elderly-related allowances are granted equally to all tax payers. Professionals receive large amount of benefit since they tend to be in a higher tax bracket, and thus, receive higher discount. Welfare recipients also hugely benefit from these allowances because this group is comprised of retirees; thus, they are eligible to deduct 190,000 baht as personal allowance for themselves and their spouse. Child allowance did not significantly alter the PIT burden for any occupation groups except for the positively relationship among laborers in 2007.

The effect of deductions on long term financial investment became significant when the total observation are categorized into occupation groups. For an increase in investment by 1,000 baht, the deductions on investment were estimated to reduce the PIT burden by 177.84 baht for farmers and by 83.16 baht for entrepreneurs in 2007 comparing to their peers within the same occupation group. An increase in deduction limit to 500,000 baht from LTFs and 500,000 baht for RMFs and provident funds in 2017 reduced PIT by 181.31 baht for farmers, by 84.46 baht for entrepreneurs, and by 11.38 baht for capital earners.

In conclusion, the probability of having personal income tax liabilities and the estimated amount of liabilities are not identical, and should be estimated in a separate equations. The regression results from the Heckman Selection Model show that assessable gross income, charity contribution, insurance premium, value of financial assets for investment, and age increased both the probability of being taxed and the amount of tax liabilities. However, there were many key factors that increase the probability of having tax burden, but help reduce tax burden for tax payers. These factors were number of child and elderly dependents, years of education, being married, and living in the municipal area.

The personal income tax policy reforms in 2007 and 2017 increased the probability of having personal income tax burden (broaden the tax base), but reduced the amount of tax paid. These changes reduced tax revenue that otherwise could have been collected from an increase in income. When considering by items, the changes in tax structure reduced both the probability of being taxed and the amount of PIT burden. The tax policy relating to charity contribution and insurance deduction increased both the probability of being tax and the amount of tax burden, while the policy relating to child and elderly dependent increased the probability of being taxed, but help reduce the amount of PIT for tax payers. The deductions on long term financial investment and contribution to provident funds was not significantly affected the amount of PIT.

The effect of personal income tax reform were more pronounce among professionals and laborers thanks to higher share of wages and salary to total income.

The deductions relating to charity contribution and insurance premium reduce the probability of tax avoidance, but not large enough to counteract the positive relationship between these factors and the amount PIT. Tax deductions on charity contribution motivate people to contribute more to charity, but only lowered the tax burden for capital earners in 2017. Tax deductions on insurance motivate people to increase their spending on insurance, but only lower the tax burden for welfare recipients. The allowance relating to elderly reduced tax burden among professionals, laborers, and welfare recipients, while deductions on long term investment decreased the income tax burden among farmers and entrepreneurs.

The effects of changes in the personal income tax regimen depend on both the number of beneficiaries and the amount of assessable income exempted. The standard benefits significantly decrease tax burden, but the effects of income related deductions are limited to high income groups. In addition, the amount of benefit claimed by tax payers are also positively correlated with income. Tax payers who are in the higher income tax bracket receive higher tax reduction than those in the lower tax bracket.

The policy implications of this study are as follows:

First, the Thai government should broaden the tax base in order to compensate for decreased revenue resulting from the changes in the personal income tax structure. The use of digital technology, mobile applications, and cashless payments could help track the income of those in the informal sector that might have not been previously recorded, and facilitate tax collection.

Second, tax deductions should be targeted to relieve the tax burden for lower and middle income groups. This study supports the idea that tax benefits that are universally and equally applied like child allowance, elderly allowance, and deduction on home mortgage interest are beneficial because they help finance fundamental human needs.

Third, tax deductions that are positively correlated with income should be limited. It can't be denied that long-term saving and investment is a behavior that should be promoted in order to smooth income after retirement and through unprecedented economic shocks. However, previous research shows that most of the beneficiaries of tax deductions on long-term investment are those in the top income tax brackets who may not even need this tax subsidy. Therefore, tax deductions on long term investment should be carefully balanced so that they will not reduce tax progressivity. Research on tax expenditure should be done on a regular basis to evaluate and improve the income tax regimen.

The Thai government has already acknowledged the problem of deductions on long-term investment, and replaced the tax deductions on LTF investment with a tax deduction for SSF (Super Saving Funds) contributions starting from the 2020 to 2024 time period. Although tax payers can now deduct up to 30% of their assessable income instead of 15%, the deduction limit has been lowered from 500,000 baht to 200,000 baht. There is no minimum amount of investment, but taxpayers have to hold the investment for at least 10 years. The total deductions on the investment are now capped at 500,000 baht, after including RMFs, other provident funds, and pension insurance premiums. This change is expected to distribute the tax benefit primarily to those in the middle and lower tax brackets, increase long term savings and investment, and stabilize the financial market.

The first challenges faced during this study concerned the data. The Socio-economic Survey (SES) contains a large number of observations and wide range of population characteristics that can be used in regression analysis; however, some data is provided in the household unit and may not be accurate as those reported in tax returns. Mitigation of these problem was undertaken by referencing income and expenditure data with the national statistics. Personal income tax was equalized with personal income tax revenue data.

The second challenge faced in this study is that the value of the financial assets for investment in the SES is the accumulated value. The data from the panel data set provides more accurate investment values. The value of long-term investments and data on contributions to provident funds are not available in the SES, and changes in asset values are also not available due to the nature of cross section data. The value of financial assets for investment is used as a representative figure. Although tax returns provide more accurate statistics on income and expenditure, the number of observations is much smaller, and mostly contains high income individuals. In addition, the data is not yet available for public use.

The value of the variables in this study is based on the value of households per capita because the value of expenses and assets are available in household units. So, the interpretation could differ from a study based on individual values like data from tax returns.

This study contributes to the field by demonstrating the effect of changes in personal income tax policy on tax liabilities at the individual level. It also distinguish the effect of changes in tax policy on the tax base and the amount of tax liabilities. The study of behavioral response to changes in personal income tax or other tax reforms is interesting, but the question of how tax reforms affect tax liabilities and tax revenue is also equally important. The empirical results from this study can be used to evaluate the efficacy of both past and future tax policy reform.

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Chapter 5

Conclusion

This study investigated the effect of direct taxes and changes in tax policy on income inequality in Thailand. It has also provided evidence on the relationship between income and wealth and their synergistic impact on the tax inequality problem in the country. Analysis was provided on both income and wealth inequality. The Shorrocks index decomposition by factor contribution and subgroup contribution was applied to measure the contribution of different factors and identify the sources of inequality. The Tobit regression model was used to estimate the effect of personal income tax reform on the individual income tax burden. The results of the studies have been presented in a series of three articles that, together, comprise the support for this thesis.

5.1 Main findings and research contribution

The overall findings suggest that wealth and income inequality are closely related and reinforce each other. Real assets and financial assets are concentrated in the high income group. This wealth inequality can aggravate income inequality because wealth can generate passive income and provide a great deal of economic advantage for owners. However, the reallocative impact of direct taxes like personal income tax and taxes on real estate is very small and diminishing due to small tax base and policy reforms that violate the principle of horizontal equity in taxation, and which hamper tax progressivity.

The first study investigated the impact of income from each source and the reallocative impact of personal income tax. It was found that the impact of personal income tax was far less that what is required to offset the inequality that stems from accrued capital gains. The analysis from Shorrocks index decomposition yielded a great deal of detailed information about income inequality and the impact of income sources and subgroups on aggregate inequality. The factor contribution analysis shows that the share of accrued capital gains from real and financial assets on comprehensive income is increasing. Real estate is slightly more equally distributed than income thanks to a fair share of residential property among low- and middle-income groups, but financial assets are much more highly concentrated among high income earners, and the trend is increasing thanks to the easing of monetary policy and tax policy that encourages investment in the financial market. While accrued capital gains from financial assets are very volatile, those from real estate tend to increase more consistently due to low liquidity and long time periods between sale transactions. By broadening income scope from money income to comprehensive income, it is possible to demonstrate that income from wealth is significant and makes

a larger contribution to inequality than traditional income sources like business profit and wages.

Business profit and wages, of course, still comprise the main income sources for the Thai population. Inequality of business income and high inequality among entrepreneurs reflect the problems of unequal opportunity between high-net worth investors and small business operators that stem from the problem of asset concentration. Assets can provides a competitive advantage in the form of lower production cost, higher returns on investment and better financial opportunity. Inequality in wages stems from the wage gap between high-skilled and low-skilled workers. Inequality among members of the economically inactive group is also increasing as a result of wealth concentration and the rising share of population over 60 years of age.

Personal income taxes (PIT) are mostly paid by people in the top income decile and high skilled workers. Nonetheless, the share of PIT from high income earners is decreasing, while the share of low income group is increasing. This is because the high income group has benefitted more fully from the personal income tax reform that decreased the marginal tax rates and provides deductions and exemptions that are positively correlated with income. Meanwhile, low-skilled workers and people in the agricultural sector are migrating into the manufacturing and service sectors. Their income may increase, but it is also subjected to personal income tax; thus, their contribution to personal income tax is increasing as the majority of personal income tax is collected from people who work in the formal sectors and is not uniformly applied to income from each source. Wages and salaries, for example, are the main focus of income tax, but the sources of household income are changing considerably. The high income group are now earns more from capital income; however, tax rates on wages and salary are progressive, while tax rates on capital income are constant and lower. This highlights the need for changes in tax policy that will be discussed later.

The findings in this study differ from the previous research on income inequality in Thailand such as the work of Jeong (2008), Kingnetr et al. (2019), Santhi (2013), and Sarntisart (2001) due to the significant share of accrued capital gains. The empirical results suggest that income inequality in the country could be much higher and may not easily resolved unless wealth concentration is taken into greater consideration.

The second study compared inequality between income and real estate ownership among Thai households. The study also provided a simulation to compare the impact of the new land and building tax with that of the previous regimen of taxes on real estate -- a combination of local development tax and building and land tax. The simulation was carried out under three scenarios: the old property tax regimen, the new land and building tax as proposed by the government (exempting the first 50 million baht of primary residence and farming property), and land and building tax without exemption.

Inequality of income and real estate moves in the same direction, but inequality of real estate ownership is much more pronounced. More than 40% of real property is held by the top 10% of income earners, while around one third of income is earned by people in this group. However, the share of real estate among the D1 to D4 groups was found to be higher than income thanks to the value of their house and farming property. Houses and residences contributed more than 50% of household real estate, but business properties were concentrated among households in the high income group. Households in Bangkok and other metropolitan areas had higher income and real estate holdings than did other regions of the country. However, the inequality among central and southern regions was found to be increasing due to rapid economic development and an influx of tourism. Income and real estate values both were also higher in the urban areas.

The majority of taxes on real estate were paid by households in the high income group due to the concentration of real assets; however, the tax structures are not completely progressive nor regressive because people in the lowest decile of the distribution are still obligated to pay property tax despite having low income or incurring losses from farming or business activities. This reflects a problem of mismatching between rising property values and fluctuating income flow. People in metropolitan Bangkok and other urban households were also subject to much higher tax on real estate due to higher real estate prices and taxes on business property.

Land and building tax can reduce income inequality more effectively than the previous real estate tax regime. The exemption on primary residence and farming property helps reduce the tax burden among high income households, while the higher tax rate on business property increases tax burden among that high income group. Land and building tax also lower the tax burden for households in all regions except for households in metropolitan Bangkok. Furthermore, modeling shows that urban households would have gotten tax relief if land and building tax had been applied in 2007 and 2011, but their tax burden would have increased in 2017. In case of land and building tax without exemption, the effective tax rate and tax burden would have been higher for every household, but the redistributive impact would not have been hampered. Land and building tax would also have generated much higher revenue for local government because it would have covered a wider range of property and the tax assessments would have been more standardized. This analysis also highlights the need for up-to-date price appraisals and participation from local citizens.

The analysis in this study is based on the property value (as opposed to factors like land size) because it is more comparable, and because the value of property is used to calculate land and building tax. The identified real estate tax inequality in this study differs from previous studies that used different data sets. The data set in this study represented households, while other studies may have been based on data about land owners that includes both individuals and juristic bodies. The latter case yields much higher inequality in real estate ownership.

The third study estimated the effect of personal income tax policy reform on tax liabilities of the individual. From 1996 to 2017, the marginal tax rate was reduced, while the tax threshold, allowances, deductions, and exemptions all were increased. Personal income tax is positively correlated with assessable gross income (AGI), charity contributions, and insurance premiums. The deductions for charity contributions and insurance premiums are not large enough to counteract the positive relationship between income and these expenses. However, allowances for elderly dependents can significantly lower household tax burden. The findings indicate that a decrease in marginal tax rates reduces the marginal effect of AGI, which indicates that government is losing the additional income that could have been collected from an increase in tax payer income. The deductions on insurance helped reduce the tax burden when the deductions limit was increased to 200,000 baht in 2017.

The regression results by occupation group demonstrate the effect of non-uniform treatment of personal income tax in Thailand. The marginal effect and elasticity of PIT in response to independent variables differed significantly across occupational groups. The marginal effect of AGI of professionals and labors was higher than that of entrepreneurs and the economically inactive. The AGI of farmers was much lower – in fact, close to zero -- which may have resulted from both low income levels and much higher allowances. This indicates that, despite having equal income, people may be subject to different tax liabilities. The impact on tax benefits also differed across occupations.

The impact of tax policy reform also depends on the amount of deductions and allowances, share of itemizers, and levels of income. Professionals comprised the group that benefitted most from changes to the personal income tax regimen. The lower marginal tax rate and increased tax threshold helped reduce the tax burden for every occupation, but the effect was most pronounced among professionals, followed by laborers and the economically inactive group. Increases in elderly allowances in 2007 and 2017 significantly reduced the tax burden for wage earners. The impact of deductions on insurance premiums seems confined to high income groups like professionals and entrepreneurs; however, the impact of deductions on long term investment was not statistically significant because the percentage of itemizers was very small. It should also be noted that those in the higher income tax bracket receive greater benefit because their marginal tax rate are higher, and these benefits may also have moved them down to a lower tax bracket.

5.2 Research Contribution

This thesis contributes to the field by addressing the link between wealth concentration and income inequality. Inequality in Thailand was examined in greater detail. This study broadened the definition of income from money income to comprehensive income, in which accrued capital gains from assets are estimated and added into the survey data. The use of Shorrocks index decomposition provides a detailed analysis of income inequality in terms of income composition and population

subgroups. The results of this study could help target sources of income and population groups for future policy implementation. The study also evaluated the effects of tax policy reform on the reallocative impact of personal income tax.

The study also extends the inequality analysis into household real estate ownership and offers a simulation to compare the efficacy of land and building tax, which replaced the old taxes on real estate (local development tax and building and land tax). This study has been built upon the study of inequality in real estate and the assessment of land and building tax and helps fill the existing research gaps by linking property tax and household income. This is important in terms of tax administration because the new tax law is based on the value of real property, but the ability to pay tax still depends on income flow. A hypothetical simulation was also carried out on the effect eliminating tax exemptions on residences and farming property under the new real estate tax law, and shows that it is possible to do so. In that case, local government could receive much higher revenue and become less dependent on the central government for budgetary funding.

The study of tax elasticity usually focuses on the impact of tax policy on the behavior of tax payers; typically it involves topics such as elasticity of taxable income, charity contributions, and financial investment in response to changes in tax rates or tax benefits. There has been less research on how changes in tax policy affect tax liabilities. The past key literature, such as the work of Tanzi (1969), Reed et al. (2011) and Creedy and Gemmell (2004); (Creedy & Gemmell, 2013) comprised research analysis at the aggregate level. This study contributes to the field by estimating the impact of personal income tax policy reform on changes in personal income tax for individuals. The impact of tax allowances, deductions and exemptions is not equally distributed. The empirical results shed light on how preferential tax treatments deviate the horizontal equity principle of taxation of personal income tax in Thailand.

5.3 Policy implications

1.   Government should find way to offset the loss of tax revenue resulting from lower marginal tax rates and increased tax benefits. Broadening the tax base by including income in the informal sector can help increase tax revenue. The technology of big data and e-payment platforms such as "Pao Tung" can help track data in the informal sector, e-commerce, and the gig economy.

2.   The findings suggest that wealth and income inequality are reinforcing each other. The earning pattern of the Thai population is also shifting toward a higher share of capital and asset-related income, especially those in the high income group, while low and middle income earners still depend on wages and salaries. However, personal income tax focuses on income from employment with progressive tax rates, while letting capital earners enjoy the benefit of lower tax rates and special tax treatment related to investment. This study supports the use of uniform tax rates on income from all sources. In addition, tax deductions that are positively correlated with income should be revised and limited.

3.   Tax on assets could help alleviate wealth concentration and income inequality. Wealth is concentrated within the high income group; therefore, increasing tax progressivity is essential. Land and building tax can help reduce asset

concentration because it increases the cost of holding undeveloped land and the cost of speculation. Instead of being based on the property value, as they are now, real property tax exemptions should be considered based on the need for financial assistance, such as the needs of people who live in areas of rapid economic development with rapidly increasing property values, retirees, or those who incur losses from economic activities. In certain instances, such as in the case of the Covid-19 pandemic, specific tax relief can be applied within reasonable limits.

        4.   Solving inequality problems does not only mean that gains should be taken from the rich and given to the poor. It is equally important to increase financial knowledge and financial accessibility for low- and middle-income groups so they can save and invest for their futures. This study calls for equality of financial opportunity and credit access that helps enhance the competitive advantages of high net worth companies. Tax exemptions should be use as a temporary measure because they reduce government revenue, and may not be sustainable in the long run.

5.4 Research limitations and future research suggestions

One limitation that should be considered before generalizing the results of this study is that the data set in this study represents the general Thai population and may not include outliers such as those who have high net worth or juristic persons. The data from the Socio-Economic Survey (SES) has been equalized with the national account and related statistics to mitigate these problems. If the data of extremely high net-worth are available and the juristic persons are included, the value of inequality is, in fact, expected to be higher.

Another consideration is that returns on assets vary from person to person and depend on many factors. Real estate prices differ by location, size, infrastructure, and personal judgement. The price is finalized only when a property is sold. In addition, the value of real estate in this study includes only residences, farming properties, and business properties. The National Statistics Office (NSO) does not address whether the value of real estate in the SES survey includes the value of unused land. It is expected that land and building tax would lead to the use of more updated and accurate values of real estate property and data on tax liabilities.

Next, returns on financial assets are volatile and differ from person to person. People with high income tend to receive better returns thanks to their better financial literacy, portfolio management, and help from financial experts. The empirical results of this study can be viewed as the lower boundary of the impact from wealth related income. Access to data on value of financial assets and investments like those in the Survey of Consumer Finance (SCF) of the United States would help increase the accuracy of the empirical results.

It should be noted that the values of income and assets in this study are based on the value of household per capita because some items such as value of household assets in the Socio-Economic Survey are recorded in household unit. The household per capita unit are prevalently used among researchers and authorities. The household per capita value also help adjusting for the household size (Datta & Meerman, 1980),

and people in the same household usually share their resources (Kingnetr et al., 2019). However, the analysis of inequality based on value of household income and assets per capita may differ from wage inequality in the labor market.

It would be better if the data on tax returns can be made available to researchers in order to track the changes in tax payer behavior and changes in tax liabilities in response to changes in tax policy. The panel data of SES should be extended to cover a range of household income assets, and other characteristics similar to those presented in the cross section data.

The value of comprehensive income in this study is calculated from the value of assets. The future research on comprehensive income inequality could be done using the value of net wealth. The effect of debt may worsen the ability to pay among low income groups.

The simulation of "comprehensive income tax" can help provide the guidance of future income tax policy reform. Income tax regimens around the world are deviate from the comprehensive income tax base due to the problem of efficiency and administration. In the ideal world, the income tax regimen based on comprehensive income would broaden the tax base and enable government to collect higher revenue with lower tax rate, thus achieving the broad base low rate approach. It may also help reduce the problem of tax avoidance because all income sources are included. The comprehensive income tax may help minimize the behavioral effect in response to changes in income tax structure such as the capital gain realizations, long term investment and housing. People who have different income composition but same amount of income will subject to equal amount of tax burden, thus conforming to the horizontal equity principle of taxation assuming equal tax treatment to all income sources (Alm, 2018).

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Appendix

Appendix A
Data variable

Table A1: Data variable from the SES of 1996, 2007, 2017

	Variable		
Year	1996	2007	2017
N	25,110	43,055	43,210
weight	A31	A52	A52
Household characteristic	Record 01	Record 01	Record 01
Regions	ID1	Reg	Reg
Changwat	ID2	Cwt	Cwt
Community type	ID3	Area	Area
Municipal	ID3(1)	Area 1	Area 1
Non-municipal	ID3 (1&2)	Area 2	Area 2
Number of Earners (exclude servants)	A11	AD02_1	A02_2
Top Earners characteristic	Record 02	Record 02	Record 02
Serial Number	B01	HM01(1)	HM01
Relationship to household Head	B02	HM02(1)	HM02
Sex	B03	HM03(1)	HM03
Age	B04	HM04(1)	HM04
Marital Status	B05	HM10(1)	HM10
Education Attainment	B07	HM15(1)	HM15
Tenure	REC01 A05=1,2	Rec 03 HH03=[1,4]	
Household Income	Record 08	Record 01	Record 01
Labor Earnings			
Wages and Salary	HC301	A18	A18
Non-agricultural Profit	HC311	A20	A20
Agricultural Profit	HC312	A22	A22
Capital earnings			
Roomers & Boarders	HC313	A32	A32
Rental for farming	HC321,322		
Other rents and property including license	HC322		
Interest and dividend	HC323	A34	A34
Transfer			
Pensions and annuity	HC332	A24	A24
Work compensation	HC333	A26	A26
Assistance and remittance	HC331	A28	A28
Organization transfer		A32	A30

	Variable		
Year	1996	2007	2017
Income in-kind			
Rental estimated of free-occupied home	HC 402, 412, 432	A39	A39
Monthly rent or estimated rental value (for all area of dwelling)	E13 if E11=1	HH05 if HH03 = 1	HH05 if HH03 = 1
Unpaid of goods and services	HC 403, 433	A40	A40
Unpaid of food and beverages	HC 401, 411, 413, 421, 431	A41	A41
Income from other sources			
Education scholarship	N/A	A43	A43
Inheritance and gifts	HC 513	A45	A45
Proceeds from health, accident, fire or life insurance	HC 511	A47	A47
Others, e.g. lottery winnings, commissions, gambling, etc.	HC 512, 514	A49	A49
Sum of all other money receipt	B19	A51	A51
Expense	Record 6	REC11	REC11
Charity Contribution	FI=910 (03 &04)	EG116(3) and EG117(3)	EG115(a) and EG116(a)
Insurance Expense	FI=930(02)	EG118(3)	EG117 (a)
Tax burden	PIT: FI=900(01)	EG113(3)	EG11202(3)
Direct tax	FI= 900(02)		
Household Assets Ownership	Estimated from rental value and dividends income	Record 17 Sub record 01	Record 17 Sub record 01
1. Value of house, land, and Building	Estimated from monthly rental value Record 05 if E11=1,2, or3	AD	AD01
1.1 Residential purpose	E14	AD01	AD01_1 and AD02_2

	Variable		
Year	1996	2007	2017
1.2 Business/ Agricultural Purpose	E13-E14	AD02	AD02
2. Value of Vehicle	N/A	AD03	AD03
3. Value of Financial assets (Baht)	Estimated from household interest and dividends income Record 03	AD 04 (levels)	AD04
3.1 Savings	CC08,09,11	AD04= 1-9 or Blank	AD04_1
3.2 Investment	CC13		AD04_2
3.3 Others	N/A		AD04_3
Work Status	Rec02	Rec02	Rec02
Formal sector	B09	HM 37	HM 37
Government employees	B09=4	HM37=04	HM37=04
State Enterprise employees	N/A	HM37=05	HM37=05
Private employees	B09=3	HM37=06	HM37=06
Informal Sector	B09	HM 37	HM 37
Employers	B09=1	HM37=01	HM37=01
Owned account workers	B09=2	HM3=02	HM3=02
Unpaid family workers	B09=5	HM37=03	HM37=03
Member of co-operative group	N/A	HM3707	HM3707
Economically inactive	B09= [6,9]	HM37= [8,14]	HM37= [08,14]
Socio-Economic Class	Record 01	Record 01	Record 01
Farmer (owned land)	A06=[1,6]	A03=[1,6]	A03=[11,16]
Farmer (rent land)	A06=[11,13]	A03=[11,13]	A03=[21,23]
Fishing, forestry , and agricultural services	A06=19	A03=19	A03=[30,35]
Entrepreneurs. Trade and industry	A06=21,22	A03=21,22	A03=[41,45]
Professional, technician, and manager	A06=31,32	A03=31,32	A03=[51,53]
Labor (farm)	A06=41	A03=41	A03=[61,63]
Labor (general)	A06=42	A03=42	A03=70
Worker (service)	A06=50	A03=50	A03=[81,86]
Worker(production)	A06=60	A03=60	A03=[91,93]

	Variable		
Year	1996	2007	2017
Pensioner and welfare recipient	A06=71	A03=71	A03=01
Capital earner	A06=72	A03=72	A03=02,03

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Appendix B

Chapter 2

The distribution of household real estate and financial assets

1) The distribution of accrued capital gains from real estate property

Table B1: The distribution of accrued capital gains from real estate property by income decile

Decile	Real Estate			Accrued Capital Gains from Real Estate			Share			
	1996	2007	2017	1996	2007	2017	1996	2007	2017	Average
D1	95,596.73	123,086.40	235,287.50	5,831.40	9,813.39	16,299.54	3.39	3.46	5.13	3.99
D2	125,603.90	152,954.20	270,933.80	7,661.84	12,194.69	18,768.94	4.45	4.28	5.92	4.88
D3	141,113.90	164,732.80	288,420.10	8,607.95	13,133.77	19,980.30	5.00	4.61	6.29	5.30
D4	159,819.30	199,612.70	318,651.20	9,748.98	15,914.66	22,074.56	5.66	5.59	6.95	6.07
D5	184,811.60	220,146.40	350,369.10	11,273.51	17,551.77	24,271.82	6.55	6.17	7.65	6.79
D6	205,559.70	255,747.10	375,997.70	12,539.14	20,390.13	26,047.24	7.28	7.17	8.20	7.55
D7	245,980.20	300,292.00	407,422.30	15,004.79	23,941.59	28,224.18	8.72	8.41	8.89	8.68
D8	309,384.10	359,890.70	470,068.30	18,872.43	28,693.26	32,563.98	10.96	10.08	10.25	10.43
D9	377,525.40	478,926.80	581,000.90	23,029.05	38,183.73	40,248.84	13.37	13.42	12.68	13.16
D10	977,329.50	1,313,324.00	1,286,446.00	59,617.10	104,708.30	89,118.53	34.61	36.80	28.04	33.15
D10/D1	10.22	10.67	5.47	10.22	10.67	5.47				

Table B2: The distribution of accrued capital gains from real estate property by employment status

Work Status	Real Estate				Accrued Capital from Real Estate				Share			
	1996	2007	2017		1996	2007	2017		1996	2007	2017	Average
Employer	229,954.70	694,306.00	1,078,508.00		14,027.23	55,355.43	74,713.65		24.51	12.04	8.03	14.86
Own Account worker	233,935.20	289,806.30	473,788.80		14,270.04	23,105.59	32,821.72		19.63	35.11	38.13	30.96
Unpaid Family Worker	300,620.70	350,849.10	479,347.60		18,337.86	27,972.39	33,206.81		2.18	2.59	2.41	2.40
Government employee	442,518.10	482,915.10	567,227.30		26,993.60	38,501.71	39,294.67		11.44	9.77	7.64	9.62
State Enterprise Employee	N/A	651,410.20	569,852.40		N/A	51,935.44	39,476.52		0.00	1.32	0.79	0.70
Private Employee	250,763.70	213,666.80	248,296.30		15,296.59	17,035.16	17,200.72		18.37	12.15	13.14	14.55
Member of Cooperative Group	N/A	349,094.10	100,850.00		N/A	27,832.47	6,986.38		0.00	0.05	0.00	0.02
Economically Inactive	415,350.70	489,723.60	520,021.20		25,336.39	39,044.54	36,024.47		23.87	26.96	29.86	26.90

Table B3: The distribution of accrued capital gains from real estate property by socio-economic class

Real estate property	Average property value			Average Accrued capital gains			Share			
Socio-economic class	1996	2007	2017	1996	2007	2017	1996	2007	2017	Average
Farmer (owned land)	176,062.20	392,292.40	820,535.70	10,739.79	31,276.57	56,842.61	16.53	20.73	20.85	19.37
Farmer (rent land)	198,424.20	208,541.30	304,640.10	12,103.87	16,626.52	21,103.94	2.54	2.38	1.6	2.17
Fishing, forestry, agricultural services	204,732.00	176,336.20	215,780.50	12,488.65	14,058.88	14,948.19	0.46	1.09	0.92	0.82
Entrepreneurs, trade and industry	348,294.60	374,587.80	446,208.60	21,245.97	29,865.03	30,911.10	19.69	20.39	17.64	19.24
Professional, technician, and manager	626,813.20	692,401.50	714,174.30	38,235.60	55,203.58	49,474.43	13.15	18.63	18.26	16.68
Labor (farm)	129,250.60	121,505.20	167,977.40	7,884.29	9,687.33	11,636.64	2.65	1.23	1.29	1.72
Labor(general)	167,517.20	131,827.50	189,127.40	10,218.55	10,510.30	13,101.80	1.87	0.31	0.98	1.05
Worker (service)	320,786.10	239,884.70	261,043.50	19,567.95	19,125.46	18,083.79	13.67	9.06	9.2	10.64
Worker (production)	193,431.90	136,498.30	198,307.30	11,799.34	10,882.70	13,737.74	10.92	5.08	6.12	7.37
Pensioners	323,941.90	387,997.60	531,465.30	19,760.46	30,934.16	36,817.26	11.13	15.16	20.11	15.47
Capital earner	2,641,932.00	3,060,033.00	2,250,864.00	161,157.80	243,969.40	155,928.60	7.39	5.94	3.04	5.46

2) Accrued capital gains from financial investment

Table B4: The decile distribution of annual accrued gains from financial assets by income decile

Decile	Financial Assets for Investment			Accrued Capital Gains from Financial Assets			Share			
	1996	2007	2017	1996	2007	2017	1996	2007	2017	Average
D1	191.23	5,696.64	1,863.06	-2.22	821.46	278.90	0.19	0.94	0.12	0.42
D2	286.03	6,223.49	2,493.15	-3.32	897.43	373.22	0.29	1.03	0.17	0.49
D3	635.74	10,207.05	2,893.91	-7.37	1,471.86	433.22	0.64	1.68	0.19	0.84
D4	902.87	10,925.24	17,760.09	-10.47	1,575.42	2,658.69	0.91	1.80	1.18	1.30
D5	2,171.97	16,593.80	10,093.01	-25.19	2,392.83	1,510.92	2.19	2.74	0.67	1.87
D6	2,428.53	19,883.15	10,372.83	-28.17	2,867.15	1,552.81	2.45	3.29	0.69	2.14
D7	3,132.00	29,132.78	10,937.70	-36.33	4,200.95	1,637.37	3.16	4.81	0.73	2.90
D8	7,327.26	36,810.02	85,140.76	-85.00	5,308.01	12,745.57	7.38	6.08	5.66	6.37
D9	14,833.66	68,037.31	109,980.90	-172.07	9,810.98	16,464.14	14.94	11.24	7.31	11.16
D10	67,386.65	401,984.10	1,254,132.00	-781.69	57,966.10	187,743.60	67.85	66.39	83.28	72.51
D10/D1	352.39	70.57	673.16	352.39	70.57	673.16				

Table B5: The decile distribution of annual accrued gains from financial assets by employment status

Work Status	Financial Assets for Investment			Accrued Capital from Financial Assets			Share			
	1996	2007	2017	1996	2007	2017	1996	2007	2017	Average
Employer	6,675.98	113,635.50	226,681.50	-77.44	16,386.23	33,934.23	20.23	11.61	5.14	12.33
Own Account worker	7,625.75	27,372.76	23,303.76	-88.46	3,947.15	3,488.57	18.20	19.55	5.71	14.49
Unpaid Family Worker	6,562.77	23,014.89	16,050.07	-76.13	3,318.75	2,402.70	1.36	1.00	0.25	0.87
Government employee	31,577.27	135,509.30	212,874.30	-366.30	19,540.43	31,867.29	23.21	16.17	8.73	16.04
State Enterprise Employee	N/A	173,150.20	931,536.50	N/A	24,968.25	139,451.00	0.00	2.07	3.95	2.01
Private Employee	4,381.42	56,816.76	107,816.40	-50.82	8,192.98	16,140.11	9.13	19.05	17.38	15.18
Member of Cooperative Group	N/A	7,293.38	0.00	N/A	1,051.71	0.00	0.00	0.01	0.00	0.00
Economically Inactive	17,064.15	94,175.55	336,320.50	-197.94	13,580.11	50,347.18	27.88	30.55	58.84	39.09

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Table B6: The decile distribution of annual accrued gains from financial assets by socio-economic class

Socio-economic class	Average property value			Average Accrued capital gains			Share			
	1996	2007	2017	1996	2007	2017	1996	2007	2017	Average
Farmer (owned land)	2,102.96	23,971.67	32,368.03	19,117.78	62,580.38	113,883.40	5.61	7.47	2.51	5.20
Farmer (rent land)	2,269.47	35,030.13	5,543.97	20,631.50	91,449.56	70,321.95	0.83	2.35	0.09	1.09
Fishing, forestry, agricultural services	1,465.75	12,951.11	6,204.47	13,325.01	33,810.13	34,853.56	0.09	0.47	0.08	0.21
Entrepreneurs, trade and industry	13,763.92	53,635.71	76,235.22	125,126.50	140,021.20	208,323.10	22.12	17.21	9.18	16.17
Professional, technician , and manager	36,325.78	244,368.00	603,494.90	330,234.30	637,946.50	941,888.00	21.67	38.75	47	35.81
Labor (farm)	1,350.54	8,537.39	584.33	12,277.60	22,287.69	20,512.72	0.79	0.51	0.01	0.44
Labor(general)	511.91	9,445.92	1,587.57	4,653.77	24,659.50	30,522.29	0.16	0.13	0.02	0.10
Worker (service)	8,855.35	34,245.17	36,114.03	80,503.14	89,400.35	106,657.90	10.73	7.62	3.88	7.41
Worker (production)	1,843.74	13,226.40	17,468.96	16,761.24	34,528.79	64,032.32	2.96	2.9	1.64	2.50
Pensioners	7,608.07	49,873.09	109,794.40	69,164.25	130,198.50	267,156.00	7.43	11.49	12.66	10.53
Capital earner	347,106.30	969,792.40	5,577,736.00	3,155,512.00	2,531,737.00	7,017,676.00	27.6	11.1	22.93	20.54

Appendix C

Chapter 3

The structure of Thai local government revenue

Table C1 The structure of Thai local government revenues, fiscal years 2007-2019

Fiscal year	Local levied revenue (MB)	Revenue from surcharge taxes and shared taxes (MB)	Subsidies (MB)	*Total Revenue (MB)*	Local levied revenue (%)	Revenue from surcharge taxes and shared taxes (%)	Subsidies (%)
2007	32,021.00	186,208.00	139,374.00	*357,424.00*	8.96	52.10	38.99
2008	35,224.00	193,676.00	147,840.00	357,740.00	9.85	54.14	41.33
2009	35,881.63	151,687.28	150,419.59	337,988.50	10.62	44.88	44.50
2010	38,169.70	191,199.65	121,818.28	351,179.90	10.87	54.44	34.69
2011	40,604.83	204,919.75	165,735.12	411,259.70	9.87	49.83	40.30
2012	43,745.41	222,410.76	215,148.07	481,304.24	9.09	46.21	44.70
2013	48,326.55	265,909.21	221,133.10	535,368.87	9.03	49.67	41.30
2014	52,489.71	259,018.10	224,238.60	535,745.81	9.80	48.35	41.86
2015	56,700.93	274,820.28	259,787.99	591,309.20	9.59	46.48	43.93
2016	58,115.73	279,004.33	246,745.65	583,865.71	9.95	47.79	42.26
2017	62,033.98	302,333.41	238,744.45	603,111.83	10.29	50.13	39.59
2018	63,632.12	327,662.56	238,744.45	636,573.20	10.00	51.47	37.50
2019	66,689.45	328,933.50	275,803.82	671,426.76	9.93	48.99	41.08

Table C2 Share of real estate taxes to total local government revenue, fiscal years 2007-2019

Fiscal year	Building and land tax (MB)	Local development tax (MB)	Total Revenue (MB)	Building and land tax (%)	Local development tax (%)
2007	15,602.00	1,148.00	357,424.00	4.37	0.32
2008	17,165.00	1,279.00	357,740.00	4.80	0.36
2009	12,813.24	245.30	337,988.50	3.79	0.07
2010	12,575.01	241.39	351,179.90	3.58	0.07
2011	15,352.51	1,501.90	411,259.70	3.73	0.37
2012	21,067.04	904.24	481,304.24	4.38	0.19
2013	23,103.25	933.85	535,368.87	4.32	0.17
2014	25,077.07	895.58	535,745.81	4.68	0.17
2015	26,939.97	932.29	591,309.20	4.56	0.16
2016	29,059.80	953.67	583,865.71	4.98	0.16
2017	32,008.16	957.00	603,111.83	5.31	0.16
2018	33,385.09	939.26	636,573.20	5.24	0.15
2019	35,559.31	968.05	671,426.76	5.30	0.14

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Inequality Decomposition of household income by income decile, regions, and community type

Table C3 Household total income inequality decomposition by income decile from SES of 2007, 2011, and 2017

Total Income	$I_2{}^{Class}$			Absolute I_2			% of I_2		
Decile	2007	2011	2017	2007	2011	2017	2007	2011	2017
D1	0.047	0.054	0.050	0.000	0.000	0.000	0.01	0.01	0.01
D2	0.005	0.004	0.004	0.000	0.000	0.000	0.00	0.00	0.00
D3	0.003	0.002	0.002	0.000	0.000	0.000	0.00	0.00	0.00
D4	0.002	0.002	0.002	0.000	0.000	0.000	0.00	0.00	0.00
D5	0.002	0.002	0.002	0.000	0.000	0.000	0.01	0.00	0.00
D6	0.002	0.002	0.002	0.000	0.000	0.000	0.01	0.00	0.01
D7	0.002	0.002	0.002	0.000	0.000	0.000	0.02	0.01	0.01
D8	0.004	0.003	0.003	0.001	0.000	0.000	0.04	0.01	0.03
D9	0.007	0.007	0.007	0.002	0.002	0.002	0.12	0.07	0.14
D10	0.613	1.401	0.618	0.904	2.072	0.796	61.15	79.64	64.36
Within Group				0.907	2.074	0.799	61.36	79.74	64.57
Between Group				0.571	0.527	0.438	38.64	20.26	35.43
Population	1.478	2.601	1.237	1.478	2.601	1.237	100.00	100.00	100.00

Table C4 Inequality of household real estate ownership decomposition by income decile from SES of 2007, 2011, and 2017

Total Real Estate	$I_2{}^{Class}$			Absolute I_2			% of I_2		
Decile	2007	2011	2017	2007	2011	2017	2007	2011	2017
D1	0.771	2.035	1.229	0.007	0.015	0.009	0.03	0.03	0.08
D2	0.880	1.655	1.570	0.014	0.023	0.023	0.06	0.04	0.19
D3	1.094	2.551	1.342	0.022	0.052	0.025	0.10	0.09	0.21
D4	1.189	0.855	1.561	0.029	0.016	0.037	0.13	0.03	0.30
D5	2.360	1.222	1.296	0.074	0.029	0.039	0.33	0.05	0.32
D6	1.545	1.280	2.719	0.056	0.040	0.106	0.25	0.07	0.88
D7	2.326	1.880	1.829	0.109	0.093	0.085	0.48	0.16	0.70
D8	4.823	1.265	2.202	0.434	0.089	0.173	1.92	0.15	1.43
D9	1.619	1.539	2.764	0.293	0.279	0.590	1.30	0.47	4.87
D10	9.377	27.994	6.573	20.701	57.710	10.491	91.72	97.67	86.61
Within Group				21.739	58.345	11.578	96.32	98.75	95.59
Between Group				0.739	0.534		3.68	1.25	4.41
Population	22.571	59.084	12.113	22.571	59.084	12.113	100	100	100

Table C5 Household total income inequality decomposition by region from SES of 2007, 2011, and 2017

Total Income Region	I_2^{Region}			Absolute I_2			% of I_2		
	2007	2011	2017	2007	2011	2017	2007	2011	2017
Bangkok Metropolitan	1.639	3.791	0.947	0.772	1.654	0.348	52.22	63.58	28.15
Central (excluding Bangkok Metropolitan)	0.831	1.402	1.287	0.249	0.310	0.467	16.86	11.91	37.75
North	1.349	0.869	0.667	0.138	0.095	0.060	9.35	3.66	4.87
Northeast	0.829	1.101	0.898	0.129	0.219	0.133	8.70	8.41	10.74
South	0.701	1.318	1.420	0.103	0.247	0.181	6.94	9.50	14.61
Within				1.391	2.525	1.189	94.08	97.06	96.12
Between				0.088	0.077	0.189	5.92	2.94	3.88
Population	1.478	2.601	1.237	1.478	2.601	1.237	100.00	100.00	100.00

Table C6 Inequality of household real estate ownership decomposition by region from SES of 2007, 2011, and 2017

Total Real Estate Region	I_2^{Region}			Absolute I_2			% of I_2		
	2007	2011	2017	2007	2011	2017	2007	2011	2017
Bangkok Metropolitan	18.550	68.861	14.794	18.067	56.333	9.425	80.04	95.34	77.81
Central (excluding Bangkok Metropolitan)	10.605	5.797	4.122	1.841	0.747	0.689	8.16	1.26	5.69
North	18.798	2.758	7.805	1.808	0.264	0.998	8.01	0.45	8.24
Northeast	2.600	2.940	1.863	0.390	0.616	0.308	1.73	1.04	2.54
South	2.243	6.312	4.380	0.220	0.925	0.578	0.97	1.57	4.77
Within				2.325	58.885	11.998	98.91	99.66	99.05
Between				0.246	0.199	0.115	1.09	0.34	0.95
Population	22.571	59.084	12.113	22.571	59.084	12.113	100.00	100.00	100.00

Table C7 Household total income inequality decomposition by community type from SES of 2007, 2011, and 2017

Total Income	$I_2^{community}$			Absolute I_2			% of I_2		
Community Type	2007	2011	2017	2007	2011	2017	2007	2011	2017
Rural	1.454	3.343	1.244	1.041	2.252	0.858	70.42	86.59	69.36
Urban	0.944	0.775	1.022	0.379	0.311	0.359	25.63	11.96	29.00
Within Group				1.420	2.564	1.217	96.05	98.55	98.37
Between Group				0.058	0.038	0.020	3.95	1.45	1.63
Population	1.478	2.601	1.237	1.478	2.601	1.237	100.00	100.00	100.00

Table C8 Inequality of household real estate ownership decomposition by community type from SES of 2007, 2011, and 2017

Total Real Estate	$I_2^{community}$			Absolute I_2			% of I_2		
Community Type	2007	2011	2017	2007	2011	2017	2007	2011	2017
Urban	23.802	76.483	15.590	21.105	57.991	11.131	93.51	98.15	91.90
Rural	4.219	2.915	2.857	1.361	1.036	0.957	6.03	1.75	7.90
Within Group				22.466	59.027	12.088	99.54	99.90	99.80
Between Group				0.105	0.057	0.024	0.46	0.10	0.20
Population	22.571	59.084	12.113	22.571	59.084	12.113	100.00	100.00	100.00

Appendix D

Chapter 4

Table D1 The result from the selection equation of personal income tax liabilities from Heckman selection equation by occupation group from pooled SES of 1996, 2007, and 2017

VARIABLES	Selection Farmer	Selection Entrepreneur	Selection Professional	Selection Laborer	Selection Welfare Recipient	Selection Capital Earners
AGI	0.0009***	0.0003***	0.0023***	0.0081***	0.0038***	0.0039***
	(0.0002)	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0012)
charity	-0.0285	0.0176**	-0.0047	-0.0059	-0.0021	0.0042
	(0.0392)	(0.0079)	(0.0049)	(0.0094)	(0.0023)	(0.0036)
insurance	0.0140	0.0408***	0.0145	0.0200	-0.0113***	-0.0005
	(0.0096)	(0.0062)	(0.0089)	(0.0123)	(0.0041)	(0.0310)
investment	0.0024*	-0.0001	0.0014***	0.0000	-0.0001	0.0001*
	(0.0013)	(0.0001)	(0.0004)	(0.0003)	(0.0001)	(0.0001)
PC_children	-0.2690	-0.0658	0.0783	-0.0082	0.3281	1.0231
	(0.2738)	(0.1186)	(0.1479)	(0.0980)	(0.2544)	(0.7510)
PC_elderly	-0.3575	-0.0143	0.4042**	-0.0792	0.5055***	0.2559
	(0.2555)	(0.1247)	(0.2017)	(0.1263)	(0.1411)	(0.4121)
age	0.0070***	0.0057***	0.0146***	0.0036***	0.0038***	0.0080
	(0.0013)	(0.0010)	(0.0014)	(0.0008)	(0.0011)	(0.0052)
education	0.0202***	0.0284***	0.0485***	0.0219***	0.0562***	0.0378***
	(0.0058)	(0.0028)	(0.0036)	(0.0025)	(0.0036)	(0.0125)
male	-0.0008	-0.0068	-0.0971***	-0.0576***	0.0117	-0.0056
	(0.0320)	(0.0231)	(0.0296)	(0.0182)	(0.0250)	(0.1135)

VARIABLES	Selection Farmer	Selection Entrepreneur	Selection Professional	Selection Laborer	Selection Welfare Recipient	Selection Capital Earners
married	0.1570***	0.1112***	0.1246***	0.1161***	0.2054***	-0.0369
	(0.0354)	(0.0251)	(0.0315)	(0.0183)	(0.0257)	(0.1137)
house	0.1123	-0.0132	0.0670**	-0.0688***	0.1453***	0.1709
	(0.0781)	(0.0226)	(0.0310)	(0.0189)	(0.0387)	(0.1833)
municipal	-0.0448*	0.2169***	0.2045***	0.2001***	0.1828***	0.4364***
	(0.0260)	(0.0216)	(0.0282)	(0.0163)	(0.0235)	(0.1068)
y07	1.1099***	0.5173***	-0.0132	0.6446***	1.2656***	1.5486***
	(0.1001)	(0.0488)	(0.0819)	(0.0524)	(0.1222)	(0.3621)
y17	1.7361***	0.8934***	0.1513*	1.1070***	1.7549***	1.5423***
	(0.0984)	(0.0493)	(0.0849)	(0.0508)	(0.1190)	(0.3763)
y07_AGI	-0.0004***	0.0000	-0.0017***	-0.0051***	-0.0032***	-0.0033***
	(0.0002)	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0012)
y07_charity	0.0465	-0.0163*	-0.0065	-0.0065	0.0223***	-0.0057
	(0.0397)	(0.0087)	(0.0061)	(0.0110)	(0.0055)	(0.0048)
y07_insurance	0.0225*	-0.0340***	0.0142	0.0111	0.0467***	0.0136
	(0.0130)	(0.0066)	(0.0095)	(0.0131)	(0.0082)	(0.0346)
y07_investment	-0.0022*	0.0001	-0.0013***	-0.0000	0.0001	-0.0001
	(0.0013)	(0.0001)	(0.0004)	(0.0003)	(0.0001)	(0.0001)
y07_children	0.0097	-0.0766	-0.3549**	0.0515	-0.4959*	-1.3655
	(0.2923)	(0.1392)	(0.1775)	(0.1199)	(0.2707)	(0.8699)
y07_elderly	0.0601	-0.3788***	-0.3946*	-0.0640	-0.7127***	-0.4959
	(0.2631)	(0.1348)	(0.2187)	(0.1411)	(0.1478)	(0.4289)
y17_AGI	-0.0009***	-0.0002***	-0.0012***	-0.0064***	-0.0026***	-0.0032***
	(0.0002)	(0.0001)	(0.0003)	(0.0003)	(0.0004)	(0.0012)
y17_charity	0.0556	-0.0077	0.0001	0.0058	0.0041	-0.0036

VARIABLES	Selection Farmer	Selection Entrepreneur	Selection Professional	Selection Laborer	Selection Welfare Recipient	Selection Capital Earners
	(0.0395)	(0.0087)	(0.0060)	(0.0103)	(0.0042)	(0.0159)
y17_insurance	0.0036	-0.0268***	-0.0135	-0.0021	0.0302***	0.0150
	(0.0106)	(0.0067)	(0.0091)	(0.0126)	(0.0054)	(0.0329)
y17_investment	-0.0024*	0.0001	-0.0014***	-0.0001	0.0001	-0.0001*
	(0.0013)	(0.0001)	(0.0004)	(0.0003)	(0.0001)	(0.0001)
y17_children	0.3736	0.1609	0.0583	0.2189*	-0.2916	-0.8535
	(0.2897)	(0.1435)	(0.1910)	(0.1181)	(0.2653)	(0.9311)
y17_elderly	0.1105	-0.2161*	-0.4651**	-0.0841	-0.8466***	-0.3507
	(0.2580)	(0.1307)	(0.2147)	(0.1330)	(0.1426)	(0.4347)
formal	0.0556	0.0204	-0.0607	-0.1335***	0.0447	0.1937
	(0.0621)	(0.0411)	(0.0372)	(0.0203)	(0.0488)	(0.2030)
Constant	-3.0428***	-2.0752***	-1.8893***	-2.1722***	-3.5667***	-3.2447***
	(0.1534)	(0.0771)	(0.1147)	(0.0650)	(0.1378)	(0.5063)
Observations	18,873	23,143	12,072	36,167	20,141	979

Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

The Thailand Revenue Code[56]

Taxable Person

Taxpayers are classified into "resident" and "non-resident". "Resident" means any person residing in Thailand for a period or periods aggregating more than 180 days in any tax (calendar) year. A resident of Thailand is liable to pay tax on income from sources in Thailand as well as on the portion of income from foreign sources that is brought into Thailand. A non-resident is, however, subject to tax only on income from sources in Thailand.

Revenue Code Act (The Revenue Department of Thailand www. rd.go.th)

Assessable income means income that is taxable under this Chapter. Such income also includes a property or any other benefit received which may be computed into a monetary value, any amount of tax paid by the payer of income or by any other person on behalf of a taxpayer and tax credit under Section 47 Bis.

Section 40 Assessable income is income of the following categories including any amount of tax paid by the payer of income or by any other person on behalf of a taxpayer.

(1) Income derived from employment, whether in the form of salary, wage, per diem, bonus, bounty, gratuity, pension, house rent allowance, monetary value of rent-free residence provided by an employer, payment of debt liability of an employee made by an employer, or any money, property or benefit derived from employment.[4]
[4]R.CT.No.29/2538

(2) Income derived from a post or from performance of work, whether in the form of fee, commission, discount, subsidy, meeting allowance, gratuity, bonus, house rent allowance, monetary value of rent-free residence provided by a payer of income, payment of debt liability of a taxpayer made by a payer of income, or any money, property or benefit derived from a post or from performance of work, whether such post or performance of work is permanent or temporary.

(3) Fee of goodwill, copyright or any other rights, annuity or annual payment of income derived from a will, any other juristic act, or court decision.

(4) Income that is:

(a) Interest on a bond, deposit, debenture, bill, loan whether with or without security, the part of interest on loan after deduction of withholding tax under the law governing petroleum income tax, or the difference between the redemption value and the selling price of a bill or a debt instrument issued by a company or juristic partnership or by any other juristic person and sold for the first time at a price below its redemption value. Such income also includes income assimilated to interest, benefit or other

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consideration derived from the provision of a loan or from a debt-claim of every kind whether with or without security[57]

(b) Dividend, share of profits or any other gain derived from a company or juristic partnership, a mutual fund or a financial institution established under a specific law in Thailand for the purpose of providing a loan in order to promote agriculture, commerce or industry; the part of dividend or share of profits after deduction of withholding tax under the law governing petroleum income tax.

For the purpose of income calculation under paragraph 1, if a lawful child who is a minor derives income and the marital status of the parents exists throughout the tax year, the income of the child shall be treated as income of the father. However, if the marital status of the parents does not exist throughout tax year, the income of the child shall be treated as income of the parent who exercises parental power, or of the father if both parents jointly exercise parental power.

The provisions of paragraph 2 shall apply mutatis mutandis to an adopted child who is a minor deriving income.

(c) Bonus paid to a shareholder or partner of a company or juristic partnership;

(d) A decrease of the capital holdings in a company or juristic partnership which does not exceed the total amount of profits and reserves;

(e) An increase of capital holdings in a company or juristic partnership that is determined from the total amount of profits or reserves;

(f) A benefit derived from the amalgamation, acquisition or dissolution of a company or juristic partnership and having the monetary value which exceeds the capital;

(g) Gains derived from transfer of partnership holdings or shares, debentures, bonds, or bills or debt instruments issued by a company or juristic partnership or by any other juristic person[58].6

(5) Money or any other gain derived from:

(a) Rent of property,

(b) Breach of a hire-purchase contract,

(c) Breach of an installment sale contract, where the seller regains the property sold without paying back the money or gains already received.

(6) Income from liberal professions, namely, laws, arts of healing, engineering, architecture, accounting, fine arts or other liberal professions as prescribed by a Royal Decree;

(7) Income derived from a contract of work where the contractor has to provide essential materials besides tools;

(8) Income from business, commerce, agriculture, industry, transport or any other activity not specified in (1) - (7).

The amount of tax under paragraph 1, which is paid for by the payer of income or by any other person on behalf of taxpayer on any category of income or in whichever tax year, shall be treated as income of the same category and of the same tax year as the income where payment of tax is made.

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[57] M.R.No.126 Clause 2 (30) R.CT.No.30/2538

[58] M.R.No.126 Clause 2 (30)

Tax exemption of assessable income (The Revenue Deapartment of Thailand, 2020)

There are several important cases of income that are exempted from personal income tax, including exemptions under Section 42 of the Revenue Code. Exemptions under the Ministerial Regulation No. 126, exemptions under various royal decrees, etc. Income exempted from tax are as follows:

(1) Allowance or vehicle expenses which the employee or the person receiving the duty or position or the recipient works to be paid in good faith as needed in order to perform his duties and to have paid all for it.

(2) Vehicle expenses and travel allowances at the rates prescribed by the government; by the decree on the rate, transportation costs and travel allowances.

(3) Travel expenses paid by the employer to the employee; only the portion the employee has paid in full as is necessary for traveling abroad for the first job or in returning to his place of origin when his employment has ended, but this exemption does not include travel expenses received by the employee in return to his or her place of origin, and in taking the job of the former employer within 365 days from the date of the termination of the previous employment.

(4) In the case where the employer and employee have entered into an agreement in good faith before the use of the Income Tax Act; 2475 B.E., there is a stipulation that The employer will pay the pension fee money, Commission money. The bonus is given to the employee in a single amount when the employment has been terminated even if the full amount will be paid later. The use of the provisions of this section is good, the gratuity fee, money commission money or the bonus part of the wage labor performed before the Income Tax Act B.E. 2475 B.E. 2475 does not have to be included in the calculation for tax purposes.

(5) Special surcharge for the position and house rent money or a house that allows you to live without paying rent for government officials at Thai embassies or consulates abroad.

(6) Proceeds from sales or a discount from the purchase of stamp duty or government postage stamps.

(7) Meeting allowance for commissioners or committees or teaching fees, examination fees at government offices or educational institutions of the government paid

(8) Interest as follows
    (a) GSB lottery interest or interest on government savings deposits only for call deposits
    (b) Interest on savings deposits received from cooperatives
    (c) Interest on bank deposits in the Kingdom that must be paid back on demand in the category of savings. In the case where the income earner receives such interest in the aggregate amount not exceeding 10,000 baht

throughout the tax year in accordance with the rules, procedures and conditions prescribed in the notification of the Director-General.

(9) Sale of movable property which is inherited or immovable property acquired without commercial purpose; or profit, but does not include sailing ships Vessels with a tonnage of 6 tons or more, steamboats or motorboats of 5 tons or more, or rafts.

(10) Income received from inheritance (The Amendment Act (No. 40) B.E. 2558)

(11) Award for study or research in science Government Lottery or Government Savings Lottery Awards. A prizes paid by government officials in contests or competitions in which the recipient does not have a career in contests or competitions; or a bribe award paid by the government for the purpose of suppressing the commission of an offense.

(12) Special pension, special pension, bequest or bequest

(13) Compensation for infringement income from insurance or funeral

(14) Farmer's income from the sale of rice arising from the agriculture that oneself and or his family has done

(15) Income received from the inheritance which must pay income tax on behalf of the inheritance

(16) Thai Red Cross maintenance lottery award proceeds from sales or discounts from buying lottery tickets for the Thai Red Cross

(17) Interest received from tax refund under the Revenue Code

(18) Income from sale of investment units in mutual funds.

(19) Income of mutual funds

(20) Compensation received by the insured from the Social Security Fund according to the law on social security

(21) Income from the transfer of ownership or possessory right in immovable property without compensation to the child legally excluding adopted children only the proceeds from the transfer to the legitimate child in respect of that does not exceed 20 million baht per child throughout the tax year (The Amendment Act (No. 43) B.E. 2559, effective from the 1st February 2016 onwards)

(22) Income received from patronage or affection from an ascendant, descendant or spouse. Only the amount not exceeding 20 million baht throughout the tax year

(23) Income received from ethical support or from giving in favor of a ceremonial or according to the occasion of tradition, from a person who is not an ascendant, a descendant or spouse only in the part that does not exceed 10 million baht throughout the tax year

(24) Income received from an affectionate gift that the giver expresses his intention or is able to see that he wishes to use it for benefits in religious affairs, educational affairs, or public benefit activities according to the rules and the specified conditions in the Ministerial Regulation (Amended Act (No. 40) B.E. 2558)

(25) Income from private school business established under the law on private schools but does not include income from non-formal private school activities in the tutoring category established under the law governing private schools for assessable income received from the day following the date this Ministerial Regulation is published in the Government Gazette. (Amended by the Ministerial Regulation No. 307 (B.E. 2558) which came into force on 11 July B.E. 2558 (2015) onwards)

(26) Income from sales or discounts from the sale of government lottery tickets

(27) The portion of the income which is the wages for working during the semester break of the foreigner who is a student. Students or students who come to study at educational institutions in Thailand. This shall be in accordance with the principle of reciprocity.

(28) The portion of income which is medical expenses paid by the employer or paid on behalf of the employee as medical expenses; for

(a) Employee, husband, wife, ascendant or descendant which is under the care of the employee. Only for medical treatment done in Thailand

(b) An employee in the event that it is necessary to receive medical treatment abroad while performing the occasional overseas duties. However, the said amount was all paid for that purpose. (Amended by the Ministerial Regulation No. 149 (B.E. 2523) which is applicable for the income from 1980 onwards)

(29) Income paid by the government as money for renting a house or money calculated from the value of living in the house provided without rent child education subsidy child support Pension allowance, subsistence allowance, or food allowance working out of time (Amended by the Ministerial Regulation No. 136 (B.E. 2574) in force for the year 1974 onwards)

(30) House rental money received from state enterprises which is not a company or juristic partnership as much as the earner paid in good faith or money calculated from the value of living in the house where the said state enterprise resides without paying rent and the state enterprise paying the money did not pay income tax on such amount.

(31) Child education assistance child support pension or pension received from state enterprises which is not a company or juristic partnership at the same rate that the government pays to the government official and state enterprises paid, did not pay income tax on the said amount. (Amended by the Ministerial Regulation No. 138 (B.E. 2518) in force for the year 1974 onwards)

(32) Awards paid by government officials for the purpose of preventing tax offenses. (Amended by the Ministerial Regulation No. 139 (B.E. 2518) in force for the year 1975 onwards)

(33) Accumulated interest received from a state enterprise which is not a company or juristic partnership at the same rate as government pays to civil servants and the state enterprise paying the money did not pay income tax on such amount. (Amended by the Ministerial Regulation No. 145 (B.E. 2522) in force for the year 1979 onwards)

(34) Income received by foreign government officials performing their duties in Thailand from their governments. This is to be in accordance with the principle of reciprocity. (Amended by the Ministerial Regulation No. 146 (B.E. 2522) in force for the year 1979 onwards)

(35) The portion of the income in the form of salary and any money received as a result of the duty or position of the work performed or from accepting work for foreigners who are representatives of the International Committee of the Red Cross performing their duties in Thailand received from the International Committee of the Red Cross (Amended by the Ministerial Regulation No. 145 (B.E. 2522) in force for the year 1979 onwards)

(36) Income paid by the government for the purpose of maintaining the security within the Kingdom; and the Ministry of Finance has authorized the disbursement. (Amended by the Ministerial Regulation No. 152 (B.E. 2523) which came into force before or after September 24, B.E. 2523onwards)

(37) The portion of the income in the form of salary or wages and any money received as a result of duties or positions made or from accepting work for an alien who does not have a residence in Thailand obtained from

(a) Intergovernmental Commission on Migration in Thailand

(b) The governments of their countries in the operation of the assistance of Indochina migrants in Thailand (Amended by the Ministerial Regulation No. 154 (B.E. 2524) in force for the year 1981 onwards)

(38) Income from the sale of immovable properties which are inherited or immovable properties received by giving by affection located outside Bangkok, municipality, sanitation or Pattaya City or other local governments. The law was specifically established, however, only the income from the sale of the amount not exceeding 200,000 baht throughout the tax year.

(39) Income from the transfer of ownership or possessory right of immovable property to a legitimate children without compensation. Such legitimate children do not include adopted children. (Repealed by the Ministerial Regulation No. 312 (B.E. 2559) which is applicable for assessable income received from the date of February 1, 2016)

(40) Proceeds from the sale of tobacco products at the tobacco factory. The Ministry of Finance pays income tax on behalf of sellers in every level under Section 48 bis of the Revenue Code (Amended by the Ministerial Regulation No. 156 (B.E. 2526) which came into force from 28 August B.E. 2525 onwards)

(41) Repealed by the Ministerial Regulation No. 187 (B.E. 2534), the original still applies for the transfer of ownership of the certificate. Accepting fixed deposits at the bank with interest issued prior to 8 November 1991.

(42) Income as follows:

(a) Bond interest or debenture interest

(b) The difference between the redemption price and the selling price of the bond or debenture initially issued at the lower than the redemption price

(c) Benefits derived from the transfer of bonds or debentures. However, only government bonds or debentures government organization or a legal financial institution especially of Thailand, established for lending to promote agriculture, commerce or industry and income earners are not residents of Thailand. (Amended by the Ministerial Regulation No. 249 (B.E. 2548) effective from 19 January B.E. 2548 onwards). Income earners must own or be transferred ownership of bonds or debentures before October 13, 2010. Such bonds or debentures must be issued before October 13, 2010. In the event that the transfer ownership of bonds or debentures has not been notified to the registrar. There must be evidence of transfer of ownership in writing specify the date of transfer of ownership of the bond or debenture clearly. (Amended by the Ministerial Regulation No. 286 (B.E. 2554) effective from October 13, 2010 onwards)

(43) Interest on savings deposits of the Bank for Agriculture and Agricultural Cooperatives (Amended by the Ministerial Regulation No. 187 (B.E. 2534) in force from 29 October B.E. 2534).

(44) Income from the sale of securities on the Stock Exchange of Thailand, but does not include income from the sale of securities that are debentures or bonds (Amended by the Ministerial Regulation No. 187 (B.E. 2554) in force from 29 October B.E. 2534)

(45) Proceeds from the sale of tin from 1 January 1988 for tin purchased during the date this Ministerial Regulation comes into force until 31 December B.E. 2530, especially that expenditures in respect of the company purchases and sells tin metal and is included in the calculation of expenses in calculating net income. Some items cannot be separated into expenditures relating to the purchase and sale of tin metal or related to other businesses. It is clear to average the expenditure according to the portion of the income of each business.

(46) Dividends or share of profits as the case may be from an ordinary partnership or a non-juristic persons, individuals or from companies or juristic partnerships

established under Thai law However, only the part that is calculated from the proceeds from the sale of tin from January 1, 1988 for tin purchased between this Ministerial Regulation is effective until December 31, 1987 and expenses related to the purchase and sale of tin metal (Amended by the Ministerial Regulation No. 171 (B.E. 2529) which is applicable for income from 2008 onwards).

(47) Income from transfer of ownership or possessory right in immovable property without compensation to Chaipattana Foundation (Amended by the Ministerial Regulation No. 177 (B.E. 2531) in force from 9 December B.E. 2531 onwards)

(48) Income for the Siammin Building Charity Lottery Award issued on January 7, 1988 and the proceeds from the sale or discount from the purchase of charity lottery to build the Siammin Building

(49) Income from the transfer of ownership or possessory right in immovable property without compensation to the Foundation for the Promotion of Arts and Crafts under Queen Sirikit

(50) Compensation under the law on expropriation of immovable property, but only for the land to be expropriated; and other real estate on the land to be expropriated (Amended by the Ministerial Regulation No. 196 (B.E. 2538) in force from 30 June B.E. 2538 onwards)

(51) Assessable income as follows:

(a) the difference between the redemption price and the purchase price of any bills or debt instruments that the Company or a juristic partnership or other juristic person is the issuer and the first sale is made at a price lower than the redemption price, but not including the case that the income earner who is the person who has the duty to pay personal income tax is the first person (Amended by the Ministerial Regulation No. 196 (B.E. 2538) in force from 30 June B.E. 2538 onwards)

(b) Benefit from the transfer of any bills or debt instruments that the company or partnership, a juristic person or other juristic person is the issuer. However, only bills or instruments representing the right to debt without interest (Amended by the Ministerial Regulation No. 223 (B.E. 2542))

(c) Interest received from bills or any debt instruments that issued by a companies or juristic partnerships or other juristic persons only the portion that occurred before the holder of the bill or debt instrument of the holder. This income must be withheld at source under Section 50 (2) of the Revenue Code from such interest the whole amount (Amended by the Ministerial Regulation No. 231 (B.E. 2544) effective from September 14, 2001 onwards). In the case where the assessable income under paragraph one arises from bills or debt instruments that have been initially sold at a price lower than the redemption price Must be in the case of withholding income tax paid from the income of a person who is the first holder under Section 50 (2) (c) of the Revenue Code and pay that the income tax has already been withheld (Amended

by the Ministerial Regulation No. 196 (B.E. 2538) in force from 30 June B.E. 2538 onwards).

(52) Income earned by foreign experts of the European Community. and does not have a residence in Thailand due to coming to work in Thailand under the project Help that Thailand receives from the European community (Amended by the Ministerial Regulation No. 190 (B.E. 2535) in force from 5 March B.E. 2535 onwards)

(53) Income from sale of investment units in mutual funds established under the law on securities and markets securities, but does not include any money or benefits received as a result of the sale of investment units back to the mutual fund, Retirement Mutual Funds or Long-Term Equity Funds under the Securities and Exchange Act (Amended by the Ministerial Regulation No. 246 (B.E. 2547) in force from 31 August B.E. 2547 onwards)

(54) Income received by the Board of Directors for the improvement of the Chakri Maha Prasat Throne Hall for the benefit of building a new throne and improve the Chakri Maha Prasat Throne Hall (Amended by the Ministerial Regulation No. 193 (B.E. 2536) in force for the year 1993 onwards)

(55) Income calculated from the value of the uniform received by the employee from the employer in an amount not exceeding two per person. Uniform per year and outerwear in the amount of not more than 1 per person per year. "Uniform" under paragraph one means the attire, including the accessories for the apparel set to be customized for use in work It does not include shoes that may be general use, underwear or accessories clothing made of metal or precious gems such as silver, gold, rubies, jade. "T-shirt" under paragraph one includes: Thai royal costumes and shirts that are commonly used in dressing to various important events" (Amended by the Ministerial Regulation No. 194 (B.E. 2537) which is applicable for income from 1994 onwards)

(56) Income as much as the employee pays as a contribution to the provident fund. According to the law on reserve fund subsistence at a rate of not more than 15 percent of the wages, only the portion exceeding 10,000 baht but not exceeding 490,000 baht for that tax year for assessable income received from 1 January 2008 onwards.

(57) Any money or benefits received from provident funds under the law on provident funds as follows:

(a) Any money or benefits received as a result of an employee leaving work due to death, disability, or leaving work when at least 55 years of age

(b) Any money or benefits that are entitled to receive from the provident fund due to the employee's retirement from work before the age of 55, but upon retirement, the money or benefits are retained in full in the provident fund and later receive money or benefits after the employee's death Disability or age 55 years in accordance with the

rules, procedures and conditions prescribed by the Director-General (Amended by the Ministerial Regulation No. 292 (B.E. 2555) in force for the year 2010 onwards).

(58) Dividends or share of profits from companies or juristic partnerships obtained from school business private schools established under the law governing private schools, or a business of a private institution of higher education established under the law on private institutions of higher education but does not include non-formal private schools in the tutoring category established under Private School Law However, for assessable income received from the day following the date of this Ministerial Regulation announced in the Government Gazette onwards. (Amended by the Ministerial Regulation No. 307 (B.E. 2558) in force from 11 July B.E. 2558 (2015) onwards)

(59) Interest on bank deposits in the Kingdom that must be paid back on demand for specific savings. In the case where the income earner receives such interest in the aggregate amount not exceeding 20,000 baht throughout the tax year, in accordance with rules, procedures and conditions prescribed in the notification of the Director-General (Amended by the Ministerial Regulation No. 200 (B.E. 2538) in force from 23 November B.E. 2538 onwards).

(60) The portion of income that is salary or wages received by seafarers in connection with the performance of work on Thai ships under Maritime Promotion Laws Used in International Freight Forwarding (Amended by the Ministerial Regulation No. 204 (B.E. 2539 (1996)), effective from September 26, 1996 onwards)

(61) Income received by the Executive Committee "Her Majesty the Queen's Charity Scholarship" received for the benefit of the scholarship from Her Majesty's charity (Amended by the Ministerial Regulation No. 205 (B.E. 2539) which is applicable for income received from 2 April 1997 onwards)

(62) Income from the sale of immovable properties as follows:

(a) Houses, houses or other structures which is normally used for housing

(b) Immovable properties under (a) together with land

(c) A condominium unit for living in a condominium under the law on condominiums.   However, only in the case where the income earner has acquired immovable property under (a), (b) or (c) by registering the acquisition in 1997 and sell that immovable property after registration for not less than 1 year but not later than December 31, 2007 (Amended by the Ministerial Regulation No. 206 (B.E. 2540) in force from 1 January B.E. 2540 onwards)

(63) Benefits derived from the merger of banks under the law on commercial banking and or finance company Securities company or credit company foncier under the law governing business of finance securities business and credit foncier business which are valued in excess of capital in accordance with the rules and procedures and

conditions prescribed by the Director-General of the Revenue Department (Amended by the Ministerial Regulation No. 207 (B.E. 2540) effective from September 16, 1997 onwards)

(64) Income equal to the amount paid by members of the Government Pension Fund as contributions to the Pension Fund, Government Pension Fund under the law on Government Pension Fund Only the portion that does not exceed 500,000 baht for that tax year for assessable income received from January 1, 2008 onwards (Amended by the Ministerial Regulation No. 266 (B.E. 2551) which is applicable for the contribution to the Fund Year 2008 onwards)

(65) Any money or benefits received from the Government Pension Fund under the law governing Government Pension Fund as follows:

(a) Any money or benefits received as a result of a member of the Government Pension Fund leaving government service because of death, disability, compensation or old age

(b) any money or benefits that are entitled to receive from the Government Pension Fund due to a member of the Government Pension Fund retires from government service in cases other than (a) and retained the whole amount of such money or benefits in the Government Pension Fund and later received money or benefits after that member's death, disability, or the age of 60, subject to the criteria and conditions and the procedures prescribed by the Director-General of the Revenue Department (Amended by the Ministerial Regulation No. 277 (B.E. 2553) in force for the year 2010 onwards)

(66) Income received from the Anti-Drug Sports Stadium Fund Committee. Office of the Prime Minister received for the benefit of the anti-drug sports ground fund (Amended by the Ministerial Regulation No. 209 (B.E. 2540) which is applicable for income received from 27 March 1997 onwards)

(67) Interest on Government Savings Bonds National Savings Bond (Amended by the Ministerial Regulation No. 210 (B.E. 2541) in force from the 1st February 1998 onwards)

(68) Income which is salary or remuneration paid by staff of the International Agroforestry Research Center who are foreigners Foreign and non-residents in Thailand received from the International Agroforestry Research Center because of their entry into the country. Thailand Under the agreement between the Thai government and the International Agroforestry Research Center (Amended by the Ministerial Regulation No. 211 (B.E. 2541) which is applicable for income received from October 21 1996 onwards)

(69) Savings Card Award of Bank for Agriculture and Agricultural Cooperatives (Amended by the Ministerial Regulation No. 213 (B.E. 2541) which is applicable for income received from 10 March 1998 onwards)

(70) Income from the transfer of ownership or possessory right in land without compensation to temples, temples, roman Catholic priests or mosques established under the law on that However, only the transfer of land made to the temple, Bad Luang, Roman Catholic or a mosque with land not more than 50 rai (Amended by the Ministerial Regulation No. 214 (B.E. 2541 (1998)), effective from 20 October B.E. 2541 (1998) onwards)

(71) Benefits received by the shareholders from the merger or transfer of business operators all to each other by transferring shares in exchange for shares in the new company that has been merged or the company who takes the entire business according to the methodology and conditions prescribed by the Director-General only for which the appraised value is more than the capital and the transfer of shares made in the same accounting period as the merger or the entire business transfer.(Amended by the Ministerial Regulation No. 291 (B.E. 2555) in force from 6 September B.E. 2555 onwards)

(72) Compensation received by an employee under the law on labor protection and compensation received by employees under the law on state enterprise employees, but does not include compensation received by employees or employees due to retirement or termination of employment contract, but only the portion of compensation that does not exceed wages or salary wages for the last 300 days but not more than 300,000 baht (Amended by the Ministerial Regulation No. 217 (B.E. 2542) in force for the year 1998 onwards)

(73) Income received as interest on loans for borrowing money to buy, hire purchase, or build a residential building residence by mortgage the building purchased or built as collateral for the loan According to the actual amount paid but not more than 100,000 baht in accordance with the rules and procedures prescribed by the Director-General However, only interest on loans that have been paid since January 1, 2007 onwards, which is paid to

(a) Property Fund to solve problems in the financial institution system established under the law with securities and stock exchange

(b) A mutual fund for solving problems in the financial institution system established under the law on securities and stock exchange

(c) Special Purpose Juristic Person established for securitization under the law with a special purpose entity for securitization, however, only in the case that such special purpose entity

To take over the right to be a creditor of a loan instead of a mutual fund under (a) or (b) a bank or other financial institution company life insurance, cooperative or employer. In the case where the taxpayer has a deductible under Section 47 (1) (h) of the Revenue Code or no exemption income under (74) or (80) must be included in the calculation of income tax exempted under paragraph one when combined with abatement under Section 47 (1) (h) of the Revenue Code or money under (74) or (80),

as the case may be; Not more than 100,000 baht. The building under paragraph one shall include the building and the land. (Amended by the Ministerial Regulation No. 264 (B.E. 2550 (2007)), effective from January 1, 2007 onwards)

(74) Income paid as interest on loans to banks or other financial institutions. life insurance company cooperative or employer For borrowing money to buy, hire purchase or build a residential building by mortgage the purchased building or created as collateral for the loan According to the actual amount paid in excess of 10,000 baht but not more than 90,000 baht and only interest on loans that have been paid since January 1, 2007 onwards in accordance with the rules and regulations methods prescribed by the Director-General. In the case where the taxpayer has a deductible under Section 47 (1) (h) of the Revenue Code or are exempt from bringing income under (73) or (80) is included in the calculation of income tax exemption under paragraph one when combined with abatement under Section 47 (1) (h) of the Revenue Code or money under (73) or (80), as the case not exceeding 100,000 baht. The building under paragraph one shall include the building and the land. (Amended by the Ministerial Regulation No. 264 (B.E. 2550 (2007)), effective from December 12, 2007 onwards)

(75) Income as much as the director, administrator, teacher or educational personnel In private schools, money is paid accumulated into the welfare fund under the law governing private schools Only the portion not exceeding 500,000 baht for that tax year. However, for assessable income received from 1 January 2008 onwards (Amended by the Ministerial Regulation No. 266 (B.E. 2551) which is applicable for income from 2008 onwards)

(76) Income paid for the purchase of investment units in a retirement mutual fund under the law on securities and Exchange at a rate of not more than 15% of assessable income Only the part that does not exceed 500,000 baht for that tax year The income earners must hold the investment units for at least 5 years from the date of purchase of the units.

Make the first investment and redeem the investment units when the income earner is not less than 55 years of age. For income Assessment received from January 1, 2008 onwards and in accordance with the rules, procedures and conditions ordered by the Director-General. In the case where the income earner has paid contributions to the provident fund under the law on provident fund government Pension Fund under the law governing Government Pension Fund or Fund welfare under the law on private schools as well Income exempted under paragraph one when combined with accumulated income paid to provident fund Government Pension Fund or the Welfare Fund must not exceed 500,000 baht. In the event that the investor has held investment units for less than 5 years from the date of initial purchase of investment units or redeem the unit to invest before the income earner reaches the age of 55, the income earner shall no longer be entitled to the exemption under paragraph one and must also pay income tax on income which has already been exempted from tax under paragraph one (Amended by the Ministerial Regulation No. 266 (B.E. 2551) which is

applicable for income from 2008 onwards) (See announcement of the Director General of the Revenue Department on income tax (No. 259)) In the tax year 2008, if the money earner has purchased investment units between October 1, 2008 to the 31 December 2008, the income under paragraph one is equal to the portion not exceeding 700,000 baht but not exceeding 50 percent of the income should be assessed and in the case where the income earner has also paid the accumulated money under paragraph two, when the income is combined with the accumulated money must not exceed 700,000 baht to be in accordance with the rules and procedures and the conditions that notified by the Director-General and the provisions of paragraph three shall also apply. (Amended by the Ministerial Regulation No. 267 (B.E. 2551) in force from 21 November B.E. 2551 (2008).

 (77) any money or benefit which the unitholders invest in a retirement mutual fund under the law on securities and Exchange received from the said fund due to old age, disability or death according to the methodology and conditions prescribed by the Director-General of the Revenue Department (Amended by the Ministerial Regulation No. 228 (B.E. 2544) which is applicable for income from 2001 onwards)

(78) Any money or benefit that the director, administrator, teacher or educational personnel in the school the private sector receives it from the welfare fund in accordance with the law governing private schools. When the director, administrator, teacher or educational personnel in a private school leaving work due to an elderly person, disability or death. Assessable income received from January 1, 2008 onwards and in accordance with the rules and procedures and conditions prescribed by the Director-General (Amended by the Ministerial Regulation No. 307 (B.E. 2558) in force from 11 July B.E. 2558 (2015) onwards)(See announcement of the Director General of the Revenue Department on income tax (No. 99))

(79) Assessable income as follows:

(a) Dividends derived from holding shares in a company or juristic partnership established for the purpose of to operate a venture capital business and is exempt from income tax under Section 5 Attharos of the Royal Decree issued under the Revenue Code On the exemption of income taxes (No. 10), B.E. 2500, amended added by a Royal Decree issued under the Revenue Code On Tax Exemption (No. 396) 2002 (Amended by the Ministerial Regulation No. 235 (B.E. 2545) in force from 1 March B.E. 2545 onwards)

 (b) benefits derived from the transfer of shares of a company or juristic partnership established with objectives to engage in venture capital business and is exempt from income tax under Section 5 Attharos of royal Decree issued under the Revenue Code On the exemption of income taxes (No. 10), B.E. 2500, which amended by a Royal Decree issued under the Revenue Code On Tax Exemption (No. 396) 2002 (Amended by the Ministerial Regulation No. 238 (B.E. 2545) in force from 27 September B.E. 2545 onwards)

(80) Income paid as interest on loans to the Government Pension Fund under the law with the Government Pension Fund for borrowing money for purchase, hire purchase, or to build a residential building in accordance with the amount actually paid but not more than 100,000 baht and only the interest paid on the loan since January 1 2007 onwards, in accordance with the rules and procedures prescribed by the Director-General. In the case where the taxpayer has a deductible under Section 47 (1) (h) of the Revenue Code or exempt from income under (73) or (74) shall be included in the calculation of income tax exempted under paragraph one when combined with the a reduction under Section 47 (1) (h) of the Revenue Code or the money under (73) or (74), as the case may be, must not exceed 100,000 baht. The building under paragraph one shall include the building and the land. (Amended by the Ministerial Regulation No. 264 (B.E. 2550) which came into force from 12 December 2007 onwards)

(81) Interest and prize of savings lottery of the Bank for Agriculture and Agricultural Cooperatives, but does not include interest which the recipient is not the first However, for savings lottery tickets issued from February 4 2002 onwards (Amended by the Ministerial Regulation No. 239 (B.E. 2545) is applicable for savings lotteries issued from February 4, 2002 onwards)

(82) Income to the extent that the income earner pays for insurance premiums in the tax year. for life insurance of those who have income according to amount actually paid Only the excess of 10,000 baht but not more than 90,000 baht, with a life insurance policy must hold f or a period of 10 years or more, and life insurance is insured with the insurer who operates the business life insurance in the kingdom However, for insurance premiums paid from January 1, 2008 onwards and shall be in accordance with the rules and procedures prescribed by the Director-General. (See Announcement of the Director-General of the Revenue Department on Income Tax (No. 112))

"If the premium paid under the first paragraph It is a premium for pension life insurance that is paid from 1 January 2010 onwards, income is exempt from being included in the calculation of income tax additionally at the rate of 15% of assessable income but not exceeding 200,000 baht exempted from calculating income tax for the case where the income earner pays in contributions to the reserve fund, provident fund under the law on provident fund under (56) or contributions to the pension fund, government officials under the law governing government pension funds under (64) or contributions to the Welfare Fund under the law on private schools under (75), as the case may be, or the purchase of investment units in mutual funds for provident fund under the law on securities and exchange under (76) must not exceed 500,000 baht in a tax year the same exemption under paragraph two to be in accordance with the rules and procedures prescribed by the Director-General. (Amended by the Ministerial Regulation No. 279 (B.E. 2554), effective from February 23, 2011 onwards)

(83) Income from the sale of immovable properties as follows:

(a) Houses, houses or other structures which is normally used for housing

(b) Immovable properties under (a) together with land

(c) A condominium unit for living in a condominium under the law on condominiums However, only in the case of a real estate sales and purchase contract in which the income earner uses it as a source of residence important, whose name is in the house registration under the law on civil registration for not less than 1 year from the date of acquisition of ownership or possessory right in that immovable property according to the methodology and conditions that the Director-General the Revenue Department orders. The exemption under paragraph one must appear within the period of one year before or from the date of the purchase contract sale of such real estate. The income earner has entered into a new real estate sale and purchase agreement with the characteristics under (a) (b) or (c) to use as one's own residence. and shall be exempted equal to the amount of the value of such immovable property but not exceeding the amount of the value of the new immovable property However, it shall be based on the appraised value of the capital for collection fee for registration of rights and juristic acts under the Land Code (Amended by the Ministerial Regulation No. 241 (B.E. 2546) in force for the sale of real estate from the 1st January 2003 onwards)

(84) Income from the sale of futures contracts in the agricultural futures market of Thailand only in the event that agricultural products are not delivered (Amended by the Ministerial Regulation No. 244 (B.E. 2547) in force from 1 March B.E. 2547 onwards)

(85) Pension under the law on government pension and the law on Government Pension This is from 11 November 2003 (Amended by the Ministerial Regulation No. 245 (B.E. 2547) which is effective for income from 11 November 2003 onwards)

(86) Any money or benefit received as a result of the sale of investment units back to the Retirement Mutual Fund under the law on securities and exchange, only in the case where the investor has already held such investment units not less than 5 years from the date of initial purchase of investment units in accordance with the rules, procedures and conditions prescribed by the Director-General (Amended by the Ministerial Regulation No. 265 (B.E. 2551) which is applicable for the purchase of investment units prior to the 1 March 2008)

(87) Income paid for the purchase of investment units in long-term equity mutual funds under the law on securities and the Stock Exchange of Thailand at a rate of not more than 15% of assessable income. Only the portion that does not exceed 500,000 baht for that tax year The said income must be the income of the income earner who is a natural person but does not include partnerships ordinary or non-juristic body of persons and undivided inheritance and income earners must hold investment units in the fund including long-term shares of not less than 7 calendar years, but not including in the event of disability or death However, for assessable income that

received from 1 January 2016 to 31 December 2019 exemption under paragraph one to be in accordance with the rules and procedures and conditions prescribed by the Director-General. In the event that the income earner does not comply with the rules and the conditions prescribed in the second paragraph to the earner is exempt from the tax exemption under paragraph one and must pay income tax on income exempted under paragraph one (Amended by the Ministerial Regulation No. 317 (B.E. 2559) which is applicable for income received from 1 January 2016 onwards)

(88) Any money or benefit received as a result of the sale of investment units back to long-term equity funds under the law on securities and exchange, only in the case where such money or benefits are calculated from assessable income that is exempted from the calculation of income tax under (Section 87) and the income earner holds such investment units have been made for not less than 7 calendar years, excluding the case of disability or death (Amended by the Ministerial Regulation No. 317 (B.E. 2559) which is applicable for income received from 1 January 2016 onwards)

(89) Assessable income after deducting expenses and deductions under Section 47 (1) (2) (3) (4) (5) or (6) of the Revenue Code equal to the amount donated to Sports Authority of Thailand to promote sports and provincial Sports Committee established under the Sports Law of Thailand to promote sports in the province, Department of Physical Education for organizing student sports competitions or the Provincial Sports Association or the Sports Association of Thailand established with permission from the Sports Authority of Thailand for Sports but when combined with donations under section 47 (7) of the Revenue Code Must not exceed 10% of assessable income after deducting expenses and deductions such (Amended by the Ministerial Regulation No. 294 (B.E. 2555) in force from 25 December B.E. 2555 onwards)

(90) Interest on bank deposits in the Kingdom, only interest on fixed deposits with a term of deposit from 1 year or more, but when combined with all types of fixed deposit interest, the total amount must not exceed 30,000 baht throughout the tax year and the earner receives interest on such deposits when they are not less than 55 years of age. Income received from January 1, 2005 onwards in accordance with the rules and procedures and the conditions that

Director-General announced (Amended by the Ministerial Regulation No. 250 (B.E. 2548) in force for the year 2005 onwards)

(91) assessable income after deducting expenses and allowances under Section 47(1) (2) (3) (4) (5) or (6) of the Revenue Code equal to the amount donated to government agencies to help those affected by floods, storms, and fires or other natural disasters But when combined with donations under Section 47 (7) of the Revenue Code must not exceed a 10% of assessable income after deducting such expenses and allowances However, for assessable income in the year 2004 which must be filed in 2005 onwards (Amended by the Ministerial Regulation No. 253 (B.E. 2548) which is applicable for the year 2004 onwards)

(92) Income from transfer of ownership or possessory right in immovable property without compensation to Thai Red Cross Society (Amended by the Ministerial Regulation No. 256 (B.E. 2548) effective from August 22, 2005 onwards)

(93) Income received by an income earner who is a resident of Thailand and is not less than 65 years of age in a tax year only the portion that does not exceed 190,000 baht in that tax year However, for the income received since January 1, 2005 onwards, in accordance with the rules and procedures and conditions prescribed by the Director-General of the Revenue Department (Amended by the Ministerial Regulation No. 257 (B.E. 2549) which is applicable for the year 2005 onwards)

(94) Money of the same nature as pension under the law on government pension and law on Government Pension Fund which the staff of the Port Authority of Thailand railway worker of Thailand and employees of the Government Savings Bank received with the same rate and method of calculation as the pension under the law on government pension and the law on government pension fund from 10 March 2004 onwards (Amended by the Ministerial Regulation No. 258 (B.E. 2549) in force from 10 March B.E. 2547 onwards)

(95) Income received by the Royal Tuition Scholarship Program Committee for Thai Monks for the benefit of Royal scholarship program for Thai monks From the 5th day February 2004 onwards (Amended by the Ministerial Regulation No. 259 (2006), effective from the 5th February 2004 onwards)

(96) Proceeds from the sale of derivatives under the law on derivatives Trading Center only in the event that the product is not delivered. However, for assessable income received from 1 November 2005 onwards (Amended by the Ministerial Regulation No. 260 (B.E. 2549) which is applicable for income received from 1 November 2005 onwards)

(97) Income to the extent that the income earner pays premiums to life insurance companies or non-life insurance companies operate in the Kingdom according to the amount actually paid but not more than 15,000 baht for the father's health insurance. The mother of the income earner, including the parents of the income earner's husband or wife whose income is insufficient for subsistence. However, it must be the insurance premium paid in 2006 onwards and in accordance with the rules and procedures that Director-General orders (Amended by the Ministerial Regulation No. 263 (B.E. 2549) which is applicable for 2006 income onwards)

(98) Income to the extent that the employer pays as a premium to the life insurance company or the non-life insurance company doing business in the Kingdom For group insurance policies with a duration of not more than 1 year, only in the part that cover medical expenses for

> (a) An employee, husband, wife, ascendant or descendant who is under the care of the employee; only medical treatment in Thailand

(b) an employee in the event that it is necessary to receive medical treatment abroad; while operating according to occasional overseas duties in this regard, for income received from January 1, 2006 onwards (Amended by the Ministerial Regulation No. 263 (B.E. 2549) which is applicable for income from 2006 onwards)

(99) Income of community enterprises under the law governing community enterprise promotion only as a partnership ordinary or non-juristic body of persons whose income does not exceed 1,800,000 baht for that tax year However, for income assessments received from January 1, 2009 to December 31, 2016 and in accordance with methodology and conditions ordered by the Director-General (Amended by the Ministerial Regulation No. 303 (B.E. 2551) which is applicable for income received from 1 January2009 to 31 December 2016)

(100) Income of the same nature as pension under the law on government pension and law on Government Pension Fund which the staff of the Thai Red Cross Society received with rates and methods calculated in the same way as pension under the law on government pension and the law on government Pension Fund (Amended by the Ministerial Regulation No. 268 (B.E. 2552) effective from February 26, 2009 onwards)

(101) Income from the transfer of ownership or possessory right in immovable property without compensation to the Orphanage of the Thai Red Cross Society However, for assessable income received from 1 January 2010 onwards (Amended by the Ministerial Regulation No. 275 (B.E. 2553) in force for the year 2010 onwards)

(102) Income received by a person with a disability who has an identification card under the law on promotion and improve the quality of life for people with disabilities who is a resident of Thailand and is not over 65 years of age in the tax year receives only the portion not exceeding 190,000 baht for that tax year However, for assessable income received from 1 January 2010 onwards and in accordance with the rules and procedures and conditions ordered by the Director-General (Amended by the Ministerial Regulation No. 281 (B.E. 2554) which is applicable for income from 2010 onwards)

(103) Income under Section 40 (5) (6) (7) or (8) of the Revenue Code for flood victims, fire or other natural disasters Occurring since January 1, 2011 onwards, which have been registered with over government assistance centers or agencies receive only the portion equal to the amount of damages occurred in accordance with the rules, procedures and conditions prescribed in the notification of the Director-General (Amended by the Ministerial Regulation No. 282 (B.E. 2554) which is applicable for the year 2011 onwards)

(104) Income calculated from the value received by the employee for adopting his own legitimate child, but does not include: The adopted child is placed in the care of a childcare facility under the law on child protection provided by the employer. A license to be established for the welfare of employees for that establishment However,

for the assessment income received from January 1, 2011 onwards. (Amended by the Ministerial Regulation No. 285 (B.E. 2554) which is applicable for the year 2011 onwards)

(105) Income received by public actors who are film actors who are domiciled in foreign countries due to foreign films produced by companies or juristic partnerships established according to foreign laws and the production is allowed under the law on movies and videos. For assessable income received from 1 January 2011 to 31 December 2015

(Amended by the Ministerial Regulation No. 289 (B.E. 2555) in force for the year 2011 - 2015)

(106) Proceeds from the sale of securities listed on the stock exchange in the ASEAN Member Countries trading through the system provided by the Stock Exchange of Thailand to link trading with the Stock Exchange of Thailand among ASEAN member countries but does not include income from the sale of securities in the form of treasury bills, bonds, bills or debentures.

(107) Special remuneration received by an officer in accordance with the regulations of the Office of the Prime Minister on gratuities for officers working in the southern border provinces 2007 However, for the assessable income received from January 1, 2012 onwards.(Amended by the Ministerial Regulation No. 295 (B.E. 2555) in force for the year 2012 onwards)

(108) The portion of the income that is in the form of compensation or other similar money received due to damage or loss of benefits arising from the exercise of the power of the State as required by law; going into real estate, utilizing or occupying real estate, or utilizing property for income received from January 1, 2013 onwards (Amended by the Ministerial Regulation No. 301 (B.E. 2556) which is applicable for income from year 2555 onwards)

(109) assessable income after deducting expenses and deductions under Section 47 (1) (2) (3) (4) (5) or (6) of the Revenue Code equal to the amount donated to the Fine Arts Department for the restoration of ancient monuments, antiques and objects of art under the law on ancient monuments antiques, objects of art and the National Museum, but when combining with donations under Section 47 (7) of the Revenue Code the value must not exceed 10% of assessable income after deducting such expenses and deductions for the year 2013, assessable income that must be filed first from 2014 onwards (Amended by the Ministerial Regulation No. 302 (B.E. 2556) which is applicable for income from the year 2012 onwards)

(110) Income received from share of profit from ordinary partnership or non-juristic body of persons received from

> (a) Lease of immovable property that is collectively owned by inheritance or received from giving by offerings which are subject to income tax under Part 2, Chapter 3, and Title 2 of the Revenue Code

(b) interest on deposits under Section 40 (4) (a) of the Revenue Code and is subject to withholding tax under section 50 (2) of the Revenue Code However, only in the case where the said income person does not claim the tax that has been withheld, refund or not request a credit for the tax money that has been withheld, whether in whole or in part (Amended by the Ministerial Regulation No. 309 (B.E. 2558) which is applicable for the year 2015 8 onwards)

(111) Income equal to the amount paid by members of the National Savings Fund as accumulated money to the National Savings Fund under the law governing the National Savings Fund in the amount actually paid but not exceeding 500,000 baht for that tax year in accordance with the rules and procedures and conditions prescribed by the Director-General

Income exempted under paragraph one when combined with exempt income, it is not included in the calculation for loss. Income tax for the case where the income earner pays as a contribution to the statutory provident fund. on provident fund under (56) or contributions to the Government Pension Fund under the law on pensions for government officials under (64) or contributions to the Welfare Fund under the law on private school under (75), as the case may be, or the purchase of investment units in a retirement mutual fund under the law on Securities and Exchange under (76) or insurance premiums for life insurance pension schemes under (82) and must not exceed 500,000 baht in the same tax year. (Amended by the Ministerial Regulation No. 314 (B.E. 2559) which is applicable for income from 2015 onwards)

(112) Any money or benefit received from the National Savings Fund under the law on National Savings Due to Disability National Savings Fund Members or termination of membership due to the age of 60 complete or deemed to be in the event that the member has reached the age of 60 years of age or has died in this regard according to the methodology and conditions ordered by the Director-General (Amended by the Ministerial Regulation No. 314 (B.E. 2559) which is applicable for income from 2015 onwards)

(113) Any money or benefit received as a result of the sale of investment units back to the mutual fund for the purpose of providing a living under the law on securities and exchange from 1 January 2016 onwards by such investment units must be investment units in the Retirement Mutual Fund that have been transferred or related to transfer from the provident fund according to the provident fund law Only if the earner has sold the unit. The investment is made when the age is not more than 55 years and has a period of Provident Fund members with the period of holding investment units in the Retirement Mutual Fund is not less than 5 years or disability or death according to the methodology and conditions announced by the Director-General (Amended by the Ministerial Regulation No. 324 (B.E. 2560) which is applicable for the redemption of investment units since January 1, 2016 onwards)

(114) Income received by athletes and sports coaches as a result of giving in ceremonies or on occasions customs and traditions as a reward for participating in a sporting event; and international amateur sports competitions, only the portion exceeding ten million baht in accordance with the rules, procedures and conditions announced by the Director-General (Amended by the Ministerial Regulation No. 325 (B.E. 2560) which is applicable for income received from 1 February 2016 onwards)

(115) Income to the extent that the income earner has paid in deposit with a bank specifically established by law in the tax year under the amount actually paid but not exceeding 100,000 baht, which the deposit has an agreement that the depository bank will pay and agreement benefits based on the life or death of the depositor and there is a time limit for the deposit from 10 years up to the year when combined with the allowance under Section 47 (1) (d) of the Revenue Code or money according to (82) paragraph one must not exceed 100,000 baht and in accordance with the rules and procedures and conditions announced by the Director-General (Amended by the Ministerial Regulation No. 326 (B.E. 2560) which is applicable for income from 2016 onwards)

(116) Any money or benefit received by the earner as a result of depositing money with a bank established by law specifically and exempted from the calculation of income tax under (115) (Amended by the Ministerial Regulation No. 326 (B.E. 2560) which is applicable for income from 2016 onwards)

(117) assessable income after deduction of expenses and allowances under Section 47 (1) (2) (3) (4) (5) or (6) of the Revenue Code twice the amount of the expenditure but not more than 10% of the said income as follows:

(117.1) Expenditures paid to support education projects under the Ministry of Education. Approved (Royal Decree (No. 420) B.E. 2547)

(117.2) Donations to government educational institutions private school (but not including non-formal schools), or private institution of higher education for actions taken from 1 January 2013 to 31 December 2018 (Royal Decree (No. 558) B.E. 2556 and Royal Decree (No. 616) B.E. 2559 (117.1) counted together)

(117.3) Expenses given to government educational institutions Educational institutions of school government organizations, private schools established under the law governing private schools. Higher education institutions established under the law of higher education institution, private for use in procurement of books or electronic media to promote reading (Royal Decree (No. 515) 2011)

(117.4) Expenditure on donations to the Teacher Development Fund, faculty members and educational personnel at the Ministry of Education was established (Royal Decree (No. 520) B.E. 2554)

(117.5) Expenses to local administrative organizations to establish or support child development centers, operations of Child Development Centers under Local Administrative Organizations (Royal Decree (No. 526) 2011)

(117.6) Money donated to vocational training programs and activities related to therapy, remedial, rehabilitate and care for children and youth of the juvenile detention and protection center or the Child Training and Training Center and youth in the Department of Juvenile Observation and Protection Ministry of Justice (Royal Decree (No. 541) 2012 by including (117.1) to be counted together)

(117.7) Donations to the Sports Authority of Thailand Provincial Sports Committee established according to sports Law of Thailand Provincial Sports Association or Sports Association of Thailand established licensed by the Sports Authority of Thailand Department of Physical Education or the National Sports Development Fund to supply sports equipment, training or competition construction and development of sports fields or sports training centers; promotion support the organization of sports events or the development of athletes and sports personnel. For actions from 1 January 2013 to December 31, 2018 (Royal Decree (No. 559) B.E. 2556 and the Royal ordinance (No. 596) B.E. 2559 (177.1) must be added together)

(118) assessable income after deducting expenses and deductions under Section 47 (1) (2) (3) (4) (5) or (6) of the Revenue Code equal to the amount donated to the welfare fund established in accordance with the regulations of the Office of Prime Minister on the provision of welfare within government agencies but when combined with donations under Section 47 (7) of the Revenue Code must not exceed 10 percent of assessable income after deducting expenses and deductions for assessable income incurred since 2004 onwards (Royal Decree (No. 424) B.E. 2547 and Announcement of the Director-General (No. 134) B.E. 2547 (117.1) must be included in the total)

(119) assessable income after deducting expenses and deductions under Section 47 (1) (2) (3) (4) (5) or (6) of the Revenue Code equal to the amount donated to the Rehabilitation Fund for the Disabled under the law on rehabilitation of people with disabilities Social Welfare Promotion Fund under the law on promotion of social welfare provision, social welfare Child protection fund under the law on child protection or the National Sports Development Fund established according to the Cabinet resolution on the 16th February 1999 but when combined with donations under section 47 (7) of the Revenue Code must not exceed 10 percent of assessable income. After deducting expenses and deductions (Royal Decree (No. 428) B.E. 2548)

(120) Personal income tax exemption on net income from income tax calculation under Section 48 (1). Only the portion not exceeding the first 150,000 baht for that tax year (Royal Decree (No. 470) B.E. 2551)

(121) Income paid for the purchase of real estate which is a building. Buildings with land or condominiums in condominium for housing according to the following criteria

(121.1) Income paid for the purchase of immovable property must be the amount actually paid. but all together not exceeding 300,000 baht, which must be paid between 1 January 2009 and 31 December 2009 and must be registered for the transfer of ownership in that real estate to be completed within that period.

(121.2) The income earner must be the owner of the property purchased for consecutive periods not less than 3 years from the date of registration of the transfer of ownership in the immovable property and such immovable property through the registration of the transfer of ownership before whether in whole or in part. This shall be in accordance with the methodological criteria and conditions ordered by the Director-General with the approval of the Minister

(122) Income paid as a service fee to a tourism business entrepreneur under the law on tourism business and a tour guide, or paid for accommodation in a hotel to a hotel business operator under the law on hotels for domestic travel According to the actual amount paid, but the total amount does not exceed 15,000 baht. However, only the service fee or accommodation fee has been paid from December 16, 2014 to December 31, 2016 and in accordance with the rules and procedures and conditions prescribed by the Director-General

(123) Personal income tax exemption as follows:

(123.1) Being a victim of floods, storms, fires or other natural disasters that occur in Thailand

From 1 January 2011 onwards

(1) For income equal to the amount of compensation received from the government;

(2) for income equal to the amount or price of the property received or assisted for compensate for damage received other than the cases under (1), but not more than the value of the damage received. In this regard, for the tax year in which money or assets are received under (1) or (2) and in accordance with methodology and conditions prescribed by the Director-General

(123.2) Assessable income after deducting expenses and deductions under Section 47 (1) (2) (3) (4) (5) or (6) of the Revenue Code equal to the amount donated. to help those affected by floods, storms, and fires or other natural disasters that occur in Thailand From January 1, 2011 onwards, with the company or juristic partnership or other juristic person Representing money or assets donated to help the victims flood, storm, fire, or other natural disasters But when combined with donations under Section 47 (7) of the Revenue Code, shall not exceed ten percent of assessable income after deducting expenses and deductions 50% additional income exemption in case of donations to help flood victims during 1 September 2011 until December 31, 2011 (Royal Decree (No. 529) B.E. 2554)

(124) Personal income tax exemption for income earners, but does not include ordinary partnerships or body of persons which is not a juristic person For dividends received from the Infrastructure Fund established under the law on Securities and Exchange for 10 consecutive years from the tax year in which the mutual fund is registered in accordance with the rules and procedures and conditions prescribed by the Director-General (Royal Decree (No. 544) B.E. 2555)

(125) Income tax exemption for natural persons and companies or juristic partnerships.

(125.1) Affected or damaged as a result of political rallies for income equal to the amount of compensation according to the Cabinet resolutions on January 10, 2012 and December 11, 2012 received from the state From the 2012 tax year onwards, or for accounting periods beginning on or after January 1 2012

(125.2) which has been affected or damaged due to the unrest in the Southern province border for an amount equal to the amount of compensation under the law governing provincial administration, and the southern border given by the state from tax year 2012 onwards or for accounting periods beginning on or after January 1, 2012 (Royal Decree (No. 567) B.E. 2556)

(126) Income tax exemption for assessable income under Section 40 (2), (7) and (8) received from government agency for food preparation to help flood victims in 2011 However, only the money that received from October 8, 2011 onwards (Royal Decree (No. 568), B.E. 2554)

(127) Income tax exemption for natural persons and companies or juristic partnerships for income equal to the amount received from the government for use in preventing floods, storms, fires, or other natural disasters that occurred in Thailand with a permanent character However, for income received from January 1, 2011 onwards and in accordance with the rules and procedures and conditions announced by the Director-General determined by the approval of the Minister. Income earners must not use the cost value of the assets made to prevent floods, storms, fires or disasters, other natural occurrences in Thailand that are permanent in the portion equal to the income exempted under the above paragraph to be included in the cost value of the property for deduction of wear and tear and depreciation of the property under Section 65 bis (2) of the Revenue Code (Royal Decree (No. 570) B.E. 2556) Income component

VITA

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	Issue 14 No.2 Year 2021

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY