

# **The Unequal Benefits of Tax Subsidies for Household Saving and Investment: Evidence from Thailand's Tax Return Data**

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## **Abstract**

This paper examines the progressivity impacts of tax subsidies in the Thai personal income tax system on household saving and investment using tax return data from Thailand. It measures the tax progressivity using the Suits index and computes bootstrapped confidence intervals. It finds that overall, the subsidies make the tax system significantly more progressive-the regressive effects of the deduction mechanism are outweighed by voluntary participation and the design regarding capped contribution levels. However, there is a strong heterogeneity in the progressivity impacts, with some tax subsidies being highly regressive. It also illustrates that turning tax deductions into non-refundable credits could have important effects on progressivity. Our findings raise concerns about the equity implications of such tax subsidies and suggest that policymakers should pay serious attention to the design of tax subsidies as well as the propensity of households to save or invest in different classes of assets.

**Keywords:** tax subsidies; household saving; progressivity; personal income tax; developing countries

**JEL classifications:** D63, H24, H31, K34

## 1. Introduction

Governments in many developing countries are concerned about the adequacy of household savings for retirement and, in response, have provided tax subsidies to promote savings and investment in their personal income tax systems. There is, however, little rigorous statistical analysis of the distributional implications of such tax incentives. This represents an important gap in the literature since the ways in which those subsidies are designed could have important effects on the overall tax progressivity. Moreover, despite the fact that the number of households subjected to this tax is relatively small in developing countries (Tanzi & Zee 2000), the personal income tax system is one of the major tax instruments directly addressing inequality.

This paper investigates the extent to which the tax subsidies for household saving and investment impact progressivity of the tax system using personal income tax return data from Thailand. It also analyzes how the design of tax subsidies could influence the degree of tax progressivity. Specifically, the paper examines alternative treatments where tax deductions are replaced by non-refundable credits so that high-income taxpayers do not benefit disproportionately from those subsidies as compared to middle- and low-income taxpayers.

While the fact that the incentives are provided in the form of tax deductions makes the subsidies regressive, the distributional impacts associated with voluntary participation and the propensity of taxpayers of different income groups to choose a particular savings vehicle are unclear. In addition, certain types of deductions are capped at a moderate level independent of income-potentially increasing the progressivity of the subsidies.<sup>1</sup> The net progressivity effect of the subsidies on the tax system therefore becomes an empirical question. Our findings shed light on the distributional effects of the overall subsidies and of each individual deduction.

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<sup>1</sup> For example, consider two taxpayers with different income levels but have the same amount of deduction at the capped level. Although higher-income taxpayer may receive a larger tax subsidy, she may receive a lower subsidy as a percent of income.

Methodologically, we estimate Suits indices under various tax treatment scenarios. The Suits index compares the cumulative distribution of income to the cumulative distribution of the tax burden and is a common tool used to measure the degree of tax progressivity.<sup>2</sup> We also construct bootstrapped confidence intervals to provide information about statistical significance of the estimated impacts.

The findings indicate that overall, the tax subsidies for household saving and investment in Thailand make the personal income tax system significantly more progressive. However, there is an important variation in the distributional impacts among the tax subsidies. In particular, the subsidies on active investments in mutual funds, whose recipients are heavily concentrated among high-income taxpayers, significantly lower progressivity. This includes subsidies for long-term equity fund (LTF) and retirement mutual fund (RMF) deductions. Moreover, the progressivity impacts of the subsidies are also economically significant, with the effects of LTF and life insurance deductions having similar magnitudes as flattening the top tax bracket.

Our paper also highlights an opportunity to enhance equity in the design of tax subsidies for household saving and investment. Turning tax deductions into non-refundable credits could yield important distributional effects. Such progressivity enhancement is even stronger when we incorporate potential behavioral adjustments to changes in the after-tax price of saving.

This paper is closely related to a small but growing empirical literature that studies the distributional implications of tax incentives aimed at stimulating household saving and investment. Most studies have primarily focused on developed countries. Examples include Joulfaian and Richardson (2001), Burman et al. (2006), Congressional Budget Office (2011), Corneo et al. (2015), OECD (2018), and Toder et al. (2020). The general conclusions are that most subsidies accrue to taxpayers in the upper income distribution and that the self-selection into the programs could play an important role in determining the distributional outcome. In particular, Corneo et al. (2015) demonstrates that Germany's major pension subsidy program is

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<sup>2</sup> Examples of studies that use the Suits index to measure tax progressivity include Casper-son and Metcalf (1994), Sarte (1997), Anderson and Roy (2001) and Agostini and Jimenez (2015).

distributionally neutral due to the progressivity subsidy schedule and the offsetting participation pattern. Toder et al. (2020) estimates the benefit distribution using alternative methods and illustrates that the US tax incentives for retirement savings provide the largest benefits as a share of income to upper-middle-income taxpayers.

Studies that focus on developing countries are relatively few due to the limited availability of administrative tax return data. For example, Tanzi and Zee (2000) provides an overview of key issues on personal income taxation for developing countries. It states that the progressivity of the personal income tax system is often severely undercut by various tax deductions and proposes that these deductions be replaced with credits for equity purposes. Laovakul and Chawanote (2017) provide comprehensive descriptive statistics on tax liabilities and key tax deductions for the personal income tax system in Thailand. Also focusing on the Thai personal income tax system, Muthitacharoen and Phongpaichit (2017) construct a microsimulation model that forecasts tax expenditures over a 10-year period and analyzes the distribution of tax expenditures under various policy scenarios. Both studies find that the benefit recipients of some tax deductions are very concentrated among rich taxpayers.

This paper contributes to the literature in two important ways. First, it uses administrative tax return data from a developing Asian country to perform a rigorous analysis of the distributional implications of tax subsidies for household saving and investment. To our knowledge, no existing empirical research specifically focuses on this issue for a developing country and estimates a formal measure of tax progressivity. Second, it highlights how alternative designs of tax incentives could provide more equal benefits to different income groups. Given the widespread use of such tax subsidies in developing countries, it is crucial that policymakers are aware of the importance of tax incentive design on the progressivity of the tax system.

The issue that we analyze in this paper is highly relevant for a number of developing countries beyond Thailand. Many developing countries in Asia, including India, Indonesia, Malaysia, and the Philippines, have provided tax subsidies that share similar characteristics as Thailand's. Our policy

implications are also applicable for other countries that are considering the introduction of such tax incentives.

The remainder of this paper is organized as follows. The next section illustrates the background on tax incentives for household saving and investment in Thailand. Section 3 describes the tax return data and the methodology for estimating the progressivity impacts. The findings and sensitivity analyses are discussed in Section 4. The final section concludes the study.

## **2. Tax Incentives for Household Saving and Investment in Thailand**

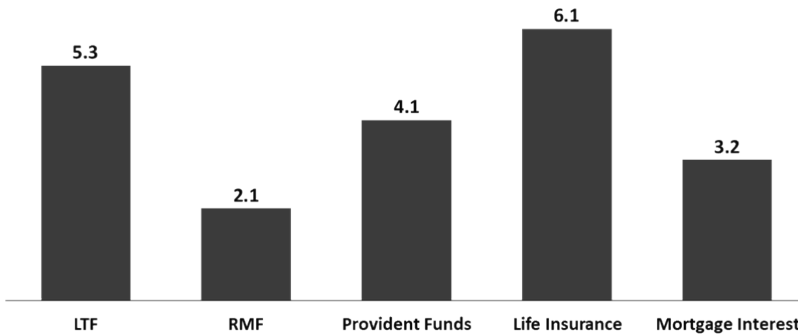
Tax incentives for household saving and investment represent important components of Thailand's personal income tax system. They are all provided in the form of tax deductions. This study focuses on five major tax deductions, which include deductions for long-term equity fund contributions (LTF), retirement mutual fund contributions (RMF), provident fund contributions, life insurance premiums, and mortgage interest.<sup>3</sup> The tax expenditures for these five tax deductions account for roughly 20% of total personal income tax revenue in 2012—slightly more than half of which is associated with the deductions for life insurance and LTF (see Figure 1).<sup>4</sup>

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<sup>3</sup> The other tax incentives are social security fund contributions and pension insurance purchases. Both of them are relatively less important. Among those with these deductions, the mean deduction is about 4,800 baht in 2012.

<sup>4</sup> Tax expenditure is defined as the difference between the tax liability without the benefit of the tax deduction and the tax liability under 2012 law. Consequently, this can be interpreted as the revenue loss attributable to the tax deduction. It is computed using the tax return dataset described in Section 3.

**Figure 1.** Tax expenditures associated with tax incentives for household saving and investment (% of total personal income tax revenue)



**Notes:** The tax expenditure is defined as the difference between the tax liability without benefit of the tax deduction and the tax liability under the 2012 law.

**Source:** Authors' estimate.

Although all of the five tax deductions are provided to encourage saving and investment, there are several important differences among them. The first difference is in the characteristics of assets. Life insurance can be viewed as medium-term saving since tax-deductible life insurance policies have a minimum period of 10 years and generally include a savings plan. The mortgage interest deduction includes interest incurred for the purchase or construction of a house and thus represents housing investment.

The other three subsidies involve investments in mutual funds. The LTF represents medium-term investment in domestic-equity mutual funds—taxpayers are required to hold the purchased units for at least five calendar years.<sup>5</sup> The RMF represents long-term investment in general mutual funds with penalties imposed if funds are withdrawn prior to reaching the age of 55. The provident funds include both registered private provident funds and the government pension fund. While both LTF and RMF involve active investment decisions every year, provident funds could be viewed as relatively passive investments where it typically requires less frequent decision-making by workers.

<sup>5</sup> The rule was later modified so that, from 2015, taxpayers are required to hold the purchased LTF units for at least seven calendar years.

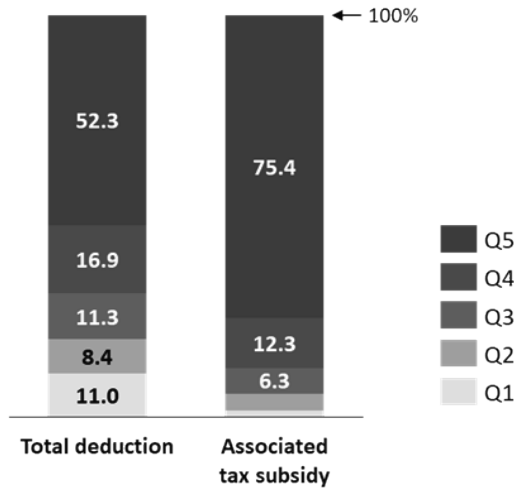
The second key difference is regarding their capped contribution levels. The deductions for life insurance and mortgage interest are limited to 100,000 baht (roughly 52% of Thailand's 2012 GDP per capita). The other three deductions are each capped at a minimum of 15% of gross income or 500,000 baht (261% of Thailand's 2012 GDP per capita).<sup>6</sup>

The way in which the tax incentives are handed out could have important distributional implications. By giving the tax subsidy in the form of a deduction, the after-tax price of saving decreases with a taxpayer's marginal tax rate. Since high-income taxpayers generally are in higher tax brackets, they receive subsidies at higher rates than low-income people. This results in the concentration of tax subsidies among high-income taxpayers. Although taxpayers in the top quintile accounted for 52.3% of total contributions to the five deductions, they received 75.4% of the associated tax subsidies (Figure 2). In contrast, taxpayers in the bottom four quintiles accounted for 48.7% of the LTF deductions, but received just 24.6% of the associated tax subsidies. In this study, we analyze how replacing the deduction with a non-refundable credit, where all taxpayers would receive the same amount of subsidy per baht of saving regardless of their income, would affect the progressivity implications.

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<sup>6</sup> Additionally, the law requires that the sum of RMF and provident fund contributions cannot exceed 500,000 baht per year.

**Figure 2.** Distribution of total tax deductions for household saving and investment and associated tax subsidy by income quintiles



Source: Authors' estimate.

### 3. Data and Methodology

This study analyzes the distributional implications of the tax subsidies using an administrative tax return dataset provided by Thailand's revenue department. In this section, we describe this dataset and the methodology for estimating the progressivity impacts.

#### 3.1 Personal Income Tax Return Data from Thailand

Our tax return dataset includes each item on the personal income tax form without any sensitive personal information. The dataset is a stratified random sample of personal income tax returns in tax year 2012. The sampling rate is 0.3% of all tax filers. This includes 9,846 taxpayers which are used in the baseline analysis and 19,387 filers without tax liability which are used in one of the sensitivity analyses.<sup>7</sup>

<sup>7</sup> In Thailand, approximately 70% of tax filers do not have any tax liability due to their low reported income. Also, relatively few of them use tax incentives for saving and investment. In 2012, for example, 0.1% had LTF contributions and 6.7% had life insurance deductions. Nevertheless, we expand the sample to include all tax filers in one of the sensitivity analyses.



Table 1 presents the summary statistics for taxpayers in 2012. The mean incomes are noticeably larger than their medians, reflecting the positive skewness of the income distribution among taxpayers. Deductions for LTF and RMF are relatively uncommon among taxpayers—the shares of those with deductions are both less than 10%. On the other hand, the deductions for life insurance and provident-fund contributions are much more popular—the shares of taxpayers with these deductions are 48.9% and 51.9%, respectively. Among the taxpayers with deductions, however, the average size of LTF and RMF deductions are considerably larger than the other deductions.

**Table 1.** Summary statistics for taxpayers

Variables	<i>n</i>	Mean	Median	S.D.
Gross income	9,846	822,723.80	505,130.00	1,811,112.00
Income net of expense	9,846	576,527.50	393,630.00	772,182.90
Tax liability	9,846	53,334.50	14,393.00	217,279.50
<b>Percent taking tax deductions</b>				
LTF	9,846	8.5	n/a	27.8
RMF	9,846	3.7	n/a	19
Provident-fund contribution	9,846	51.9	n/a	50
Life insurance	9,846	48.9	n/a	50
Mortgage interest	9,846	23.9	n/a	42.7
<b>Average amount of deductions</b>				
LTF	834	132,442.90	100,000.00	119,658.10
RMF	368	127,938.80	100,000.00	118,850.30
Provident-fund contribution	5,114	22,876.00	13,620.00	32,313.50
Life insurance	4,813	39,757.10	27,480.00	33,557.60
Mortgage interest	2,357	41,903.70	34,450.00	30,863.50

**Notes:** Weighted estimates are reported.

**Source:** Authors' estimate.

### 3.2 Measuring the Progressivity Impacts Using the Bootstrapped Suits Index

To measure the progressivity of the tax system, one may construct the distribution of tax burden across income groups. However, complications may arise if researchers need to compare the effects across different tax policies or scenarios. Following common practice in the tax literature, we measure the

distributive effects of tax incentives using the Suits index (see Suits 1975).<sup>8</sup> This approach allows researchers to address the above complications by summarizing the progressivity in a single measure.

The Suits index is one of the most widely used indicators for measuring progressivity. It is intuitively similar to the Gini coefficient; it essentially compares the cumulative distribution of pre-tax income to that of the tax burden. As a point estimator, however, it does not allow us to have a sense of its statistical significance. Therefore, in order to illustrate the statistical significance of the progressivity impacts, we follow Anderson et al. (2003) and estimate bootstrapped standard errors and confidence intervals corresponding to changes in the Suits indices.

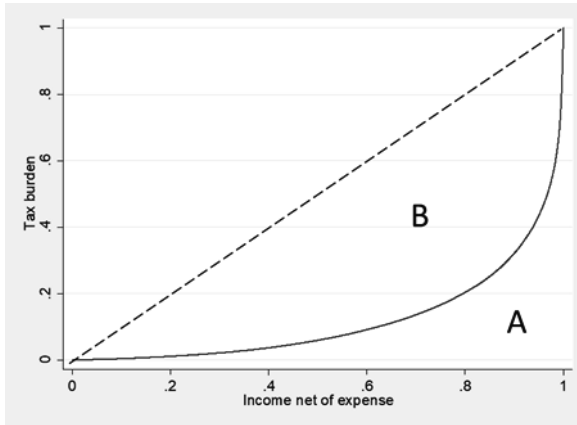
Figure 3 illustrates the intuition behind the Suits index. It plots the cumulative distribution of tax burden on the Y axis against the pre-tax income distribution on the X axis. The Suits index is defined as  $1 - A/(A+B)$ . For a progressive tax such as personal income tax, it ranges between 0 and 1, with larger values indicating higher progressivity. We compute the Suits index with respect to gross income net of expenses.

To compute the tax liability for each individual under various scenarios, we construct a tax calculator that mimics tax law parameters in 2012.<sup>9</sup> In scenarios where a tax incentive is removed, the associated deductions are zeroed out. For cases where the tax deduction is replaced with a non-refundable credit, taxpayers are assumed to continue to contribute the same observed amount of savings, but they now receive the applicable tax credit instead.

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<sup>8</sup> Another popular tax progressivity measure is the Kakwani index (see Kakwani 1977). In contrast to the Suits index which is based on the distributions of tax burden against pre-tax income, the Kakwani index compares the distributions of tax burden and pre-tax income against population. Providing that the distribution of pre-tax income is fixed, both Suits and Kakawani indices are consistent for measuring changes in tax concentration (see Formby et al. 1981).

<sup>9</sup> Most of the tax law parameters regarding the tax deductions for household saving and investment are still in effect in 2018. The only difference is in the required holding period for the LTF, which is now extended to 7 years.

**Figure 3.** Example of tax progressivity curve

**Notes:** This figure shows an illustrative example of the Suits index computation. The Suits index is defined as  $1 - A/(A+B)$ .

In the baseline analysis, we estimate the difference between the Suits index under the 2012 law and that under a counter-factual scenario without the benefit of the tax incentive. This allows us to understand the extent to which each tax incentive affects the overall tax progressivity. A negative difference in the Suits index implies that the tax incentive lowers the overall progressivity of the tax system, while a positive difference suggests that the tax incentive adds progressivity.

We also illustrate how the design of tax subsidies could affect progressivity by analyzing the extent to which using credits could influence the Suits index. In particular, we have investigated scenarios where the tax deductions are replaced with respective 15% non-refundable credits. This change equalizes the after-tax price of saving and potentially makes the tax subsidies less regressive. Since the choice of a 15% credit is arbitrary, we have performed sensitivity tests where the credit is doubled to 30%.

Our results should be interpreted with caution. First, it is possible that an individual may adjust his or her contributions in response to changes in the tax structure. The baseline analysis, however, does not take into account any behavioral response. Abstracting from such behavioral responses make the estimates here less sensitive to assumptions imposed on taxpayers and makes it possible to identify the salient effects of the tax structure on progressivity.

Nonetheless, we have illustrated the impacts of potential behavioral responses in one of the sensitivity analyses of the credit alternative. Specifically, the simulation allows taxpayers to change their savings in response to a change in the after-tax price of saving. The change in saving contributions is calculated by applying a tax-price elasticity to existing savings using the applicable change in the after-tax price of saving. That price was estimated by computing the marginal tax rate on saving for each taxpayer under each policy scenario and under the 2012 tax law. For example, under a scenario that would replace the LTF deduction with the 15% credit, a taxpayer in the 30% tax bracket would see his or her tax price of saving rise from 0.7 baht per baht of saving to 0.85 baht—a 21% increase. Since empirical evidence about the tax responsiveness of tax-preferred savings vehicles is inconclusive, we have computed the estimates using two elasticity values: -1.5 and -0.75. The elasticity assumption of -1.5 is consistent with the inferred tax-price elasticity of -1.4 from Chetty et al. (2014). We have also computed another scenario which halves the tax-price sensitivity to -0.75.

Second, it should be emphasized that the focus of this paper is on the progressivity impacts of tax subsidies on the personal income tax system rather than on the entire population. Given the small share of tax filers in the total labor force in Thailand (roughly 25%), the effects on the tax system are likely to be smaller than that on the entire population. Nonetheless, the progressivity impacts on the tax system are highly relevant since 1) the tax subsidies typically account for a large share of total tax expenditures associated with personal income taxes, and 2) the personal income tax system is a major tax instrument directly addressing inequality in developing countries.

#### **4. Findings and Discussions**

In this section, we present and discuss our findings on the progressivity impacts of the five tax deductions. Next, we show how providing the subsidies in the form of non-refundable tax credits would influence the tax progressivity. A series of sensitivity analyses are also discussed at the end of each subsection to illustrate the robustness of our findings.

## 4.1 Progressivity Impacts of the Tax Incentives

### 4.1.1 Findings

We first examine the overall progressivity effects of tax incentives for household saving and investment. Table 2 reports differences in the Suits indices between the 2012 law and a counter-factual scenario without the tax incentives. It also provides a 95% confidence interval for each of the differences. If a confidence interval does not contain zero, it suggests that the difference in the Suits indices is statistically different from zero.

**Table 2.** Baseline estimate - Impacts of the tax incentives on the progressivity

Tax Incentives	Differences in Suits indices	95% Bootstrapped Confidence Intervals	
		Lower Bound	Upper Bound
LTF	-0.0066	-0.0081	-0.0051
RMF	-0.0031	-0.0038	-0.0023
Provident funds	0.0039	0.0033	0.0135
Life insurance	0.0099	0.0092	0.0105
Mortgage interest	0.0052	0.0047	0.0057
All	0.0110	0.0082	0.0137
Suits index (2012 law) = 0.7636			

**Notes:** The impacts of tax incentives on the progressivity are computed as differences in the Suits indices between the 2012 law treatment and a counter-factual scenario without the tax incentive. Positive changes indicates higher progressivity. Confidence intervals are calculated from 400 bootstrap replications.

**Source:** Authors' estimate.

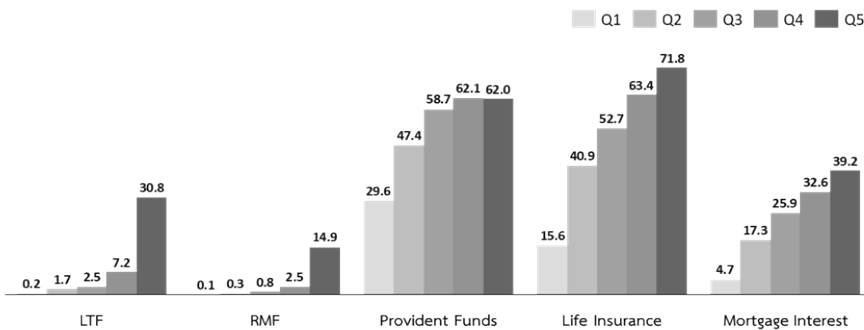
The findings indicate that together, all tax incentives significantly add progressivity to the tax system (Table 2). They increase the Suits index by 0.0110, and that increase is statistically significant. This suggests that the regressive effects associated with the deduction mechanism are outweighed by voluntary participation of middle- and low-income taxpayers and the design regarding capped contribution levels.

However, the distributional impacts of the five major tax incentives vary considerably. On one hand, the findings suggest that, as expected, the

LTF and RMF deductions lower the progressivity level. The LTF deduction significantly reduces the Suits index by 0.0066, while the RMF deduction’s impact on the Suits index is about half of the LTF’s impact. On the other hand, the deductions for life insurance, mortgage interest, and provident-fund contributions are associated with higher progressivity. The life insurance deduction significantly increases the Suits index by 0.0099. The impacts of deductions for mortgage interest and provident fund contributions on the Suits index are also significant but with smaller magnitudes (0.0052 and 0.0039, respectively). As discussed below, these progressivity effects are driven by patterns of self-selection into the tax-favored savings vehicles and, for life insurance and mortgage interest deductions, rules specifying capped contributions at a moderate level.

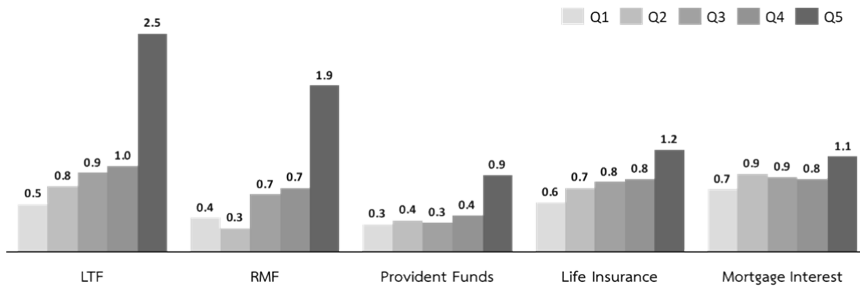
Consider first the patterns of self-selection into the five tax-favored savings vehicles (Figures 4 and 5). These patterns show how the tax deductions are utilized and how the associated tax subsidies accrue along the income distribution in 2012. The LTF and RMF deductions are heavily concentrated among high-income taxpayers (Figure 4). Over 30% of taxpayers in the top quintile take LTF deductions, while less than 10% of taxpayers in the bottom four quintiles have that deduction. The distribution of the RMF deductions gives a similar picture. This is in contrast to the other three deductions which are much less concentrated among the top quintile.

**Figure 4.** Percent of taxpayers with deductions by types of incentives and income quintiles



Source: Authors’ estimate.

**Figure 5.** Tax subsidy rates by types of incentives and income quintiles (% of income net of expense)



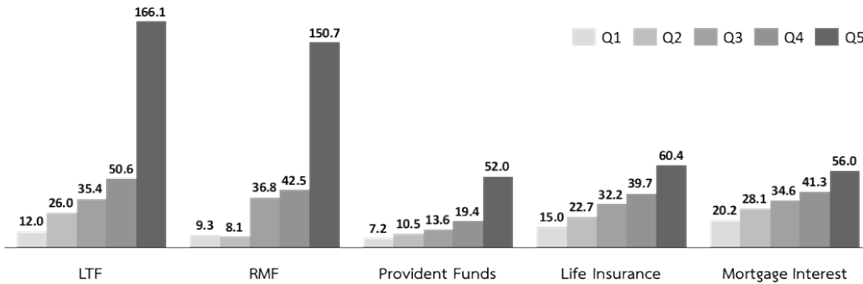
**Notes:** Tax subsidy rate is computed as the reduction in the tax liability when the incentive is removed divided by income net of expense.

**Source:** Authors' estimate

Among taxpayers with each type of tax deduction, there are also differences in the extent to which they benefit from the tax incentives. Figure 5 shows the distribution of tax subsidy rates by income quintiles. The subsidy rate is defined as the reduction in the tax liability when the incentive is given divided by gross income net of expenses. For LTF and RMF deductions, the subsidy rates are considerably higher for the top quintile. For the other three deductions, the subsidy rates are still relatively high for the top quintile, but they are more comparable to those associated with the lower quintiles.

The contribution caps are also likely to play an important role on the average contribution levels across the income distribution for each tax deduction. For life insurance and mortgage interest deductions where the contribution caps are set at 100,000 baht, there is relatively less difference in the mean contributions between the top quintile and the rest of the taxpayers. In contrast, for the other three deductions where the caps are considerably higher, the average contribution levels for those in the top quintile are more than twice the average levels in the lower quintiles. Such disparity is even more evident for the LTF and RMF deductions, which high-income taxpayers utilize disproportionately. Together with the self-selection patterns, this supports our findings about the differing progressivity impacts among the five tax subsidies.

**Figure 6.** Average contribution amounts by types of incentives and income quintiles (Thousand baht)



**Notes:** The average is conditional on having the tax deduction.

**Source:** Authors' estimate.

To get a sense of the size of the distributional impacts discussed here, consider a scenario where the top tax bracket of 35% is eliminated so that the top tax rate becomes 30%. In this case, the Suits index declines by 0.0070 (Table 3). If all tax brackets are raised by 1 percentage point, the Suits index increases by 0.0087. Both changes are statistically significant. This suggests that the distributional impacts of these tax incentives are economically quite significant, especially that of the LTF and life insurance deductions.

**Table 3.** Illustrative impacts of selected changes in the tax structure on the progressivity

Reference tax scenarios	Differences in Suits indices	95% Bootstrapped Confidence Intervals	
		Lower Bound	Upper Bound
Eliminating top tax bracket	-0.0070	-0.0085	-0.0056
Increasing all tax brackets by 1 percentage point	0.0087	0.0082	0.0092

**Notes:** The impacts of tax incentives on the progressivity are computed as differences in the Suits indices between the counter-factual scenario and the 2012 law treatment. Positive change indicates higher progressivity. Confidence intervals are calculated from 400 bootstrap replications.

**Source:** Authors' estimate.



#### 4.1.2 Sensitivity Analyses

We perform two sensitivity tests to study the robustness of the baseline results. First, we expand the computation to take into account not only taxpayers but also tax filers with no tax liability. Removing the tax deductions could impose tax liability for some filers who do not pay any tax under the 2012 law. The results are provided in Panel A of Table 4. We find that the direction of the progressivity impacts is consistent with the baseline estimates—the LTF and RMF deductions lower progressivity, while the other three deductions enhance progressivity. The magnitudes of the effects differ as expected because the computation now includes considerably more tax filers at the bottom of the income distribution.

Next, the baseline computation is based on income net of expenses. However, the expenses are defined by the tax law and may not reflect the true expenses of the taxpayers. Here we perform the robustness test by using gross income instead. As illustrated in Panel B of Table 4, the findings in terms of both direction and magnitude are consistent with the baseline estimates.

**Table 4.** Sensitivity analyses - Impacts of the tax incentives on the progressivity

Tax Incentives	Differences in Suits indices	95% Bootstrapped Confidence Intervals	
		Lower Bound	Upper Bound
A: Including all tax filers			
LTF	-0.0022	-0.0027	-0.0018
RMF	-0.0010	-0.0013	-0.0008
Provident funds	0.0015	0.0013	0.0017
Life insurance	0.0041	0.0039	0.0043
Mortgage interest	0.0023	0.0021	0.0025
All	0.0044	0.0035	0.0052
B: Using gross income			
LTF	-0.0064	-0.0080	-0.0047
RMF	-0.0032	-0.0041	-0.0024

Provident funds	0.0058	0.0051	0.0065
Life insurance	0.0122	0.0115	0.0129
Mortgage interest	0.0067	0.0062	0.0073
All	0.0133	0.0102	0.0164

**Notes:** The impacts of tax incentives on the progressivity are computed as differences in the Suits indices between the 2012 law treatment and a counter-factual scenario without the tax incentive. Positive change indicates higher progressivity. Confidence intervals are calculated from 400 bootstrap replications.

**Source:** Authors' estimate.

## 4.2 Providing Tax Subsidies in the Form of Credits

### 4.2.1 Findings

In this subsection, we analyze how altering the way incentives are given could affect the distributional effects. Specifically, each deduction is replaced with a 15% non-refundable credit. Table 5 reports changes in the Suits indices between scenarios where the incentive is given as a 15% credit and the scenario without the tax incentive. The change in the Suits indices can thus be interpreted as the progressivity impact of the tax credit. Positive (negative) differences indicate that the 15% credit increases (lowers) the progressivity degree.

**Table 5.** Baseline estimate - Impacts of the tax credits on the progressivity

Tax Incentives	Differences in Suits indices	95% Bootstrapped Confidence Intervals	
		Lower Bound	Upper Bound
LTF	-0.0024	-0.0031	-0.0051
RMF	-0.0014	-0.0018	-0.0010
Provident funds	0.0088	0.0083	0.0092
Life insurance	0.0174	0.0164	0.0183
Mortgage interest	0.0090	0.0083	0.0096
All	0.0288	0.0273	0.0303

**Notes:** The impacts of tax incentives on the progressivity are computed as differences in the Suits indices between the credit scenario and a counter-factual scenario without the tax incentive. Positive change indicates higher progressivity. Confidence intervals are calculated from 400 bootstrap replications.

**Source:** Authors' estimate.

The findings indicate that giving the tax subsidies in the form of a 15% credit would enhance progressivity relative to the deduction treatment in the 2012 law. Overall, the 15% credit would increase the Suits index by 0.0288—such an increase is larger than that with the deduction treatment shown in Table 2 (0.0110). Moreover, for the LTF and RMF deductions, the 15% credit would lessen the regressivity impact associated with the deduction method under the 2012 law. In particular, the 15% LTF credit would decrease the Suits index by 0.0024—such regressivity impact is much smaller than that with the deduction (-0.0066). In turn, the 15% life insurance credit would raise the Suits index by 0.0174—noticeably larger than that with the deduction (0.0099).

#### *4.2.2 Sensitivity Analyses*

We perform a series of sensitivity analyses to illustrate the impacts of different sizes of credits as well as potential behavioral responses.<sup>10</sup> First, we study the impact of a 30% credit (Panel A of Table 6). For the LTF and RMF, where utilization is concentrated among high-income taxpayers, the 30% credit treatment would increase regressivity relative to the 15% credit treatment. Such effects are reversed for the subsidies that significantly benefit middle- and low-income taxpayers such as life insurance, mortgage interest, and provident funds.

We further illustrate how incorporating sensitivity to after-tax prices would impact our findings on the credit treatment (Panels B and C of Table 6). Our findings indicate that incorporating price sensitivity would generally increase the progressivity impact relative to the scenario without a behavioral response. This is because, for low-income taxpayers, the 15% credit would reduce the after-tax price of saving and, thus, increase the subsidy. High-income taxpayers, on the other hand, would see declines in their subsidies. For example, under the scenario with the tax-price elasticity of -1.5, giving all of the tax subsidies in the form of 15% credit would increase the Suits index by 0.0339—noticeably higher than that without the behavioral response (0.0288). We also find that assuming a larger behavioral response would increase the progressivity effects associated with the credit approach.

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<sup>10</sup> Analogous to the impacts of tax deductions discussed earlier, we also perform sensitivity tests by including all tax filers and using gross income. The findings are consistent with our baseline estimates and are shown in the appendix (Table A1).

**Table 6.** Impacts of the tax credits on the progressivity – Sensitivity analyses

Tax Incentives	Differences in Suits indices	95% Bootstrapped Confidence Intervals	
		Lower Bound	Upper Bound
A: 30% Credit			
LTF	-0.0053	-0.0068	-0.0037
RMF	-0.0030	-0.0038	-0.0021
Provident funds	0.0170	0.0161	0.0179
Life insurance	0.0302	0.0286	0.0317
Mortgage interest	0.0149	0.0139	0.0159
All	0.0496	0.0470	0.0522
B: 15% Credit with tax-price elasticity of -1.5			
LTF	-0.0011	-0.0017	-0.0005
RMF	-0.0009	-0.0012	-0.0005
Provident funds	0.0101	0.0096	0.0106
Life insurance	0.0192	0.0181	0.0203
Mortgage interest	0.0099	0.0091	0.0106
All	0.0339	0.0324	0.0354
C: 15% Credit with tax-price elasticity of -0.75			
LTF	-0.0018	-0.0024	-0.0011
RMF	-0.0011	-0.0015	-0.0008
Provident funds	0.0094	0.0090	0.0099
Life insurance	0.0183	0.0173	0.0193
Mortgage interest	0.0094	0.0087	0.0101
All	0.0314	0.0299	0.0329

**Notes:** The impacts of tax incentives on the progressivity are computed as differences in the Suits indices between the credit scenario and a counter-factual scenario without the tax incentive. Positive change indicates higher progressivity. Confidence intervals are calculated from 400 bootstrap replications.

**Source:** Authors' estimate.

## 5. Conclusion

Understanding the progressivity implications of tax subsidies for household saving and investment is key to building an equitable personal income tax system. Our findings underline that policymakers should pay serious attention to the design of tax incentives as well as the propensity of households to save or invest in different classes of assets. As expected, the tax deductions that are heavily concentrated among high-income taxpayers make the tax system significantly more regressive. However, the regressive effects associated with deductions are reversed for tax deductions in which middle- and low-income taxpayers utilize heavily and which have a moderate contribution limit. We also highlight a non-refundable credit method as an opportunity to enhance equity in the design of tax subsidies, while still continuing to provide incentives for saving and investment.

It is natural to ask whether these findings and policy implications will be applicable to other developing Asian economies beyond Thailand. While there is no substitute for directly analyzing tax return data for the country of interest, we are confident that the lessons from the Thai tax return data can be generalized and are helpful for other developing countries for at least two reasons. First, many developing countries have provided tax subsidies for saving and investment in their personal income tax system. Second, and more importantly, some countries including India, Indonesia, Malaysia, and the Philippines have introduced such subsidies in the form of tax deductions. Given that their subsidies share key characteristics with that of Thailand, we expect the policy implications here to be useful in those countries.

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## Appendix

**Table A1.** Sensitivity analyses - Impacts of the tax credits on the progressivity

Tax Incentives	Differences in Suits indices	95% Bootstrapped Confidence Intervals	
		Lower Bound	Upper Bound
<b>A: Including all tax filers</b>			
<b>LTF</b>	-0.0008	-0.0011	-0.0006
<b>RMF</b>	-0.0005	-0.0006	-0.0003
<b>Provident funds</b>	0.0031	0.0030	0.0033
<b>Life insurance</b>	0.0067	0.0063	0.0070
<b>Mortgage interest</b>	0.0036	0.0034	0.0039

<b>All</b>	0.0115	0.0109	0.0120
<b>B: Gross income</b>			
<b>LTF</b>	-0.0019	-0.0028	-0.0011
<b>RMF</b>	-0.0014	-0.0019	-0.0009
<b>Provident funds</b>	0.0109	0.0104	0.0115
<b>Life insurance</b>	0.0195	0.0184	0.0205
<b>Mortgage interest</b>	0.0104	0.0096	0.0111
<b>All</b>	0.0340	0.0323	0.0358

**Source:** Authors' estimate

**Notes:** The impacts of tax incentives on the progressivity are computed as differences in the Suits indices between the credit scenario and a counter-factual scenario without the tax incentive. Positive change indicates higher progressivity. Confidence intervals are calculated from 400 bootstrap replications.