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Individual Income Tax in Indonesia: Behavioral Response, Incidence, and the Distribution of Income Tax Burden

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INDIVIDUAL INCOME TAX IN INDONESIA:
BEHAVIORAL RESPONSE, INCIDENCE, AND THE DISTRIBUTION
OF INCOME TAX BURDEN

BY

THALYTA ERNANDYA YUWONO

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree
of
Doctor of Philosophy
in the
Andrew Young School of Policy Studies
of
Georgia State University

GEORGIA STATE UNIVERSITY
2008

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ACCEPTANCE

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics in the Andrew Young School of Policy Studies of Georgia State University.

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ABSTRACT

INDIVIDUAL INCOME TAX IN INDONESIA: BEHAVIORAL RESPONSE, INCIDENCE, AND THE DISTRIBUTION OF INCOME TAX BURDEN

By

THALYTA ERNANDYA YUWONO

December, 2008

Committee Chair: Dr. Sally Wallace

Major Department: Economics

This dissertation estimates the relationship between tax-reporting decision and the change in marginal tax rates, relying on taxpayer's responses (standard labor supply response) as well as reported behavioral responses (compliance). There are still limited studies on elasticity estimates for developing countries. We utilize an applicable theoretical model by using standard labor supply model and summarize a tax avoidance model as the base of our elasticity estimation. The labor supply theoretical model suggests ambiguity of the labor supply decision and the tax avoidance model suggest that the responsiveness of taxpayers in the reporting decision differs across income groups. As previously stated, in developing countries, empirical evidence on reporting decision is still very limited. For our empirical analysis, we estimate reporting income elasticity for microsimulation purposes. We use this elasticity to estimate a dynamic behavior microsimulation model. The elasticity result shows that higher-income groups are more responsive and lower-income groups are less responsive to changes in tax policy.

Our empirical analysis continues with estimating differences in taxpayers' responses to the change in tax policy. We use a modified difference-in-difference model to analyze behavioral responses of taxpayers that are highly affected by the change in marginal tax rate compared to those who are least affected. The result shows that the treatment group, who experienced larger reductions on their marginal tax rate, reported more of their income relative to the control group, whose members are least affected by the change in marginal tax rate.

The last part of our empirical analysis examines the distribution of income tax burden across different income groups and examines the government's tax collection from withholding income from some proposed scenarios. We proposed several scenarios and estimated the change in income tax burden compared to that under current income tax law. We also examine the government's revenue loss by calculating the tax differences under current and proposed scenarios. The overall microsimulation results suggest that there is a trade-off between government revenue loss and the distribution of income tax burden.

CHAPTER I

INTRODUCTION

Income tax plays an important role in government tax revenue in Indonesia, contributing the largest share to total government revenue, as compared to other taxes.¹ Revenue from income tax includes individual income tax revenue and corporate income tax revenue. The total government revenue from income tax in 2006 was IDR 165.6 trillion (\$18.4 billion), which accounted for 52.6 percent of the total government revenue from tax. In this dissertation, we will analyze individual income tax from withholding income. Revenue from Individual Income Tax Article 21 (the withholding income tax) in 2006 was the second largest amount of revenue, accounting for 18.5 percent of total income tax revenue.²

Income tax in Indonesia has always been under the authority of central government. However, the sharing arrangement between central and sub-national government has changed based on law 33/2004, and now sub-national governments are entitled to 20 percent of income tax revenue. The central government determined both the tax base and tax rates for individual and corporate income tax. To make any changes in the income tax rate, income tax reforms are necessary; however, any changes on personal exemptions can be made by government decree. Personal exemptions have changed several times since 2000.

This dissertation explores behavioral responses to the distribution of income tax burden under current law and under some proposed scenarios for individual income tax in Indonesia. We use the basic labor supply choice model to show the ambiguous choice of hours worked when tax

¹ See Appendix A, Table A1.

² See Appendix A, Table A2.

rates change. Data limitation prevents estimation of a true labor supply response. However, we do have data on reported wage income. Changes in reported income as tax rates change will be a function of labor supply effects and reporting (compliance) behavior. We use a unique individual micro-level dataset of income tax returns to empirically analyze the effect of current and proposed tax rates. We analyze the effect of change in taxable income with respect to the change in marginal tax rates by using several different methods.

Using micro-level data on taxpayers from the Indonesian Directorate General of Taxation (DGT), the first empirical part of this dissertation uses a difference-in-difference (DID) model to show the behavioral response of taxpayers most affected by the change in tax rate relative to taxpayers that are least affected. We calculate the taxable income elasticities from the change in taxable income with respect to the change on marginal tax rate. The elasticity results are useful to analyze dynamic policy simulation using a microsimulation model utilized for this dissertation. We use the microsimulation model for analyzing income tax liability under current and proposed law, the distribution of income tax burden across income groups, and the tax differences under each proposed scenario. As an addition to the basic labor/leisure choice model, we also present a summary of tax avoidance models by Alm and Wallace (2007a) that describe the theoretical model of taxpayer reporting decisions subject to a change in marginal tax rate.

Background

This dissertation provides a theoretical framework for the bases of the empirical analysis. The microsimulation presented in this dissertation extends the static model of microsimulation into a more dynamic behavior model that includes income behavioral responses of taxpayers after the change in marginal tax rate in 2000. The microsimulation process in this dissertation is

what we might call a “dynamic behavior” microsimulation.³ We do not have a panel dataset to generate a dynamic microsimulation of the same individual over time.

Previous studies on individual income tax reform, the distribution of income tax burden, and the behavioral response of taxpayers have used micro-level data from the taxpayer office and/or the IRS.⁴ The main empirical analysis in this dissertation is to develop a dynamic income behavior microsimulation that provides policy simulations of income tax reforms. The literature on microsimulations for developing countries is still very limited. Previous studies utilizing microsimulation models have been done for several countries, such as Russia (McNab and Wallace 2000), Czech Republic (Vecernik and Stepankova 2002), Spain (Granell-Perez et al. 2006), and Jamaica (Alm and Wallace 2007). We believe that there is still limited analysis on the individual income tax in Indonesia; the current empirical analysis attempts to fill the gap left by previous studies.

Motivation

The modern tax provision in Indonesia started in 1983. This period is the post-1983 reform period where tax laws are amended and adjusted with current economic conditions. Income tax has been simplified, and the rate has been decreased in order to encourage people to comply with income-tax reporting rules. In the meantime, the tax authorities are discussing several options for the next income tax reform. The income tax law includes individual income tax and corporate income tax, both of which utilize a progressive marginal tax rate. There is a possibility that the corporate income tax will become a flat rate in the near future, but individual

³ A fully dynamic model would accommodate changes in the overall level of income, employment, etc. as a result of the tax change.

⁴ See Chapter II for a detailed literature review.

income tax continues to be debated. Policy-makers are debating several options of reform, such as whether individual income tax should also be flat with a large level of personal exemption, or whether the current progressive marginal tax rate should be changed to a flat rate with an increased amount of possible personal exemptions.

Based on the central government's plan to reform individual income tax law in the near future, this dissertation examines income behavioral response under the current tax law, analyzes the distribution of income tax burden, and proposes several options of reform for the individual income tax.

The objectives of this study are: (i) to estimate the relationship between reporting decision and the change in marginal tax rate, relying on taxpayer response through the standard labor supply response as well as a reporting behavioral response (compliance—we discover that there are still limited studies on elasticity estimates for developing countries); (ii) to analyze behavioral responses of taxpayers that are highly affected by the change in marginal tax rate relative to taxpayers that are least affected; and (iii) to examine the distribution of income tax burden across different income groups and examine the government's tax-collection from individual income withholdings.

Overview of the Dissertation

The remainder of this dissertation is organized as follows: Chapter II provides a brief review of income tax policy in Indonesia, literature review on behavioral response, and literature review on microsimulation modeling. In Chapter III we provide a simple theoretical model of labor/leisure choice, with the imposition of income tax into the model and a theoretical motivation for reporting behavior changes, as well as a basic structure of microsimulation

modeling. Chapter IV provides the empirical analysis, including variable description and data sources, and the empirical methodology. In Chapter V we present the empirical results on behavioral response followed by results on microsimulation. Chapter VI offers a conclusion and policy recommendation.

CHAPTER II

LITERATURE REVIEW

The Haig-Simons definition of income is net increase in individual's ability to consume plus additional wealth from any sources. Some economists view this as an optimal definition of income for tax purposes. Others consider it overly broad because all sources of income are included under individual income. For example, there is no separation between realized and unrealized capital gains: income in kind and imputed rent are also considered income according to the Haig-Simons measure. Some of the problems arising out of this definition of income include difficulties in measuring capital gains and losses, in-kind services, and imputed income from durable goods (Rosen 2002).

The definition of taxable income in Indonesia's current income tax law is any additional income received by the taxpayer, either domestic or international, that can be used to consume goods or as additional to the taxpayer's wealth, including salary, wage, honoraria, bonuses, commissions, gratuities, pensions, and business profits. Under Article 21 of the individual income tax law, incomes are globally taxed with a progressive tax rate. Under Article 23, the definition of profit includes interest, dividends, royalties, rent, insurance premiums, income from routine payments, profits from the difference in currency exchange, and additional net wealth from income before taxes. Profits are taxed at a constant marginal tax rate of 15 percent. Capital gains are taxed at the same progressive rate for individual and corporate income tax and are taxed on realized value. There is no difference in rates for short- and long-term capital gains.

In this chapter, we provide background on the individual income tax in Indonesia and a literature review of some findings from previous studies on behavioral responses to tax changes

as well as studies on micro simulations across countries. In the first section, we present a brief review of the Indonesian income tax policy. The second part of this chapter presents a literature review on income tax and the behavioral response of taxpayers to the change in tax rate. The next part of this chapter highlights microsimulation analysis across countries, followed by a conclusion.

Income Tax Policy in Indonesia

Regulated by Law No. 17/2000 as the third amendment to Law No. 7/1983, individual income tax is still highly centralized. The central government has full authority to determine the tax base and tax rate. Indonesia's tax system started with an officer assessment system that required tax officers to collect income tax. The modern tax system started in 1983 with the adoption of a self-assessment system, which requires taxpayers to fulfill their tax obligations and submit tax returns by the end of each tax year.

Sidik (2007) argued that under the current income tax Law No. 17/2000, self-assessment is still maintained as in the former income tax law no 7/1983. Individual taxpayers file their own taxes annually except for business owners and independent professionals, in which cases they file monthly tax returns. A withholding tax is applied by a third party, such as an employer or pension fund, to income sources such as wages and salary, honoraria, pensions, dividends, interest, royalties, gifts, rent, and income from Stock Exchange transactions. The withholding tax is collected, reported, and paid by the third party that provides the income. Taxpayers are obliged to submit their yearly tax reports at most three months after the end of the tax year.⁵

⁵ The due date for submitting tax returns is March 31. The tax year runs from January through December. The main income tax return form is SPT 1770S, submitted yearly; an attachment includes a form 1721A1 or 1721A2 for employers, which we will use as our data source for the empirical estimation in this dissertation.

The tax collection process is managed by an institution designed by the central government under the Ministry of Finance: the Directorate General of Taxation (DGT). Under the DGT, subordinate organizations responsible for collecting taxes are the Taxpayer Office (KPP) and the District Tax Office. The function of KPP is mainly to provide taxpayers with services and guides to facilitate submitting their tax returns. Other functions of the KPP include administration, collection, and legal issues. Taxpayers submit their tax returns to the KPP office. The KPP for Jakarta is available in every sub-district, while in other provinces the KPP is available in every district. Since 2001 the DGT has been running a campaign on tax awareness and has been enforcing the requirement that each taxpayer have a tax identification number.

Low compliance and poor administration of the individual income tax have been a continuing problem in Indonesia. Low compliance was suspected as the cause of high marginal tax rates and low personal exemptions (Directorate General of Taxation 2007). Table A3 in the appendix shows several adjustments to the personal exemptions from 1983 through 2006. The purpose of these changes is to reduce the income tax burden of lower-income groups. Changes in personal exemptions do not necessarily mean that a change has been made in the income tax law, which can be done by government regulation, a decree by the Ministry of Finance, or an amendment. Under current law, there is an additional exemption for married women filing jointly. Married couples with a maximum of three dependents can take additional exemptions. Dependents can be children or anyone related by blood, adoption, or marriage and who lives with the taxpayer. The same dependents can be claimed only once per taxpayer. If a husband has already claimed additional exemptions for being married and having dependents, his spouse can exempt only herself. There is also a deductible amount for pension and occupation expenses in the amount of 5 percent, which is deducted from the gross income and calculated from the total

time of employment in the related year, with a maximum amount of IDR 1,296,000 (\$144) (Directorate General of Taxation 2007).

As shown in Table 1, individual income tax rates are divided into five income tax brackets per income tax law no. 17/2000, implemented in 2001. Under income tax law no. 7/1983, there were only three income tax brackets, ranging from 15 percent for taxable income up to IDR 10 million (\$1,111) to the highest of 35 percent for taxable income higher than IDR 50 million (\$5,556). In 1994 there was an amendment to the income tax law, and in January 1995 the marginal tax rates changed and now range from 10 percent for taxable income up to IDR 25 million (\$2,778) to 30 percent for taxable income higher than IDR 50 million (\$5,556). The marginal tax rates for individual income taxes range from 5 percent for people with taxable income up to IDR 25 million (\$2,778) to 35 percent for people with taxable income above IDR 200 million (\$22,222).⁶

Table 1. Statutory Marginal Tax Rate by Income Group, 1983–2000

Income tax law No. 8/1983		Income tax law No. 10/1994		Income tax law No. 17/2000	
Income group	MTR	Income group	MTR	Income group	MTR
<=IDR 10,000,000 (\$2,111)	15%	<=IDR 25,000,000 (\$2,778)	10%	<=IDR 25,000,000 (\$2,778)	5%
>IDR 10,000,000 (\$1,111) and <=IDR 50,000 (\$5,556)	25%	>IDR 25,000 (\$2,778) and <=IDR 50,000 (\$5,556)	15%	>IDR 25,000 (\$2,778) and <=IDR 50,000 (\$5,556)	10%
>IDR 50,000 (\$5,555.56)	35%	>IDR 50,000 (\$5,556)	30%	>IDR 50,000 (\$5,556) and <=IDR 100,000,000 (\$11,111)	15%
				>IDR 100,000,000 (\$11,111) and <= IDR 200,000,000 (\$22,222)	25%
				>IDR 200,000,000 (\$22,222)	35%

Source: Rusjdi, 2006

Note: \$1=IDR 9,000

⁶ The exchange rate that we use in this dissertation is \$1=IDR 9,000.

Table 1 compares the statutory marginal tax rate (MTR) imposed on individual income in nominal terms under previous and current law. The current income tax law introduces a more progressive tax rate for individual income tax than the previous law. The lowest income group is taxed at a lower rate than under the former law, while the highest income bracket is charged at a relatively higher rate. The big disparity between the lowest and the highest tax brackets could create an incentive for higher-income earners to try to shift income or otherwise avoid the income tax.

The penalty rate for failing to file taxes or for filing incorrectly is two percent interest per month of the unpaid tax calculated from the due date of the tax return. The tax year in Indonesia is the same as the calendar year which ends on December. Indonesia adopted a schedular system in which unearned income, including dividends, interest, rent, and savings, is taxed at a different rate than earned income (15 percent for residents and 20 percent for non-residents).

There have been many changes in the income tax law since the big tax reform of 1983. The post-1983 reform created a simpler tax structure than that of the ordinance period or period before 1983 reform. Before 1983, income taxes were divided into four different types: corporate tax, individual income tax, wealth tax, and a tax on interest, dividends, and royalties; after 1983, those four types of taxes became regulated under one law, the income tax law. The current income tax law No.17/2000 is the third amendment of tax law No.7/1983. The main purpose of income tax reform in Indonesia is to increase government revenue, while additional purposes include simplification and fairness (Directorate General of Taxation 2007).

For residents of Indonesia, tax liability is based on both domestic and foreign income. The definition of "resident" under current tax law is any individual who lives in Indonesia or stays in Indonesia for at least 183 days within 12 months, or who has been in Indonesia for the

whole tax period with the intention of residing there. Non-residents who are subject to taxation are individuals who are not residing in the country and are staying for fewer than 183 days within 12 months and who have businesses based in Indonesia from which they derive income. Other income sources from abroad are not subject to income tax for non-residents.

Individual income subject to taxation is defined under tax law no. 17/2000 as wages, salary, honoraria, pension payments, allowances, insurance premiums, benefits in kind, bonuses, and income from business, independent professions, and professional services. Other sources of earned income are interest, discounts, insurance and other dividends, surplus of cooperation, royalties, lottery winnings, and gains on foreign currency exchange and the sale of property. Capital gains are taxed and regulated under corporate income tax laws.

In Indonesia, each taxpayer has a tax identification number (NPWP). Table A4 shows that, the number of taxpayers with taxpayer IDs increased over time, for both individual and corporate taxpayers. The total number of individual taxpayers with tax ID numbers in 2004 was 2,622,184, while the total number of individual and corporate taxpayers with tax IDs was 3,670,060. Each tax year, the tax authorities' goal is to encourage more taxpayers to get tax IDs and submit their annual tax returns.

Behavioral Response Literature

Recent Literatures on Behavioral Response

Theoretical studies on income taxes, labor supply, and wages offer ambiguous conclusions about taxpayers' behavioral responses to tax reform. Income tax reform in Indonesia changes the statutory marginal tax rate (MTR) of individual income tax to be more progressive under the current law, thus increasing the tax rate for the highest income group and decreasing it

for others. By estimating these responses and using them to make one policy analysis more dynamic, we are better able to determine the distributional implications of changes in the individual income tax laws in Indonesia. These changes in income tax law provide a “natural experiment” opportunity to analyze behavioral responses to income tax changes. Changes in the marginal tax rate and several changes in personal exemptions affect the decisions of taxpayers either to comply with, evade, or avoid income tax laws. The empirical literature on income tax reform and the behavioral response of taxpayers shows different results depending on the estimation method, tax system, and type of data used. The elasticity of reported taxable income with respect to the change in statutory marginal tax rate shows the behavioral response of taxpayers following such a change, which in turn affects the government's income tax revenues following the reform. However, this behavioral response comes from reporting behavior (compliance) and labor supply changes in addition to the variables in response due to estimation method and tax system.

Few studies have been done on tax reform behavioral responses in developing countries. Rochjadi and Leuthold (1994) estimated the effect of a change in marginal tax rate on labor supply responses in Indonesia using cross-sectional data. They estimated the compensated and uncompensated labor supply elasticity for various groups of labor across provinces for 1982. They used the labor/leisure choice model as the basis of their analysis, derived the labor supply elasticity from the basic model, and empirically calculated labor supply elasticity. Some demographic characteristics included in their estimation were age, gender, education, region of residence, and number of dependents. Using the National Socio-Economic Survey data for 1982 from the Central Bureau of Statistics—350,000 individuals across provinces—they concluded that the labor supply elasticity in Indonesia was relatively small, with a range of -0.2 to -0.6 for

uncompensated elasticities and 0.33 to 0.58 for compensated elasticities. As in other literature on labor supply elasticities, Rochjadi and Leuthold's results showed that male labor was less elastic than female labor. They also concluded that the elasticity they found in their study was comparable to labor supply elasticities estimated in developed countries.

Tax changes may affect labor supply directly and therefore affect the level of reported income. The impact of individual income tax rates on labor supply has been an empirical topic in many previous studies that attempt to effectively estimate the incidence of a tax on labor.

Eissa (1995) estimated responsiveness of married women by analyzing labor supply changes following the Tax Reform Act of 1986 (TRA86). She estimated the elasticity of labor supply for married women with respect to the after-tax wage for high income. She used a basic difference-in-difference econometric method to analyze married women in the top percentile since she argued that women in this group would be more affected by the reform. The control group (married women in the 90th percentile of income) was women less affected by the reform, while the treatment group was the income group with the largest change in their tax rate (married women in the 75th percentile). Eissa used Current Population Survey (CPS) data from 1984 through 1986 and from 1990 through 1992 to estimate the impact of tax reform. Her results showed that the number of hours worked for high-income married women increased 90 hours per year after the reform where their marginal tax rate had decreased. She concluded that participation is to some extent more sensitive to changes in the tax rate than the number of hours worked. She also suggested that total elasticity is captured mostly by labor force participation; labor supply responsiveness to changes in income tax rates varies among different income groups and different demographics. She concluded that the incidence of labor tax on married women is not fully borne by labor.

Previous studies on the taxpayer behavioral response to the change in MTR have been done in several countries using different types of datasets and different types of estimation methods. Lindsey (1987) analyzed taxpayer responsiveness to the 1981 tax rate cut using as a baseline a cross-section for all income groups in 1979. He used the National Bureau of Economic Research (NBER)-TAXSIM calculator to simulate the base year and to compare the predicted simulation result to the actual level of revenue from 1980 through 1984. He estimated the elasticity of reporting response using a percentage change in reported taxable income with respect to percentage change in after-tax share, and the result showed a wide range in elasticity, from 1.6 to 1.8. In Lindsey's analysis, we are not able to say with certainty that the change in reporting was due to changes in compliance behavior or labor supply.

Another early study on income responsiveness to the change in MTR in the United States was conducted by Feldstein (1995). His study analyzed the behavioral response of the same individuals to the change in MTR before and after TRA 1986. He used a panel dataset from the tax return data produced by the IRS for all income groups from 1985 through 1988. His study was also an early study of behavioral response using a DID method. Using different datasets and based on different tax reform acts, Feldstein's results were similar to Lindsey's (1987). Feldstein also found a large amount of elasticity following TRA 1986 for all income groups, ranging from 1.04 to 3.05. From these results, he concluded that, since taxpayers are highly responsive to the change in MTR, the next tax rate changes in 1993 were unlikely to increase the income tax revenue even for a significant increase in the tax rate.

Long (1999) uncovered behavioral responses using reported taxpayer data from the Internal Revenue Service (IRS) in 1991. Different from other studies on behavioral responses, Long's study used cross-sectional data for reported taxable income in 1991. Using a different

dataset, he still found a negative relationship between taxable income and the MTR. He estimated the elasticity of taxable income with respect to MTR and net-of-tax rate using the mean value in each income group. His elasticities were smaller than those presented by Feldstein (1995). Long found an elasticity of -0.4 for the income group above \$150,000 and concluded that a low elasticity for a high-income group implies that any reduction on the tax base would generate less revenue gain from this group.

In the recent literature on behavioral responses to tax reform, the “natural experiment,” or difference-in-difference (DID), method has become the most popular. There have been debates whether this is a good estimation for behavioral response, since the main assumption of DID is that, without any changes in the tax rate, all taxpayers would have been in the same situation. All other external factors beyond the tax reform are assumed to have the same impact on all income groups. Other debates on this method are whether it would work for the highest income groups and whether using tax return data for this method would give accurate information for the estimation.

Behavioral response following the change in MTR is measured primarily using panel data. Thoresen and Aarbu (1999) conducted a study on income responsiveness to the change in MTR in Norway. Using panel data from 1991 through 1994 of 2000 individuals, they used the DID model to estimate the elasticity of individuals in the high-income groups who experienced larger changes in their MTR relative to those in lower-income groups who experienced smaller changes in their MTR after the reform took place in January 1992. Applying two different regression methods to correct for endogeneity, 2SLS and synthetic tax rate approach, their results showed elasticities ranging from -0.2 to 0.14. These elasticities are very small, but the researchers concluded that these numbers are still meaningful and not to be ignored by policy

makers in conducting tax reform. Thoresen and Aarbu's overall results showed that income response to the change in MTR is very small in Norway. Finally, they concluded that a flat tax rate for Norway would not encourage higher-income groups to earn more and that this should be considered by policy makers when changing tax rates.

Responses by high-income groups have also been the focus of tax reform studies in recent literature. Goolsbee estimated income responses to the change in MTR among corporate executives categorized as high-income earners (2000) and Goolsbee estimated behavioral responses of high-income and median-income earners (2000a). In both papers he used panel data from 1991 through 1995 for thousands of top executives in the United States. Using natural experiments, he estimated behavioral responses for top corporate executives and for other top-income groups.

Goolsbee (2000) found that the elasticity between income and net-of-tax rate shows a number above 1, which means that in the short run the high-income group is very responsive to the change in MTR. The short-run elasticity is 1.3 for top corporate executives with stock options. In the long run, the elasticities range from zero to 0.4 for top executives, excluding temporary income components from the income variable. Goolsbee (2000a) concluded that previous literature in behavioral response among high-income groups had some measurement errors because of false assumptions about higher-income earners. He provided three possible problems for using high income as a control group in the DID estimation.⁴

In the same year, Alm and Wallace (2000) also analyzed behavioral response by the very rich in the United States using a pooled cross-section micro level dataset from the Individual Tax Model Files (ITMF). To estimate the responsiveness of the very rich in terms of the change in MTR, they also used a natural experiment assuming that some income groups experienced very

large changes in MTR, while others were less affected. They used different types of income to test the behavioral response among the rich and between the rich and lower-income groups.

Using a difference-in-difference econometrics model and the net-of-tax rate, they found that the rich are more responsive to the change in MTR relative to lower-income groups. This result is different from Thoresen and Aarbu's (1999). One possibility is that different tax systems in the United State and in Norway, where they have dual income tax rates, makes the result slightly different.

Another recent study using natural experiment and panel data was a longitudinal study conducted by Hansson (2004) to test the effect of the change in MTR in Sweden in 1990–1991. The model used growth of taxable income as the dependent variable and net-of-tax rate in addition to some individual characteristics such as age, marital status, education, and location as independent variables. He used two different approaches—two-stage least square regression and a DID model—to estimate taxable income elasticity relative to the change in MTR and compared 1989 (the year before the tax reform) to 1992 (the year following the reform period). He found the elasticity of taxable income relative to the change in MTR in Sweden to range from 0.4 to 0.5. Individual characteristics showed that college students were more responsive than people with less education, women were more responsive than men, and younger people were more responsive than older people.

Further empirical studies of behavioral responses to tax reform in the United States using a panel data approach have been done by Saez (2004) and Kopczuk (2004). Both estimated taxpayer responses to the changes in MTR and used a broader definition of income than the taxable income definition used in previous literature. Saez calculated the elasticity of income by dividing the change in income for high-income groups minus that of middle-income groups,

divided by the change in net MTR for high-income groups minus that of middle-income groups, all in log forms. His definition of income included all income before deductions, excluding realized capital gains, transfers, and benefits.

Kopczuk (2004) defined “broad income” as all income reported in a tax return before any deductions. He pointed out an important implication of using “broad income” as his income type: any changes in deductions might affect income elasticity. Using panel data from tax returns from 1979 through 2000, and after correcting the possibility of endogeneity from using net-of-tax rate as the independent variable, he showed that lower-income groups were less responsive, with an elasticity of 0.088 for income groups below \$30,000, and that the high-income group was more responsive, with an elasticity of 0.156 for income groups above \$100,000. He concluded that different elasticities between income groups were due to the tax policy. Saez (2004) also found similar results. Using panel data from 1960 through 2000, he measured the responsiveness of U.S. taxpayers to changes in MTR from the Kennedy cut in the 1960s until the Tax Reform Act of 1986 and the 1993 tax increase. His results showed that the highest income percentile group was more responsive to the change in MTR, while some middle-income groups showed elasticity very close to zero, indicating that they were not responsive to the change in MTR over the years.

Different definitions of income in estimating behavioral responses to tax reform yielded different results in elasticity. Similar to Alm and Wallace (2000), both Kopczuk (2004) and Saez (2004) calculated MTR at the first dollar before any deductions, used a TAXSIM calculator to estimate the MTR, and ran OLS regression using income as a dependent variable and net of MTR as the independent variable. Saez (2004) used both panel and time series data for his regression and used Newey-West standard errors to correct for the correlation in standard errors over time. He also ran a 2SLS regression model in addition to the OLS model to correct for

endogeneity. His findings suggested that only the highest income group was responsive to the change in MTR from 1960 through 1993, while other income groups below the top 1 percent showed a very small response to the change in MTR. He also compared two cross-section years to estimate the MTR elasticity and found a very wide range in elasticities depending on the income tax policy change. In this paper, using tax return data we compared two cross-section years to estimate MTR elasticity, which resulted in smaller elasticities than those found in previous literature.

Thomas (2007) used panel data for New Zealand to estimate the responsiveness of taxpayers to a 1986 change in marginal tax rate. He measured behavioral responses of taxpayers over time using a natural experiment in which some taxpayers were affected by the change in marginal tax rate, while others only experienced a slight change in MTR. Assuming they were all affected in the same way in other aspects but income tax, this natural experiment would give a significant result. Using the taxable income elasticity, Thomas also measured the dead weight loss from the current reform in New Zealand. The elasticity of taxable income and labor income with respect to the change in marginal tax rate ranged from 0.35 to 1.10, and Thomas concluded that different responsiveness of taxpayers in one country to those in another depends on the tax structure and different methodologies used to calculate elasticity.

Another recent panel data study on income responses to the change in MTR has been done for Swedish income tax reform by Holmlund and Soderstrom (2007). They used a different approach in estimating behavioral response by analyzing both short-run and long-run responses, which included some lagged variables for income and MTR, and estimated the difference between men and women. Their empirical study used panel data from 1993 through 2002 and three different sources of income (earned income, assessed income, and broad income) as the

dependent variables. As in previous studies, they used log of income as the dependent variable and log net-of-tax rate as the independent variable to capture income responses to the change in marginal tax rate. In this case, statutory tax rates were used instead of effective tax rates. They also used statutory MTR for the estimation of behavioral response.

A major tax reform took place in Sweden in 1990 and 1991, which comprised some tax cuts and some tax rate increases for high-income groups. In 1995 there was an important change in the national tax rate, and in 1999 two new tax brackets were introduced: one at 20 percent and one at 25 percent. As in Indonesia's tax system, the Swedish tax system also adopted a dual tax system in which earned income is set on a progressive tax rate, while capital income is taxed at a flat rate of 30 percent. Under the current law in Indonesia, capital income is taxed at a flat 15 percent for residents and 20 percent for non-residents. The elasticity result for long-term behavioral responses in Holmlund and Soderstrom's paper (2007) ranged from 0.20 to 0.30, while the short-term responses were smaller. These results showed long-term responses that were larger than short-term results than those in previous studies. Due to an increase in statutory MTR for high-income groups, the second result showed no evidence of men's being less responsive to the change in MTR but that men were more affected by the change in MTR because most high-income earners in Sweden are male.

A study by Alm and Wallace (2007a) used a cross-section of data instead of panel data to estimate taxpayer responses to the change in MTR. In their estimation they use ordinary least square (OLS) regression and quantile regression to estimate the elasticity of taxpayers in the United States on a pure cross-section of data in 1995. They found that there were differences across income classes on taxpayer decisions to report income. To test whether there were differences in tax-reporting responsiveness across income types, Alm and Wallace used three

different income types: wages and salaries, adjusted gross income, and total income. The regression results between log of income and net of MTR for OLS and quantile regression showed the same negative sign on the coefficient of MTR, which means that as MTR increased, taxpayers reported less of their income. The elasticity ranged from -1.53 to -3.69 for the 3 different types of income and 5 income quantiles. The authors also mentioned that their choice of estimation method and using different types of income affected taxpayers' reporting decision responsiveness.

Following Alm and Wallace (2007a), this dissertation uses a cross-section of data to estimate taxpayer response to the change in MTR. OLS and quantile regression results show that taxpayers in Indonesia are not very responsive to the change in MTR, and in contrast to Saez's (2004) results, the elasticity of the highest income group in this dissertation is very close to zero, which means that this group is not responsive to the change in MTR.

Some caveats of using a natural experiment as an estimation method to measure taxpayer responsiveness to the change in MTR are the assumption that other changes besides the tax reform affect all taxpayers in the same way and the possibility that endogeneity will arise from using both income and the net of MTR as dependent variables. Literature on taxpayer behavioral response using natural experiments has also been done for several countries besides the United States, but to my knowledge there is no study on behavioral tax responses in Indonesia.

Following previous literatures on behavioral response to the change in MTR, the empirical analysis in this research starts with a "natural experiments" approach, or the DID econometrics model, to test behavioral responses of taxpayers before and after tax reform in 2000. In the DID model, we divide taxpayers into treatment and control groups. The treatment group was more affected by the 2000 change in MTR, while the control group was less affected.

The DID coefficient shows us how taxpayers in the treatment group responded to the change in MTR relative to the control group.

From the micro-level data on taxpayers, we are able to estimate the effect of tax reform on tax reporting decisions by taxpayers. The second method that we use to estimate income behavioral response of individuals to changes in marginal tax rates (MTR) is to estimate the elasticity of the taxpayers during the year prior to and the year following the tax reform. Marginal tax rate elasticity is calculated by the percentage change in taxable income with respect to percentage change in marginal tax rate.

Empirical literature on DID models and on taxpayer responsiveness to the change in MTR has been done using cross-sections, pooled cross-sections, and panel data. This study uses pooled cross-section taxpayer data from 1998 through 2006. Several different methods of estimation have been used in previous literature, and the results are slightly different depending on the estimation method used and the different tax system or tax design applied. The taxpayer return data in this dissertation does not have any identification for taxpayers; this limitation prohibited us from following the same taxpayers over time, so estimating income tax elasticity using panel data was not possible. Behavioral response to the change in MTR in some countries is very small. In this paper we used a cross-section of taxable income elasticities between income groups before and after 2000, which yielded a very small number. This means that taxpayers were not responsive to the change in MTR—even those who experienced a large change in their MTR following the income tax reform.

Microsimulation Literature

Microsimulation Model

Microsimulation modeling has been used in several countries to analyze government policy and forecasting. The recent trend is using dynamic microsimulation for government policy forecasting. The dynamic microsimulation model includes behavioral response and forecasts the effects of a change in government policy on the population or a sample of individuals, households, or firms. Dynamic microsimulation is expensive and needs more detailed information for the micro dataset. Another microsimulation process is static microsimulation, which basically needs cross-section information on individuals or firms at a certain point in time as the base year; behavioral change is not accounted for in this model (Harding 2000).

Stepankova (2002) describes microsimulation methods and the redistribution of tax and social benefit. She describes a static simulation model with cross-sectional data, not taking into account any behavioral response, and two types of dynamic microsimulation using panel and cross-sectional data. We will use static microsimulation and dynamic behavior microsimulation to analyze the change in MTR and personal exemptions in Indonesia. As mentioned by Stepankova, the static simulation assumes no changes in individual characteristics of taxpayers. The dynamic simulation with cross-sectional data includes behavioral responses of taxpayers regarding the change in tax rates.

Stepankova (2002) mentions the importance of a microlevel database for the microsimulation model. The best would be a panel dataset following the same taxpayers over time. Using cross-sectional data would be less expensive because data for confidential information on taxpayers is not easy to get. For Czech Republic, Stepankova claims that microsurvey data is the best sample survey data for microsimulation. Another type of survey

data, from the Family Expenditure Survey (FES), is not an appropriate data type for microsimulation because the sample is not random but based on quotas. In Indonesia, Socio-Economic Household Survey (Susenas) data would be an option for microsimulation databases, but unfortunately the income survey in the Susenas data is only available every three years, and the only income information it contains is net tax wages and salaries.

Harding (2000) describes the trend of static and dynamic microsimulation and describes the advantages of using dynamic microsimulation, which allows for the possibility of following a particular individual over time in the presence of policy change. It is thus possible to track taxpayer characteristics and to answer questions regarding policy changes following a particular taxpayer profile over time.

Naylor (2000) addresses an overview of statistics on individual taxation regarding sampling data, tax modeling to simulate policy changes, and the challenges of putting together a microdatabase. He gives an overview of Canada's microsimulation process. The process of collecting microdata for individual taxpayers started with income tax returns. Sample selection is the next step for building the database, and after some manual checking and corrections, the final tax return data are placed on the sample file, ready for use.

The microsimulation model that Naylor (2000) described was a flexible model used to analyze any tax policy changes at the Department of Revenue in Canada. The simulation process started with data processing and inputting the elements of the current system into the tax calculator. If the information from the sample data is not enough to explain the policy changes, other information can be added into the calculator. This simulation process was done in Canada initially by the Department of Finance. Issues regarding data collection include confidentiality of taxpayer information and limited availability of information on taxpayers. The tax return process

is by self-assessment, and the government of Canada tried to simplify and reduce the burden of self-assessment by reducing the information that needed to be filed by taxpayers.

Empirical Microsimulation across Countries

McNab and Wallace (2000) conducted an empirical microsimulation analysis for corporate profit tax and value-added tax in the Russian Federation. They developed a microsimulation model for corporations in Moscow City without including behavioral response. The objective of their model was to analyze the changes in federal tax law on the enterprise profit tax (EPT) and value-added tax (VAT). The micro-level database that they used in their analysis was combined data from the Territorial Tax Inspectorates (TTIs) of Moscow City. The data consist of observations from the 1st quarter of 1993 through the 3rd quarter of 1995. Their results suggested that a one percentage increase in the corporate profit tax and an increase in fixed capital depreciation decrease the overall tax liability but increase liabilities of smaller firms with fewer assets. Another result shows that the distribution of *winner*s only applied to one industry group, while others are either *loser*s or unchanged. They concluded that the microsimulation results were important for informing policymakers of how a small change in tax rates and capital depreciation could hurt smaller firms even when the aggregate liabilities decreased.

An empirical microsimulation analysis for Czech Republic was conducted by Vecernik and Stepankova (2002) using the household income microcensus survey data for 1988 and 1996. They proposed two scenarios, including a flat tax rate of 15 percent and total child benefits with a more progressive tax rate. The current income tax rate in Czech Republic is progressive. As in other transitional countries, microsimulation models are not a very popular method for policy

analysis in Czech Republic. The result showed that a flat income tax rate of 15 percent is too costly, which means that it made the distribution of the tax burden larger than under the current progressive system. The second scenario result indicated that a more progressive rate might be more equitable but that imposing a universal child benefit into the scenario made it less equitable. The researchers concluded that the results of their microsimulation under two different scenarios still needed to be verified using better data sources.

Granell-Perez, et al. (2006), did a more recent empirical study on static microsimulation using Spain's income tax. They used cross-sectional sample data on Spanish taxpayers in 2002 that contained information on taxpayer income by region. The analysis focused on the change needed in regional tax policies in order to collect the same amount of tax income. They designed a microsimulation module using STATA to get the result for tax differences between current and proposed scenarios. They proposed a scenario that eliminated the tax credit from the regional tax system and reduced tax rates. The results on *winners* and *losers* reported that only the two highest income groups experienced a net gain from the proposed regional tax scenario. The results also showed that the proposed scenario was less progressive since only a few people benefited from the tax credit.

Alm and Wallace (2007) developed a microsimulation process to address vertical and horizontal equity in Jamaica's income tax on labor. They used Jamaica's Emolument Survey data of 2001. The data consist of laborers' earned income with no information on capital income. Capital income is reported on different return forms and is taxed at a different progressive rate than labor income. This is similar to the situation in Indonesia, where taxpayers need to report capital income on a different return form from their labor income return form because they are taxed at different rates. Alm and Wallace highlighted the fact that in Jamaica only laborers in

certain sectors are taxed. They proposed three proposed scenarios: the first option was to eliminate all non-taxed allowances, the second was to eliminate non-taxed gratuities, and the last was to eliminate non-taxed bonus income. Their result showed that the first option, as they expected, had more effect on the entire distribution of equity. They found that the three options gave different results according to the target of each scenario. The first option had a broader impact on the distribution of equity in all income groups, while the third was more targeted to high-income groups.

Conclusion

Previous studies on behavioral response mentioned in this chapter suggest that taxpayers in lower income groups are less responsive to the change in their marginal tax rate than higher income groups. Literature on behavioral response across countries suggests that elasticity of taxable income with respect to marginal tax rate depends on the tax system and on the method of estimation. Few studies outside the United States separated the labor and compliance responses to tax rate changes to explain changes in reported income. The empirical literature on the effect of income tax reform on taxpayers suggests that taxpayers that experience more reduction on their marginal tax rates report more of their income after the reform relative to taxpayers who do are least affected by the change in marginal tax rate.

The literature on microsimulation across countries shows that the microsimulation model is a useful tool for informing policy makers about the distribution of income tax burden, revenue changes following a change in tax systems, and tax differences between current and proposed scenarios. Microsimulation requires a microlevel database with detailed information on each individual or firm. Literature in this chapter also describes that static and dynamic

microsimulation options depend on the needs of each simulation. Static simulations assume that behavioral responses of individual or firms are constant. On the other hand, the dynamic microsimulation tax calculator takes into account behavioral responses.

CHAPTER III

THEORETICAL FRAMEWORK

This chapter describes the theoretical framework for income tax and presents the theoretical model that supports the empirical model. As motivation for the theory, the first section describes the structure of individual income tax in Indonesia. The theoretical model in this dissertation is the labor/leisure choice model with the imposition of progressive income tax into budget constraints. As an addition to the labor/leisure choice model, we present a summary of tax avoidance theory. The last part of this chapter is conclusion.

The Structure of Individual Income Tax in Indonesia

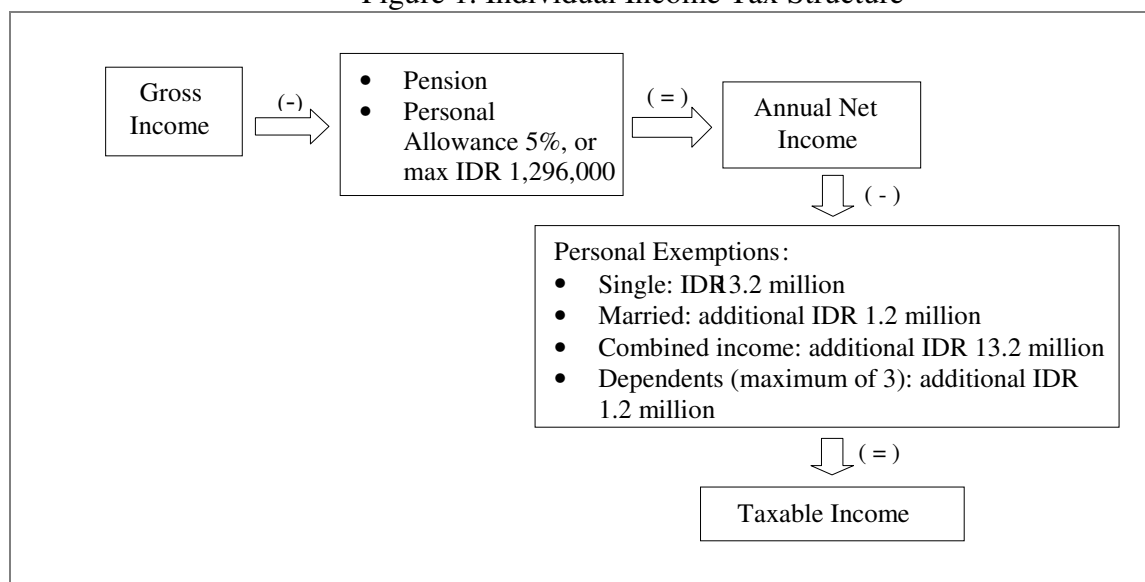
The definition of "income" in Indonesia's tax system is any additional increase in a taxpayer's economic welfare, from any sources either in Indonesia or outside the country that can be used for consumption or to increase the taxpayer's wealth.⁷ Any additional economic resource is included within the tax base only if it is realized.⁸ The unit of income tax in Indonesia is the individual. Taxpayers can take some personal exemptions based on their marital status, but they are considered as individuals rather than as families. There is only one taxable income threshold for all individuals, regardless of marital status. Additional exemptions are available for married individuals and for individuals with dependents, for a maximum of three dependents for

⁷ See Income Tax Law No. 17/2000, Article 4, paragraph 1.

⁸ See Appendix A for a list of income sources.

each taxpayer.⁹ The income tax base is taxable income defined as annual net income minus personal exemptions. Pensions and personal allowances are deducted from gross income. Unearned income is taxed at a different rate. Taxable income includes wages, salaries, honoraria, bonuses, pensions, lottery prizes and awards, gains from sale of property, refunds of tax payments already deducted as cost, and royalties. Since the law changed in 1983, benefits in kind are taxed under income tax law, pensions received are taxable after retirement, and any pension paid by an employer is not included in the employee's taxable income. Figure 1 presents the schematic of the individual income tax structure in Indonesia. The rates of personal exemptions are based on the current rate implemented in 2006.

Figure 1. Individual Income Tax Structure



Source: Ministry of Finance and Directorate General of Taxation, 2007

Note: Indicates the main components in calculating taxable income

Taxpayers report gross income on the income tax return form, deducting personal allowances at 5 percent for each taxpayer, or a maximum of IDR 1,296,000 (\$144). Gross

⁹ As mentioned earlier, additional exemptions for the same dependents can be claimed by one taxpayer. If a father already claimed his children, the mother can exempt only herself. If a husband already claimed additional exemption for being married, the wife can claim only herself. On the other hand, there is an additional exemption for married women who receive income from a source other than their husbands or another person in the family.

income minus personal allowance equals annual net income. From the annual net income, taxpayers can take some personal exemptions based on their marital status and number of dependents. Personal exemptions consist of an exemption for each taxpayer, IDR 13.2 million (\$1,467), plus an additional IDR 1.2 million (\$133) for married taxpayers, and an additional IDR 1.2 million (\$133) for each of up to three dependents. Married women can exempt an additional IDR 13.2 million (\$1,467).¹⁰ A married taxpayer with dependents can claim an additional exemption for being married and for having dependents, but his spouse can exempt only herself. Taxable income equals annual net income minus personal exemptions.

Applicable Theoretical Model

One of the theoretical models that this dissertation appeals to is the standard model of labor/leisure choice. In micro theory, the impact of imposing income tax on labor is ambiguous, depending on the substitution and income effect. The basic labor/leisure choice model is a maximization model of an individual or family subject to a budget constraint that consists of potential earned and unearned income and a time constraint (Varian 1992, Nicholson 2002). We will impose an income tax into the budget constraint to analyze the effect of tax on labor supply decisions. Macrae and Yezer (1976), Moffit (1979), and Slemrod (2001) extend the basic labor/leisure model by imposing a progressive income tax rate. It is important to estimate the labor responses since there are no readily available labor elasticity estimates for Indonesia and because we want to add income behavioral responses to the microsimulation model.

The standard labor/leisure choice model is:

¹⁰ Recall that a married woman who has income from any source unrelated to her spouse or any other members in the family is eligible for an additional exemption of IDR 13.2 million (\$1,466.67).

$$\text{Max } U = U(L, Y) \quad (3.1)$$

Before the presence of any tax, the general budget constraint is $Y = W[1 - L] + Z$, where L is leisure, Y is total reported income or consumption, W is wage, and Z is non-wage income. The time constraint is the total number of potential hours (1), including leisure (L), plus the amount of time spent working (N), which is equal to $I=L+N$.

Literature on income tax and labor supply suggests different ways of imposing income tax into the budget constraint, depending on the tax structure (Macrae and Yezer 1976, Boadway and Wildasin 1984, Triest 1990, Slemrod 2001, Eissa 2002). This dissertation imposes progressive income tax into the labor/leisure choice model following Slemrod (2001). The imposition of progressive a marginal tax rate is associated with the change in taxable income. Taxpayers in the higher taxable income tax brackets are taxed at a higher rate. In Indonesia, the individual income tax system is a non-linear progressive tax with an increasing marginal tax rate. Under current law, there are five taxable income brackets with progressive marginal tax rates. The budget constraint is a non-linear kinked line.

The general budget constraint after imposing progressive income tax is represented as:

$$Y = (1 - t_i)W[1 - L] + Z \quad (3.2)$$

Where t_i is the tax rate imposed on i^{th} income tax bracket, and Z is the unearned income. There were three income tax brackets before the income tax reform in 2000, five income brackets after 2000, and four income brackets for the proposed income tax law. As mentioned earlier, Indonesia imposes a different tax rate for unearned income.

The budget constraint including progressive income is:

$$\mathbf{Y} = (\mathbf{1} - t_i)W(\mathbf{1} - L) + \mathbf{Z} \quad (3.3)$$

The maximization problem is equation (3.1) subject to equation (3.3). As in the general model, the first order condition equates the marginal rate of substitution between total income and leisure and the relative price of leisure, $MRS_{L,Y} = (1-t_i) W$.

The time allocation utility function after the imposition of a progressive income tax is:

$$\mathbf{U} = [\mathbf{W}(\mathbf{1} - t_i)(\mathbf{1} - L) + \mathbf{Z}, L] \quad (3.4)$$

The first order condition yields the marginal rate of substitution between taxpayer leisure time:

$$\frac{dU}{dL} = -W(1 - t_i)U_Y + U_L = 0$$

$$MRS_{L,Y} = \frac{U_L}{U_Y} = W(1 - t_i) \quad (3.5)$$

Equation (3.5) shows that the relative price of leisure, or the amount of income that a taxpayer is willing to exchange for leisure time, is equal to the amount of wages after tax. The first order conditions are used to solve for the optimal amounts of labor supply and leisure demand.

The implicit function consists of all variables in the budget constraint $F [L, W (1-t_i), Z]$. The Marshallian leisure demand $L^* = L [W(1-t_i), Z]$ and the Marshallian labor supply $N^* = 1-L^*$, which is the negative of leisure demand $N^* = 1- L [W(1-t_i), Z]$.

The Slutsky equation for leisure demand is:

$$\frac{\partial L^*}{\partial W} = \frac{\partial L^*}{\partial W_{dU=0}} + (1 - t_l)N^* \frac{\partial L^*}{\partial Z} \quad (3.6)$$

The Slutsky equation for labor supply is:

$$\frac{\partial N^*}{\partial W} = \frac{\partial N^*}{\partial W_{dU=0}} + (1 - t_l)N^* \frac{\partial N^*}{\partial Z} \quad (3.7)$$

Following Slemrod (2001), the effect of tax on labor supply yields:

$$\frac{\partial N^*}{\partial t} = \frac{\partial N^*}{\partial W_{dU=0}} - WN^* \frac{\partial N^*}{\partial Z} \quad (3.8)$$

The Slutsky equation above shows that the change in labor supply with respect to the change in wages after tax equals the substitution effect, holding utility constant plus the income effect, which is the change in non-wage income. Equation (3.6) shows the Slutsky equation for leisure demand, which has the opposite sign from the Slutsky labor supply equation in (3.7). The substitution effect of leisure demand with respect to the change in wages after tax is positive, which implies that, holding utility constant, an increase in wages after tax increases the number of hours worked, and the second part of the right-hand side of equation (3.7) implies that the income effect is negative. The Slutsky equation in (3.7) implies the positive substitution effect and negative income effect. This is the ambiguity of the labor/leisure choice model.¹¹ Following

¹¹ See Appendix B for a full derivation of the labor/leisure choice model.

Slemrod (2001), equation (3.8) presents the ambiguity of labor supply subject to a change in tax rate.

The substitution elasticity of the change in labor supply with respect to the change in wages after tax can be defined following the elasticity equation by Nicholson (2002):

$$\frac{\partial N}{\partial W} = \frac{\partial N}{\partial W_{U=U_0}} \quad (3.9)$$

Multiply (3.8) by $\frac{W}{N}$ to get:

$$\frac{\partial N}{\partial W} \cdot \frac{W}{N} = \frac{\partial N}{\partial W} \cdot \frac{W}{N_{U=U_0}}$$

The labor supply substitution elasticity equation becomes:

$$\epsilon_s(N, W) = \frac{\partial N}{\partial W} \cdot \left[\frac{W}{N} \right]_{U=U_0} \quad (3.10)$$

The empirical calculations of labor supply elasticity for a change in income tax would be possible if data on taxes and hours worked were available. Unfortunately, the household survey data (Susenas) for income is available only as a series of cross-sections every 3 years. We are able to empirically estimate elasticities using the variation in wages among individuals. These elasticities will be total rather than compensated elasticities. However, for revenue analysis purposes, total elasticities are expected to be relevant. We compare these relatively imperfect labor supply elasticities with those found in other countries and, eventually, with the reporting behavior elasticities that are discussed next.¹²

¹² We present elasticity results for other countries in the literature review.

Another theoretical notion that we appeal to in this dissertation is the induced reporting decision response of individuals as tax rates change. Aside from the labor decision, the tax compliance literature suggests that individuals faced with increases (or decreases) in marginal tax rates will evade tax responsibility more (or less). The reasons for this are well established in the literature, including the seminal work by Allingham and Sandmo (1972). More recent studies on tax avoidance have been done by Slemrod (2001) and Alm and Wallace (2007).¹³ A summary of this theory is presented in this section.

Literature on tax compliance has mentioned that the decisions of taxpayers to report all or some of their income depend on the cost of evasion, penalty rate, and probability of getting caught. Alm and Martinez-Vazquez (2001) presented a review of tax compliance theory, arguing that, besides the cost of evasion and the penalty rate, compliance decision is also affected by tax audit, tax rate, and tax withholding function. Allingham and Sandmo (1972) presented theoretical analysis on static and dynamic characteristics of the decision of tax evasion. Slemrod (2001) presented a general labor/leisure choice model with the imposition of tax avoidance into the budget constraint. The cost of tax avoidance depends on reported income.

We will present a summary of tax avoidance theory developed by Alm and Wallace (2007a), which described a more specific theoretical model of tax avoidance in which the cost of avoidance depends on the total fixed amount of income. Consider an individual who has a choice of reporting his fixed amount of income M as taxable income R or choosing tax avoidance A . The taxable income is subject to a progressive income tax $T(R)$, where the first and second derivatives of the progressive income tax schedule are both positive ($T' > 0$ and $T'' > 0$). The cost of avoidance depends on the total fixed amount of income $C(A/M)$ where the first and second derivatives of avoidance cost are both positive ($C' > 0$ and $C'' > 0$). The cost of avoidance includes

¹³ See the literature review for a summary of tax avoidance literature by Alm and Wallace (2007a).

the costs of obtaining information, keeping records, paying for tax advice, and buying and selling assets that provide tax shelters.

Consider an individual who maximizes utility between taxable income R and tax avoidance A , which is assumed to depend only upon income. Given the progressive income tax schedule $T(R)$ and the cost of avoidance $C(A/M)$, the first order condition of the maximization model yields:

$$-T'(R) + C'(A/M) = 0 \quad (3.10)$$

$$T'(R) = C'(A/M)$$

The marginal benefit of progressive income tax schedule $T'(R)$ equals the marginal cost of tax avoidance $C'(A/M)$.

Since $T''(R) > 0$ and $C''(A/M) > 0$, the second order condition yields:

$$T''(R) + C''(A/M) > 0 \quad (3.11)$$

As mentioned earlier, both marginal tax rates and marginal tax avoidance costs are increasing, hence the second order derivative is also positive.

To analyze the reporting decision of taxpayers as an impact of a change in marginal tax rate, Alm and Wallace (2007a) also presented an example where an increase in marginal tax rate is imposed into the marginal tax rate function. The impact of an increase in marginal tax rate on the reporting decision of taxpayers shows a negative effect, which means that an increase in marginal tax rates would reduce the amount of income that an individual reports on his or her tax

return.¹⁴ Imposing an income tax shift parameter into the progressive income tax schedule, the first order condition yields $[T'(R)+t]$, where t is a shift parameter.

$$\partial R/\partial t = -1/[T''(R)+C''(A/M)] \quad (3.12)$$

Equation (3.12) can be interpreted as meaning that an increase in marginal tax rates will reduce the amount of reporting income. The change in taxable income is subject to a change in marginal tax rate defined as taxable income elasticity $\eta \equiv [(\partial R/\partial t)(t/R)]$. Lindsey 1987, Feldstein 1995, Alm and Wallace 2000, and Alm and Wallace 2007a emphasized that reporting decision is a more extensive response than labor supply response. The reporting decision is expected to vary across income groups, and literature on reporting income response in the United States shows that even if marginal tax rates increase with income, the rate declines as income increases, which implies that $T''(R)$ is generally larger for lower-income groups than for higher-income groups. The responsiveness of taxpayers in their reporting decision will differ across income groups. In developing countries, empirical evidence on reporting decisions is still very limited.

Conclusion

The current individual income tax rate in Indonesia is a progressive rate. The theoretical model of labor/leisure choice maximization suggests that imposing progressive income tax on the budget constraint by substitution effect has a positive effect on labor supply decision but that by that doing so by income effect has a negative effect on the labor supply decision. The conclusion of the theoretical labor/leisure choice model is that there is an ambiguity between substitution and income effect. Since the dataset in this dissertation is taxpayer income tax return data from withholding income, we assume that the labor supply decision is related to reporting

¹⁴ See Alm and Wallace (2007) for a complete derivation of the impact of an increase in marginal tax rate to the reporting decision of taxpayers.

decision. To measure behavioral response in the empirical chapter, we use taxable income responsiveness to the change in statutory marginal tax rate. The behavioral response in this dissertation is income behavioral response, which is the taxable income response. The theory of income tax avoidance by Alm and Wallace (2007a) suggests that reporting decision by taxpayers across income groups decreases as the marginal tax rate increases.

CHAPTER IV

EMPIRICAL ANALYSIS

The objective of this empirical analysis is to develop an empirical model of income responses to the change in marginal tax rate and to test the microsimulation model that we have described in the theoretical chapter. The Indonesian income tax reform in 2000 changed the statutory marginal tax rate for all income groups. The highest income groups suffer from a higher marginal tax rate following the reform, while other income groups experienced a reduction in their marginal tax rate. Since changes in the MTR differ across income groups, the main objective of using a DID model in this empirical analysis is to examine whether the reporting behavior differs across income groups. Behavioral response and reporting decision are estimated using labor supply elasticity from the household socio-economic survey data (Susenas) and from the income tax return data from 2000, the year of the tax reform.

Empirical literature on behavioral response suggests that using a difference-in-difference (DID) model to test the effect of the change in marginal tax rate on income before and after tax reform would give us information on how taxpayers in the most affected income group behave relative to those who are not affected or are least affected by the change in MTR. The DID model includes a time-specific factor: the year of the tax reform. The differences in response of the highly affected income groups are compared to the least affected income groups before and after the reform. This model also consists of the interaction variable between the dummy of time-specific variable and the dummy for reporting income of the highly affected income group. In this empirical analysis we use a DID model to observe the differences in reporting behavior across income groups after the enactment of the current marginal tax rate. The income elasticity

with respect to the change in marginal tax rate is calculated by income groups. We do not use the marginal tax rate elasticity from the DID model for the dynamic income behavior microsimulation; instead, we generate ten income groups by their taxable income, from the lowest to the highest taxable income, and calculate the elasticity by the difference in taxable income before and after the tax reform in 2000, with respect to the percentage change in marginal tax rate by income group.

The empirical estimation consists of a simulation on the base year, a static simulation without income behavior, and a dynamic income behavior simulation. We will present several options for reform that are currently being discussed by the tax authorities for the near-future income tax reform, and we will also present an option for a flat individual income tax rate. The objective of the microsimulation model is to analyze the distribution of income tax burden across income groups under several options of reform and to examine the amount of government income tax revenue from the number of tax liabilities.

The organization of this chapter is as follows: the first part is data description and sources. We describe the variables for the DID model and how we constructed each variable into the model, describe variables for the tax calculator in the microsimulation model, and provide information on the data sources. The second part of this chapter provides the hypotheses, empirical model for the DID, constructs the calculation for labor supply elasticity and marginal tax rate elasticity, and develops the microsimulation process.

Data Description and Sources

Dependent and Independent Variables for DID model

The dependent variable for DID regression is the total income reported by taxpayers via form 1721A1 both before and after 2000. As mentioned in the previous chapter, reported income from form 1721A1 is withholding income from the employer. We use only wage income for this analysis because non-wage income is taxed under a different rate.

The independent variables for the DID regression include a time-specific dummy variable, defined as dummy = 1 for the years after 2000 and = 0 for the years before 2000. A dummy for the income treatment group = 1 for taxpayers in the income group that is most affected by the change in MTR (the income group that experienced the largest reduction in MTR after 2000) and = 0 for the control group, which comprises taxpayers in the highest income group, who are least affected or experienced the smallest percentage change in MTR. Additionally, there is an interaction variable between the time-specific dummy and the dummy for the income treatment group, as well as individual specific variables, such as a dummy for marital status and number of dependents.

Variables for Microsimulation

Variables for microsimulation consist of all the reported income variables from the income tax return form. The tax calculator starts by using income variables from the base year.¹⁵ The variables include annual gross income and annual net income, personal exemptions, taxable income, marginal tax rate, and income tax liability for the base year. For a simulation with proposed scenarios, we use a new taxable income, new marginal tax rate, and new personal

¹⁵ 2006 is the baseline year for the microsimulation model under the current scenario.

exemptions; we use income behavioral response variables, including percentage change in taxable income and percentage change in marginal tax rate, and we also use the elasticity of taxable income with respect to the change in marginal tax rate.

The tax calculator for the microsimulation on proposed scenarios calculates a new marginal tax rate by using the new taxable income, captures a new income tax liability, and estimates the income tax burden under proposed scenarios and the tax difference between the current and proposed scenarios. The new taxable income is basically the old taxable income plus an adjustment on the income behavioral response. For the static microsimulation, income behavioral response is not included into the tax calculator, while for the dynamic behavior microsimulation model we apply elasticity for each income group and the change in marginal tax rate.

Data Sources

The data we use in this analysis derive from the 1998–2006 reported individual income tax return dataset from the Directorate General of Taxation (DGT) in Indonesia. Each taxpayer is responsible for submitting tax form 1721A1 (employer-withholding wage income) by the end of each tax year. Employers, as the withholding party, must also submit this form to the tax authorities at the end of tax year. The dataset includes pooled cross-section micro-level data that contain detailed information on taxpayers' wage income (non-wage income is not included). The whole dataset contains 8 million taxpayer records. There is no top coding for the highest income group. The taxpayer name, tax identification number (Nomor Pokok Wajib Pajak, or NPWP), and other confidential identifying information are excluded from the dataset to maintain taxpayer confidentiality.

The advantage of using a reported income tax return dataset is in the detailed information provided for all taxpayers. Reported incomes by taxpayers are annual gross income, net income, annual net income, personal exemptions, taxable income, statutory marginal tax rate, income tax liability, and individual characteristics.¹⁶ The main limitation of using this dataset is the unavailability of a panel dataset for the whole period from 1998 through 2006 due to a lack of identifying information. Another limitation is the restricted nature of information on individual characteristics. For confidentiality purposes, we could get information only on marital status and number of dependents. Individual information on region, type of job, age, and gender are excluded.

Hypotheses

The empirical work in this dissertation attempts to examine taxpayers' responsiveness to the change in MTR following the income tax reform of 2000. Another attempt of the empirical work is to examine the distribution of tax burden for each income group after applying the new MTR. Income tax burden is estimated using microsimulation modeling.

The hypothesis for the DID model is obtained from the labor supply theoretical model, with some modifications. The reporting decision is considered a more extensive decision than the labor supply decision (Alm and Wallace 2000). In this dissertation, we assume that the reported wage income reflects the labor supply response and the reporting decision. We use the DID model to estimate the difference in reporting decision by taxpayers across income groups, depending on the change in marginal tax rate. The hypothesis for the DID model is that, on average, the difference in reporting wage income between the treatment group (the highly

¹⁶ Descriptive Statistics for all the variables are available in Appendix C.

affected income group) and to the control group (the least affected income group) should be positive.

As mentioned in the literature review, empirical studies on labor supply elasticity in Indonesia showed low elasticity, with a range from -0.2 to -0.6 for uncompensated elasticities and a range from 0.33 to 0.58 for compensated elasticities (Rochjadi and Leuthold 1994). Based on these findings, labor supply elasticity and reporting elasticity in Indonesia should be low, given that employees have very limited control over the number of hours they work and that withholding income tax amounts are reported by both the employee and employer.

The objective of income tax reform is to increase government revenue at a lower cost of burden. Increasing personal exemptions or lowering the marginal tax rate is expected to ease the distribution of income tax burden across income groups. Previous literature on distribution of income tax burden suggests that, under a progressive income tax rate, an increase in exemptions ambiguously eases the burden on lower-income groups. According to Keen et al. (2000), progressivity of income tax could be evaluated from the reduction in income tax liability or from the after-tax income inequality. Theoretically, Keen et al. suggest, an increase in exemptions could lead to a more unequal distribution of income tax. Our hypothesis for the microsimulation is that, from the equity point of view, the distribution of tax burden under the current income tax rate could be better distributed by making changes in both MTR and personal exemptions.

Model Specifications

The Modified Difference-in-Difference Model

The objective of this model specifications section is to develop an empirical model for the DID regression. The model starts with a simple ordinary least square (OLS) model,

consisting of reported income as the dependent variable and taxpayer specifications and time specifications as the independent variables. In previous literature, Alm and Wallace (2002) constructed their DID model based on a simple OLS model and used reported income as the dependent variable to test responses of the high-income group relative to the low-income groups before and after the tax reform act in 1986.

Where y is the reported income, x is the explanatory variables, and ε is the error term, the baseline for the DID regression equation is:

$$Y = \beta X + \varepsilon \quad (4.1)$$

The DID econometrics model in this dissertation is an estimation of reported income behavioral response across income groups. This DID estimation uses data before and after the income tax reform in 2000. As previously mentioned in the literature review chapter, there are debates on using the DID, or “natural experiment,” model for estimation on the effect of the change in MTR. The main assumption about this estimation is that the only shocks that cause different effects on the income groups are the changes in MTR, while macroeconomics shocks would have the same effect on all income groups.

The model for DID starts from the basic OLS equation in (4.1) and is modified by including the DID variable, which is the interaction variable between the dummy for the income treatment group and the dummy variable for years after the reform. The construction of the DID model in this dissertation follows the model by Alm and Wallace 2000, Moffitt and Wilhelm 2000, and Martinez et al. 2006. The DID estimation uses the reported income tax return dataset as pooled cross-sectional data from 1998 through 2006.

The DID equation is:

$$Y = \alpha_1 + \beta_1 D_{\text{Post}} + \beta_2 D_{\text{Treatment}} + \beta_3 D_{\text{Post}} * D_{\text{Treatment}} + \beta_4 \text{married} + \beta_5 \text{dependent} + \varepsilon \quad (4.2)$$

Where Y is the reported income as in equation (4.1), D_{post} is a dummy variable for years after 2000, $D_{\text{treatment}}$ is a dummy for the treatment group, married is a dummy for marital status equals 1 if the taxpayer is married and 0 otherwise, dependent is the number of dependents (maximum 3 dependents per taxpayer), and ε is the error term.

The construction of treatment and control groups is based on the effect of the change in statutory marginal tax rate for each income group. There are five groups based on taxable income. The treatment group is income groups that are highly affected by the change in marginal tax rate after 2000, and the control group is the least affected income group. After the tax reform in 2000, the two highest income groups are the least affected income groups, but the highest income group suffers from an increase in their marginal tax rate. The marginal tax rate for the highest income group with taxable income over IDR 200 million increased from 30 percent to 35 percent, while for other income groups the marginal tax rate decreased after 2000.

Table 2. Statutory Marginal Tax Rate (MTR) and Percentage Change in MTR Before and After 2000, by Income Group

Income Group	MTR	MTR	%Δ MTR
	Before 2000	After 2000	
i. ≤25 million(\$2,778)	10%	5%	-0.5
ii. >25 million & ≤ 50 million (\$5,556)	15%	10%	-0.333
iii. >50 million & ≤ 100 million	30%	15%	-0.5
iv. >100 million(\$11,111) & ≤ 200 million	30%	25%	-0.167
v. >200 million(\$22,222)	30%	35%	+0.167

Source: Directorate General of Taxation (DGT) 2007 and author's own calculation

Table 2 shows the percentage change in statutory MTR after the income tax reform in 2000. Based on the numbers presented in Table 2, we use the highest income group and the second highest income group as the control group and other income groups as treatment groups. The change in statutory MTR mostly affects low- and middle-income groups, while the two highest income groups are the least affected.

Taxable Income Elasticity

The estimation of elasticity uses survey data to find labor supply elasticity for labor and employees and uses income tax return data to estimate reporting elasticity of taxpayers. In order to create a dynamic income behavior microsimulation model, we need taxable income elasticity. Including elasticity into the tax calculator simulation process generates a new taxable income with the income behavioral response of taxpayers after the change in MTR. The elasticity of taxable income with respect to statutory MTR is calculated by the difference in taxable income and MTR before and after 2000. The taxable income elasticity is calculated by income group.

$$e = \frac{\% \Delta \text{hours work}}{\% \Delta \text{tax}}$$

$$e = \frac{\% \Delta \text{reported income}}{\% \Delta \text{tax}} \quad (4.3)$$

The elasticity of labor supply decision (calculated using number of hours worked by labor and employees) and reporting elasticity (estimated using reporting income with respect to the change in MTR) give us information on how responsive taxpayers are to the change in their MTR. Elasticity results enter the dynamic income behavior simulation model to capture

behavioral responses and in order to calculate a new taxable income amount for simulating the proposed scenarios.

Microsimulation Model

The microsimulation model in this dissertation includes static and dynamic income behavior simulation. We use 2006 as the base year and simulate the proposed scenarios on the same year. The static simulation on the proposed scenarios is a microsimulation process using the same data as the base year but with different scenarios. The dynamic income behavior microsimulation is a simulation that uses reported income elasticity in the tax calculator to estimate the change in income tax liabilities and income tax burden after including income behavioral response into the model. In this dissertation we do not develop dynamic microsimulation with forecasting or growth models.

The tax calculator for the microsimulation calculates taxable income, defined as annual net income minus personal exemptions. The tax liability is calculated by multiplying taxable income times the marginal tax rate. The main objective of the microsimulation model in this dissertation is to estimate the income tax burden for each scenario, total income tax revenue with respect to taxpayers' income tax liability, and the income tax differences between the base scenario and the proposed scenario.

Figure 2. The Microsimulation Process

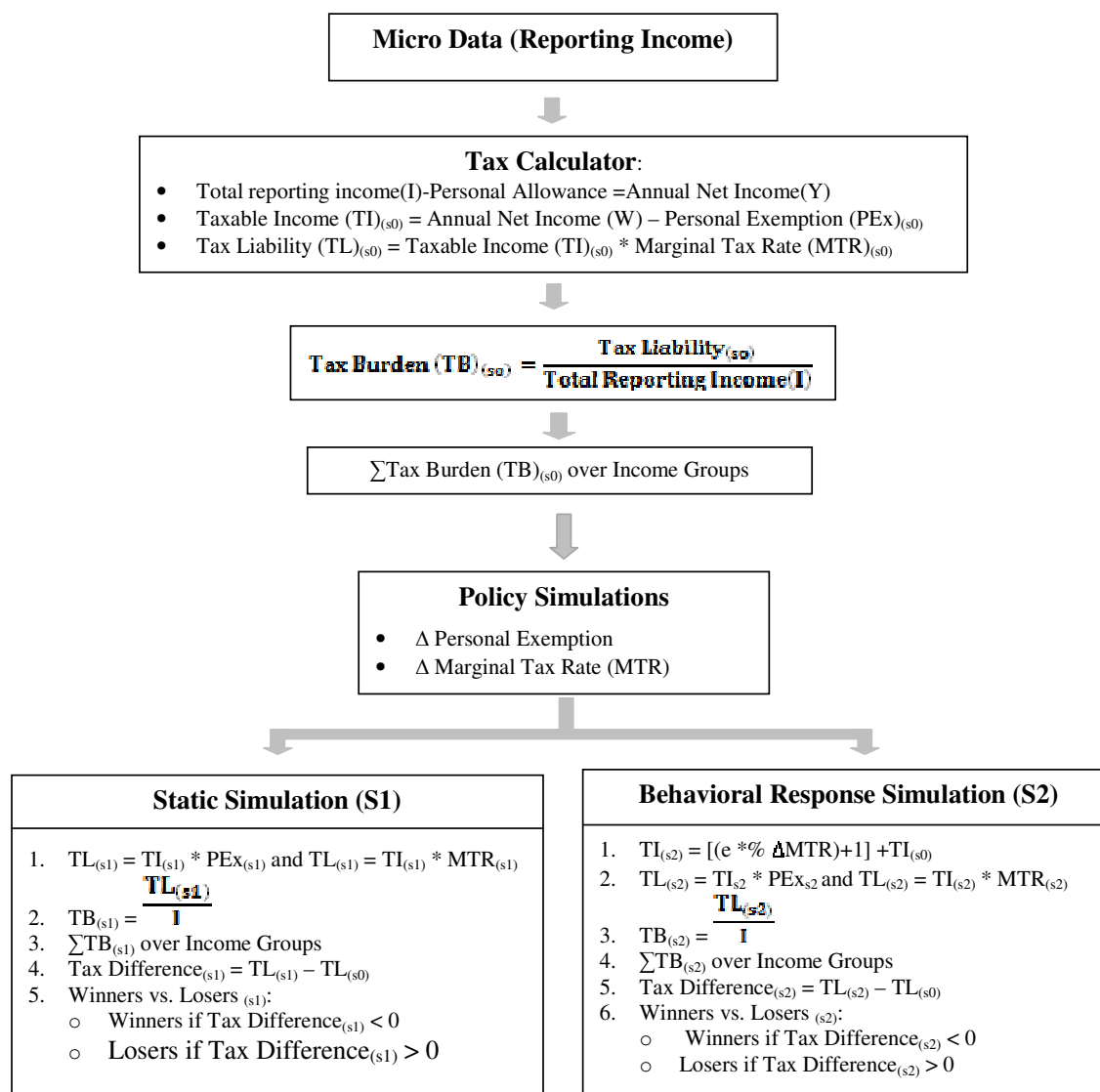


Figure 2 describes the microsimulation process starting from running income tax return data for the base year, 2006, using that year's marginal tax rate. Total reported income tax returns in 2006 were 902,343.¹⁷ For this microsimulation process, we designed a program in STATA

¹⁷ The total dataset that we have includes 1998 through 2006. In this dissertation we only present a simulation for 2006. We use other years for the DID regression. The total number of observations for the whole dataset was 5,580,771. The data comes from income tax return form 1721A1 from all effective taxpayers in Indonesia.

that generated a tax calculator for the static simulation on the base year and compared the result with the dynamic simulation result obtained from each proposed scenario.

The first simulation process on the base year shows results on the distribution of income tax burden across income groups under that year's law. The next process is simulating the proposed scenarios using the same year but with new income tax liabilities, taking into account income behavioral responses. For this purpose, we generated a tax calculator module in STATA to compare the tax difference after applying proposed scenarios. The income tax burden was calculated as the income tax liability divided by total reported income. The tax difference captures the number of *winner*s, which are taxpayers with fewer income tax liabilities after the proposed scenario, and the number of *loser*s, defined as taxpayers who suffer from more income tax liabilities after the proposed scenario.

Granell-Perez et al. (2006) conducted a static microsimulation in Spanish regions and defined an interactive module on STATA for estimating the change in the distribution of income tax burden under their proposed scenarios. For comparison, we also simulate proposed scenarios using a static microsimulation process that excludes income behavioral response. The static simulation using the proposed scenario follows the same process as the simulation for the base year. The static simulation also gives results on liabilities, distribution of burden, and *winner*s and *loser*s.

CHAPTER V

EMPIRICAL RESULTS

In this chapter we present all the results obtained from the empirical analysis. The first section presents results from the DID model, the second section presents results on labor supply elasticity and reporting income elasticity, and the third section presents the results of the microsimulation. The last part of this chapter is a conclusion of the overall empirical results.

Modified Difference-in-Difference (DID)

DID models use data before and after a policy change that occurs in one period of time and affects one group and not another. The objective is to compare the response of the affected group relative to that of the unaffected group following a change in policy. In a case of tax reform, all income groups are exogenously affected by the change in tax rate, but there are some differences in the magnitude of the change. In this dissertation we use a modified DID model in which taxpayers in all income groups are affected by the change in tax policy, but we can still create a control group, containing taxpayers who are less affected relative to other income groups, and a treatment group, which is the income group most affected by the change in marginal tax rate.

Previous literature on DID suggests that income groups that experienced larger reductions in their marginal tax rates in the presence of income tax report more of their income relative to income groups that are less affected (Alm and Wallace 2000). Martinez-Vazquez et al. (2006) used a DID to estimate the impact of tax reform in Russia on net-of-tax wage. This was also a modified DID in which all income groups were affected by the tax reform, but the treatment groups were different across income groups.

The hypothesis for the modified DID model is that, on average, taxpayers in the treatment group report more of their income relative to taxpayers in the control group. As mentioned in the previous chapter, the treatment group is the income group that experienced larger reductions in their MTR relative to the control group. The dependent variable for the DID model is taxpayers' reported wage income. The DID coefficient is the interaction between a time-specific dummy for years after the reform and a dummy for the income treatment group. The independent variable includes a dummy for years after 2000, a dummy for the income treatment group, the interaction variable or DID estimator, marital status, and number of dependents. The DID model controls for exogenous shocks that occur because of a change in policy. For the purposes of this model, we assumed that macroeconomics shocks affect all taxpayers in the same way, while the change in tax policy yields different effects on taxpayers in different income groups.

In the modified DID model we present pairs of years 1998/2006, 1999/2006, 1998/2005, and 1999/2005. Recall that 1998 and 1999 are years before the tax change, and 2005 and 2006 are years after the tax change in 2000. We use the two highest income groups as the control group. The highest income group (income above IDR 200 million) was least affected by the change in marginal tax rate and also experienced an increase in their marginal tax rate, while the second-highest income group (income between IDR 100 million and IDR 200 million) was least affected by the change and experienced a reduction in their marginal tax rate. The treatment group is the income group most affected by the change in marginal tax rate (income between IDR 50 million and IDR 100 million). We also constructed a treatment group that consisted of all taxpayers earning less than IDR 100 million and who all experienced a larger reduction in their marginal tax rate compared to the control group.

Table 3. Modified Difference-in-Difference Result, Control Group Income > IDR 100 Million and <= IDR 200 Million

Year	1998/2006		1999/2006		1998/2005		1999/2005	
Independent Variables	Treatment Group							
	50m–100m	<100m	50m–100m	<100m	50m–100m	<100m	50m–100m	<100m
DID coefficient	3.98e+06*** (135595)	6.51e+06*** (114033)	3.98e+06*** (135595)	6.51e+06*** (114033)	1.64e+06*** (422205)	9.07e+07*** (522325)	2.58e+06*** (126207)	5.38e+06*** (106174)
Married	-298061*** (-67878)	2.08e+06*** (15691)	-298061*** (67878)	2.08e+06*** (15691)	7.60e+06*** (104075)	4.15e+06*** (92458)	-565719*** (68012)	1.92e+06*** (15641)
Dependents	-863433*** (-22368)	1.50e+06*** (6734)	-863433*** (-22368)	1.50e+06*** (6734)	2.38e+06*** (44718)	331251*** (39618)	-732534*** (-22438)	1.57e+06*** (6726)
Constant	1.06e+08*** (62015)	1.00e+08*** (-43557)	1.06e+08*** (62015)	1.00e+08*** (43557)	1.18e+07*** (62640)	2.48e+08*** (202346)	1.06e+08*** (62767)	1.00e+08*** (44286)
Observations	457943	5494728	457943	5494728	5580243	5580243	457943	5494728
R-squared	0.71	0.503	0.71	0.503	0.013	0.221	0.708	0.502

Source: Author's own calculations

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Modified Difference-in-Difference Result, Control Group Income > IDR 200 Million

Year	1998/2006		1999/2006		1998/2005		1999/2005	
	Treatment Group							
Independent Variables	50m-100m	<100m	50m-100m	<100m	50m-100m	<100m	50m-100m	<100m
DID coefficient	1.38e+08*** (-3870000)	1.41e+08*** (-1030000)	1.38e+08*** (-3870000)	1.41e+08*** (-1030000)	1.39e+08*** (-3250000)	1.42e+08*** (-858925)	1.39e+08*** (-3250000)	1.42e+08*** (-858925)
Married	2.08e+07*** (-1340000)	3.42e+06*** (-87560)	2.08e+07*** (-1340000)	3.42e+06*** (-87560)	1.98e+07*** (-1330000)	3.20e+06*** (-87131)	1.98e+07*** (-1330000)	3.20e+06*** (-87131)
Dependents	- 8540853*** (-441889)	- 865199*** (-37644)	- 8540853*** (-441889)	- 865199*** (-37644)	- 8010812*** (-44718)	- 967712*** (-37534)	- 8010812*** (-441443)	- 967712*** (-37534)
Constant	4.37e+08*** (-1290000)	4.37e+08*** (-276005)	4.37e+08*** (-1290000)	4.37e+08*** (-276005)	4.42e+08*** (-1310000)	4.42e+08*** (-280903)	4.42e+08*** (-1310000)	4.42e+08*** (-280903)
Observations	421731	5458516	421731	5458516	421731	5458516	421731	5458516
R-squared	0.243	0.321	0.243	0.321	0.244	0.322	0.244	0.322

Source: Author's own calculations

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The current income tax law was implemented in January 2001. Table 3 shows the DID result for control-group income between IDR 100 million (\$11,111) and IDR 200 million (\$22,222). The first column shows results for 1998/2006 where the treatment group is income between IDR 50 million (\$5,556) and IDR 100 million (\$11,111). The DID coefficient shows that, holding other things constant, taxpayers who experienced a larger reduction in the marginal tax rate (treatment group) increased reporting income by IDR 3,980,000 (\$442) relative to the control group. Being married decreased the amount of reporting income by taxpayers in the treatment group by IDR 298,061 (\$33) relative to those in the control group, and as the number of dependents increases, taxpayers in the treatment group reduced the amount of their reporting income by IDR 863,433 (\$96). For the treatment group below IDR 100 million, the DID coefficient shows that, holding other things constant, taxpayers in the treatment group report more of their income by IDR 6,510,000 (\$723) relative to the control group. Being married and having more dependents for this treatment group also increased the amount of reporting income relative to the control group. The result for 1999/2006 shows the same number as that for 1998/2006. For the same control group, we also estimated 1998/2005 where the DID coefficient shows a positive and statistically significant number. The results show that, holding other things constant, taxpayers in the treatment group reported more of their income by IDR 1,640,000 (\$182) relative to the control group. Being married also increased the reporting income of taxpayers in the income group between IDR 50 million and IDR 100 million by IDR 7,600,000 (\$844) relative to the control group, and having more dependents increased reporting income by IDR 2,380,000 (\$264). The last two columns show results for 1999/2005, which gave a different result from 1998/2005. The DID coefficient for

the income group below IDR 100 million shows that on average, taxpayers in the treatment group increased the amount of their reporting income by IDR 5,380,000 (\$598).

Table 4 shows the DID result for the control group above IDR 200 million. The first column shows that, holding other things constant, the treatment group reported more of their income by IDR 138,000,000 (\$15,333) relative to the control group. This number is greater than the DID coefficient for the control group between IDR 100 million and IDR 200 million. The control group for this DID is the income group above IDR 200 million, which experienced an increase in their marginal tax rate. The highest income group is the only income group that experienced an increase in their marginal tax rate after the income tax reform in 2000. Their marginal tax rate increased from 30 percent to 35 percent. In the second column of Table 4, the DID coefficient is IDR 141,000,000 (\$15,667), which suggests that taxpayers in income groups below IDR 100 million (\$11,111) report more of their income relative to the highest income group. Being married increased reporting income by taxpayers in the treatment group by IDR 20,800,000 (\$2,311) relative to the control group, and having more dependents reduced the amount of reporting income by taxpayers in the treatment group by IDR 8,540,853 (\$949) relative to the control group. The result for 1999/2006 is the same as the result for 1998/2006. The DID coefficient for 1998/2005 in Table 4 shows that, on average, holding other things constant, the treatment group below IDR 100 million reported more of their income by IDR 142,000,000 (\$15,778) relative to the control group. For the same treatment group, the DID coefficient for 1999/2005 shows the same number. Being married increased the decision of taxpayers in the treatment group to report more of their income, while having more dependents reduced the reporting income of taxpayers in the treatment group relative to the control group.

The overall DID results from Tables 3 and 4 supports the hypothesis that, on average, income groups that experienced larger reductions in MTR reported more of their income relative to those who were less affected. Our modified DID estimation in this dissertation is to estimate the interaction variable between the dummy for the treatment group times the dummy for the year after the reform. The objective of this model is to estimate the reporting behavioral response of taxpayers in the treatment group relative to that of the control group. Including individual specific variables, such as marital status and number of dependents, the result of the DID coefficient is still positive and statistically significant. Different effects across income groups allow us to use a modified DID model to analyze the effects of the change in MTR before and after 2000.

To estimate the reporting elasticity of taxpayers before and after 2000, we did not use the DID model because the DID estimation compares the impact of income tax reform on affected and least affected income groups, while the reporting income elasticity that we want to use for our microsimulation purposes includes elasticities for all taxpayers. Another reason for not calculating reporting income elasticity from the DID model is that the nature of the taxpayer dataset that we have is an independent cross-section without any information on taxpayers' identities. We estimate the response of taxpayers by comparing between income groups instead of comparing individual taxpayers.

Elasticity Results

The elasticity results in this dissertation present labor supply elasticity from the socio-economic household survey data (Susenas) and reporting elasticity from the income tax return data. The labor/leisure choice model in the theoretical chapter shows the ambiguity of labor

supply decision with respect to a change in marginal tax rate. Empirical results of labor supply elasticity provide evidence to support the theoretical model. Recall, Rochjadi and Leuthold (1994) found that labor supply elasticity in Indonesia to range from -0.2 to -0.6 for the uncompensated elasticities and from 0.33 to 0.58 for compensated elasticities.¹⁸ These elasticities are small but still comparable to labor supply elasticities in developed countries.

Table 5. Labor Supply Elasticity 2004, by Income Group

Income Group	Elasticity
1	-0.05
2	-0.22
3	-0.2
4	-1.05

Source: Author's own calculations

Table 5 presents labor supply elasticities by income group. We estimate the change in number of yearly hours worked with respect to the change in marginal tax rate. The data for the elasticities are from the household survey data (Susenas) for 2004. We created four income groups based on tax bracket.¹⁹ The elasticity results in Table 5 show that the lowest income group is the least responsive among the income groups, while the highest income group is the most responsive to the change in marginal tax rate. The overall labor supply elasticity for 2004 ranged from -0.05 to -1.05. The elasticity for low-income groups is very small given that we used data on taxpayers who have a very limited ability to change their number of hours worked when the marginal tax rate changes. On the other hand, the labor supply elasticity for the highest income group is relatively large, -1.05, compared to other

¹⁸ Note that compensated elasticity takes into account the change in income, while uncompensated elasticity does not take into account the change in income. Our elasticities are the totals from household survey data and income tax return data.

¹⁹ There are five income tax brackets under current law, but we created only four income groups since there are no observations for the income group above IDR 200 million (\$22,222.22).

income groups. Previous studies on labor supply elasticity in Indonesia excluded employees and laborers from the estimation regarding the rigidity in number of hours worked.²⁰ We also calculated reporting income elasticities by income groups for 2004; results ranged as follows: 1.4 for the lowest income group, 0.76 for the income group between IDR 25 million (\$2,778) and IDR 50 million (5,556), 0.63 for the income group between IDR 50 million and IDR 100 million (11,111), and 0.9 for the highest income group. The reporting elasticities are all bigger than the labor supply elasticity. The decision of taxpayers to report their income is a broader decision and more responsive to the change in marginal tax rate.

Table 6. Total Labor Supply Elasticity

	Employee/Laborer		All Types of Jobs	
	1999	2004	1999	2004
Elasticity	-0.1	-0.2	-0.27	-0.78

Source: Author's own calculations

Table 6 shows elasticities of employees and laborers for 1999 and 2004.²¹ For employees or laborers, the elasticity for 1999 and 2004 was smaller than the labor supply elasticity for the same years for all types of jobs, given that employees and laborers do not have much control over their number of hours worked. The total reporting income elasticity for 1999 was 0.02, which is very small compared to the labor supply elasticity for the same year. For 2004, the reporting income elasticity was 1.34, which was larger than the labor supply elasticity. The labor supply and reporting income elasticities were smaller for 1999 under the previous law, which had a higher marginal tax rate than the current one. Under

²⁰ See Rochjadi and Leuthold (1994) for more information on their labor supply elasticity estimation.

²¹ Susenas only provides income modules every two or three years. The income module contains information on household wages and expenditures. The Susenas data that we have are for 1998–2004. The income module is available for 1999, 2002, and 2004.

current law, the elasticities are larger, even though some income groups experienced large reductions in MTR, because the highest income group suffered from an increase in their marginal tax rate from 30 percent to 35 percent.

Comparing labor elasticity and reporting elasticity results, we conclude that changes in marginal tax rate reduce the amount of labor supply but increase the amount of reporting income.²² These results support the elasticities results found by Rochjadi and Leuthold (1994), which was negative for labor supply uncompensated elasticity, without taking into account changes in income. The reporting income elasticities for 1999 and 2004 were positive, which suggests that an increase in marginal tax rate increased the compliance decision. Tax enforcement programs by the central government and tax authorities are one reason for the increase in compliance over time.

For the dynamic microsimulation model, we used reporting income elasticities. The dynamic microsimulation in this dissertation is a dynamic income behavior simulation. The elasticity is calculated from income tax return reporting. We calculate the elasticity rate from the percentage change in taxable income with respect to the percentage change in marginal tax rate. Compared to the elasticities results from the survey data, reporting income elasticities are relatively larger. The labor supply elasticities for 1999 and 2004 from the survey data show smaller results, ranging from -1.05 to -0.05, as compared to reporting elasticities from the income tax return data for 1998 and 2006, which ranged from -1.77 to 0.4. As suggested by previous literature on labor supply elasticities and reporting income elasticities, both results show that high-income groups are more elastic compared to lower-income groups.

²² Note that our elasticities result on labor supply shows negative sign, and results on reporting income are positive.

Table 7. Taxable Income Elasticity 1998 and 2006, by Income Groups

Income Group	Elasticity
1	0.21
2	0.40
3	0.26
4	0.27
5	0.20
6	0.18
7	0.32
8	0.28
9	-0.10
10	-1.77

Source: Author's own calculations

Table 7 shows reporting income elasticity for 1998 and 2006. The elasticity varies from -1.77 for elasticity on the highest income group to 0.4 for the second-lowest income group. These elasticities are smaller than results achieved by Alm and Wallace (2007) using a cross-section of data for the United States in 1995. They obtained reporting income elasticities from -1.53 to -3.69 for three different income types. Previous literature shows that the elasticity of taxable income varies around the world. Hansson (2004) found the elasticity of taxable income in Sweden to range from 0.4 to 0.5. Kopczuk (2004) found elasticity ranging from 0.088 to 0.156 and also stated that higher-income groups are more responsive than lower-income groups. Thomas (2007) found elasticity in New Zealand ranging from 0.35 to 1.1. Our elasticity results are comparable to those elasticities from previous studies. The highest income group has the highest elasticity, meaning that taxpayers in the highest income group are more responsive to the change in MTR compared to those in the lower income group, with elasticity close to zero.

Microsimulation Results

Static and Dynamic Microsimulation

The microsimulation model in this dissertation was designed to address government income tax revenues from withholding income under current and proposed scenarios, to estimate the distribution of income tax burden among income groups, and to discuss the number of *winner*s and *loser*s under each proposed scenario. We proposed several scenarios that were discussed by the tax authorities for the near future income tax amendment, and we also propose a flat income tax scenario. The static microsimulation does not take into account reporting response by taxpayers. The dynamic behavior microsimulation includes reporting income elasticity into the tax calculator. We are expecting different results between static and dynamic behavior microsimulations given the inclusion of reporting income elasticity.

In the following subsection we present the proposed scenarios and microsimulation results, including results for income tax liabilities, which represent government income tax collection from withholding income; the income tax burden across income groups, defined as income tax liability divided by total reporting income; and the change in tax liabilities, calculated as the new liability (liability under proposed scenario) minus the current liability (liability under current law). *Winner*s under each scenario are taxpayers with reductions in tax liabilities, which will have a negative calculation on the tax change, while *loser*s are taxpayers with an increase in tax liability, which will have a positive calculation on the tax change.

Scenario I

In this scenario we change the MTR and reduce the number of income groups from five to four. The personal exemptions stay the same.

Table 8. Current and Proposed Scenario I Marginal Tax Rate, by Income Group²³

Current MTR		Proposed MTR	
Income Group	MTR	Income Group	MTR
<=25m(\$2,777.78)	5%	<=50m(\$5,555.56)	5%
>25m<=50m(\$5,555.56)	10%	>50m<=100m(\$11,111)	15%
>50m<=100m(\$11,111)	15%	>100m<=200m(\$22,222.22)	25%
>100m<=200m(\$22,222.22)	25%	>200m	35%
>200m	35%		

Source: Directorate General of Taxation (2007), all in million rupiahs

Table 8 shows that the proposed scenario is slightly different from the current MTR. The second-lowest income group under current law is diminished into one income group with a statutory MTR of 5 percent. The rest of the income groups are not affected by the change in MTR. This scenario is expected to attract more taxpayers in the low-middle-income group with taxable income between IDR 25 million (\$2,778) and IDR 50 million (\$5,556) to comply with tax-compliance rules. In the income tax return dataset, most taxpayers are either in the lowest or in the second-lowest income group. Based on this fact, another purpose of this scenario is to ease the burden of lower-middle-income taxpayers. We expect that the distribution of income tax burden under this scenario will be slightly different from the current scenario and that diminishing one income group will reduce the total amount of government income tax revenue.

²³ See Chapter I for personal exemptions under current law. Under the first proposed scenario, we use the same personal exemptions as current law. The proposed marginal tax rate was quoted from the Directorate General of Taxation's website available at www.pajak.go.id, accessed on 23 November 2007.

Table 9. Static Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario

Income Group	Base Scenario			Scenario I		
	Sum Liabilities	PctSum (%)	Mean Burden	Sum Liabilities	PctSum (%)	Mean Burden
1	134,001,139,628	6.79	0.01	134,001,139,652	9.14	0.01
2	121,800,576,458	6.17	0.04	99,255,792,051	6.77	0.03
3	135,998,556,580	6.89	0.06	82,224,658,274	5.61	0.04
4	117,963,406,663	5.98	0.08	57,883,290,248	3.95	0.04
5	181,027,961,028	9.17	0.11	96,887,541,567	6.61	0.06
6	167,264,911,746	8.48	0.14	95,084,250,845	6.49	0.08
7	221,084,367,448	11.20	0.18	140,669,947,654	9.59	0.11
8	149,046,370,900	7.55	0.23	100,424,732,280	6.85	0.15
9	173,594,508,740	8.80	0.26	130,012,188,124	8.87	0.19
10	571,355,070,208	28.96	0.30	529,669,766,904	36.13	0.27
Total	1,973,136,869,398	100.00	0.03	1,466,113,307,598	100.00	0.02

Table 9 presents static microsimulation results for the base scenario and scenario I. The results show that, under scenario I, all income groups experienced reduction on their nominal income tax liabilities, but the share of income tax liabilities for income groups 1, 2, 9, and 10 are more under this scenario. Government income tax collection loss under scenario I shows a significant number, from IDR 1, 973 billion (\$219 million) to IDR 1, 466 billion (\$162 million). The income tax burden for all income groups was slightly reduced compared to the current scenario. Under this set of scenarios, diminishing one income tax bracket eases the burden for all income groups by a small amount, but the drawback is significant loss of government income tax revenue. There are some taxpayers that suffer from paying more income taxes (losers) for the two lowest income groups under this scenario. There are 108, 296 losers and 547, 298 winners in the lowest income group and 2, 779 losers and 109, 208

winners in the second-lowest income group.²⁴ The total number of winners under this scenario is larger than the total number of losers. This scenario does not ease the burden of lower-income groups because some taxpayers in the first and second income groups are considered losers.

Table 10. Dynamic Behavior Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario I

Income Group	Base Scenario			Scenario I		
	Liabilities		Burden	Liabilities		Burden
	Sum	PctSum(%)	Mean	Sum	PctSum(%)	Mean
1	134,001,139,628	6.79	0.014	1.48071E+11	12.28	0.015
2	121,800,576,458	6.17	0.039	79,404,633,636	6.58	0.026
3	135,998,556,580	6.89	0.062	75,169,782,592	6.23	0.034
4	117,963,406,663	5.98	0.082	52,725,889,097	4.37	0.037
5	181,027,961,028	9.17	0.106	77,356,786,166	6.41	0.045
6	167,264,911,746	8.48	0.143	81,156,368,321	6.73	0.069
7	221,084,367,448	11.20	0.177	126,091,032,144	10.45	0.100
8	149,046,370,900	7.55	0.225	93,210,144,404	7.73	0.141
9	173,594,508,740	8.80	0.258	126,309,462,760	10.47	0.186
10	571,355,070,208	28.96	0.303	346,733,618,192	28.75	0.169
Total	1,973,136,869,398	100.00	0.03	1,206,228,976,634	100.00	0.022

Table 10 shows that taking into account taxpayers' income reporting behavior yields a larger reduction in the total government income tax collection as compared to the static microsimulation. The total government income tax collection loss under this scenario is IDR 766 billion (\$ 85 million).²⁵ The share of income tax burden for the lowest income group is 1.5 percent, which is slightly higher than under the current scenario, while the share of income tax burden for other income groups reduced under this scenario as compared to the

²⁴ See Appendix C4

²⁵ See Table 24.

current scenario. There are no winners for the lowest income group under this scenario. All winners (246,749) from this scenario are from income groups two through ten, while all taxpayers in income group 1 are losers.²⁶ The total number of losers was greater than the number of winners in this scenario, with the lowest-income group paying more of the income tax burden. Overall, this scenario is considered regressive and less equitable, and it generates a large amount of government revenue loss.

Scenario II

This scenario proposes the same marginal tax rate as Scenario I, with a change in the personal exemptions rate.

Table 11. Proposed Scenario II Marginal Tax Rate and Exemptions, by Income Group²⁷

Proposed Exemptions		Proposed MTR	
	Exemptions	Income groups	MTR
For each taxpayer	IDR 39.6 million (\$4,400)	<=50 million (\$5,556)	5%
Additional married	IDR 3.6 million (\$400)	>50million<=100million (\$11,111)	15%
Additional for married woman with unrelated job with her spouse	IDR 39.6 million (\$4,400)	>100 million<=200 million (\$22,222)	25%
Additional for each dependents	IDR 3.6 million (\$400)	>200 million	35%

Source: Directorate General of Taxation (2007)

In this scenario, we impose an increase in personal exemption by three times the current rate. We increase the personal exemptions to ease the burden of lower-income groups. Under this scenario, it is expected that the distribution of burden will shift to higher-income groups. The drawback of this scenario is that government income tax collection will be reduced by a greater amount than under scenario I.

²⁶ See Table 25 at the end of this section.

²⁷ See Chapter I for personal exemptions under current law. Under the first proposed scenario, we use the same personal exemptions as current law. The proposed marginal tax rate was quoted from the Directorate General of Taxation's website, www.pajak.go.id, accessed on 23 November 2007.

Table 12. Static Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario II

Income Group	Base Scenario			Scenario II		
	Sum Liabilities	PctSum (%)	Mean Burden	Sum Liabilities	PctSum (%)	Mean Burden
1	134,001,139,628	6.79	0.01	0	0.00	0.00
2	121,800,576,458	6.17	0.04	11,912,803,121	1.17	0.00
3	135,998,556,580	6.89	0.06	36,180,990,973	3.57	0.02
4	117,963,406,663	5.98	0.08	34,522,539,488	3.40	0.02
5	181,027,961,028	9.17	0.11	53,037,015,222	5.23	0.03
6	167,264,911,746	8.48	0.14	63,120,031,186	6.22	0.05
7	221,084,367,448	11.20	0.18	103,360,797,008	10.18	0.08
8	149,046,370,900	7.55	0.23	84,449,483,950	8.32	0.13
9	173,594,508,740	8.80	0.26	114,155,181,476	11.25	0.17
10	571,355,070,208	28.96	0.30	514,110,277,288	50.66	0.26
Total	1,973,136,869,398	100.00	0.030	1,014,849,119,711	100.00	0.006

In the static microsimulation for scenario II, government income tax revenue reduced by a significant amount. The total income tax revenue loss under this scenario is the largest compared to the other scenarios. The share of income tax liabilities borne by the highest-income group increased by a significant rate, from 28.96 percent to 50.66 percent. The income tax burden shifted to middle- and high-income groups, while lower-income groups bear almost none of the income tax burden under this scenario. All income groups are winners under this scenario, which means that all taxpayers pay fewer taxes. The increase in personal exemptions by three times of the current rate is considered very large and will affect the government income tax collection by a greater amount compared to scenario I.

Table 13. Dynamic Behavior Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario II

Income Group	Base Scenario			Scenario II		
	Liabilities		Burden	Liabilities		Burden
	Sum	PctSum(%)	Mean	Sum	PctSum(%)	Mean
1	134,001,139,628	6.79	0.014	0	0.00	0
2	121,800,576,458	6.17	0.039	9,530,242,497	1.21	0.003
3	135,998,556,580	6.89	0.062	33,076,661,943	4.19	0.015
4	117,963,406,663	5.98	0.082	31,446,581,210	3.98	0.022
5	181,027,961,028	9.17	0.106	46,181,618,061	5.84	0.027
6	167,264,911,746	8.48	0.143	52,068,928,343	6.59	0.044
7	221,084,367,448	11.20	0.177	93,201,867,889	11.79	0.074
8	149,046,370,900	7.55	0.225	77,981,898,684	9.87	0.117
9	173,594,508,740	8.80	0.258	110,975,930,980	14.04	0.163
10	571,355,070,208	28.96	0.303	335,776,174,592	42.49	0.16
Total	1,973,136,869,398	100.00	0.03	790,239,904,198	100.00	0.005

Table 13 shows that, under the reporting behavior microsimulation, increasing personal exemptions by three times the current rate generates a very large reduction in total government revenue—only IDR 790 billion (\$ 87 million). The total government revenue loss is IDR 1,182 billion (\$ 131 million). The lowest-income group is not entitled to any liabilities under this scenario, and the share of tax burden for all income groups is very low. The two lowest-income groups bear no burden under this scenario. The income tax burden is shifted to the two highest-income groups. There are no losers under this scenario. This scenario eases the burden of lower-income groups. Greatly increasing personal exemptions while keeping the same marginal tax rate for all income groups yields a very large governmental revenue loss but has the advantage of shifting the income tax burden to higher-income groups. As mentioned in the introduction, income-tax revenue contributes the largest amount to the total government revenue from taxation. Implementing this scenario would generate a very large

reduction in total government revenue. The drawback of this scenario is the trade-off between government revenue and income tax burden.

Scenario III

This scenario proposes a similar marginal tax rate as in scenario I, except for the highest-income group. Under this scenario, the marginal tax rate for the highest-income group was reduced from 35 percent to 30 percent. The 10 percent income tax bracket is diminished, and the personal exemptions rate is the same as the current rate.

Table 14. Current and Proposed Scenario III Marginal Tax Rate, by Income Group

Current MTR		Proposed MTR	
Income groups	MTR	Income groups	MTR
<=25m (\$2,777.78)	5%	<=50m (\$5,555.56)	5%
>25m<=50m (\$5,555.56)	10%	>50m<=250m (\$27,777.78)	15%
>50m<=100m (\$11,111)	15%	>250m<=500m (\$55,555.56)	25%
>100m<=200m (\$22,222.22)	25%	>500m	30%
>200m	35%		

Source: Directorate General of Taxation (2007), all in million rupiahs

The reason for reducing the MTR for the highest-income group is to make the rate comparable with the corporate income tax rate. Considering the current MTR for corporate income tax ranges between 10 percent and 30 percent, the highest marginal tax rate was reduced to 30 percent to avoid income shifting.²⁸ Another reason for decreasing the highest marginal tax rate is to improve the reporting decision among the affluent. Without any changes in the personal exemptions rate, it is expected that the total amount of government income tax collection under this scenario will be reduced by a less significant amount as compared to scenario II.

²⁸ Note that there is a possibility of a flat 30 percent corporate income tax rate implemented at the same time as the new marginal tax rate for individual income tax.

Table 15. Static Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario III

Income Group	Base Scenario			Scenario III		
	Sum Liabilities	PctSum (%)	Mean Burden	Sum Liabilities	PctSum (%)	Mean Burden
1	134,001,139,628	6.79	0.01	134,001,139,652	10.49	0.01
2	121,800,576,458	6.17	0.04	99,255,792,051	7.77	0.03
3	135,998,556,580	6.89	0.06	82,224,658,274	6.44	0.04
4	117,963,406,663	5.98	0.08	57,883,290,248	4.53	0.04
5	181,027,961,028	9.17	0.11	96,887,541,567	7.59	0.06
6	167,264,911,746	8.48	0.14	95,084,250,845	7.45	0.08
7	221,084,367,448	11.20	0.18	122,305,968,580	9.58	0.10
8	149,046,370,900	7.55	0.23	74,618,839,382	5.84	0.11
9	173,594,508,740	8.80	0.26	89,085,836,586	6.98	0.13
10	571,355,070,208	28.96	0.30	425,496,183,480	33.32	0.21
Total	1,973,136,869,398	100.00	0.030	1,276,843,500,664	100.00	0.022

Under this scenario, the total income tax liabilities reduced from IDR 1,973 billion (\$219 million) to IDR 1,276 billion (\$ 141 million). The percentage share of income tax liabilities for the two lowest-income groups increases from 6.79 percent to 10.49 percent and from 6.17 percent to 7.77 percent, respectively. Similar to scenario I, this scenario contains losers in the two lowest-income groups.²⁹ Under this scenario, the income tax burden for high-income groups was reduced by a significant rate.

²⁹ See Appendix C4.

Table 16. Dynamic Behavior Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario III

Income Group	Base Scenario			Scenario III		
	Liabilities		Burden	Liabilities		Burden
	Sum	PctSum(%)	Mean	Sum	PctSum(%)	Mean
1	134,001,139,628	6.79	0.014	1.48071E+11	14.03	0.015
2	121,800,576,458	6.17	0.039	79,404,633,636	7.52	0.026
3	135,998,556,580	6.89	0.062	75,169,782,592	7.12	0.034
4	117,963,406,663	5.98	0.082	52,725,889,097	5.00	0.037
5	181,027,961,028	9.17	0.106	77,356,786,166	7.33	0.045
6	167,264,911,746	8.48	0.143	81,156,368,321	7.69	0.069
7	221,084,367,448	11.20	0.177	113,237,950,367	10.73	0.091
8	149,046,370,900	7.55	0.225	70,290,086,590	6.66	0.106
9	173,594,508,740	8.80	0.258	86,593,125,506	8.21	0.128
10	571,355,070,208	28.96	0.303	271,229,917,448	25.70	0.124
Total	1,973,136,869,398	100.00	0.03	1,055,235,799,045	100.00	0.022

Table 16 shows that the lowest-income group bears more income tax liabilities under this scenario as compared to the current scenario. As in scenario I, changing the marginal tax rate without changing the current personal exemptions yields a revenue loss, and the lowest income group is the only group that suffers from higher income tax liabilities. The lowest income group bears 14.03 percent of the total income tax liabilities as compared to 6.79 percent under the current scenario. Under this scenario, the largest share of income tax burden is borne by income groups 7, 8, 9, and 10. Overall, the share of income tax burden for all income groups reduced, except for the lowest-income group. There are no winners in the lowest-income group. All taxpayers in the lowest-income group pay more income tax liability under this scenario. The total government revenue loss is greater as compared to scenario I,

given that under this scenario the marginal tax rate for the highest-income group reduced from 35 percent to 30 percent.

Scenario IV

This scenario proposes the same marginal tax rate as Scenario III. In this scenario, there is a 20 percent increase in the personal exemptions rate. Personal exemptions are not indexed to inflation. The inflation rate in Indonesia was around 7.37 percent as of June 2008, an increase of 20 percent in the personal exemptions rate is considered suitable.³⁰

Table 17. Proposed Scenario IV Marginal Tax Rate and Exemptions, by Income Group

Proposed Exemptions		Proposed MTR	
	Exemptions	Income Group	MTR
For each taxpayer	IDR 15.84 million (\$1,760)	<=50million (\$5,556)	5%
Additional married	IDR 1.44 million (\$160)	>50million<=250million (\$27,778)	15%
Additional for married woman with unrelated job from her spouse	IDR 15.84 million(\$1,760)	>250million<=500million (\$55,556)	25%
Additional for each dependent	IDR 1.44 million (\$160)	>500million	30%

This scenario is based on the planned scenario by the tax authorities. By increasing the personal exemptions rate, it is expected that the distribution of income tax burden will shift to higher-income groups. This scenario will be implemented in the near future as the new individual income tax law.³¹ The drawback of this scenario is that the increase in personal exemption plus the reduction in the highest marginal tax rate will reduce income tax collection and government revenue from individual income tax.

³⁰ Indonesian Statistical Bureau, <http://www.bps.go.id/sector/cpi/table1.shtml> Accessed July, 2008

³¹ See the announcement from the Directorate General of Taxation, http://www.pajak.go.id/index.php?option=com_content&view=article&id=7026:Siaran%20Pers%20RUU%20PPh&catid=89:pressrelease&Itemid=174. Accessed July 21, 2008.

Table 18. Static Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario IV

Income Group	Base Scenario			Scenario IV		
	Sum Liabilities	PctSum (%)	Mean Burden	Sum Liabilities	PctSum (%)	Mean Burden
1	134,001,139,628	6.79	0.01	88,617,518,080	7.38	0.01
2	121,800,576,458	6.17	0.04	89,846,884,155	7.49	0.03
3	135,998,556,580	6.89	0.06	77,620,293,177	6.47	0.04
4	117,963,406,663	5.98	0.08	55,547,215,997	4.63	0.04
5	181,027,961,028	9.17	0.11	90,876,423,484	7.57	0.05
6	167,264,911,746	8.48	0.14	91,887,826,579	7.66	0.08
7	221,084,367,448	11.20	0.18	119,768,862,310	9.98	0.10
8	149,046,370,900	7.55	0.23	73,660,325,044	6.14	0.11
9	173,594,508,740	8.80	0.26	88,024,999,536	7.33	0.13
10	571,355,070,208	28.96	0.30	424,218,250,320	35.35	0.21
Total	1,973,136,869,398	100.00	0.030	1,200,068,598,681	100.00	0.018

Under scenario IV, the total income tax liability is reduced by IDR 773 billion (\$85 million). The share of income tax liability for lower-income groups is increased, although the sum of income tax liability for each income group is reduced. The income tax burden under this scenario is more equally distributed. The high-income groups experience a large reduction in their income tax burden. Implementing this scenario would reduce the government income tax collection but would ease the burden of all income groups. Comparing this scenario with scenario III, high-income groups bear more of the burden owing to an increase in the personal exemption rate by 20 percent, even though there is also a reduction in this group's marginal tax rate.

Table 19. Dynamic Behavior Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario IV

Income Group	Base Scenario			Scenario IV		
	Liabilities		Burden	Liabilities		Burden
	Sum	PctSum(%)	Mean	Sum	PctSum(%)	Mean
1	134,001,139,628	6.79	0.014	97922357474	10.00	0.009
2	121,800,576,458	6.17	0.039	71,877,507,320	7.34	0.023
3	135,998,556,580	6.89	0.062	70,960,472,021	7.25	0.032
4	117,963,406,663	5.98	0.082	50,597,959,066	5.17	0.035
5	181,027,961,028	9.17	0.106	73,100,484,385	7.47	0.043
6	167,264,911,746	8.48	0.143	78,247,622,119	7.99	0.067
7	221,084,367,448	11.20	0.177	110,836,427,096	11.32	0.089
8	149,046,370,900	7.55	0.225	69,376,392,544	7.09	0.105
9	173,594,508,740	8.80	0.258	85,495,022,212	8.74	0.126
10	571,355,070,208	28.96	0.303	270,347,588,064	27.62	0.123
Total	1,973,136,869,398	100.00	0.03	978,761,832,301	100.00	0.017

Table 19 shows that implementing scenario IV yields a total income tax liability of IDR 978 billion (\$ 109 million). The total government revenue loss under the dynamic behavior microsimulation is IDR 994 billion (\$104 million). Income groups 1, 2, and 3 bear the larger share of the income tax burden under this scenario as compared to in the current scenario. The share of income tax liability borne by the lowest-income group under this scenario is 10 percent, while under the current scenario it is only 6.79 percent. The income tax burden was reduced for all income groups. Income groups 8, 9, and 10 bear 35.4 percent of the income tax burden. This scenario will be implemented in the near future as the fourth amendment of income tax law no. 7/1983. The benefit of implementing this scenario is the progressivity of income tax burden across income groups. There are no losers under this scenario. All taxpayers are winners meaning that under this scenario taxpayer are given less

income tax liability. There is an anomaly under this scenario; although all income groups are winners, the share of income tax liability for lower-income groups is higher under this scenario as compared to the current scenario. The drawback in this scenario is the significant reduction in total government revenue. Increasing the personal exemptions rate by 20 percent, while reducing the marginal tax rate for the highest-income group, is expected to encourage taxpayers to report more of their income and to consume more.

Scenario V

This scenario is a flat income tax scenario. In this scenario we increase the personal exemption three times from the current exemption and set a flat rate of 25 percent for all income groups. Individual income tax has always been progressive in Indonesia, but the corporate income tax was once a flat rate.

Table 20. Proposed Scenario V Marginal Tax Rate

Proposed Exemptions and MTR		
Income Group	Exemptions	MTR
All Income Groups	Single IDR 39.6 million(\$4,400)	25%
	Additional married IDR 3.6 million(\$400)	
	Additional for married woman with unrelated job from her spouse IDR 39.6 million (\$4,400)	
	Additional for each dependent IDR 3.6 milion (\$400), max 3 dependents	

It is expected that under a flat rate with high personal exemption the income tax burden on lower-income groups will be shifted to higher-income groups. A flat individual income tax rate is not popular in developing countries like Indonesia. In terms of tax

liabilities, imposing a flat rate on all income groups is expected to ease the liabilities for high-income groups as compared to the current rate.

Table 21. Static Microsimulation: Sum and Percentage Sum of Income Tax Liabilities and Mean Income Tax Burden Base Scenario and Scenario V

Income Group	Base Scenario			Scenario V		
	Sum Liabilities	PctSum (%)	Mean Burden	Sum Liabilities	PctSum (%)	Mean Burden
1	134,001,139,628	6.79	0.01	0	0.00	0.00
2	121,800,576,458	6.17	0.04	59,564,015,610	3.25	0.02
3	135,998,556,580	6.89	0.06	180,904,954,870	9.88	0.08
4	117,963,406,663	5.98	0.08	172,612,697,397	9.43	0.12
5	181,027,961,028	9.17	0.11	255,342,903,849	13.95	0.15
6	167,264,911,746	8.48	0.14	204,650,051,949	11.18	0.18
7	221,084,367,448	11.20	0.18	240,524,866,026	13.14	0.19
8	149,046,370,900	7.55	0.23	138,314,483,950	7.56	0.21
9	173,594,508,740	8.80	0.26	147,641,345,992	8.07	0.22
10	571,355,070,208	28.96	0.30	430,946,625,240	23.54	0.24
Total	1,973,136,869,398	100.00	0.030	1,830,501,944,883	100.00	0.021

Under this scenario, total income tax liabilities reduced the least as compared to other scenarios. Middle-income groups bear more of the burden than in the current scenario. The share of income tax liability for income groups 3, 4, 5, 6, and 7 increased, and the income tax burden for these income groups also increased. These income groups are the losers, while other income groups are winners. Middle-income groups bear the burden of a flat income tax scenario. This scenario yields more income tax revenue for the government, but the distribution of burden under this scenario is less equitable as compared to other scenarios.

Table 22. Dynamic Behavior Microsimulation: Sum, Percentage Sum of Income Tax Liabilities, and Mean Income Tax Burden Base Scenario and Scenario V

Income Group	Base Scenario			Scenario V		
	Liabilities		Burden	Liabilities		Burden
	Sum	PctSum(%)	Mean	Sum	PctSum(%)	Mean
1	134,001,139,628	6.79	0.014	0	0.00	0
2	121,800,576,458	6.17	0.039	47,651,212,483	2.99	0.014
3	135,998,556,580	6.89	0.062	165,383,309,774	10.37	0.075
4	117,963,406,663	5.98	0.082	157,232,906,054	9.86	0.109
5	181,027,961,028	9.17	0.106	229,808,613,455	14.41	0.135
6	167,264,911,746	8.48	0.143	186,231,547,243	11.68	0.160
7	221,084,367,448	11.20	0.177	227,671,217,148	14.28	0.183
8	149,046,370,900	7.55	0.225	131,846,898,684	8.27	0.200
9	173,594,508,740	8.80	0.258	145,175,735,620	9.10	0.216
10	571,355,070,208	28.96	0.303	303,563,112,068	19.04	0.165
Total	1,973,136,869,398	100.00	0.030	1,594,564,552,530	100.00	0.019

Table 22 shows that the total income tax liability under a flat tax rate yields the lowest government revenue loss as compared to other scenarios. The total government revenue loss under this scenario is IDR 378 billion (\$42 million). If the personal exemption rate is increased by three times the current rate, the lowest-income group bears no liabilities under a flat income tax rate. The income tax burden shifts to the middle-income groups. Income groups 3, 4, 5, 6, and 7 bear more of the burden under this scenario as compared to the current scenario. The total number of winners is still greater than the number of losers. There are losers in income groups 2 through 7. The burden is not equally distributed. The burden is greater for the middle-income groups as compared to high-income groups. The advantage of this scenario is that the government would be able to maintain its revenue, given that the reduction in income tax liabilities is smaller than as compared to a progressive income tax

rate. The drawback of this scenario is that most of the income tax burden is borne by low- and middle-income groups, which are also the largest. Thus, implementing a flat tax rate of 25 percent could make most taxpayers worse off than under the current scenario.

Conclusion

The microsimulation shows different results between static and dynamic behavior. Results for static microsimulations in all scenarios show smaller government revenue losses as compared to the dynamic behavior microsimulations.

The results for both static and dynamic behavioral microsimulations show that changing the marginal tax rate or the income tax bracket without any changes in the personal exemptions yields a lower government income tax collection loss at a cost of a greater income tax burden for lower-income groups. Under scenarios I and III, taxpayers in income group 1 are all losers, which suggests that these income groups suffer from more income tax liability. Increasing the personal exemptions and reducing the marginal tax rate for the highest-income group in scenarios II and IV generates greater government income tax collection loss as compared to scenarios I and III. Under scenarios II and IV, all income groups are considered winners, which imply that taxpayers in all income groups pay less income tax liability. Under flat income tax scenario V, the government income tax collection loss is the least as compared to other proposed scenarios. The income tax burden under this scenario is shifted to the lower- and middle-income groups. Income groups 3, 4, 5, 6, and 7 are losers under this scenario. These income groups suffer from paying more income tax liability under a flat income tax scenario.

In the near future, the tax authorities will implement scenario IV as the fourth amendment to income tax law no. 7/1983. There will be four income tax brackets, personal exemptions will increase 20 percent over the current rate, and the marginal tax rate of the highest income group will be reduced from 35 percent to 30 percent. Under this scenario, the government will suffer from a large income tax revenue loss, but all income groups will be better off in terms of sharing the income tax burden. All income groups bear a smaller burden under this scenario, but in terms of income tax liability the three lowest-income groups bear larger shares of income tax liability. There is a trade-off between government income tax collection and the income tax burden. Due to the increase in personal exemptions and the reduction in the marginal tax rate of the highest-income group, it is expected that implementing this scenario will encourage taxpayers' reporting decision.

Table 23. Static Microsimulation, New Minus Current Tax Liabilities

Income Group	Scenario I		Scenario II		Scenario III		Scenario IV		Scenario V	
	Sum	PctSum	Sum	PctSum	Sum	PctSum	Sum	PctSum	Sum	PctSum
1	24	0.00	-134,001,139,628	13.98	24	0.00	-45,383,621,548	5.87	-134,001,139,628	93.95
2	-22,544,784,407	4.45	-109,887,773,337	11.47	-22,544,784,407	3.24	-31,953,692,303	4.13	-62,236,560,848	43.63
3	-53,773,898,306	10.61	-99,817,565,607	10.42	-53,773,898,306	7.72	-58,378,263,403	7.55	44,906,398,290	-31.48
4	-60,080,116,415	11.85	-83,440,867,175	8.71	-60,080,116,415	8.63	-62,416,190,666	8.07	54,649,290,734	-38.31
5	-84,140,419,461	16.59	-127,990,945,806	13.36	-84,140,419,461	12.08	-90,151,537,544	11.66	74,314,942,821	-52.10
6	-72,180,660,901	14.24	-104,144,880,560	10.87	-72,180,660,901	10.37	-75,377,085,167	9.75	37,385,140,203	-26.21
7	-80,414,419,794	15.86	-117,723,570,440	12.28	-98,778,398,868	14.19	-101,315,505,138	13.11	19,440,498,578	-13.63
8	-48,621,638,620	9.59	-64,596,886,950	6.74	-74,427,531,518	10.69	-75,386,045,856	9.75	-10,731,886,950	7.52
9	-43,582,320,616	8.60	-59,439,327,264	6.20	-84,508,672,154	12.14	-85,569,509,204	11.07	-25,953,162,748	18.20
10	-41,685,303,304	8.22	-57,244,792,920	5.97	-145,858,886,728	20.95	-147,136,819,888	19.03	-140,408,444,968	98.44
Total	-507,023,561,800	100.00	-958,287,749,687	100.00	-696,293,368,734	100.00	-773,068,270,717	100.00	-142,634,924,515	100.00

Table 24. Dynamic Behavior Microsimulation, New minus Current Tax Liabilities

Income Group	Scenario I		Scenario II		Scenario III		Scenario IV		Scenario V	
	Sum	PctSum	Sum	PctSum	Sum	PctSum	Sum	PctSum	Sum	PctSum
1	14,070,119,695	-1.83	-134,001,139,628	11.33	14,070,119,695	-1.53	-36,078,782,154	3.63	-134,001,139,628	35.40
2	-42,395,942,822	5.53	-112,270,333,961	9.49	-42,395,942,822	4.62	-49,923,069,138	5.02	-74,149,363,975	19.59
3	-60,828,773,988	7.93	-102,921,894,637	8.70	-60,828,773,988	6.63	-65,038,084,559	6.54	29,384,753,194	-7.76
4	-65,237,517,566	8.51	-86,516,825,453	7.31	-65,237,517,566	7.11	-67,365,447,597	6.77	39,269,499,391	-10.37
5	-103,671,174,862	13.52	-134,846,342,967	11.40	-103,671,174,862	11.29	-107,927,476,643	10.85	48,780,652,427	-12.89
6	-86,108,543,425	11.23	-115,195,983,403	9.74	-86,108,543,425	9.38	-89,017,289,627	8.95	18,966,635,497	-5.01
7	-94,993,335,304	12.39	-127,882,499,559	10.81	-107,846,417,081	11.75	-110,247,940,352	11.09	6,586,849,700	-1.74
8	-55,836,226,496	7.28	-71,064,472,216	6.01	-78,756,284,310	8.58	-79,669,978,356	8.01	-17,199,472,216	4.54
9	-47,285,045,980	6.17	-62,618,577,760	5.29	-87,001,383,234	9.48	-88,099,486,528	8.86	-28,418,773,120	7.51
10	-224,621,452,016	29.29	-235,578,895,616	19.92	-300,125,152,760	32.70	-301,007,482,144	30.27	-267,791,958,140	70.74
Total	-766,907,892,764	100.00	-1,182,896,965,200	100.00	-917,901,070,353	100.00	-994,375,037,097	100.00	-378,572,316,868	100.00

Table 25. Dynamic Behavior Microsimulation Scenarios I and III, Number of Winners and Losers

Income Group	Winners	Losers
1	0	655594
2	111,987	
3	53,899	
4	26878	
5	23770	
6	11934	
7	9,476	
8	3,591	
9	2,665	
10	2,549	
Total	246,749	655,594

Table 26. Dynamic Behavior Microsimulation Scenario V, Number of Winners and Losers

Income Group	Winners	Losers
1	655,594	
2	105,810	6,177
3	10,406	43,493
4		26,878
5		23,770
6		11,934
7	2,848	6,628
8	3,591	
9	2,665	
10	2,549	
Total	783,463	118,880

CHAPTER VI

CONCLUSION AND POLICY RECOMMENDATION

In this dissertation we explored the impact of the change in individual income tax law on laborers and employees. We analyzed the income behavioral responses of taxpayers across different income groups, estimated the distribution of income tax burden, and calculated the amount of income tax liability under current and proposed laws.

Theoretically, we used an applicable labor/leisure choice model to explore the labor supply elasticities and reporting income elasticities. We developed a general labor/leisure choice model with the imposition of a progressive income tax into the budget constraint. The general labor/leisure choice model was adapted from the labor choice model frameworks developed in Varian 1982, Slemrod 2001, and Nicholson 2002. As an additional appeal to our theoretical framework, we also summarized a tax avoidance model by Alm and Wallace 2007a.

The empirical results for behavioral response suggest that taxpayers who experienced larger reductions in their marginal tax rate after the tax reform in 2000 reported more of their income relative to taxpayers who were least affected. Based on the household survey (Susenas) data for 1999 through 2004, the labor supply elasticity results suggest that an increase in marginal tax rate reduced the number of hours worked by laborers and employees. The reporting income elasticities results show that taxpayers in the highest-income groups are more responsive to changes in the marginal tax rate. These results are comparable to reporting income elasticity results in previous literature. Our labor supply elasticities from the household survey data ranged from -0.05 to -1.05, while our reporting income elasticities

from the taxpayers dataset ranged from 0.4 to -1.77. The reporting income elasticities are relatively larger than the labor supply elasticities. Recall that the reporting income data are collected from the Indonesian taxpayer's office. The reporting decision of taxpayers is a bigger decision than the labor supply decision, since laborers and employees do not have much control over their number of hours worked.

The microsimulation results suggest that using a static microsimulation yields smaller government income tax collection losses as compared to a dynamic behavior microsimulation. Under scenarios I and III, where there are no changes in the personal exemptions rate, the government income tax collection loss was smaller as compared to scenarios II and IV, where the personal exemptions rate increased by three times and 20 percent of the current rate, respectively.

The microsimulation results imply that, under a progressive income tax schedule, a small increase in personal exemptions without any significant changes in the marginal tax rate does not ease the income tax burden for lower-income groups. The income tax liabilities results show that, under a proposed flat rate scenario, government income tax revenue is higher than under other proposed scenarios with a progressive marginal tax rate but the income tax burden under this scenario would be highly unequal, where most of the income tax burden would be borne by the lower-middle income groups.

The overall empirical results could be translated into policy recommendations for the central government and tax authorities for future income tax reform, improving the individual income tax system in Indonesia. Our primary contribution to the empirical literature on individual income tax is the estimation of a combination between labor supply elasticity and reporting income elasticity for the dynamic income behavior microsimulation. Our second

contribution is a newly utilized microsimulation model that includes static and dynamic income behavior microsimulation. The microsimulation tax calculator gives us results for the income tax liabilities under current and proposed laws, the income tax burden across income groups under current and proposed laws, and the tax difference (or number of winners and losers) in each scenario.

Our empirical results have some implications for policy makers in Indonesia. Based on the behavioral response analyses, we argue that high-income taxpayers are more responsive to the change in their marginal tax rate, thus any changes on the income tax rate should consider the fact that changing the rate for high-income taxpayers would make more changes in reporting decisions and in labor supply decisions. From an equity point of view, the new scenario should ease the burden on the lowest-income group.

APPENDIX A
INCOME TAX IN INDONESIA

Table A1. Government Revenue 2001–2006, by Type of Tax

Tax	Year					
	2001	2002	2003	2004	2005	2006
				111,957.2	140,394.1	165,643.8
Income Tax	71,359.55	84,469.47	96,051.41	1	3	8
					101,295.1	123,032.5
VAT	55,857.25	65,243.73	76,760.78	87,567.31	6	7
Property Tax	6,663.91	7,985.77	10,906.12	14,680.02	19,613.78	23,895.55
Others	1,591.48	1,468.88	1,654.60	1,832.33	2,050.25	2,287.38
	135,472.1	159,167.8	185,372.9	216,036.8	263,353.3	314,859.3
Total	9	5	1	8	1	8

Source: Directorate General of Taxation (DGT), 2007

Note: \$1=IDR 9,000. All in billion rupiah.

Table A2. Income Tax Revenue by Type of Source, 2006

Type	Income Tax Revenue (in million Rupiah)	Share of Revenue (%)
Article 21	31,594,963.38 (\$3,510.55)	18.47
Article 22	4,044,272.26	2.36
Article 22 import	13,141,300.19	7.68
Article 23	15,413,008.30	9.01
Article 25/29 individual	1,815,310.53	1.06
Article 25/29 corporate	70,252,728.57	41.07
Article 26	10,619,311.07	6.21
Final and Fiscal	24,135,219.04	14.11
Others	42,352.57	0.02
Total Income Tax	171,058,465.91(\$19,006.5)	100.00

Source: Directorate General of Taxation (DGT), 2007

Note: \$1 = IDR 9,000

Table A3. Articles on Income Tax Law

Articles	Object
Article 21	Withholding income
Article 22	Corporate income tax
Article 22 import	Income tax from imported goods and services
Article 23	Dividend, rent, royalty
Article 25/29 (individual and corporate)	Real Income of individual/corporate at the end of tax year based on the amount of tax owed last year
Article 26	Income tax for expatriate either individual or corporate from income sources in Indonesia such as interest, dividend, royalty, rent, etc.
Final and Fiscal	Any income sources that are already taxed at the final stage, no need to report this under the individual income tax form. Fiscal is any tax that taxpayer pay when leaving the country

Table A4. Personal Exemptions 1983–2006, by Marital Status

Status	Year				
	1983–1991	1991–2000	2000–2004	2005	2006–2008
Single	960(\$106.67)	1,728(\$192)	2,880(\$320)	12,000(\$1,333.33)	13,200*
Additional Married	480(\$53.33)	864(\$96)	1,440(\$160)	1,200(\$133.33)	1,200
Add Married Woman	960(\$106.67)	1,728(\$192)	2,880(\$320)	12,000(\$1,333.33)	13,200
Additional Dependent	480(\$53.33)	864(\$96)	1,440(\$160)	1,200(\$133.33)	1,200

Source: Directorate General of Taxation (DGT), 2007

Note: \$1=IDR 9,000. All in thousand rupiahs, number of dependents maximum three.

*IDR 13,200,000=\$1,466.67

Table A5. Total Individual and Corporate Income Tax Identification, by Year

Year	Individual Income Tax ID	Corporate Tax ID	Total
2000	1,320,157	660,736	1,980,893
2001	1,690,193	795,361	2,485,554
2002	2,020,334	879,375	2,899,709
2003	2,327,618	966,802	3,294,420
2004	2,622,184	1,047,876	3,670,060

Source: Directorate General of Taxation (DGP), 2007

Object of Individual Income Tax under Law No. 17/2000:

- Wages, salary, commissions, bonuses, allowance, pensions, gratuities
- Honoraria, lottery prizes, awards
- Insurance premiums
- Profits from business
- Interest
- Dividends
- Royalties
- Rents from property
- Annuities received or accrued
- Gains from cancellation of debts
- Gains from sale or transfer of property
- Gains from the difference in exchange rate
- Refunds of tax payments already deducted as cost
- Any source of income that increases net of wealth and has not been taxed

APPENDIX B
THEORETICAL MODEL

In this appendix, we present the derivation of the theoretical model we developed earlier in chapter III. The maximization problem in the theoretical model (3.1) is derived as follows:

$$\text{Max } U = U[L, Y]$$

Subject to:

$$Y = W(1 - L) + Z \tag{B.1}$$

Where Y is the total reported income, W is wage income, L is leisure, and Z is non-wage income, or unearned income. The total time constraint is $1 = N + L$, where N is the total amount spent working, or the labor supply.

After imposing a progressive income tax into the budget constraint:

$$Y = W(1 - L)(1 - t_i) + Z \tag{B.2}$$

Substitute budget constraint into the utility function to get:

$$U[W(1 - L)(1 - t_i) + Z, L] \tag{B.3}$$

The next step is to maximize equation (B.3); the first order condition gives the information on the marginal rate of substitution between leisure and income:

$$\frac{dU}{dL} = -W(1 - t_i)U_Y + U_L = 0$$

$$MRS_{L,Y} = \frac{U_L}{U_Y} = W(1 - t_i) \quad (\text{B.4})$$

The marginal rate of substitution between leisure and income in equation (B.4) shows the amount of income which the taxpayer is willing to exchange for leisure time, is equal to the amount of wage after tax. We also obtain the first order condition from the implicit function of $F(L, Z, W(1 - t_i))$.

Use implicit function:

$$F(W(1 - t_i), L, Z) = U_L - W(1 - t_i)U_Y = 0 \quad (\text{B.5})$$

From the labor/leisure choice model, we expect to get the leisure demand function and labor supply function. By implicit function theorem, we implicitly define the leisure demand and labor supply:

$$L^* = L(W(1 - t_i), Z)$$

$$N^* = 1 - L^* = 1 - L(W(1 - t_i), Z)$$

The comparative static properties:

$$\frac{\partial L^*}{\partial Z} = - \frac{\frac{\partial F}{\partial Z}}{\frac{\partial F}{\partial L}} = - \frac{U_{LY} - W(1-t_i)U_{YY}}{F_L}$$

Note that $\frac{\partial L^*}{\partial Z}$ can be positive, negative, or zero, depending on whether the type of goods is normal, neutral, or inferior. At least one of these goods, either Y or L, must be normal.

$$\frac{\partial L^*}{\partial Z} = - \frac{U_{LY} - W(1-t_i)U_{YY}}{F_L} \leq 0$$

or

(B.6)

$$\frac{\partial L^*}{\partial Z} = - \frac{U_{LY} - W(1-t_i)U_{YY}}{F_L} \geq 0$$

Use comparative statics in equation (B.5) to derive the Slutsky equation; find $\frac{\partial L^*}{\partial W}$

and **the total differentiation of** $\frac{\partial L^*}{\partial W} dU = 0$. To derive the second order condition, recall the implicit function equation from (B.3):

$$\frac{\partial L^*}{\partial W} = - \frac{\frac{\partial F}{\partial W}}{\frac{\partial F}{\partial L}} = - \left[\frac{U_{LY}(1-t_i)(1-L) - W(1-t_i)U_{YY}(1-L) - U_Y}{F_L} \right]$$

$$\frac{\partial L^*}{\partial W} = \frac{U_Y}{F_L} - (1-t_i)(1-L) \frac{U_{LY} - W(1-t_i)U_{YY}}{F_L}$$

From equation (B.5) we can get:

$$\frac{\partial L^*}{\partial W} = \frac{U_Y}{F_L} + (1-t_i)(1-L) \frac{\partial L^*}{\partial Z} \quad (B.7)$$

The $\frac{\partial L^*}{\partial W}$ holding constant the utility $U=U_0$ yield $\frac{\partial L^*}{\partial W}_{dU=0} = \frac{U_Y}{F_L} < 0$, the Slutsky equation for leisure demand:

$$\frac{\partial L^*}{\partial W} = \frac{\partial L^*}{\partial W}_{dU=0} + (1 - t_i)N^* \frac{\partial L^*}{\partial Z} \quad (B.8)$$

The labor supply implies $N^*=1-L^*$, thus $\frac{\partial N^*}{\partial W} = -\frac{\partial L^*}{\partial W}$, thus:

$$\frac{\partial N^*}{\partial W} = -\frac{U_Y}{F_L} - (1 - t_i)N^* \frac{\partial L^*}{\partial Z}$$

The $\frac{\partial N^*}{\partial W}$ holding constant the utility $U=U_0$ yield $\frac{\partial N^*}{\partial W}_{dU=0} = -\frac{U_Y}{F_L} > 0$, the Slutsky equation for labor supply:

$$\frac{\partial N^*}{\partial W} = \frac{\partial N^*}{\partial W}_{dU=0} + (1 - t_i)N^* \frac{\partial N^*}{\partial Z} \quad (B.9)$$

Following Slemrod (2001), the effect of tax on labor supply yields:

$$\frac{\partial N^*}{\partial t} = \frac{\partial N^*}{\partial W}_{dU=0} - WN^* \frac{\partial N^*}{\partial Z} \quad (B.10)$$

APPENDIX C

DATA SOURCE, SUMMARY STATISTICS, AND RESULTS

Table C1. Summary Statistics of 1998–2006 Income Tax Returns Data in Real Terms

Variable	Observations	Mean	Std. Dev.	Min	Max
Year	5580771	2003.511	1.803007	1998	2006
Married	5580771	0.583034	0.4930572	0	1
Dependent	5580771	0.9992297	1.152557	0	3
Rgrossinc	5580771	3.16E+07	2.35E+09	2086359	5.52E+12
Rnetincy	5580771	2.93E+07	1.35E+08	2072012	7.13E+10
Rnontaxinc	5580771	5428897	2674244	2071943	1.81E+07
Rtaxinc	5580771	2.39E+07	1.35E+08	15.72327	7.13E+10
MTR	5580771	7.679886	5.877055	5	35
Rinctaxl	5580771	4175501	4.27E+07	0.7861635	2.49E+10

Source: Directorate General of Taxation (DGT), 2007

Table C2. Definition of Variables

Variable	Variable Definition
Year	Year of income tax return
Married	marital status: married=1, not married=0
Dependent	number of dependents (max=3)
Grossinc	annual gross income (IDR)
netincy	yearly net income (IDR)
nontaxinc	Non-taxable income (tax exemption) (IDR)
taxinc	taxable income (netincy - nontaxinc) (IDR)
inctaxb	income tax bracket: <=2000: 10%,15%,30% ; >=2001:5%,10%,15%,25%,35%
inctaxl	income tax liability (taxinc * MTR) (IDR)

Source: DGT, 2007

Table C3. Taxable Income Groups for Microsimulation

Income Group	Taxable Income
1	<=IDR 12,500,000 (\$1,389)
2	>IDR 12,500,000 <=IDR 25,000,000 (\$2,778)
3	>IDR 25,000,000 <=IDR 37,500,000(\$4,167)
4	>IDR 37,500,000<=IDR 50,000,000(\$5,556)
5	>IDR 50,000,000<=IDR 75,000,000(\$8,333)
6	>IDR 75,000,000<=IDR 100,000,000(\$11,111)
7	>IDR 100,000,000<=IDR 150,000,000(\$16,667)
8	>IDR 150,000,000<=IDR 200,000,000(\$22,222)
9	>IDR 200,000,000<=IDR 300,000,000(33,333)
10	>IDR 300,000,000(33,333)

Table C4. Number of Winners and Losers, by Income Group (Scenarios I and III)

Income Group	Winners	Losers
1	547,298	108,296
2	109,208	2,779
3	53,899	
4	26,878	
5	23,770	
6	11,934	
7	9,476	
8	3,591	
9	2,665	
10	2,549	
Total Observations	791,268	111,075

Source: Author's own calculations

Table C5. Number of Winners, by Income Group (Scenarios II and IV)

Income Group	Winners
1	655,594
2	111,987
3	53,899
4	26,878
5	23,770
6	11,934
7	9,476
8	3,591
9	2,665
10	2,549
Total Observations	902,343

Source: Author's own calculations

Table C6. Number of Winners and Losers, by Income Group (Scenario V, Flat Income Tax Rate)

Income Group	Winners	Losers
1	655,594	108,296
2	96,913	15,074
3	6,247	47,652
4		26,878
5		23,770
6		11,934
7	895	8,581
8	3,591	
9	2,665	
10	2,549	
Total Observations	768,454	242,185

Source: Author's own calculations

Table C7. Income Tax Burden for Static Microsimulation, by Scenario and Income Group

Income Group	Base Scenario		Scenario I		Scenario II		Scenario III		Scenario IV		Scenario V	
	Sum	PctSum (%)	Sum	PctSum (%)	Sum	PctSum (%)	Sum	PctSum (%)	Sum	PctSum (%)	Sum	PctSum (%)
1	8,999	33.26	8,999	43.18	0	0	8,999	44.45	5,500	34.18	0	0.00
2	4,364	16.13	3,616	17.35	391	6.94	3,616	17.86	3,266	20.30	1,957	10.28
3	3,325	12.29	2,026	9.72	884	15.68	2,026	10.01	1,912	11.88	4,420	23.22
4	2,201	8.14	1,083	5.20	644	11.42	1,083	5.35	1,039	6.46	3,222	16.93
5	2,514	9.29	1,340	6.43	738	13.09	1,340	6.62	1,255	7.80	3,569	18.75
6	1,708	6.31	971	4.66	642	11.39	971	4.80	938	5.83	2,095	11.01
7	1,674	6.19	1,061	5.09	777	13.78	930	4.59	910	5.66	1,834	9.64
8	808	2.99	544	2.61	457	8.11	405	2.00	400	2.49	752	3.95
9	687	2.54	512	2.46	448	7.95	350	1.73	346	2.15	586	3.08
10	773	2.86	688	3.30	656	11.64	527	2.60	525	3.26	599	3.15
Total	27,053	100	20,839	100	5,637	100	20,246	100	16,090	100	19,032	100

Source: Author's own calculations

Table C8. Sum of Income Tax Liabilities Static Microsimulation, by Scenario and Income Group

Income Group	Base Scenario (Rupiah)	Scenario I (Rupiah)	Scenario II (Rupiah)	Scenario III (Rupiah)	Scenario IV (Rupiah)	Scenario V (Rupiah)
1	134,001,139,628	134,001,139,652	0	134,001,139,652	88,617,518,080	0
2	121,800,576,458	99,255,792,051	11,912,803,121	99,255,792,051	89,846,884,155	59,564,015,610
3	135,998,556,580	82,224,658,274	36,180,990,973	82,224,658,274	77,620,293,177	180,904,954,870
4	117,963,406,663	57,883,290,248	34,522,539,488	57,883,290,248	55,547,215,997	172,612,697,397
5	181,027,961,028	96,887,541,567	53,037,015,222	96,887,541,567	90,876,423,484	255,342,903,849
6	167,264,911,746	95,084,250,845	63,120,031,186	95,084,250,845	91,887,826,579	204,650,051,949
7	221,084,367,448	140,669,947,654	103,360,797,008	122,305,968,580	119,768,862,310	240,524,866,026
8	149,046,370,900	100,424,732,280	84,449,483,950	74,618,839,382	73,660,325,044	138,314,483,950
9	173,594,508,740	130,012,188,124	114,155,181,476	89,085,836,586	88,024,999,536	147,641,345,992
10	571,355,070,208	529,669,766,904	514,110,277,288	425,496,183,480	424,218,250,320	430,946,625,240
Total	1,973,136,869,398	1,466,113,307,598	1,014,849,119,711	1,276,843,500,664	1,200,068,598,681	1,830,501,944,883

Source: Author's own calculations
\$1=IDR 9,000

Table C9. Percentage Sum of Income Tax Liabilities Static Microsimulation, by Scenario and Income Group

Income Group	Base Scenario (%)	Scenario I (%)	Scenario II (%)	Scenario III (%)	Scenario IV (%)	Scenario V (%)
1	6.79	9.14	0	10.49	7.38	0
2	6.17	6.77	1.17	7.77	7.49	3.25
3	6.89	5.61	3.57	6.44	6.47	9.88
4	5.98	3.95	3.40	4.53	4.63	9.43
5	9.17	6.61	5.23	7.59	7.57	13.95
6	8.48	6.49	6.22	7.45	7.66	11.18
7	11.20	9.59	10.18	9.58	9.98	13.14
8	7.55	6.85	8.32	5.84	6.14	7.56
9	8.80	8.87	11.25	6.98	7.33	8.07
10	28.96	36.13	50.66	33.32	35.35	23.54
Total	100	100	100	100	100	100

Source: Author's own calculations

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