BEHAVIORAL REACTION TO THE 2008 INCOME TAX REFORM
IN INDONESIA: A BUNCHING ANALYSIS

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Income tax reforms generally constitute some changes in marginal tax rates and its income thresholds which often lead to a higher tax liability. Taxpayers may respond to these changes differently, mainly by trying to lower their tax payments. Self-employed individuals have a greater incentive to strategically adjust to a lower income declaration. Using administrative tax data, this paper examines the reaction of self-employed taxpayers to the 2008 Indonesian Income Tax Reform using bunching analysis. Beside a clear evidence on bunching around the first kink point, our empirical findings suggest that Indonesia exhibits special cases. We find an inertia of pre-reform bunching around the first kink point in later years as well as an extraordinary bunching above the first kink point in the post-reform periods.

Penelitian ini berisi analisis tentang bagaimana wajib pajak merespon perubahan ketentuan perpajakan, khususnya pajak penghasilan. Penelitian ini menggunakan data Surat Pemberitahuan Tahunan Pajak Penghasilan periode 2006-2012 untuk menjelaskan perilaku Wajib Pajak Orang Pribadi yang melakukan kegiatan usaha sehubungan dengan perubahan dalam Undang-Undang Nomor 36 Tahun 2008 menggunakan metode bunching. Penelitian ini menemukan adanya perilaku bunching pada titik batas pertama, yaitu pada batasan penghasilan yang dikenakan tarif pajak terendah. Disamping itu, penelitian ini juga menemukan bahwa Wajib Pajak di Indonesia menunjukkan perilaku yang unik. Terdapat resistensi wajib pajak dalam melaporkan penghasilan meskipun batasan tarif pajak paling rendah berubah. Juga, terdapat perilaku bunching yang unik di atas batasan penghasilan yang dikenakan tarif pajak penghasilan sebesar 10% yang mengindikasikan penghindaran pajak.

1. INTRODUCTION

One of the biggest global challenges for governments is tax evasion since it hinders tax revenue collection and results in slower economic development (Picur & Riahi-Belkaoui 2006). Tax evasion in general consists of deliberate violation of tax law to evade tax payments (Réthi 2012) and can take various forms, such as refraining from declaring taxable income truthfully (Sandmo 2015, p.645) and over-reporting tax exemptions, deductions, or credits (Alm & Martinez-Vazquez 2003, p.146). In addition, evasion is more likely to occur in income tax than other types of taxes (Allingham & Sandmo 1972) due to its self-assessment system and the strategic decision making of taxpayers under uncertainty. A taxpayer may declare his actual income or less in his tax return without being directly penalized until a supervision by Account Representative or a tax audit by tax auditor is being done, which creates an incentive to evade tax. In contrast, commodity taxes, for instance, provide limited opportunity to evade because people have to pay the tax as the transaction occurs. Due to its negative impact on revenue, this problem is taken seriously by governments which exert great effort to discover tax evasion behavior or deter evasion prior to tax audit.

Both governments and researchers have been exploring various techniques to identify and measure tax evasion. Direct approaches which rely on taxpayer data, surveys and audit (Khlif & Achek 2015), and indirect approaches using estimation of the size of the hidden economy (Schneider & Enste 2002, 2000) are typical methods applied in the contemporary literature. The discussion of tax evasion detection techniques began with the incorporation of behavior analysis, pioneered by Allingham and Sandmo (1972), who studied reporting income of individual taxpayers under uncertainty. Exploration of psychology followed, such as the experiences of taxpayers with audit probability and penalty on evasion (Bruttel & Friehe 2014; Soliman, Jones & Cullis 2014; Tan & Yim 2014).

Empirical study is crucial to tax institutions since it depicts the actual responses of taxpayers who are not perfectly rational and have inconsistent preferences (Congdon, Kling & Mullainathan 2009) particularly in the presence of reforms. These changes in income tax, which can take a form of adjustment in tax rates, base, and deductions, will affect taxpayers nonlinearly and result in different responses. For instance, self-employed taxpayers typically have greater incentives to misreport income than wage earners (Heim 2010). Consequently, behavior analysis has been developing in taxation studies, and one of the approaches, bunching, was introduced by Saez (2010) and Chetty et al. (2011) to signal behavioral responses of taxpayers.

Bunching in taxes can detect some motives that govern behavior, such as optimizing frictions (see Chetty et al. 2011; Kleven & Schultz 2014; Kleven & Waseem 2013; Saez 2010) or tax evasion and enforcement (see Almunia & Lopez-rodriguez 2018; Best et al. 2015; Dwenger et al. 2016; Fack & Landais 2016; Kiss & Mosberger 2015; Kleven et al. 2011). However, this approach requires large data sets with low measurement error (Kleven 2016) which cannot be provided by survey or experiment.

This paper aims to explore whether we can use the changes in the tax rules to find evidence of tax evasion. We examine tax returns from the 2008 income tax reform period, which resulted in wider income thresholds. These changes create discontinuities in the slope of choice sets where taxpayers can decide how much income to declare given the rate changes apply to their reported income. We focus on self-employed individuals since each of them acts as a single decision maker with respect to taxation so that their action may represent their behavior toward changes in tax rules. In contrast, an action of a corporate taxpayer may be decided by many people behind it such as the CEO, COO, tax managers and tax consultants. Furthermore, we have no access on corporate tax return data.

This paper contributes to research in Indonesia, particularly by providing an empirical study on tax evasion with respect to tax reform. More importantly, we have an excellent opportunity to exploit tax return data, which for some countries is highly confidential. So, to our knowledge, this study will be the first to present empirical analysis of real administrative data for Indonesia using bunching. In addition, the results of this paper are expected to present tax institution suggestions in designing tax policy to deter tax evasion. As bunching can be a signal of tax evasion, the tax authority could utilize this evidence to strategically conduct tax audits targeting taxpayers who display bunching.

Our results exhibit evidence of bunching that differs from the literature except for bunching at the first kink. Firstly, we find obvious bunching at just before the first kink, although the 2009-2012 spikes are less strong than pre-reform periods. Secondly, we find a noticeable inertia of bunching at the pre-reform first kink in the post-reform periods. Even though the kink was shifted from IDR 24 million to IDR 50 million, some taxpayers declared IDR 24 million of taxable income from 2009 onwards, suggesting that these individuals might not have realized that the threshold increased. Finally, we find an extraordinary bunching where people declare above the first kink after the tax reform. We conduct an investigation on people declaring taxable income of IDR 50-54 million in 2009 and find

that these individuals come from those who reported less than IDR 54 million in the previous year. We conclude that these people are likely to engage in tax evasion by strategically declaring taxable income above the threshold without any improvements in macroeconomic conditions.

This paper is organized as follows. Section 2 describes the 2008 income tax reform and how income tax works in Indonesia. In section 3 we provide the research methodology of this paper. Section 4 exhibits the empirical evidence of the bunching approach. Finally, section 4 presents our conclusions and policy implications.

2.   LITERATURE REVIEW

Previous studies in the literature on bunching provides mixed results. Using the United States of America (US) tax data from 1960-2008, Saez (2010) found visible bunching only at the first kink point of two schedules for self-employed people: the Earned Income Tax Credit (EITC) schedule where qualified taxpayers start receiving refundable tax credit, and federal income tax bracket in which the first tax rate applies. He found no evidence of bunching on wage earners. In contrast, Heim (2010) analyzed a smaller sample of 1987-1996 US data and suggested that taxpayers whose income were around the first income tax threshold behave less responsively. Kleven et al. (2011) who analysed Danish tax data found that there was no tax evasion by wage earner taxpayers due to the third-party reporting mechanism, while tax evasion existed in self-reported income. Later, Kleven and Schultz (2014) found a visible bunching on the top income distribution of Danish taxpayers with surprisingly low income elasticities, representing a quite modest response to relatively high tax rate changes. This evidence supports their argument that the Danish tax system provides few opportunities to evade tax. Using the same setting, Chetty et al. (2011) distinguished bunching evidence between employment status and suggested that wage earner taxpayers display bunching at the first kink point when the tax changes are relatively large, i.e. the changes in net-of-tax wage is larger than 10%, while bunching by the self-employed is found at both small and large kink points.

Based on the tax subject or taxable entity, we acknowledge that Indonesian taxation system has corporate income tax and personal income tax. Corporate income tax is applied to firms, and it was initially a progressive tax with the highest marginal rate of 30%. Personal income tax is imposed on individuals whose income is more than the non-taxable income known as income threshold.

Individual taxpayers can be wage earners or self-employed taxpayers depending on the sources of income, and

they are treated differently with respect to tax liabilities. Typically, income tax of wage-earning individuals is mostly withheld by a firm. Thus, they are classified as low risk taxpayers. As long as these individuals do not earn income from other sources, they are liable to file the tax returns and report withholding tax from their wages. On the other hand, individuals who earn income other than from employment are categorized as self-employed taxpayers. They have to account for their taxable income based on their bookkeeping themselves.

Indonesia began the tax reform in 1983 by enacting three pillars of the taxation systems, i.e. Law No. 6/ 1983 concerning General Provisions and Tax Procedures, Law No. 7/ 1983 concerning Income Tax, and Law No. 8/ 1983 concerning Value Added Tax of Goods and Services and Sale Tax on Luxury Goods. Since then Indonesia has succeeded in increasing its tax revenue, and taxes have become the major source of government revenue superseding revenues from oil and natural resources (Wijayanto & Vidyattama 2017). It is important to understand the scope of tax reforms in our analysis so that we can observe the effect on taxpayers' behavior. We must also consider the data, i.e. administrative tax returns data, together with the changes in the tax system. Consequently, the main discussion of this paper will focus on the enactment of Law No. 36/2008 which legislated changes in tax rates, as in Table 1.

(Table 1 here)

There have been modest changes in the threshold for current income tax regulation, with a general decrease in the marginal tax rates, in nominal terms. The lowest tax rate is now applied up to the first two brackets in the previous law, i.e. IDR 50 million, whereas the highest rate is reduced to 30%. Other significant changes lie in wider ranges of thresholds with the top cut-off now more than twice as high as in the earlier system. This disparity may induce high-income earners to under-declare their income to shift their income (Yuwono 2008). Furthermore, Yuwono emphasizes that by exploring the distributional effect of this tax reform we can estimate behavioral responses and generate policy analysis.

Apart from tax rates, there have been a series of changes in personal deductions for family status and dependents, known as nontaxable income. The amounts of nontaxable income vary with marital status and number of dependents. These amounts change in accordance with changes in the cost of living standard, as shown in Table 2. However, since these changes are not subject to choice after the beginning of a fiscal year, nontaxable income reform is not considered as a source of bunching (Kleven 2016).

(Table 2 here)

The 2008 income tax reform created changes in the kink points at which bunching may appear. These kinks are generated by discontinuities, or increases in this case, in marginal tax rates. In pre-reform periods, the upper limits of taxable income brackets, i.e. IDR 25 million, 50 million, 100 million and 200 million, may provide the highest cutoffs where taxpayers would bunch because beyond these points, they are levied with higher tax rates. The kink points in post-reform periods are likely to lie in IDR 50 million, 250 million and 500 million of taxable income.

3. RESEARCH METHODS

In this paper, we follow a simple model of tax bunching introduced by Saez (2010). We also follow theoretical model introduced by Kleven (2016) in which individuals' utility functions are defined over income and value of effort to generate income. The utility function is written as $u(z - T(z), z/n)$ where z represents income, $T(z)$ is tax as a function of income, and n is ability. There is heterogeneity in ability due to differences in preference or ability, and this is captured by the probability density distribution $f(n)$. Then, income is distributed following a smooth probability density distribution $h(z)$. Assume further that the tax system is linear, so $T(z) = t\, z$.

Now, suppose that there is an increase in the marginal tax rate from t to $t + \Delta t$ at the income threshold z^*. This means that a kink is introduced at income z^*. Then, the tax function at the kink point is $T(z) = t\, z + \Delta t\, (z - z^*)\, I(z > z^*)$ where $I(.)$ is an indicator function. Figure 1 illustrates the effect of introducing kink point in the tax function.

Figure 1. Bunching at kink point
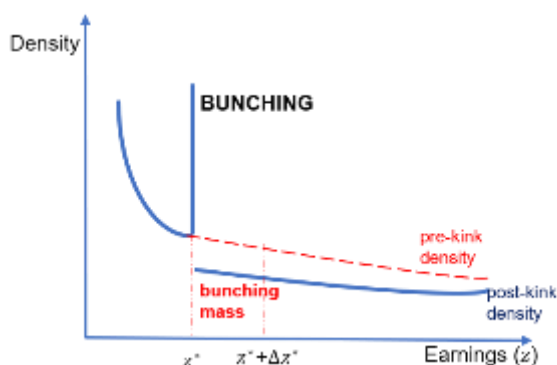
Source: Kleven (2016)

Initially, an individual with ability n^* chooses income n^*, and similarly individuals having ability $n^* + \Delta n^*$ choose income $z^* + \Delta z^*$. When the marginal tax rate increases at $z^* + \Delta z^*$, this kink will produce bunching of individuals who were previously located in the income distribution $z^* + \Delta z^*$ to move down to z^*, while other individuals who were located above the $z^* + \Delta z^*$ area will stay in their location. The same

behavior is observed for individuals located at z^* prior to the change of marginal tax rate. When more people do the similar reactions, they will be shifted to certain income level they would choose. As a result, there will be excess mass in the distribution of individuals at the kink point, z^*. This bunching can be seen from spikes in the data distribution diagram.

The standard theoretical model of bunching stated above provides explanation for labor supply model in which an individual may reduce his effort following an increase in marginal tax rate. Then, if bunching we would observe in our data is due to the reduction of effort, the taxpayers' responses clarify the rationale of adverse incentive to work (Paetzold 2019, p.188). Consequently, we will get welfare losses because of the distortion of the income tax system.

Another channel of explaining the behavioral responses of taxpayers to the tax reform is tax evasion. The theoretical framework for evasion works in a similar fashion to the labor supply model. Instead of lowering their working effort, individuals may react to the changes in income tax by under-reporting their taxable income to avoid being imposed by a higher marginal tax rate. A study by Kleven et al. (2011) presents both how the theory works and its empirical results.

Having these two possibilities in justifying the bunching response, we then need to determine which path accommodates our data. We analyse the Indonesian data for individual self-employed tax return covering more than 400,000 people in each year. The average taxable income reported by these tax filers is showing an upward trend starting from IDR 28 million in 2006 up to IDR 42 million in 2012 (see table 3). This figure suggests that most Indonesian taxpayers earn a relatively low income and generally this income group would sacrifice more of their leisure to exert more effort to work. Hence, their behavioral reactions toward the changes in tax rules presumably are more likely due to the tax evasion rather than the reduction of effort.

4. DISCUSSION
4.1 Descriptive Statistics

To begin this discussion, we would like to explain the changes in Indonesian income tax rules. Indonesia began the tax reform in 1983 by enacting three pillars of the taxation systems, i.e. Law No. 6/ 1983 concerning General Provisions and Tax Procedures, Law No. 7/ 1983 concerning Income Tax, and Law No. 8/ 1983 concerning Value Added Tax of Goods and Services and Sale Tax on Luxury Goods. Since then Indonesia has succeeded in increasing its tax revenue, and taxes have become the major source of government revenue superseding revenues from oil and natural resources (Wijayanto & Vidyattama 2017). It is important to understand the scope of tax reforms in our analysis so that we can

observe the effect on taxpayers' behavior. We must also consider the data, i.e. administrative tax returns data, together with the changes in the tax system. Consequently, the main discussion of this paper will focus on the enactment of Law No. 36/2008 which legislated changes in tax rates, as in Table 1.

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There have been modest changes in the threshold for current income tax regulation, with a general decrease in the marginal tax rates, in nominal terms. The lowest tax rate is now applied up to the first two brackets in the previous law, i.e. IDR 50 million, whereas the highest rate is reduced to 30%. Other significant changes lie in wider ranges of thresholds with the top cut-off now more than twice as high as in the earlier system. This disparity may induce high-income earners to under-declare their income to shift their income (Yuwono 2008). Furthermore, Yuwono emphasizes that by exploring the distributional effect of this tax reform we can estimate behavioral responses and generate policy analysis.

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The 2008 income tax reform created changes in the kink points at which bunching may appear. These kinks are generated by discontinuities, or increases in this case, in marginal tax rates. In pre-reform periods, the upper limits of taxable income brackets, i.e. IDR 25 million, 50 million, 100 million and 200 million, may provide the highest cutoffs where taxpayers would bunch because beyond these points, they are levied with higher tax rates. The kink points in post-reform periods are likely to lie in IDR 50 million, 250 million and 500 million of taxable income.

We obtain access to administrative data from income tax returns between 2006 and 2017 specifically for self-employed individuals. The data covers 8.7 million individual business owners. In this paper, however, we will only use those filed tax returns until 2012, covering 4.15 million individuals and an average of IDR 35.48 million of annual taxable income, as listed in Table 3.

(Table 3 here)

The main reason we exclude data from 2013 onward is that another income tax reform was enacted in July 2013 with the implementation of Government Regulation No. 46 Year 2013 (PP 46) concerning "Income tax on income from business received or acquired by taxpayers having certain gross turnover". By this law, taxpayers with an annual gross turnover up to IDR 4.8 billion are subject to 1% final tax based on gross income, regardless of net loss. This assumes a different income concept for these groups, in that final taxpayers use gross income, whereas regular income taxpayers apply a taxable income concept taking into account any deductions. Consequently, the kink points referred to in the previous section do not apply to this group of taxpayers.

Furthermore, the final taxpayer group is still required to file the 1770 tax return in which they report gross income at section 1770-III but report zero taxable income at section 1770. On the other hand, the regular income tax mechanism requires taxpayers to declare net income at 1770. As a result, we cannot distinguish individual taxpayers with zero taxable income due to net loss from those who are subject to 1% final tax payment, and therefore we exclude the data from 2013 onward.

4.2 Bunching Around the First Kink

We define the kink points around which bunching would appear as the cutoff levels of taxable income. In the periods prior to the 2008 tax reform, the first kink point is at IDR 25 million taxable income with a 5% tax rate, while IDR 50 million, 100 million, and 200 million are the second, third, and the last kink points respectively. The marginal tax rate increases by 5% for the second kink, whereas the two higher kink points experience a 10% increase. Thus, we have two small kinks at the lower income distribution and two larger kinks at the higher income group.

On the other hand, the post-reform years have undergo a different pattern of changes in the marginal tax rates. The new tax rule starts with a higher first income threshold of IDR 50 million, with the reported taxable income up to this level is subject to a 5% tax rate. The income tax rate then jumps to 15%, with a 10% increase in the marginal term, for the income level up to IDR 250 million. Correspondingly, the next threshold of IDR 500 million encounters a 10% increase in marginal tax rate. Interestingly, a lower increase in marginal tax rate by 5% occurs for the highest income earners, i.e. individuals reporting more than IDR 500 million of taxable income.

Figure 2 displays the density distribution of taxable income in million Rupiah from those reporting between IDR 20 and 30 million. We find evidence of bunching at the first kink in the periods before the reform when taxpayers declared taxable income just before the first

threshold, i.e. IDR 24 million. There are peaks in the density before the IDR 25 million due to a 5% increase in the marginal tax rates beyond this limit. By reporting taxable income of not more than IDR 25 million, taxpayers are subject to the lowest income tax rate.

(Figure 2 here)

The evidence of bunching appears to be strong as the spike around the first kink point is relatively high compared to the other kinks (see detail in the Appendix) even though the size of this kink is relatively small. We can also see that this bunching seems to be stable over the corresponding pre-reform periods and even lasts over the next four years after the new income tax law has been implemented. On a wider income interval, the spike is more obvious than the ones around other kink points.

In the periods after the reform, we can also find bunching evidence around the first kink point depicted by a peak in the distribution of taxable income slightly below IDR 50 million, as shown in Figure 3. This visual evidence of 2009 onward may not as strong as in the pre-reform periods. Nevertheless, these results from both figures provides evidence on behavioral response of declared taxable income due to discrete jumps in tax rate.

(Figure 3 here)

Furthermore, we find no clear evidence of bunching at the other kink points where higher increases in tax rate apply. For instance, before the 2008 tax reform, there is no visual bunching on the third kink point where marginal tax rates jump from 15% to 25%. This evidence is followed by the next kink, i.e. around IDR 100 million of taxable income where the tax rate jumps to 35%. Detail graphs are presented in the Appendix.

It is surprising that we cannot find bunching evidence for the higher kink points even though these kinks are large. This result demonstrates a deviation from the prediction in the literature that a large kink will induce significant change in the individuals' income (Bastani & Selin 2014).

However, possible explanations may justify these results. Firstly, these results may be driven by the economic structure that is dominated by the lower taxable income group. It is important to note that 70% of these individual tax filers report taxable income below IDR 25 million for each year. Consequently, bunching would not appear in higher kinks due to the lack of mass of high-income individuals. The small number of individuals declaring income around the two highest kink points contributes to the lesser visibility of responses. In addition, Saez (2010, p.211) noted that the first kink is the area in which the lower income taxpayers laid in the distribution, and these taxpayers may have

difficulties in understanding more details of the tax system. In our case, the proportion of taxpayers declaring taxable income below the third kink, i.e. IDR 100 million, is 94.3% of all 524 thousand tax filers in 2008. Therefore, income response from a mass of taxpayers accounting for less than 6% of total individuals in 2008 cannot produce a visible spike in the data distribution.

4.3 Inertia of bunching from the previous kink point

Figure 2 also presents further compelling evidence of inertia of bunching with taxpayers still bunching from 2009 onward at the location of the first kink point of pre-reform, i.e. IDR 24 million. In the periods prior to the income tax reform, this excess mass in the data distribution represents bunching at the first kink point where the IDR 24 million is the income cutoff for the imposition of a 10% tax rate. In 2009 where the new tax law applies, the first kink point was then shifted to IDR 50 million where up to this level the taxpayers have to pay income tax at 5%, while beyond this income cutoff, the tax rate applied is 10%. We expected that people would show bunching around IDR 25 million up to 2008 and then move to a level around IDR 50 million for 2009 onward.

However, when the kink point was shifted to a higher income level, i.e. IDR 50 million in 2009, we find a huge spike of self-employed taxpayers around IDR 24 million. This means that some people kept declaring income at the same level from previous years even though declaration at this point does not provide tax filers with an incentive such as lower marginal rate since the threshold now is set to IDR 50 million. The graph shows that the spike emerges in 2006, continues in 2012, then decreases in 2013, and disappears in 2014. This result suggests that there is a delay in recognizing the new tax rules, for four years of the implementation, when people start realizing that the income threshold for a higher tax rate has shifted.

We extend the analysis and take a closer look at the data distribution of taxpayers who reported income around these two kink points: 24 and 50 million. We take a small value of income, ε, and draw the density distribution of people declaring income between $(25\ million - \varepsilon, 25\ million)$. We should see high masses in the density distribution of this group especially for the periods of 2006-2008. We draw the distribution of taxpayers reporting income within the interval of $(50\ million - \varepsilon, 50\ million)$ in similar fashion, and then compare the results to the previous income interval, $(25\ million - \varepsilon, 25\ million)$. Similarly, we expect a higher density of income ranging $(50\ million - \varepsilon, 50\ million)$ in 2009 onward as this represents the first cutoff point for an increase in marginal tax rate.

Table 4 provides the density of each income interval, with the ε is set to IDR 1 million. We also provide robustness check with more ε values, i.e. 0.5, 0.2, and 0.1. It is obvious that the pre-reform density exhibits higher values than post-reform ones for taxpayers within the $(25\ million - \varepsilon, 25\ million)$ interval at any values of ε. Despite the clear spikes at the histogram shown in Figure 2 for 2009 onward, we find that there is decreasing trend in the total number of taxpayers reporting income around IDR 25 million after the 2008 income tax reform. This downward trend in the density of these groups of taxpayers suggests that some people know that there is a change in the threshold for a higher marginal tax rate while some may neglect the reform, as we did not see a jump in the density figures.

(Table 4 here)

We also see an upward trend in the density of people declaring incomes in the range of $50\ million - \varepsilon, 50\ million$ with any values of ε in post-reform periods likewise. This provides evidence that some taxpayers realize that the new income cutoff for higher tax rate of 15% has shifted to IDR 50 million so that reporting less than this cutoff level will not have the consequence of paying more taxes. Interestingly, this increasing trend in $50\ million - \varepsilon, 50\ million$ group runs more smoothly than the decreasing trend in the lower income interval suggesting that only some of the people reporting around IDR 24 million in 2008 contribute to the increase in the distribution of the

We provide a graphical density distribution in Figure 4 to show the changes clearly. The slopes of the decreasing trend in the proportion of taxpayers declaring income around IDR 25 million in the periods prior to the income tax reform are steeper than the slopes of increasing movement from IDR 50 million group. The upward trend for the taxpayers in the income interval of $50\ million - \varepsilon, 50\ million$ is relatively flatter and this means that the proportion of this group of taxpayers only increases slightly. In spite of this small growth, we still see clear evidence of bunching around this kink point in 2009 as shown in Figure 2. Moreover, this result supports our result of unusual bunching from 2009 onward where taxpayers bunch more around IDR 54 million, which we discuss in the next section.

(Figure 4 here)

Despite its abnormality, this evidence of inertia is not meaningless; it casts light on the actual income response of Indonesian self-employed taxpayers. As we could not find empirical evidence of inertia in the literature, we justify our finding on this inertia of IDR 24-million bunching with the underlying conditions of taxpayers and the system itself. Firstly, majority of Indonesian taxpayers are lower income earners, with more than 1.5 million of 8.7 million in total declaring

zero taxable income, and this number is substantially greater in 2009 showing one-fourth of the 2009 tax filers. In terms of assets owned, the proportion of taxpayers having total assets below IDR 250 million is approximately 70% in 2009. It means that these lower income people may not need to consider the changes in the tax rates since these changes would not affect them.

4.4 Extraordinary bunching

In the post-reform years, we find observable graphical evidence of unusual bunching above the first kink (see Figure 3). There is a huge spike in the 2009 data distribution where self-employed individuals reported taxable income around IDR 54 million (see the mass between the black dashed lines and red dotted lines in Figure 3). In contrast, we do not find this bunching before the reform. This evidence suggests that the 2008 tax reform induces tax filers to behave contrary to the prediction of the literature.

We now look more closely at the data for 2008-2009 to examine self-employed taxpayers who bunch at IDR 54 million in 2009 (see Table 5). We put identifiers on earnings ranging between IDR 50-54 million and similarly on incomes between IDR 25-50 million for comparison purposes. Of all observations in each year, 88% of taxpayers in 2008 but only 38% in 2009 declared taxable incomes between IDR 50-54 million, while the proportions change for incomes between IDR 25-50 million at 87% and 44% for 2008 and 2009 respectively.

(Table 5 here)

We then conduct simple analysis to discover how much taxpayers who are in the IDR 50-54 million group will declare on average and compare it to those outside the IDR 50-54 group. People beyond the IDR 50-54 million group have a relatively higher income declaration of IDR 37.8 million, which is a 30% increase on their previously reported income. However, individuals declaring IDR 50-54 million will report IDR 20.5 million on average with an insignificant effect of their previous declaration.

This finding suggests that this bunching- the majority of taxpayers declaring taxable income around IDR 54 million in 2009, comes from some people who declared less than this amount in the previous year. If we extend the lower bracket similarly, those in reported IDR 25-50 income group declared IDR 30 million on average, while people beyond this group reported IDR 39 million with 30% higher declarations than their previous income. This result confirms our finding of an unusual kink point where the bunching is driven by individuals who strategically declared taxable income around IDR 54 million right after the tax reform was enacted. In addition, it is unlikely that bunching individuals come from the taxpayers who declared zero income in the previous year, since on average they earn

more in 2009. Figure 5 provides visual evidence of this shifting behavior. Consequently, it can be concluded that these taxpayers are likely to have engaged in tax evasion previously since they declared more income after the tax reform without any substantial increase in macroeconomic conditions, such as GDP, in 2009.

(Figure 5 here)

We then plot the taxpayers whose incomes are in between IDR 20 million and IDR 60 million to see whether the unusual bunching resulted from the lowest kink in the previous year. In Figure 6 the green bars represent the 2008 data and the white bars outlined in red plot the 2009 data. We can see the changes in the spikes between the two adjacent years. We find bunching around IDR 25 million in both periods, with the lesser mass in the post-reform year representing our evidence of inertia of bunching in the previous section, while the bunching above the income threshold of IDR 50 million exists only in the later year. However, this diagram does not suggest that the mass in 2008 around IDR 25 million shifted to above IDR 50 million in 2009.

(Figure 6 here)

It is noteworthy that the 2008 income tax reform includes an amnesty regulation, referred to as the Sunset Policy, in which individuals can pay back the taxes without being subject to criminal penalties. According to Charness & Dufwenberg (2006), once joining the tax amnesty, these taxpayers may then exhibit a guilt averse behavior which serves as a mean of communication to the tax authority. A guilt averse individual will experience guilt if he believes he let others down (Charness & Dufwenberg 2006), or in our case, it can be seen that the strategic preference of the guilt averse taxpayers to join the 2008 tax amnesty depends on their beliefs about the beliefs about the tax institution. They may think that it would be bad to declare incomes less than the first threshold after they had joined the amnesty program and cleared the penalties. Thus, they are more likely to report more than IDR 50 million in income in 2009. This behavior may be interpreted as their intention not to exploit the advantage of declaring less taxable income, or, in other words, not to engage in tax evasion. By reporting a taxable income of IDR 54 million, taxpayers are levied by 15% marginal income tax rate in both pre- and post-reforms. This behavior is in contrast to those who bunch below the 50 million point and are favored with a lower marginal tax rate.

Extended analysis of tax liabilities may provide better explanations, as shown in Table 6. Some people may put more emphasis on the nominal tax liability they have to pay. Declaring IDR 54 million taxable income stipulates lower tax payment under the new law. However, this may not justify the extraordinary bunching after the reform since taxpayers have higher incentive to report income lower than IDR 50 million.

(Table 6 here)

Then, in the case of an individual calculating his disposable income, this individual may decide to declare a greater taxable income with a lower tax rate applied. As a result, this taxpayer earns a higher disposable income, net of tax. To illustrate, suppose an individual reported income of IDR 40 million (see Figure 5 where we suspect the unusual bunching comes from) in 2008 decided to declare IDR 54 million in 2009, then the tax liability is given in Table 7.

(Table 7 here)

We see that the liable tax increases after the reform with the corresponding taxable incomes. However, this taxpayer experiences a higher income which counterbalances the higher tax payment. Then, we can conclude that the increase in his declaration is likely intended to keep the tax liability constant in the post-reform periods. By declaring income above the first kink, the guilt feeling may not arise if this person joined the tax amnesty, and he still earns a higher net-of-tax disposable income.

5. CONCLUSION

This paper explores behavioral responses of taxpayers toward income tax changes using administrative data. We conduct a bunching analysis on Indonesian tax return data from 2006 to 2012 to show how self-employed individuals behave in relation to the 2008 income tax changes. This reform has shifted the lowest income threshold to IDR 50 million, which is twice as high as the previous cutoff with a 5% marginal tax rate. Hence, the kink points where bunching may occur have moved following the new thresholds.

Bunching can be attributable to a reduction in effort of an individual to choose a certain level of income or can be due to a tax evasion. The Indonesian data show that more than 70% of the population earns less than the first income tax thresholds, of IDR 25 million and 50 million. This means that if these people display bunching, it is likely that they are trying to keep the marginal tax rate applied to their income is the lowest one, or in other word they could be regarded as engaging in tax evasion since reducing their efforts to avoid paying higher tax is not an optimal decision.

Having firstly investigated Indonesian income tax data, we find a clear evidence of bunching around the first kink in both time intervals: before and after the tax reform. More interestingly, we also find compelling evidence of bunching inertia where there is an excess mass of taxpayers who keep reporting taxable income at IDR 24 million in post-reform periods when the income cutoff moved to IDR 50 million. Furthermore, there is evidence of extraordinary bunching above the first kink point after the change to the new tax system. Closely analyzing the 2008-2009 data, we find that this unusual

result is driven by individuals who strategically increase their income declaration.

Our results provide a new signal of tax evasion behavior which policymakers must address in order to enhance revenue collection. Tax audit can be one policy to deter evasion; however, this policy needs sufficient resources. Our findings constitute an advance warning of tax evasion by lower-income taxpayers, which the Indonesian tax authority may need to heed in order to direct better targeted tax audits.

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TABLES

Table 1. Changes in Personal Income Tax Rate

2001-2008		2009 onward	
Taxable Income Bracket (in thousand Rupiah)	Tax Rate	Taxable Income Bracket (in thousand Rupiah)	Tax Rate
Income ≤ 25,000	5 %	Income ≤ 50,000	5 %
25,000 < Income ≤ 50,000	10 %	50,000 < Income ≤ 250,000	15 %
50,000 < Income ≤ 100,000	15 %	250,000 < Income ≤ 500,000	25 %
100,000 < Income ≤ 200,000	25 %	Income ≥ 500,000	30 %
Income > 200,000	35 %		

Source: Law No.36/ 2008

Table 2. Changes in Nontaxable Income

	2005	2006-2008	2009-2012	2013-2014	2015	2016 onward
TK/0: taxpayer himself	12,000	13,200	15,840	24,300	36,000	54,000
K/0: for married taxpayer	13,200	14,400	17,160	26,325	39,000	58,500
K/I/0: married, joint filing	25,200	27,600	33,000	50,625	75,000	112,500
Each dependent, max.3	1,200	1,200	1,320	2,025	3,000	4,500

Source: by the author

Table 3. Tax Returns in Indonesia for Self-employed Individuals, 2006-2012

Year	Total Taxpayers	Reported Taxable Income (million IDR)		
		Average	Minimum	Maximum
2006	418,384	28.36	0	125,926.00
2007	429,131	30.82	0	57,679.53
2008	524,950	31.45	0	108,476.10
2009	673,682	34.83	0	326,458.90
2010	680,896	37.42	0	447,594.20
2011	686,327	37.21	0	231,967.10
2012	744,115	42.21	0	641,991.70

Note: taxpayers experiencing loss will report negative net income, hence their taxable income will be zero

Source: Directorate General of Taxes

Table 4. Density Distribution of Income

Year	$\varepsilon = 1$		$\varepsilon = 0.5$		$\varepsilon = 0.2$	
	$(25 - \varepsilon, 25)$	$(50 - \varepsilon, 50)$	$(25 - \varepsilon, 25)$	$(50 - \varepsilon, 50)$	$(25 - \varepsilon, 25)$	$(50 - \varepsilon, 50)$
2006	0.00885	0.00310	0.00474	0.00154	0.00208	0.00061
2007	0.00933	0.00336	0.00468	0.00172	0.00205	0.00068
2008	0.00886	0.00326	0.00447	0.00166	0.00183	0.00065
2009	0.00582	0.00309	0.00258	0.00150	0.00105	0.00073
2010	0.00554	0.00339	0.00248	0.00169	0.00099	0.00089
2011	0.00520	0.00345	0.00236	0.00173	0.00089	0.00081
2012	0.00485	0.00374	0.00212	0.00187	0.00082	0.00088

Note: this table presents the density distribution of taxpayers whose reported income is between the respective intervals. All values of income and ε are in IDR million.

Table 5. Data Summary for 2008-2009

	2008	2009
Observations		
Total	524,950	673,682
Taxable income between 25-50	456,464	295,732
Taxable income between 50-54	462,986	255,337
Taxable Income (IDR million)		
Average	31.45	34.83
Minimum	0.00	0.00
Maximum	108,476.10	326,458.90

Note: this table only presents the results of the investigation of changes in behavior of tax filers in 2008-2009 who declare incomes higher than the kink.

Table 6. Tax Liability Calculation of IDR 54 Million Taxable Income

Pre-reform		Post-reform	
25 million x 5%	1.25 million	50 million x 5%	2.50 million
25 million x 10%	2.50 million	4 million x 15%	0.60 million
4 million x 15%	0.60 million		
Tax liability	**4.35 million**	**Tax liability**	**3.10 million**

Note: see table 1 for applicable progressive tax rates and the thresholds

Table 7. Tax Liability Comparison

2008 (IDR 40 million)		2009 (IDR 54 million)	
25 million x 5%	1.25 million	50 million x 5%	2.50 million
15 million x 10%	1.50 million	4 million x 15%	0.60 million
Tax liability	**2.75 million**	**Tax liability**	**3.10 million**
Tax/Income	**93%**	**Tax/Income**	**94%**

Note: see table 1 for applicable progressive tax rates and the thresholds

FIGURES

### Figure 2. Density of Taxable Income: Pre-2008-reform
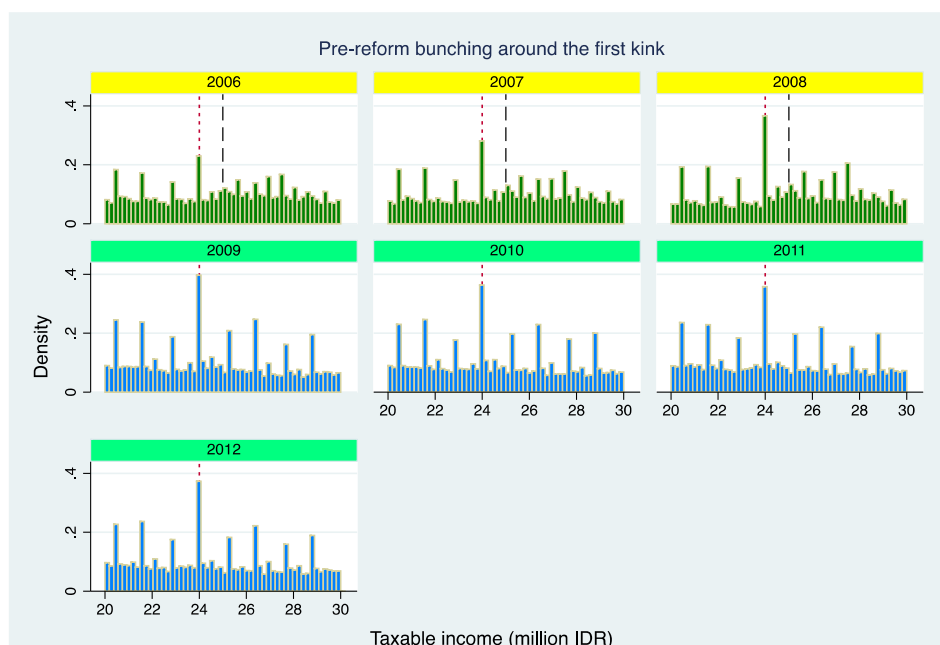
Note: These figures plot the distribution of declared taxable income between IDR 20 and 30 million. We focus on the pre-reform periods in which the income cutoff is IDR 25 million shown as black-dashed line. There is a huge spike on the income level of IDR 24 million in each year which is depicted by red-dotted line. Moreover, this compelling evidence on bunching keeps existing for the following years given the income tax system has been reformed.

Figure 3. Density Distribution of Taxable Income: Post-2008-reform
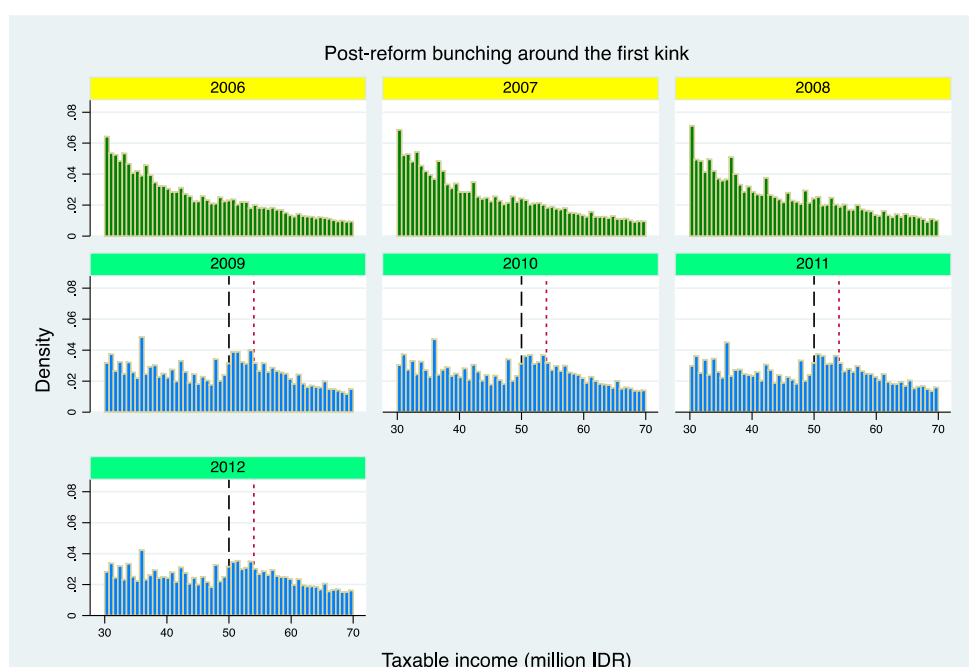
Note: These figures plot the distribution of declared taxable income between IDR 30 and 70 million. The black-dashed line represents income threshold for the first kink of post-reform periods, i.e. IDR 50 million, while the red-dotted line shows the income level in which the excess mass lays out.
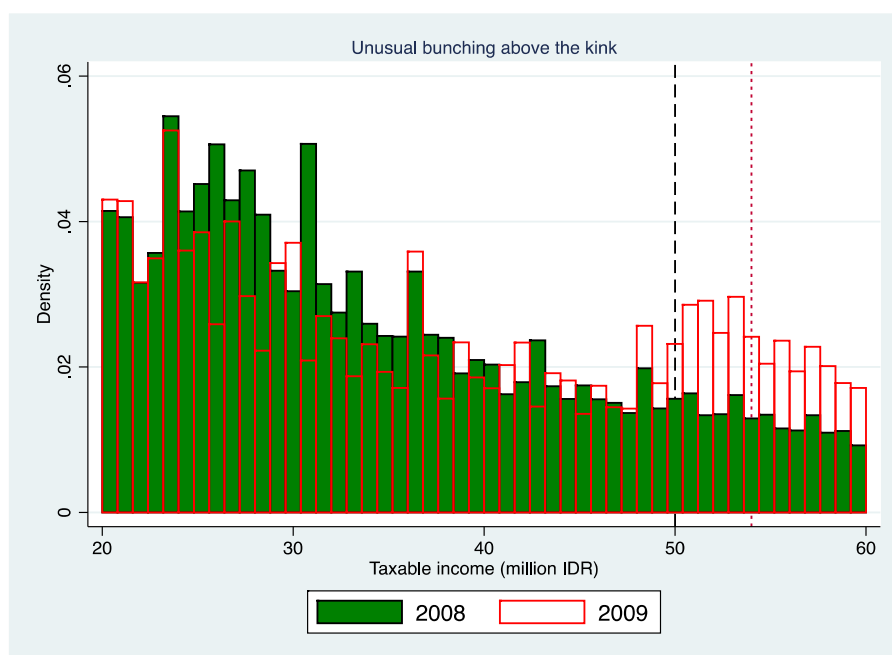
Figure 4. Density Distribution of Income
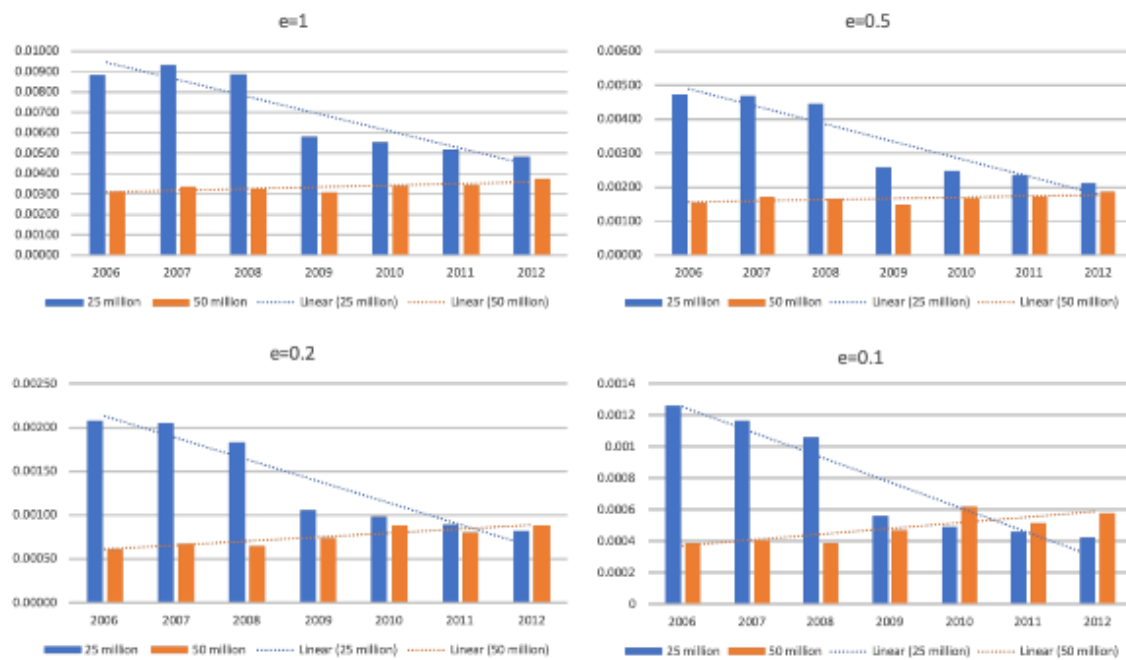
Note: this graph plots the density distribution (see table 4). We can see the increasing and decreasing trends in the proportion of taxpayers within the income interval with various ε.

Figure 5. Scatterplot of Tax Filers Declared Taxable Income Between IDR 50-54 Million (2009)
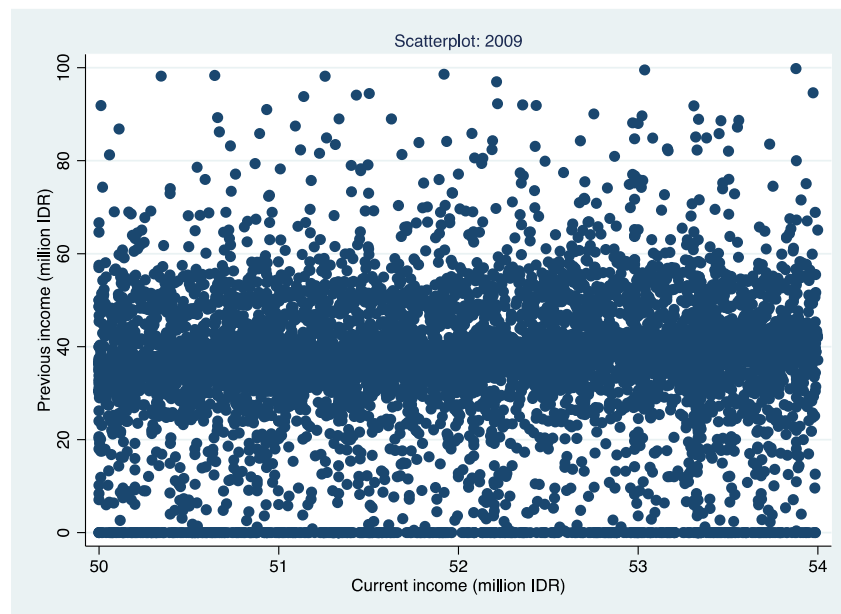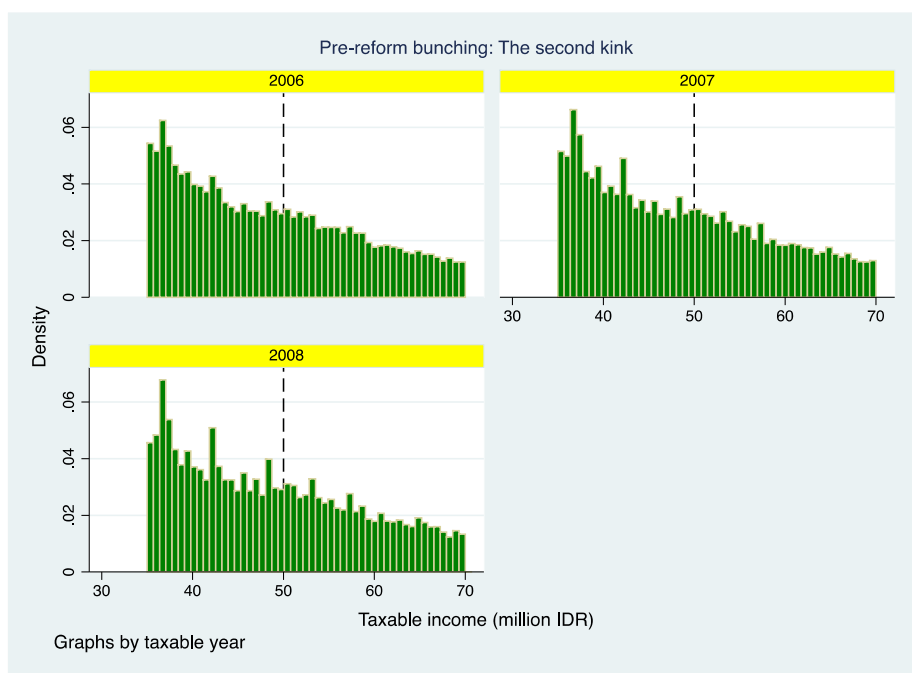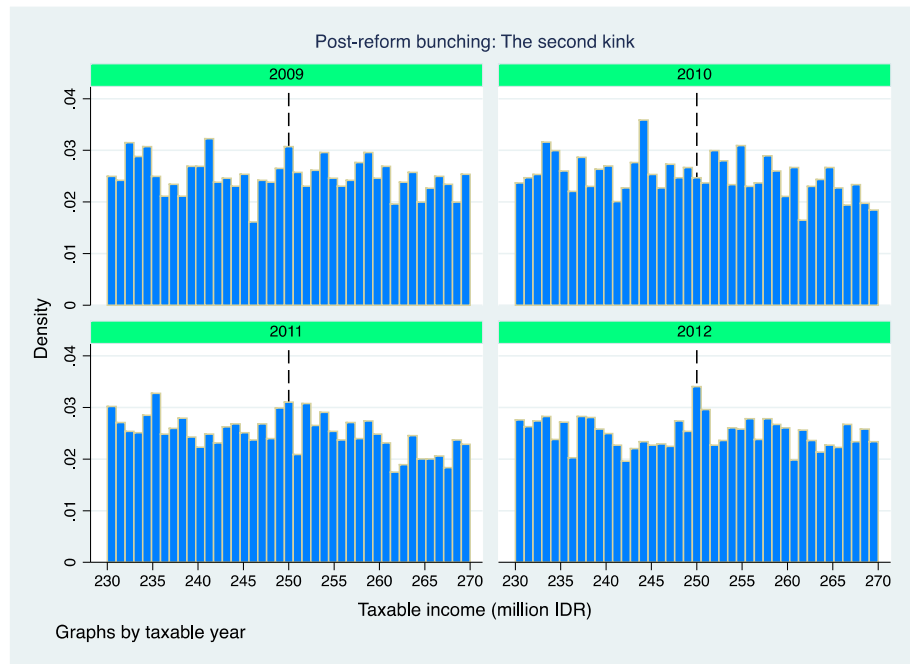
Figure 6. Bunching Above the Kink

Note: this diagram plots a comparison of the distribution of tax filers who declared incomes between IDR 20 million and IDR 60 million in 2008 (in green) and 2009. There are clear spikes in the incomes above IDR 50 million only in 2009.
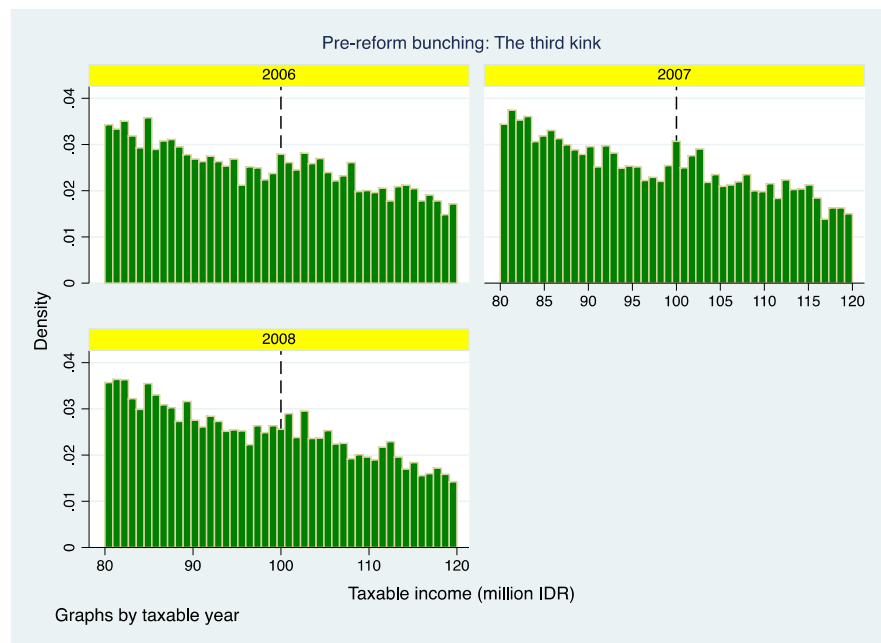
APPENDIX: GRAPHICAL EVIDENCE

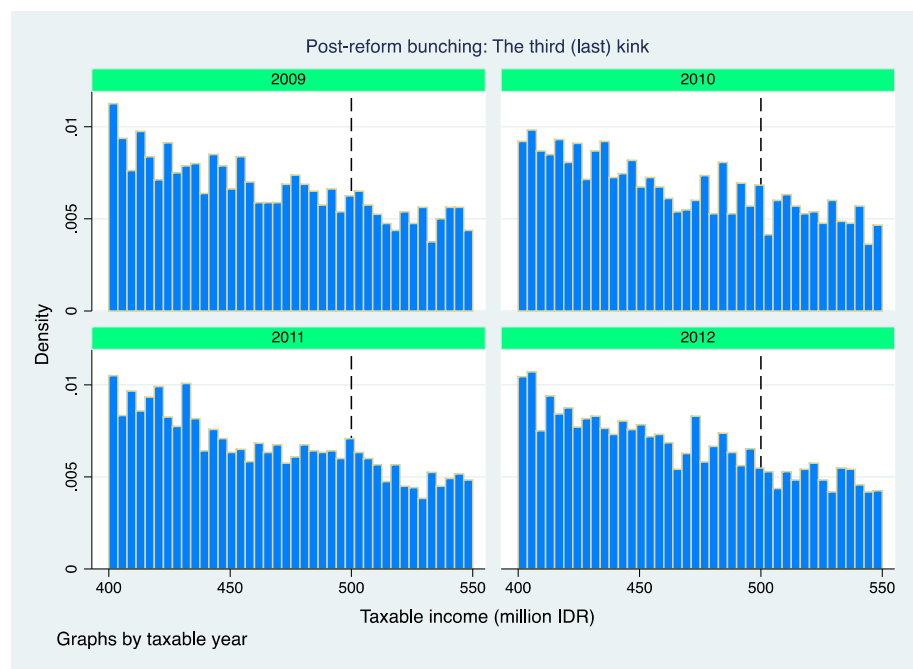**Figure 7. Graphical Evidence of Bunching Around the Second Kink**

Figure 8. Graphical Evidence of Bunching Around the Third Kink

Figure 8. Graphical Evidence of Bunching Around the Last Kink