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Taxpayer Bunching Evidence: Responsiveness at kink points of the Honduran Personal Income Tax.

David Fernando Pineda Pinto* Roldan Manuel Enamorado Irías†

Abstract

This paper studies the response of taxpayers to changes in the marginal tax rate or kinks, estimated through compensated elasticities by applying the bunching methodology to Honduran administrative data on Personal Income Tax (PIT) from the period 2011 – 2018. Due to missing data issues at the first kink, estimates are only generated for the other two kinks. The results show a low response, reflected by a compensated elasticity around 0.09. Higher response on wage earners was found at the second kink. Further analysis is done by type of taxpayer, income source, third-party reporting, gender, and age.

Keywords: Bunching, Personal Income Tax, Elasticity of Taxable Income
JEL Classification: H24, H31, O12

Resumen

Este documento estudia la respuesta de los contribuyentes a los cambios en la tasa de impuesto marginal o kinks, estimados a través de elasticidades compensadas aplicando la metodología de Bunching a datos administrativos hondureños del Impuesto sobre la Renta de Personas Naturales (ISRPN) del período 2011-2018. La falta de datos en el primer kink permiten las estimaciones solo para los otros dos kinks. Los resultados reflejan una baja elasticidad alrededor de 0.09. Mayores elasticidades son observadas para los asalariados en el segundo kink. Este análisis se extiende por tipo de contribuyente, fuente de ingresos, reporte de terceros, género y edad.

Palabras Clave: Bunching, Impuesto sobre la Renta de Persona Natural, Elasticidad de la Renta Gravable, Honduras.
Clasificación JEL: H24, H31, O12

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1 Introduction

The recognition that tax capacity plays a major role in state building and development has brought governments and multilateral institutions particular interest in this topic (Akitoby et al., 2018). Moreover, the recent economic crisis in 2020 due to the covid-19 pandemic has revealed the importance of revenue mobilization to have a sound fiscal budget to attend critical fiscal policy measures. According to the IMF's Fiscal Monitor (2021), higher revenue mobilization used to finance social spending has a significant potential to reduce inequality, and in this sense, it is recommended, during the recovery phase, to gradually expand the base for corporate income taxes (CIT) and personal income taxes (PIT).

OECD (2021) estimates show that the average tax structures in Latin America and the Caribbean have a significant reliance on taxes on goods and services, representing 50.3% of total tax revenues in 2018 (32.7% for OECD countries). Meanwhile, the average share of personal income taxes in LAC represented in average 9.2% of total tax revenues, considerably lower compared to the OECD members which was of 23.5%. This situation indicates a gap that may be filled by raising tax collection in the form of individual income tax by improving the enforcement capacity of the tax administration. According to Allingham and Sandmo (1972) the decision to declare actual or less than actual income depends on whether the individual is investigated by tax authorities, which turns to be function of enforcement capacity.

The design of progressive personal income taxes is of particular interest for governments. Saez (2001) explained that redistribution benefits from income taxes may be offset by efficiency costs caused by behavioral responses. For example, higher taxes existing in progressive tax systems may disincentivize work and in consequence reduce potential revenue. Therefore, public and labor economists have largely analyzed how individuals respond to taxes.

Drawing on the seminal works by Saez (2010) andChetty et al. (2011), this paper intends to measure responsiveness through the amount of bunching in the earnings distribution at kink points using the bunching technique. In this sense, taxable income distributions are used as a measure of labor supply to study behavioral responses due to changes in marginal tax rates in the Honduran PIT schedule. Hence the parameter of interest is the compensated taxable labor income elasticity with respect to the net-of-tax rate.

Even though the state of the art has contributed with a methodological approach to evaluate responses at kinks of the personal income tax schedule using earnings distributions, the literature has concentrated on developed countries, for example USA (Saez, 2010), Denmark (Chetty et al., 2011) and Sweden (Bastani & Selin, 2014). Recently, similar research has been carried out in other regions, as has been the case of South Africa (Bell, 2020) and Uruguay (Bergolo et al., 2019). Most of the empirical evidence suggest small elasticities near or equal to 0, however, larger elasticities may be encountered on self-employed due to their ability to adjust more freely their working hours.

Meanwhile, in Central America, bunching literature continues to be scarce, with exceptional cases. The bunching approach was implemented in Costa Rica, by Bachas and Soto (2018), however the research intended to study notches in the CIT tax system. Scot et al. (2020) also employed the bunching technique on notches to analyze the minimum income tax to corporations that was implemented between 2014 and 2017 in Honduras, the estimates show a large response of firms with elasticities in the range of 0.35 to 1. Due to the gap on the literature for Latin America and developing countries, this paper aims to contribute by estimating elasticities of taxable income of PIT in Honduras and offer insights on the behavior by taxpayer income source and characteristics in a country where labor market context is different (e.g., high informality).

The data employed for the analyses corresponds to the Honduran personal income tax returns for the period 2011 to 2018. A caveat of this analysis is found at the first kink, the most salient one and where liability starts. The Honduran tax code exempts individuals to file their PIT returns if income is below the non-taxable threshold, therefore, a missing data problem occurs for incomes at the left of the first kink, which prevents bunching approach to be employed. The estimation of elasticities was only performed for the second and third kinks.

The empirical results are mainly two. First a visual inspection shows bunching at the three kinks of the Honduran PIT schedule for each year through 2011-2018. As expected, the bunching increased year by year in line with the augmentation of the number of taxpayers filing, and their knowledge and expertise. On the other hand, implied elasticities estimated through the bunching technique for the second and third kink resulted in a small and statistically significant (0.095 and 0.096 respectively), which are largely consistent with the empirical evidence found in other countries. Strikingly, the response among

self-employed is smaller in comparison to wage earners at the second kink, implying an elasticity of 0.095 and 0.25 respectively. Results change at the third kink where the highest income tax bracket is located, self-employed show a larger elasticity compared to wage earners (0.13 and 0.059 respectively). Larger elasticities are also found for taxpayers who are not reported by third party at both, second and third kinks, Additionally, slightly larger elasticity for women than for men at the third kink, and as taxpayers grow older elasticities seem to become smaller although differences are found depending at which kink individuals are located.

The theory suggests that the observed responsiveness of taxable income to the change in marginal tax rate could be either to tax avoidance through changes in reporting behavior or by changes in real economic activity through adjustments in labor supply. However, the results in this paper cannot draw any conclusion on whether the bunching is driven by real behavior or tax avoidance, further analysis can be done in this regard. We defer from other papers where analyses and extensions where the bunching dynamics is revised. This is a gap to be filled in future work.

This paper is organized as follows. The next section presents a literature review related to the use of the bunching approach applied for the estimation of elasticities of taxable income. Section 3 explains the estimation strategy. Section 4 describes the institutional background of the Honduran PIT and data used for the analyses. The empirical results are presented in section 5. Finally, section 6 contains the main conclusions and implication derived from this research.

2 Related Literature

The bunching approach is a relatively new methodology, and its relevance is increasing, evidenced by the large range of applications on public finance and other fields. Its applicability depends on the availability of large administrative data sets, which explains its rising popularity in recent years. Kleven (2016) presents a thorough review of the bunching approach applications for empirical research and discusses its main identification assumptions and challenges. In short, this approach exploits the features of policy designs that create bunching incentives around thresholds to capture responsiveness and based on that, estimate structural parameters of interest: elasticities.

Following Kleven (2016), the context for which the bunching approach was initially developed arose from the possibility to estimate labor supply compensated elasticities at local points. In this sense, bunching at kinks or notches represents intensive margin responses to price incentives (taxes). Furthermore, the existing literature of this topic presents two different bunching designs: (i) kink points, which are discrete changes in the slope of choice sets and was developed by Saez (2010) and Chetty et al. (2011), and (ii) notch points, which are discrete changes in the level of choice sets and was developed by Kleven and Waseem (2013). In the context of taxation, the former represents changes in marginal tax rate which are commonly found in progressive PIT schedules, while the latter implies changes in average tax rates.

The analysis of bunching at kinks was presented by Saez (2010), who analyzed the kinks on the U.S. Earned Income Tax Credit (EITC) and the Federal Income Tax. He founded evidence of bunching at the first kink of the EITC, where the level of earnings maximizes the tax refund and just before the tax liability starts; however, no response was seen at higher kink points from the Federal Income Tax. The possible explanation described was that upper income tax filers have income that may be partially derived from stochastic realizations.

Additionally, stronger frictions to adjust labor supply may be found due to dynamics at higher incomes (e.g., working for a promotion). The bunching at the first kink was not precisely before the level of income were tax liability started which was explained by the optimization frictions that individuals may find to adjust working hours. Besides, the response was larger among the self-employed rather than wage earners, indicating easier adjustability of working hours for the former group. Also, it was suggested that this behavior may be accounted for taxable income misreporting rather than real changes in labor supply.

Chetty et al. (2011), on their study of taxpayer responses at kinks of the Danish Tax System, extended the methodology allowing for adjustment cost and hours constraints, by setting a model to account for optimizations frictions. The analysis was based on the middle and top kink (which is the most salient). The results were consistent with the model proposed and predicted larger elasticities for larger kinks due to the compensation of search costs. Likewise, larger elasticities were consistent with larger working groups which may negotiate contracts more easily, and finally they founded proof of offer adjustments made by firms to match aggregate workers' tax preference in equilibrium.

In Kleven (2016), can be seen that most of the work done so far in the field have analyzed for developed countries. According to Bell (2020) there are some exceptions: Kleven and Waseem (2013) that study bunching in the Pakistani income tax system; Bachas and Soto (2018) who study the Costa Rican corporate income tax and Boonzaaier et al. (2019) that study the South African corporate income tax. Some works should be added to this list: Bastani and Selin (2014) that studied bunching at kink points of the Swedish tax schedule and in more recent years, Bergolo et al. (2019) studied bunching at kink in Uruguay; Bell (2020) analyzed taxpayer responsiveness to taxation in South African; and Scot et al. (2020) found large evasion response in the context of a minimum income tax in Honduras.

3 Methodology

The bunching technique derived by Saez (2010) relies on the predictions of the standard taxable income labor supply model. In this sense, to account for behavioral responses, tax reforms are evaluated using compensated elasticities, which are obtained by assuming income effects as constant. It is convent to consult Chetty et al. (2011) or Kleven and Waseem (2013) for a more thorough explanation of the assumptions and limitations of the bunching approach. Kleven (2016) explain that individual preferences may be represented through a quasi-linear and iso-elastic utility function, as shown in equation 1. Taxable income z is subject to tax liabilities $T(z)$ which may be considered as a linear tax system, $T(z) = t \cdot z$, where the proportional tax rate may be average or marginal. Utility is also affected by the disutility related to the supply of labor or the cost of effort, which depends on the ability gradient n and the elasticity e.

$$u = z - T(z) - \frac{n}{1 + \frac{1}{e}} \cdot \left(\frac{z}{n}\right)^{1+\frac{1}{e}} \tag{1}$$

The maximization of the previous utility function results in equation 2. The structural parameter of interest e is the elasticity of earnings with respect to the marginal net-of-tax-rate. Intuitively, a larger tax rate lowers after-tax income, being the amount of this effect subject to the size of the elasticity e.

$$z = n(1 - t)^e \tag{2}$$

Following Bastani and Selin (2014) simplified explanation of the bunching predictions, it is convenient to begin with a baseline situation where individuals' optimization of the utility function generates a smooth taxable income distribution $h_0(z)$ and all individuals face the same marginal tax rate t_1 under a proportional tax schedule. If a kink is introduced at taxable income level k, where the marginal tax rate $t_2 > t_1$, a new version of the income distribution $h(z)$ will be generated as the individuals adjust their working hours (taxable income) in response to the tax reform.

The introduction of this kink will generate the following behavioral responses:

1. The individuals located at the left of the kink in the taxable income distribution are not affected by the reform as they earn less than earning levels at k. In other words, $h(z) = h_0(z)$ for $z < k$.
2. Individuals which had incomes greater than the level of income k before the tax reform will adjust their taxable income to a lower level in response to the larger tax rate.
3. A spike will be observed in the post-reform income distribution as individuals that earnings were at the interval $[k,\ k + \Delta z]$ before the introduction of the kink, will now move to the kink point. Meanwhile, those individuals with incomes greater than this interval will adjust their incomes in an interior optimal but not precisely at the kink point.

These behavioral responses produce an excess bunching denoted by $B = \int_k^{k+\Delta z} h_0(z)dz$. If we define the elasticity e from equation 2, the following equation 3 is obtained, where e is expressed as a changes in income relative to the level at kink k due to a change in the net of tax rate.

$$e = \frac{\Delta z/k}{\Delta t/(1 - t_1)} \tag{3}$$

Summarized by He et al. (2021), under the assumption that the heterogeneity distribution of individuals is uniform around the kink, the compensated elasticity of taxable labor income at the local kink point can be related to the estimate of excess bunching B by employing equation 4,

$$e \cong \frac{B/h_0^W(k)}{\frac{k}{w} \cdot \frac{\Delta t}{(1-t_1)}} \tag{4}$$

where $h_0^W(k)$ is the density function at point k associated with bins of width W. The numerator of the previous equation may be expressed as $b \equiv \frac{B}{h_0^W(k)}$, which is a ratio of the number of excess bunchers normalized by the number of individuals found at counterfactual density. Thus, the elasticity formula may be simplified to:

$$e \cong \frac{b}{\frac{k}{w} \cdot \frac{\Delta t}{(1-t_1)}} \tag{5}$$

In this sense, it is crucial for the estimation procedure to measure the excess mass at the kink point, as the difference between the observed mass and the mass of individuals in absence of the kink point, i.e., a counterfactual distribution. This paper measures the counterfactual distribution following Chetty et al. (2011), fitting a flexible polynomial to the observed earnings distribution and isolating the mass located in a range around the kink. In first place, the procedure consists of grouping the observations by their taxable income in bins j of size W. Subsequently, a wide bunching window is chosen as an interval from the income distribution, which are the observations to be used as the sample to estimate the counterfactual distribution and the excess mass. Additionally, a small bunching window is set as the excluded range surrounding the kink. As presented by Bergolo et al. (2019), the following regression is estimated,

$$c_j = \sum_{i=0}^{q} \beta_i^0 \left(z_j\right)^i + \sum_{i=k^-}^{k^+} \gamma^0 \cdot 1\left\{z_j = i\right\} + \varepsilon_j^0 \tag{6}$$

where c_j is the number of individuals with earnings at bin j, z_j is the income level relative to the kink; q is the order of the polynomial, and ε_j^0 is the error term. The interval $[k^+, k^-]$ corresponds to the small bunching window, or a symmetric range of bins which excludes the observations around the kink, therefore, the $1\left\{z_j = i\right\}$ intends to mark the observations that are located on the bunching zone and controls for being near the kink. We then predict the smooth counterfactual density for the entire distribution ignoring the dummies from the small bunching window, extrapolating the polynomial prediction to the bunching area.

The data in this paper was pooled by normalizing the taxable income distribution of individuals to the kink, as worked by Bergolo et al. (2019) Thus, the kink point lies at the 0th bin and the bin width is of 1% of deviation of the kink. The counterfactual distribution was estimated by fitting polynomials of degree 5 to the observed distribution and standard errors were estimated using the bootstrapping method as shown by Chetty et al. (2011). Also, the wide bunching window was set to observations in the range of $[-20\%, 20\%]$ of distance relative to the kink. On the other hand, the small bunching window was chosen visually within the range of bins that lie around $[-2\%, 2\%]$. Following the estimates from regression 6, we may estimate the excess bunchers and consequently obtain the elasticity, as shown in the equation below.

$$\hat{b} = \frac{\sum_{j=k^-}^{k^+} \left(c_j - \widehat{c_j}\right)}{\left[\frac{k^+ - k^-}{w}\right]^{-1} \sum_{j=k^-}^{k^+} \widehat{c_j}} \tag{7}$$

The numerator is the difference between the observed density c_j and the counterfactual distribution in the bin range $[k^-, k^+]$. The denominator represents the average counterfactual distribution around the kink adjusted by width w, in this case w is set to 1%. Once $\hat{b}$ is estimated, the elasticity formula is employed to obtain a measure of behavioral response to the kink k: $\hat{e} = \frac{\hat{b}}{\frac{k}{w} \cdot \frac{\Delta t}{1-t_1}}$.

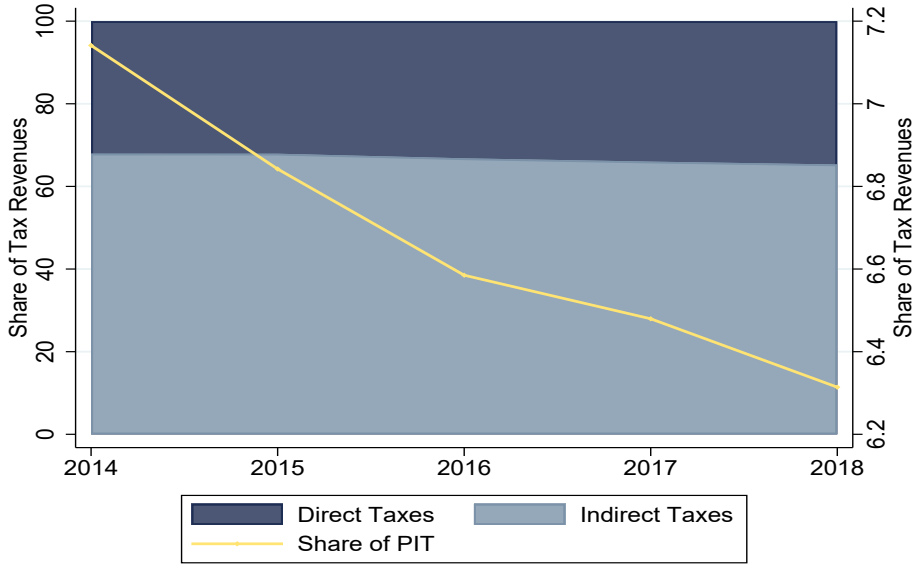
4 Context and Data

4.1 Honduran personal income tax system

The tax composition in Honduras depends largely on indirect taxes, accounting on average (2014-2018) for 67% of total tax revenues. As shown in Figure 1, the share of direct taxes has remained relatively steady, however, the weight of PIT revenues is slowly decaying (secondary axis). This behavior is partially

explained by the inflation adjustments of the tax brackets. Compared to OECD countries where the PIT revenues ascend to 23.5% of total tax revenues, LAC show a small share of this tax (9.2%) (OECD, 2021). Honduras is not an exception where the PIT has represented 6.8% in average over 2014-2018.

Figure 1: Honduran Tax Revenue Composition, 2014 - 2018



Source: own elaboration based on SEFIN and SAR data.

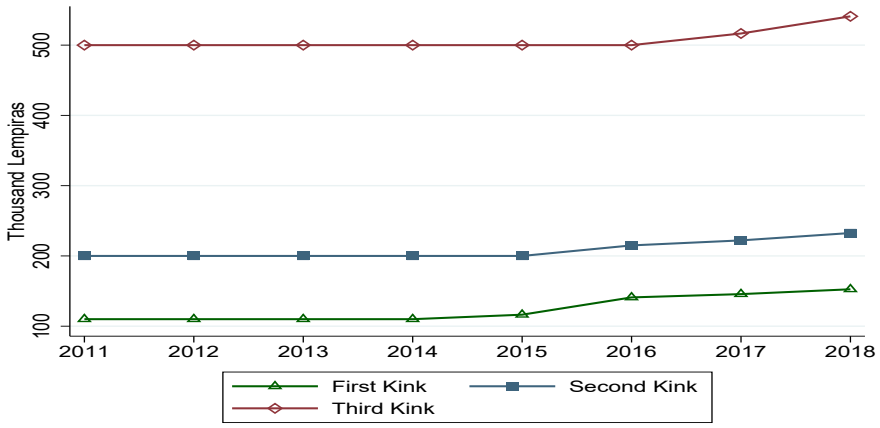
According to the Honduran Income Tax Law, the system relies on the dual income taxation, which separates the taxes for income derived from labor from those obtained through capital gains. Accordingly, the Honduran tax system combines a three-bracket progressive tax schedule for personal income (15% at the lowest non-exempt bracket) and a lower flat tax rate on capital income (10%). However, these taxes are not aligned to the CIT (25%), as is in the pure version of the dual system pioneered by Nordic countries in the early 1990's.

In the analyzed period of this paper 2011-2018, personal income is taxed with the structure of progressive marginal rates (15%, 20% and 25%), whereas the PIT's lower bracket is exempt. During this period, marginal rates have not been changed, however the tax brackets have been adjusted to compensate for inflation, as may be seen in panel (2a) of Figure 2. The progressive tax schedule brackets remained unchanged from 2011 to 2014, based on Decree 140-2008. On 2015, the table was amended by Agreement No. DEI-SG-100-2015 of the Tax Administration, raising the maximum level of the lower bracket. Since 2017 all three tax brackets are adjusted automatically each year for inflation. Panel (2b) below, shows the tax schedule for the fiscal year 2020 [1] as reference in terms of Lempiras, the national currency in Honduras. The net-of-tax rate falls by 7.06% at the kink point where the liability starts, subsequently drops by 2.63% at the middle bracket and 2.8% at the point where the top bracket begins.

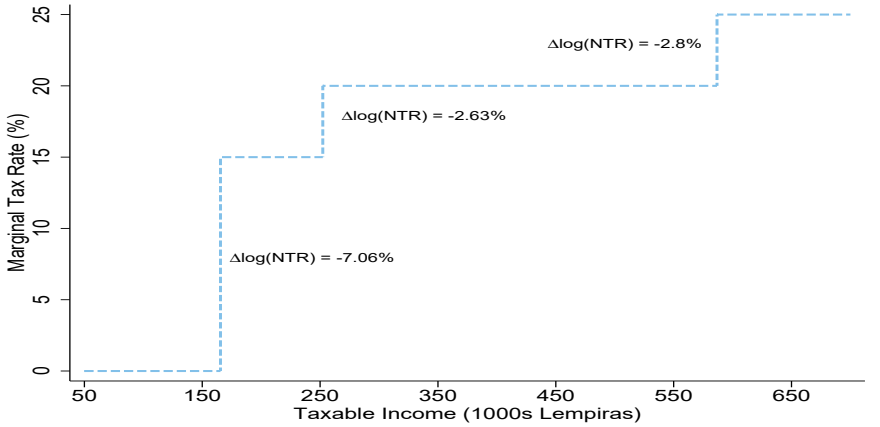
[1] In Honduras, the tax year runs the same as the calendar year (Jan 1 – 31 December). The deadline for the filing and payment of both PIT and CIT is in Abril 30th after the end of the fiscal year.

Figure 2: Kink points of the Honduran PIT system

(a) Honduran Personal Income Tax Schedule 2011-2018



(b) Honduran Marginal Tax Rates



Source: own elaboration based on SAR data.

Note: Panel (2a) shows the higher level of each bracket for the first and second kink, and the lower level of the higher bracket. Panel (2b) shows an example of the PIT marginal tax rates and the taxable income for 2020. It is evident that the first kink has the higher incentive to bunch, based on the log difference of the Net-of-Tax rate $= log\left(\frac{1-t_2}{1-t_1}\right)$. The second and third kink show similar changes in NTR around -2.63%.

Tax liabilities are assessed at the individual level, therefore, neither spousal income nor capital income is included in the individual's taxable income. Taxable incomes include wages and incomes from commercial activities derived from self-employment. Furthermore, individuals have the right to deduct from their taxable income the expenses on the realization of their economic activity, contributions to pension funds and social security, and donations as itemized deductions. An exception is given for health care and education, which is treated as a non-itemized deduction with a standard amount of L40,000, which may be augmented depending on the age of the taxpayer (can increase to L70,000 or L350,000). In other words, taxable income is defined as gross income minus deductions and minus a personal exemption[2].

The PIT law exempts individuals that earn income below the first kink point (non-taxable income) to file their tax returns. On the other hand, wage earners do not have the duty to file their tax returns unless their tax liability is not withheld by the employer[3].

[2]More information on taxable income and deduction allowed by the Honduran PIT system can be found in PIT law and its reforms (Ley de Impuesto sobre la Renta).

[3]Article 28 of the Honduran Income Tax Law.

4.2 Data Description

The data available for the purpose of study contains annually detailed information on income and deductions for the taxpayer's universe during the period from 2011 to 2018. Additionally, a dataset on third-party reporting was merged to identify the taxpayers that were subject to this system. Self-employed were defined as those taxpayers who report any business income other than wage, and wage earners as those that reported wages as income. Another variable called *pure wage earners* was made to mark the taxpayers that only declared income from wages and not a mix of other sources of income. Similarly, third party reported are define as those who are informed by third party in at least one of the third-party sources managed by the tax administration.

To address the analysis by taxpayer characteristics, a second dataset was generated by restricting the sample to taxpayers with both non-missing age and gender values. Subsequently, those taxpayers that had ages below 15 and over 65 were dropped from the dataset. Table 1 presents statistics for the population of personal tax income taxpayers: The number of tax returns per year is between 41,143 and 126,700, which means that filling has tripled over the period of analysis; The participation of Individual Merchant[4] has decreased from 45.9% of the total in 2011 to 37.8% in 2018; wage earners account for slightly more than on tenth of the yearly total; the share of third-party reported has increased from one fifth in 2011 to around one third in 2018. Table 2 shows that most of the taxpayers are between 25 – 54 years old, and that males represent between 63% in average of the PIT filers.

Table 1: PIT Taxpayers by categories, 2011-2018

	2011	2012	2013	2014	2015	2016	2017	2018
Total Taxpayers	41,143	43,463	46,558	52,368	81,276	102,302	121,331	126,700
Type of Taxpayer								
Natural Person	54.1	52.9	51.8	50.6	54.8	59.3	63.0	62.2
Individual Merchant	45.9	47.1	48.2	49.4	45.2	40.7	37.0	37.8
Source of Income								
Other	84.5	84.7	84.3	84.6	87.2	88.2	88.5	87.7
Wage Earners	15.5	15.3	15.7	15.4	12.8	11.8	11.5	12.3
Salary and Wages as Sole Income								
Mixed Income and Other	91.8	91.8	91.5	91.7	94.4	95.3	95.4	95.2
Pure Wage Earners	8.2	8.2	8.5	8.3	5.6	4.7	4.6	4.8
Third Party Reporting								
Not Reported	76.5	75.7	74.7	73.2	69.5	67.9	69.1	67.0
Reported	23.5	24.3	25.3	26.8	30.5	32.1	30.9	33.0

Source: own elaboration based on SAR data.

Table 2: PIT Taxpayers by categories, 2011-2018

	2011	2012	2013	2014	2015	2016	2017	2018
Total Taxpayers	30,439	31,483	34,504	38,231	61,922	78,181	103,136	110,571
Age								
15 - 24	2.3	2.5	2.5	3.2	4.7	4.9	4.1	4.2
25 - 34	19.6	19.4	18.9	19.5	21.7	22.5	23.0	23.9
35 - 44	30.9	31.1	31.5	30.8	30.0	29.9	30.6	30.2
45 - 54	27.3	27.0	26.8	26.1	25.2	24.9	24.3	23.9
55 - 64	19.9	20.0	20.2	20.3	18.4	17.9	18.1	17.9
Gender								
Male	62.4	62.3	62.3	62.6	64.1	64.6	65.5	64.1
Female	37.6	37.7	37.7	37.4	35.9	35.4	34.5	35.9

Source: own elaboration based on SAR data.

5 Empirical Results

5.1 Main Results

A fundamental step in the bunching approach is to plot the data, to visually get some insights, as stated by Jogi Berra, you can observe a lot just by watching. Saez (2010) states that to detect exact

[4] An individual merchant is a business registration figure where a natural person declares that he/she will get involved in one or various commercial activities. This feature allows a person to be subject to the progressive tax system of the PIT while making economic activities like an enterprise.

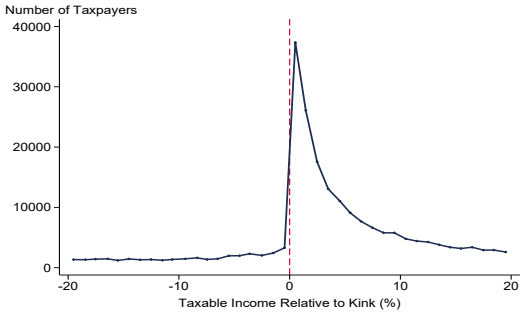
bunching at kink points, the simplest method consists of producing histograms of the distribution to check whether spikes appear at kink points. According to Bastani and Selin (2014), the bunching estimation is a genuinely visual technique. Thus, we begin with a general visual inspection of the excess bunching around the three kinks in the Honduran income tax schedule in 3 for the full sample, pooling all years 2011-2018. The taxable income variable is redefined such that it takes on the value of zero at the bracket cut-off or kink point, accordingly, the bins are set to 1% of width[5]. The blue line plots the observed distribution of taxable income around each kink, the vertical line shows where the tax rate rises. There is evident bunching at the three kinks.

Panel (3a) shows bunching at the right after (not before) the first change in marginal tax rate. Also, the distribution is not downward sloping at the left-side graph. The reason is because Honduran legislation requires PIT filing only when the individual's gross income is above an exempt base, which causes the lack of data before the kink point. For this reason, the estimation of elasticities is restricted to the second and third kink.

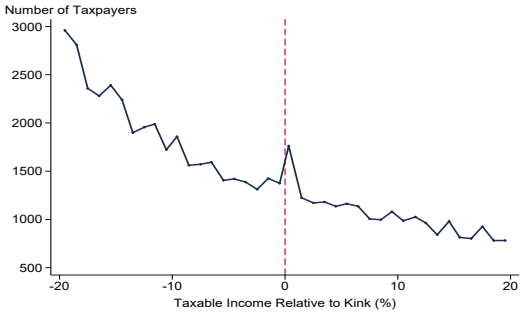
Saez (2010) explains that taxpayers may not be able to bunch perfect at kink points due to imperfect information about the location of the exact kink point or the inability of tax filers to control or forecast their incomes perfectly. Keeping this in mind, Panel (3b) and Panel (3c) evidence a bunching behavior in the distribution around the second and third kink, respectively. It is also evident number of taxpayers around these two kinks is lower since income levels needed to be around those kinks are higher.

Figure 3: Observed density at kink points, pooled 2011 - 2018

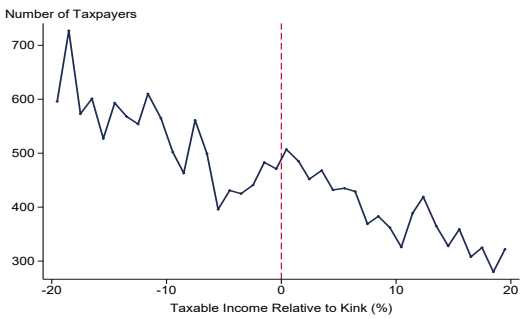
(a) First Kink



(b) Second Kink



(c) Third Kink



Source: own elaboration based on SAR data.

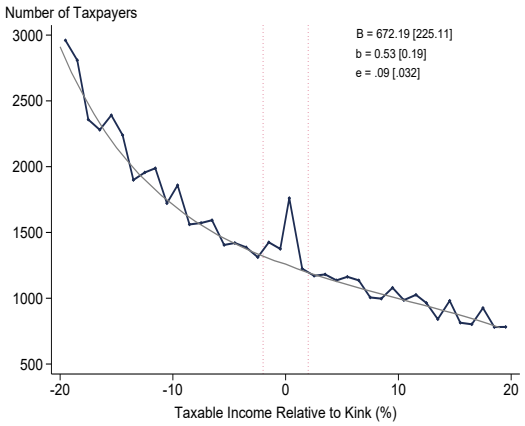
Note: The blue dotted line represents to the observed distribution of taxpayers by their distance relative to the taxable income at the kink point. The red dashed vertical line corresponds marks the kink point (bin = 0). The bin width is set to 1%.

[5]For example, the second bin at right of the bracket cut-off represents the number of taxpayers that report taxable income over 2% of the earning level at the kink.

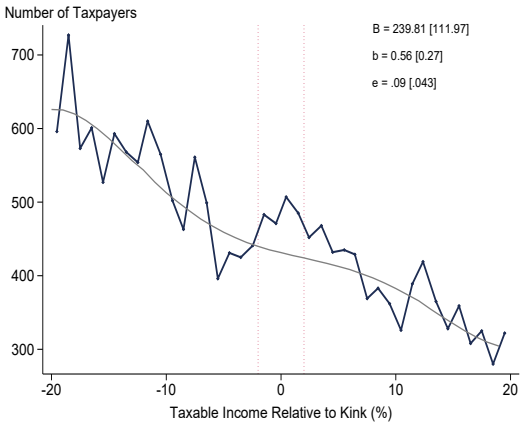
The following step of this analysis consists in generating the counterfactual distribution at the second and third kinks. In this way, the excess mass is calculated, and an estimation of the elasticity is obtained, as it is explained in section 3. Figure 4 plots the empirical distribution of taxable income around the kink point represented by the blue line and the solid gray line represents the fifth order polynomial fitted to the taxable income distribution while excluding bins in the small bunching window of around [-2%, 2%] of the kink point. Although the bunching is evident at both kinks the elasticity is relatively small and significant for the full sample, estimated on 0.095 and 0.096 respectively. These findings are consistent with the literature and empirical research, where very small intensive-margin elasticities have been found.

Figure 4: Counterfactual and Observed Distributions, pooled 2011 - 2018

(a) Second Kink



(b) Third Kink



Source: own elaboration based on SAR data.

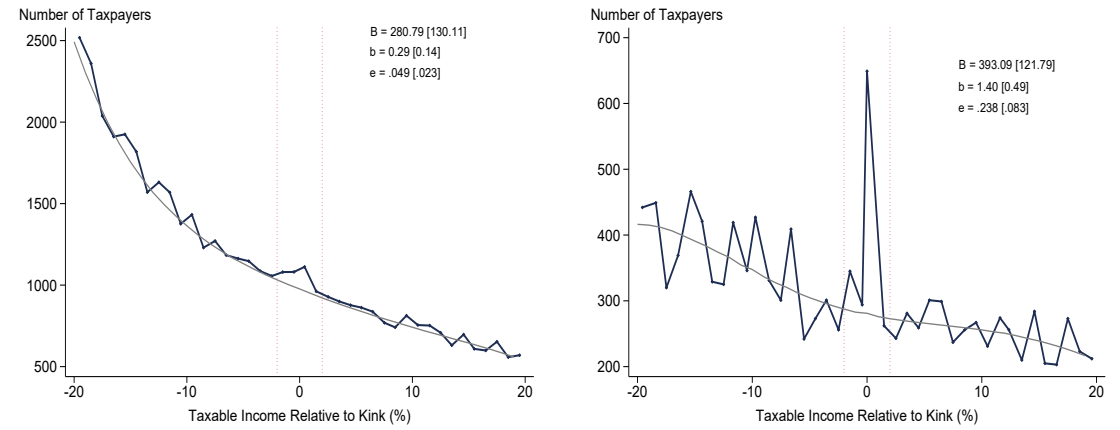
Note: The blue dotted line represents to the observed distribution of taxpayers by their distance relative to the taxable income at the kink point. The red vertical dashed lines correspond to the small bunching interval which was excluded to estimate the counterfactual distribution with the help of the fifth order polynomial regression. The bin width is set to 1%. The elasticity is denoted by e. B corresponds to the excess mass or the number of taxpayers over the counterfactual distribution at the kink. On the other hand, b is the ratio of the excess mass on the counterfactual distribution at the kink.

5.2 Response by taxpayer categories

This subsection contains a breakdown of the sample for different categories of interest, based on the source of income, third-party reporting, and type of taxpayer. A common analysis among the bunching at kinks of the PIT literature is to compare the bunching of self-employed and wage earners. Figure 5 plots the distributions for the second kink. The left Panel (5a) shows the distribution of self-employed, which are defined as those taxpayers that have other income different from wages and salaries. Wage earners distribution is plotted in the right Panel (5b). Results reflect a different pattern, where larger bunching and elasticities have been found among self – employers. This paper finds that wage earners generate larger bunching at the second kink compared to self-employed, with an elasticity of 0.24 for wage earners and 0.049 for self-employers. A possible explanation of this behavior is that wage earners at this income level sub report their taxable income through itemized deductions like the contributions to the social security or pension funds. This hypothesis will be evaluated in a further analysis.

Figure 5: Counterfactual and Observed Distributions at the Second Kink – Source of Income Category, pooled 2011-2018[6]

(a) Other Income **(b)** Wage Earners



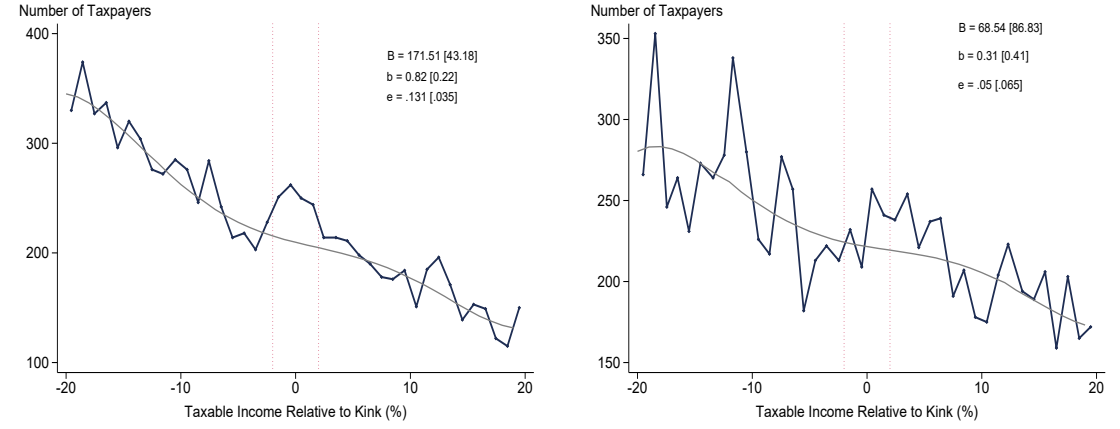
Source: own elaboration based on SAR data.

Note: The blue dotted line represents to the observed distribution of taxpayers by their distance relative to the taxable income at the kink point. The red vertical dashed lines correspond to the small bunching interval which was excluded to estimate the counterfactual distribution with the help of the fifth order polynomial regression. The bin width is set to 1%. The elasticity is denoted by e. B corresponds to the excess mass or the number of taxpayers over the counterfactual distribution at the kink. On the other hand, b is the ratio of the excess mass on the counterfactual distribution at the kink.

Following the analysis of self-employed and wage earners, Figure 6 shows the distributions for the third kink. Different from the situation found at the second kink, the self-employed shown at Panel (6a) show a larger bunching behavior that represents an elasticity of 0.131. On the contrary, wage earners estimated elasticity is very close to 0. This may denote that bunching incentives change depending on the level of income at which the kink is located.

Figure 6: Counterfactual and Observed Distributions at the Third Kink – Source of Income Category, pooled 2011-2018

(a) Other Income **(b)** Wage Earners



Source: own elaboration based on SAR data.

Note: The blue dotted line represents to the observed distribution of taxpayers by their distance relative to the taxable income at the kink point. The red vertical dashed lines correspond to the small bunching interval which was excluded to estimate the counterfactual distribution with the help of the fifth order polynomial regression. The bin width is set to 1%. The elasticity is denoted by e. B corresponds to the excess mass or the number of taxpayers over the counterfactual distribution at the kink. On the other hand, b is the ratio of the excess mass on the counterfactual distribution at the kink.

The estimated elasticities by taxpayer categories are shown in table 3. To study more thoroughly the

situation of wage earners, a variable called *pure wage earners* was created to mark only those taxpayers who had reported only income from wages and salaries in that year and not a mix of other incomes. Nevertheless, the estimated elasticities remained higher for wage earners at the second kink (0.469) and lowered at the third kink (-0.002).

Another interesting pattern among the type of taxpayers. Taxpayers in the Honduran Tax Administration may report themselves as Individual Merchants *(Comerciantes Individuales)*. Individual Merchants, however, may get involved in economic activities that are very similar to the one carried out by corporations, but they get taxed through the progressive tax system of the PIT. Panel F and G show that natural persons (self-employed or wage earner) tend to bunch slightly more than individual merchants at the second kink, with estimated elasticities around 0.104 and 0.075 respectively. This behavior changes at the third kink, which corresponds to higher income levels, where the estimated elasticity for individual merchants is larger (0.094) than natural persons (0.086). Regarding the responses of taxpayers to third-party reporting, a larger elasticity is found at the second kink for those individuals that are not reported. Although this behavior seems to even-out at the third kink with an estimated elasticity of 0.09.

Table 3: Estimated Elasticities by Taxpayer Categories, pooled data 2011 - 2018

	Elasticity	SD
Panel A - Total Taxpayers		
Second Kink	0.090	0.032
Third Kink	0.090	0.043
Panel B - Wage Earners		
Second Kink	0.238	0.083
Third Kink	0.050	0.065
Panel C - Other Income		
Second Kink	0.049	0.023
Third Kink	0.131	0.035
Panel D - Pure Wage Earners		
Second Kink	0.469	0.147
Third Kink	-0.002	0.154
Panel E - Mixed Income and Other		
Second Kink	0.044	0.023
Third Kink	0.109	0.033
Panel F - Individual Merchants		
Second Kink	0.075	0.023
Third Kink	0.094	0.041
Panel G - Natural Person		
Second Kink	0.104	0.049
Third Kink	0.086	0.057
Panel F - Reported		
Second Kink	0.059	0.019
Third Kink	0.090	0.041
Panel G - Not Reported		
Second Kink	0.112	0.049
Third Kink	0.090	0.055

Source: own elaboration based on SAR data.

5.3 Responses by taxpayer characteristics

In the following section the sample is restricted to taxpayers whom their gender and age has been identified. The sample was further reduced to taxpayers whose age ranged between 15 and 65 years of age. Table 4 presents the results of the estimated elasticities by gender and age of the taxpayers. The literature suggests that female workers tend to adjust their taxable income at kinks because they are secondary provisioners of a household. This pattern has recently changed due to the higher integration of women to the workforce, which has lowered the reported elasticities. In Honduras this seems to be the case at the second kink, were males and females present very similar elasticities (0.097 and 0.107 respectively). At the third kink this behavior changes, where females have a slightly larger response in comparison to males (0.104 and 0.088 estimated elasticities respectively). This suggests that women may have larger incentives to respond when the kink is located at a higher income level.

Regarding the age of the taxpayer, there is not a clear behavioral pattern as it was found in the South African case (Bell, 2020) where estimated responses tend to be lower as the taxpayers get older. Nevertheless, Honduran younger taxpayers (15-24 years) show a large response at the third kink, with an

estimated elasticity of 0.294 however the standard deviation is very large (0.249). Although patterns are not stable, it seems that younger taxpayers have lower responses at lower income levels (second kink). On other hand, older taxpayers near retiring age show a higher response at the second kink.

Table 4: Estimated Elasticities by Gender and Age of the Taxpayers, pooled data 2011-2018

	Elasticity	SD
Panel A - Female		
Second Kink	0.107	0.032
Third Kink	0.104	0.052
Panel B - Male		
Second Kink	0.097	0.038
Third Kink	0.088	0.047
Panel C - 15-24 years		
Second Kink	0.024	0.108
Third Kink	0.294	0.249
Panel D - 25-34 years		
Second Kink	0.126	0.053
Third Kink	0.034	0.069
Panel E - 35-44 years		
Second Kink	0.082	0.036
Third Kink	0.117	0.062
Panel F - 45-54 years		
Second Kink	0.077	0.036
Third Kink	0.083	0.051
Panel G - 55-64 years		
Second Kink	0.158	0.042
Third Kink	0.099	0.091

Source: own elaboration based on SAR data.

6 Conclusions

The recent interest of the importance of tax capacity to achieve economic behavior has highlighted the importance of efforts needed to be done by government to improve the tax administration. Particularly the Personal Income Taxes represent an instrument of reduction of inequality which is favored by policy makers. In Latin America and The Caribbean there is still job to be done to increment the levels of tax revenues obtained through PIT in comparison with OECD countries (OECD, 2021).

This trend has favored the analysis of the implications of PIT schemes on taxpayer behavior. The recent disposal of data has allowed brought the bunching technique to explore behavioral responses at kink points which are common in progressive tax schedules (Kleven, 2016). This paper aims to study the behavioral responses at the Honduran PIT, specifically at the second and third kink.

Evidence of bunching was visually corroborated at the three kinks of the Honduran Tax system. Due to missing data issues, the estimation of counterfactual distributions through the bunching technique was restricted to the second and third kink. Both of those kinks showed low levels of responses by taxpayers in the order of 0.09. Differences exist by taxpayer characteristic, where wage earners tend to have a higher response at the second kink but a lower one at the third kink. On the other hand, taxpayers that are not subject to third party reporting tend to have a higher reaction at the second kink point of the tax schedule, which may suggest that responses at this kink might be induced by evasion behavior rather than adjustments of working hours.

Female workers tend to have larger elasticity at the third kink, which occurs at higher incomes. This response may associate with the literature findings of larger responses of secondary earners, however, the information on civil status is not available in the Tax Administration. No general trend could be found by taxpayer age, nevertheless it seems that younger taxpayers have larger incentives to bunch at low-income levels. Meanwhile, older taxpayers have higher responses at low-income levels.

Further analysis may be done to disentangle the behavioral reactions and identify whether taxpayers' bunch due to real labor supply adjustments or to evasion patterns. This paper highlights the importance of considering behavioral responses on economic policy measures. Our results contribute to the literature by applying the bunching approach and the estimation of elasticities for low-income countries.

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7 Appendix

Table 5: Estimated Elasticities for Wage Earners by Year, 2011 - 2018

	Elasticity	SD
Panel A - Second Kink		
2011	0.687	0.161
2012	0.697	0.229
2013	0.821	0.281
2014	0.406	0.170
2015	0.447	0.170
2016	-0.214	0.153
2017	-0.005	0.149
2018	0.180	0.184

Source: own elaboration based on SAR data.

Note: Taxpayers are considered wage earners if they report wages or salaries as income.