

**ESSAYS ON INCOME TAX EVASION**

**Jeong Dae Lee**

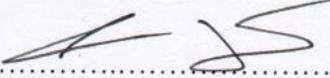
**A Dissertation Submitted in Partial  
Fulfillment of the Requirements for the Degree of  
Doctor of Philosophy (Economics)  
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2018**

# ESSAYS ON INCOME TAX EVASION

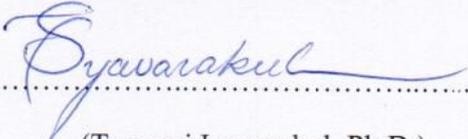
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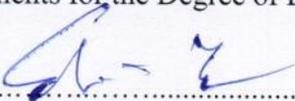
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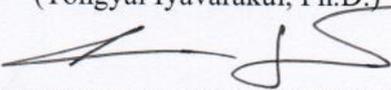
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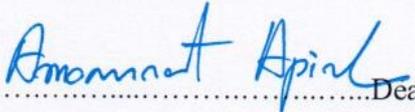
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## **ABSTRACT**

<b>Title of Dissertation</b>	Essays on Income Tax Evasion
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Tax evasion has a direct impact on government revenues and therefore capacity to provide public goods. Moreover, tax evasion imposes a welfare cost on society by having to resort to more distortionary taxes and discouraging financial transparency, both of which result in inefficient allocation of resources. If tax evasion is concentrated in certain segments of society, equity concerns also arise.

The objective of my dissertation is to enhance our understanding of tax evasion-why people cheat the government, old and new ways of cheating, and which remedies may be effective.

In Chapter 2, “Cheating the government: Does taxpayer perception matter?”, I ask whether people cheat (in the form of misreporting their income to tax authorities) because they know that they can get away with it or because they genuinely feel that the rules are unfair. Specifically, I incorporate taxpayer perception into a widely used consumption-based method for estimating income tax evasion. Compared to the standard method which distinguishes taxpayers only by their occupational or income type as a way of measuring their “ability” to misreport income, the refined method introduces taxpayers who may be “able but unwilling” to cheat because they feel fairly treated with respect to public services and compared to other taxpayers. Applied to a longitudinal data for Korea (2007-2015), the standard method yields a uniform tax evasion rate of 13 percent, but the refined method provides a range of 7 to 25 percent based on taxpayer perception. This implies that strategies for improving tax compliance must be tailored to different motivations for tax evasion.

In Chapter 3, “Hide-and-seek: Can tax treaties reveal offshore wealth?”, I highlight that information asymmetry becomes a far greater challenge in a multiple-jurisdiction context, where offshore centres can facilitate tax evasion. In response, governments have introduced new tax treaties to facilitate the exchange of financial account information between jurisdictions, including traditional tax havens. Based on international banking statistics, I examine whether these treaties have had a material impact on offshore tax evasion. Based on panel regression analysis, I find that cross-border deposits in traditional haven jurisdictions, taken as a proxy for offshore evasion in the literature, have declined substantially. However, I also find that these offshore assets are being relocated to few non-compliant tax havens and moreover, “non-haven” offshore financial centres, most notably the United States, which has yet to commit to reciprocal and automatic exchange of information and establish a public register of ultimate beneficial ownership.

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Jeong Dae Lee

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# CHAPTER 1

## AN INTRODUCTION

### 1.1 (Why) is Tax Evasion an Issue?

Taxation triggers various behavioural responses, including noncompliance. The traditional focus of policy debate and academic literature on taxation was on real income and substitution effects of taxation (e.g. labour supply and savings responses), but recent years have seen a growing interest on issues of tax evasion and avoidance such as offshore accounts, forms of compensation, timing of transactions, and profit-shifting by multinational corporations. For developing economies, the widespread informal sector also remains a challenge.

This is a concern because noncompliance has a direct impact on government revenues and implications in turn for macroeconomic stability and the provision of public goods. Moreover, noncompliance imposes welfare costs on society by having to resort to more distortionary taxes and discouraging financial transparency, both of which have a direct impact on the efficient allocation of resources. If noncompliance is concentrated in certain segments of the population, equity concerns may also arise.

Tackling noncompliance, however, can be a daunting challenge for governments. Tax authorities of developing economies in particular often have limited capacities and resources to acquire and assess relevant information, conduct audit, impose penalty and ultimately, enforce the tax law. It becomes more daunting once international dimensions are added. Indeed, the legal, policy and administrative considerations and requirements associated with different forms of tax evasion and avoidance can be overwhelming.

My thesis focuses on tax evasion, which is generally understood to be illegal, compared to tax avoidance which could be defined as minimizing the tax burden

within the legal bounds but in conflict with the law's intention.<sup>1</sup> The objective of my study is to enhance our understanding of tax evasion-why people cheat the government, old and new ways of cheating, and which remedies may be effective.

In my first paper, "Why do people cheat? Explaining tax evasion behaviour based on household income survey", I ask whether people cheat (in the form of underreporting their true income) because they know that they can get away with it or because they genuinely feel that the rules are unfair. If the reason for evasion is the former, stronger enforcement is needed. But for the latter, changes to tax policy, together with voluntary compliance measures, could be more effective. To examine this question, I compare individuals that are "able to cheat" (as defined by their occupational and income type) versus those that are "willing to cheat" (as defined by their tax burden and social perception) by extending a methodology used in the literature for estimating the size of the shadow economy. Following Pissarides and Weber (1989), I estimate the Engel curve of a benchmark group to infer the true income of a comparison group. My contribution is to add another layer of heterogeneity to this analysis by accounting for willingness as well as the ability to cheat. By applying this method to a unique household income survey for Korea, I find that previous studies are likely to have over-attributed tax evasion to people's ability to cheat while overlooking the willingness dimension. For sure, tax authorities can curb tax evasion by improving their information reach on 'hard-to-observe' incomes. At the same time, social and psychological dimensions of tax compliance behaviour need to be better understood.

In my second paper, "Offshore tax evasion: Is exchange of information effective?", I highlight that information asymmetry becomes a far greater challenge in a multiple-jurisdiction context; offshore financial assets and incomes are often hidden

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<sup>1</sup> As cited in Slemrod and Yitzhaki (2002), the classic distinction between avoidance and evasion is due to Oliver Wendell Holmes, who wrote: "When the law draws a line, a case is on one side of it or the other, and if on the safe side is none the worse legally that a party has availed himself to the full of what the law permits. When an act is condemned as evasion, what is meant is that it is one the wrong side of the line... (Bullen v. Wisconsin, 1916)."

from tax authorities back home. In response, countries have signed treaties with each other to exchange information and most recently, shifted from “upon request” to “automatic” exchanges. Despite such efforts, high-profile leaks such as the Panama Papers reveal that offshore evasion is alive and well. To assess treaties’ effectiveness, I extend a methodology adopted by Johannesen and Zucman (2014), which exploits international banking statistics. The idea is that tax treaties would affect certain types of capital flows motivated by tax evasion (e.g. deposits in tax havens), but not others (e.g. deposits in non-havens). My contribution is to differentiate between different types of treaties, whose impacts may differ, and update the analysis to 2017, which was the first year of implementing automatic exchanges. Compared to traditional double taxation conventions (DTCs), I find that recent tax information exchange agreements (TIEAs) and Common Reporting Standard (CRS)-based automatic exchanges are more effective. In particular, CRS-based exchanges also reduce deposits held through sham corporations. But I also find that these new treaties remain vulnerable to deposit shifting to noncompliant tax havens. The policy implication is that effectiveness will depend on further expanding the treaty network to all jurisdictions and enhancing tax transparency on beneficial ownership.

While my contribution is primarily on the empirical side, I do discuss the relevant theoretical literature. Moreover, in this introductory chapter, I lay out the basic income tax evasion model of and work towards a general model which incorporates the role of information and possibilities of income shifting across tax bases. While the focus of my thesis is individual income tax evasion, I also illustrate how the general model could be applied to corporate taxation and indirect taxation.

## **1.2 Role of Information in Tax Enforcement**

### **1.2.1 Evasion**

The basic model on tax evasion is found in Allingham and Sandmo (1972) and Yitzhaki (1974), in which evasion is seen essentially as a gamble with an expected payoff based on a proportional tax rate  $\tau$ , a probability of detection  $p$ , and a penalty

$\theta$ .<sup>2</sup> For the moment, these are all exogenous variables. As shown in [1], an individual decides how much to report on his personal income taxes. He reports a taxable income  $\hat{y}$  that is below its true value  $y$  as long as the marginal benefit of doing so exceeds the marginal cost. If the individual's risk preference is incorporated (through the concavity of his utility function), the model further predicts that those with higher incomes evade more in absolute terms (as a fraction of income) if the absolute (relative) risk aversion is decreasing.

$$[1] \quad \max_{\hat{y}} u = (1 - p)(y - \tau\hat{y}) + p[y(1 - \tau) - \theta\tau(y - \hat{y})]$$

For corporate income tax, the tax base in [1] can simply be replaced from incomes  $y$  to profits  $\pi$ . Defining profits as revenues minus costs,  $\pi = R - C$ , a firm can underreport profits  $\hat{\pi} < \pi$  by either underreporting revenues  $\hat{R} < R$  or overreporting costs  $\hat{C} > C$ , depending on whether revenues or costs are harder to monitor by the tax authority.<sup>3</sup> Firms are generally considered risk-neutral.<sup>4</sup> An analysis of corporate tax evasion is arguably more complex than the household case as a firm's compliance behaviour could be influenced by, for instance, market environment and corporate governance.<sup>5</sup>

Similarly, for indirect taxes such as value added tax, the tax base in [1] can be reformulated as sales minus purchases,  $S - \mu P$ , where  $\mu \in [0, 1]$  is the share of

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<sup>2</sup> Whereas Allingham and Sandmo (1972) assumes that the penalty is imposed on the evaded income, Yitzhaki (1974) points out that in most countries, it is imposed on the evaded tax.

<sup>3</sup> Carrillo, Pomeranz, and Singhal (2017) shows how firms can choose the optimal (tax-minimizing) reported profits by adjustments to both revenues and costs.

<sup>4</sup> However, in many developing economies, where a large share of firms are sole proprietorships or owned by a single family, assuming risk-averse as in the household case may be more appropriate.

<sup>5</sup> Crocker and Slemrod (2005) presents an agency model in the context of the contractual relationship between the shareholders and the chief financial officer, who determines the firm's deductions from taxable corporate income.

purchases that can be deducted. If  $\mu = 0$ , it would be a turnover tax. Some countries also have minimum tax schemes according to which firms are taxed either on profits or on turnover (with a lower rate applying to turnover), depending on which tax liability is larger.<sup>6</sup>

The basic model provides a simple framework to think about tax evasion on various direct and indirect taxes. Regardless of how tax is evaded,<sup>7</sup> the bottom line is to evade as long as the expected return is positive. The model's limitations should be recognized, however. It has been argued that the model's prediction is in contrast with the observation that compliance levels are high in modern tax systems despite low audit rates and fairly modest penalties.<sup>8</sup> This point is somewhat reconciled when key parameters such as the probability of detection  $p$  are endogenously determined and the cost of evasion is reinterpreted more generally beyond just the government-imposed penalty  $\theta$ .<sup>9</sup>

### 1.2.2 Avoidance

The distinction between tax evasion and tax avoidance is not always clear, but it is generally understood that the former is illegal and the latter legal means of

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<sup>6</sup> Best et al. (2014) shows how turnover taxes, which are viewed as inferior to VAT from efficiency perspective, can in fact reduce evasion of corporate income when tax administrative capacity is weak.

<sup>7</sup> Tax can be evaded, for instance, through misreporting on incomes, profits, sales or deductible costs, shifting taxable income to offshore accounts, and engaging in informal sector activities outside the purview of tax authorities.

<sup>8</sup> Kleven et al. (2011) highlights this point, with a reference to Andreoni, Erard and Feinstein (1998)'s conclusion that "the most significant discrepancy that has been documented between the standard economic model of compliance and real-world compliance behaviour is that the theoretical model greatly over-predicts noncompliance."

<sup>9</sup> Although not the focus of this paper, dynamic models can also help reconcile this discrepancy. For instance, Engel and Hines (1999) presents the possibility of retrospective examination of previous-years' returns.

minimizing the tax burden. Moreover, the distinction between tax avoidance and other behavioural responses to taxation can be debatable.<sup>10</sup> Certain forms of tax avoidance, such as income- or profit-shifting across different tax bases, are easier to identify.<sup>11</sup> Such shifting activities can be distinguished from substitution effects of taxation which reflect underlying individual preferences or production technologies.

Partly due to definitional issues, there is no standard tax avoidance model. Equation [2] is an adoption of Slemrod (2001) and Piketty, Saez and Stantcheva (2014). The basic idea is that there are two tax bases with different tax rates,  $\tau > t$ , but shifting across tax bases entails a cost  $c(s, t)$ , which is a function of the shifted income  $s$  and the tax rate of the destination tax base  $t$ .

$$[2] \quad \max_s u = y - \tau(y - s) - ts - c(s, t) = (1 - \tau)y + (\tau - t)s - c(s, t)$$

Equation [2] can be viewed as a more general expression of [1]. Notice that if  $t = 0$  and  $c(s, t)$  is paid to the government rather than to a tax lawyer, it becomes a tax evasion model. Formally, the shifting cost could be specified as the expected penalty,  $c(s, t) = p[\tau s + \theta]$ . Again, the tax bases can be flexibly defined for different settings such as personal and corporate income taxes and indirect taxes.

### 1.2.3 Multiple Tax Bases

A natural extension of the two-base model is the multiple-base model, which is widely used in international corporate tax analysis. Equation [3] is an adoption of

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<sup>10</sup> A popular definition of tax avoidance is one that focuses on the lawmakers' intention and says that avoidance is a type of action that is an unintended, although legal, consequence of tax policy. But it is often far from simple to discover what the intentions of politicians really are—a point also noted in Sandmo (2005).

<sup>11</sup> Examples include changing the form of compensation or the form of business organization in order to shift incomes or profits across individual and corporate tax bases. It could also include postponement of taxes and tax arbitrage across individuals facing different tax brackets. See Gordon and Slemrod (1998) and Stiglitz (1986) for a general discussion.

Zodrow and Mieskowski (1986), Wilson (1986) and Crivelli, de Mooij and Keen (2015), in which tax bases are different tax jurisdictions. Conceptually, however, multiple tax bases can be viewed more generally as to include various types of taxes, periods and jurisdictions. There are  $N = 1 \dots n$  tax bases, each with a different tax rate  $\tau_i \in [0, 1]$ . Let  $s_{ij}$  be income or profit shifted from tax base  $i$  to  $j$ . The associated shifting costs  $c_{ij}$  is a function of  $s_{ij}$  and the tax rate on the destination tax base  $\tau_j$ .

$$[3] \quad \max_s u = \sum_{i=1}^n [y_i - \tau_i(y_i + \sum_{i \neq j}^n s_{ij}) - \sum_{i \neq j}^n c_{ij}(s_{ij}, \tau_j)]$$

Equation [3] can be viewed as a more general expression of [2]. Among others, it allows for co-existence of tax evasion and tax avoidance. For instance, some tax bases can be legal and other illegal,  $\sum_{i=1}^{j-1}(\cdot)$  and  $\sum_{i=j}^n(\cdot)$ . Alternatively, tax rates can be positive in some tax bases and zero in others.<sup>12</sup> Note that the optimal shifting, however, will depend on not only the tax rate but also the shifting cost. The degree of information disclosure of each tax base may also vary such that shifting across bases is also motivated by the ability to escape detection by tax authorities.

#### 1.2.4 Information

So far, I have considered a case of self-reporting only, but the ability to verify taxpayer self-reports against reports from third-parties can help tackle tax evasion and avoidance. As pointed out in Slemrod (2007), under third-party reporting the observed audit rate is a poor proxy for the probability of detection faced by a taxpayer contemplating to engage in tax evasion, because systematic matching of information reports to income tax returns will uncover any discrepancy between the two. This argument is supported by the U.S. Taxpayer Compliance Measurement Programme (TCMP), which found that aggregate compliance is much higher for income categories with substantial information reporting than for income categories with little or no information reporting (Internal Revenue Service, 2006).

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<sup>12</sup> For instance, profit-shifting multinationals may employ a hybrid strategy consisting of tax havens, transfer pricing and other forms of avoidance, some of which may be deemed illegal.

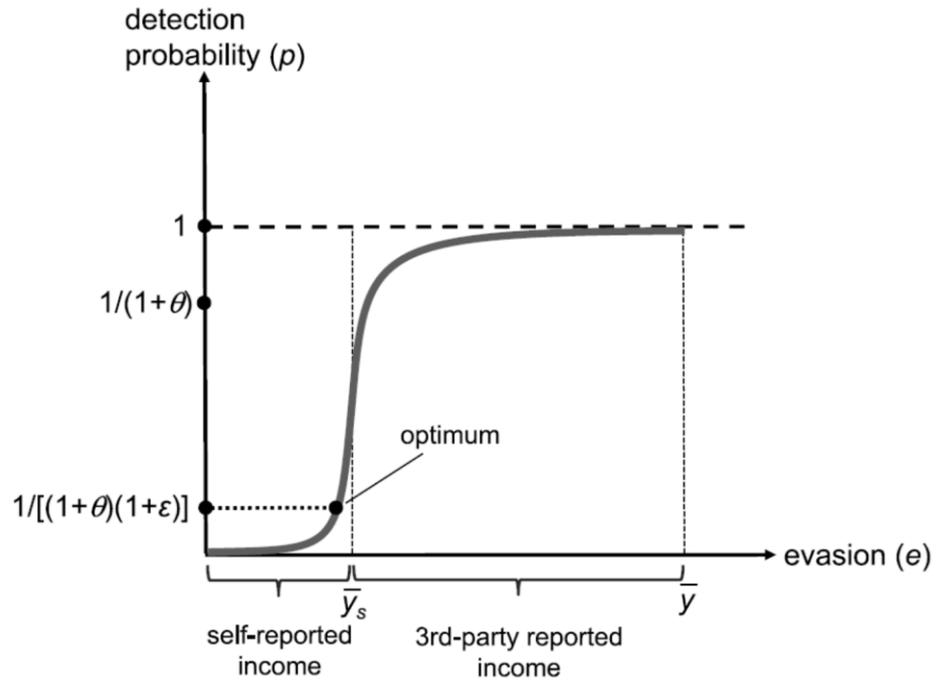
Following Kleven et al (2011), third-party reporting can be embedded in the tax evasion model by dividing income into that which is subject to third-party reporting  $y_t$  (e.g. wages and salaries, interest income, mortgage payments) and that which is self-reported  $y_s$  (e.g. self-employment income, deductions) such that the probability of detection is close to 1 for the former and very low for the latter, as seen in Figure 1.1.<sup>13</sup> True income is  $y = y_t + y_s$ . The basic idea is extended to the firm context in Carrillo, Pomeranz and Singhal (2014), where revenues and costs are comprised of third-party and self-reported components,  $R = R_T + R_S$  and  $C = C_T + C_S$ . It can also be applied to the case of indirect taxes.

Returning to equation [1], it now becomes obvious that there cannot be a single probability of detection  $p$  given exogenously. It would be more realistic for the probability to be endogenously determined.<sup>14</sup> This point is recognized in the early literature, but has been explored further in the recent literature. Allingham and Sandmo (1972) defines the probability as a decreasing function of reported income,  $p = p(\hat{y})$  where  $p'(\hat{y}) < 0$ . Alternatively, Yitzhaki (1974) defines it as an increasing function of the undeclared income,  $p = p(y - \hat{y})$  where  $p'(y - \hat{y}) > 0$ . In either case, the model now predicts an optimal evasion which is lower than in the exogenous case.

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<sup>13</sup> In the empirical literature, this distinction owes to Pissarides and Weber (1989), which uses the UK Family Expenditure Survey to estimate the size of the underground economy; a key assumption in the methodology is that employees report their income accurately whereas the self-employed do not.

<sup>14</sup> The probability of detection will typically be lower than the probability of audit. This may be particularly true in developing economies where audit capacities are weak. In fact, where enforcement capacities are weak and the vulnerability to corruption is high, the ‘effective’ probability of detection may be far lower than initially thought.



**Figure 1.1** Third-party Reporting and the Probability of Detection

Source: Kleven et al. (2011).

An elasticity expression further illustrates the point. Denoting undeclared income as  $e = y - \hat{y}$ , the elasticity of the detection probability with respect to undeclared income can be written as  $\varepsilon \equiv \frac{dp}{de} \frac{e}{p}$ . Following Kleven et al. (2011), the first-order condition in [1] can then be written as<sup>15</sup>

$$[4] \quad p(\hat{y})(1 + \theta)(1 + \varepsilon(\hat{y})) = 1$$

, where the right-hand side is the marginal benefit of an extra dollar of tax evasion and the left-hand side the expected marginal cost. If  $\varepsilon = 0$  and thus  $p$  independent of  $\hat{y}$ , the expected marginal cost is simply the probability of detection times the evaded tax

<sup>15</sup> From [1], an interior optimum for reported income satisfies the first-order condition  $du/d\hat{y} = 0$ , which can be written as  $[p(\hat{y}) - p'(\hat{y})(y - \hat{y})](1 + \theta) = 1$ . This becomes [4] under  $\varepsilon \equiv \frac{dp}{de} \frac{e}{p} = -p'(\hat{y}) \frac{y - \hat{y}}{p}$ .

plus penalty,  $p(1 + \theta)$ . But as long as  $\varepsilon > 0$ , evading one more dollar incurs a higher probability of detection on all the infra-marginal units of tax evasion. Thus, even in the case of a zero penalty,  $\theta = 0$ , partial tax evasion may be better than full evasion because it involves a lower probability of being detected and having to pay the full statutory tax (Kleven et al., 2011).

The elasticity of the detection probability with respect to undeclared income,  $\varepsilon \equiv \frac{dp}{de} \frac{e}{p}$ , depends critically on the information base availability to the tax authority. For instance, if the tax authority has some information about the distribution of profit rates (profits as a share of revenues) across firms in the same industry, reporting a profit rate which is far below the industry average would make a tax audit more likely. Similarly, for personal income taxes, the tax authority may observe whether individual's self-reports seem internally consistent, for instance, by comparing the reported income against reported expenditures. Going back to the basic model [1], I can specify the detection probability function as  $p\left(\frac{\hat{c} + \varepsilon}{\hat{y}}\right)$  and  $p' > 0$  for households and as  $p\left(\frac{\hat{\pi} + \varepsilon}{\hat{R}}\right)$  and  $p' < 0$  for firms, where  $\varepsilon$  is a small number greater than zero.

To provide a more concrete picture, some of the main sources of information, including firms, value chains, consumers, the financial sector, and tax authorities of other jurisdictions are discussed below from a theoretical perspective. The issue of possible collusion amongst informed parties is also discussed.

### 1.2.5 Sources of Information

In the early literature on tax evasion, the role of the firm was largely overlooked. However, in most countries, firms remit the majority of tax revenues to the government, either with regard to taxes it owes or through withholding taxes owed by employees (Kopczuk & Slemrod, 2006). For large firms with a sizable number of employees, clients or business partners, it becomes essential to use accurate business records such as accounting books, details of purchases and sales, or payroll accounts listing individual wages and salaries. In such case, collusion to evade on taxes becomes extremely fragile to whistleblowing or any random shock.

As in Kleven, Kreiner, and Saez (2015), say there are  $N$  employees and let  $\delta$  be the probability of any given employee revealing true information. Then the

probability that somebody will reveal the true information is given by  $1 - (1 - \delta)^N$ , which is increasing in  $N$ , i.e.  $\partial p / \partial N > 0$ . Naritomi (2015) extends this idea to a case in which the government offers a monetary reward  $\alpha \in [0, 1]$  on the evaded tax  $\tau(y - \hat{y})$ . Then, for collusion to hold, the firm needs to share some of the evasion rent with the informed party; in particular, at least  $\alpha\tau(y - \hat{y})$  to match the government's reward. Once this additional cost enters the utility or profit function [1], the right-hand side of its first-order condition [4] becomes  $1 - \alpha$ , i.e. the marginal benefit of evasion is lower by  $\alpha$ . This basic framework could be applied between the employer and the employee, the firm and the consumer, or any other internal or external parties.<sup>16</sup>

Other firms can also be viewed as sources of third-party information. The most obvious example is the value added taxes (VAT), which require firms to keep accounts of all purchases and sales and pay taxes on sales net of purchases. Each firm has an incentive to underreport sales and overreport purchases hence creating opposite incentives across businesses engaged in arm's-length transactions. Thus, in principle, VAT has a self-enforcing property. Only businesses selling directly to households for final consumption can evade by underreporting sales. Even this may be difficult: countries like Korea have encouraged the use of credit cards for everyday transactions and introduced receipts on cash transfers which are electronically transferred to the government database on a daily basis.

Another major source of information is the financial sector including banks, insurers, investment funds and pension funds – which reports taxable income earned by individuals (employees or clients) to the government. In the corporate context, Gordon and Li (2009) present a simple model [5] in which a price-taking firm maximizes expected net-of-tax profits by choosing factor inputs  $K, L$  at prices  $r, w$  to produce output  $f$  at price  $q$ . In addition, the firm chooses the degree of financial sector use  $\beta \in (0, 1)$ , which increases its output by a factor  $\alpha$  but also entails an

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<sup>16</sup> For instance, as in Naritomi (2015), shared rent could be in the form of a discount to consumers who are willing to pay in cash or not request for receipts. Government monetary rewards for consumers reporting firm tax evasion has been applied in several countries including Brazil and Korea.

effective tax payment  $\tau$ .<sup>17</sup> If the productivity benefit does not outweigh the total cost, i.e.  $\alpha < \tau$ , the firm shifts entirely to cash transactions, withdrawing from the formal financial sector in the process.<sup>18</sup>

$$[5] \quad \max_{\beta, L, K} (1 - \beta)qf + \beta q \frac{1+\alpha}{1+\tau} f - rK - wL$$

The parameter  $\beta$  can be viewed as a special case of the probability of detection  $p$ , as the use of the financial sector is only one of the factors which may affect  $p$ . Conceptually, equation [5] is similar to equation [2] if the productivity parameter  $\alpha$  is viewed as an opportunity cost which is equivalent to the tax evasion or avoidance cost  $c$ , earlier defined as either a government-imposed penalty or a fee for hiring a tax lawyer. The foregone benefit of using the financial sector could also be compared to the foregone tax evasion rent from having to compensate informed third-parties for collusion. However, as illustrated in Chetty (2009), the welfare implications can be very different.

Turning to international dimensions, the exchange of information among tax authorities of different jurisdictions could also be viewed as an extension of third-party reporting. If tax bases in equation [3] are defined as national jurisdictions, unless there is some tax treaty to exchange information, there would be no way to monitor offshore financial accounts held by the super-rich. Similarly, transfer pricing assessment against multinationals could be challenging without recent tools such as country-by-country reporting, whose data could also be exchanged between tax authorities.

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<sup>17</sup> The assumption that the government has access to financial sector information seems to be appropriate for most countries where it is either required by law or facilitated through credit bureaus and registries.

<sup>18</sup> Blackburn et al. (2012) offer a less extreme model in which disclosure is associated with a better loan contract.

### **1.2.6 Less Verifiable Margins**

There may be limits to the effectiveness of third-party information if firms make offsetting adjustments on less verifiable margins. For instance, in the case of corporate taxation, while third-party reporting limits the scope for misreporting revenues, this is not true for costs. Since third-party reporting creates a floor on reported costs (not a ceiling), firms can increase their reported costs without the tax authority being able to determine whether or not these costs are legitimate.

Carrillo, Pomeranz and Singhal (2017) reports that in an experiment conducted in Ecuador, firms which were notified by the tax authority for having underreported revenues filed a revised tax return in which they offset the majority of increases in reported revenues with increases in reported costs, under items that are difficult to verify such as “Other administrative costs.” Similar challenges also arise in the context of profit-shifting by multinationals, where costs associated with using intangible assets (e.g. intellectual property, advisory services) can be difficult to verify. Therefore, the tax authority’s ability to enforce non-third-party reported margins is critical in order to prevent income or profit shifting to more opaque tax bases.

## **1.3 Beyond Information**

While the role of information in tax enforcement cannot be overemphasized, tax authorities should be mindful of the compliance cost which new information requirements may impose on tax payers, along with privacy and data security issues. This leads to an equally important point that information should be viewed not only from the perspective of enforcement but also from the perspective of voluntary compliance and taxpayer services. As discussed in my first paper, if people do not see the value of paying taxes and cannot trust the government, they may be less inclined to pay taxes. Thus, while making an effective use of modern tools of tax enforcement such as third-party reporting, a broader perspective on the issue of tax evasion would be needed. In the long run, greater transparency of the government itself could be an effective way of building trust and enhancing tax compliance. Finally, as tax evasion

is also related to perceptions of fairness, attention to horizontal and vertical equity in the design and implementation of the tax law could go a long way.

## CHAPTER 2

### CHEATING THE GOVERNMENT: DOES TAXPAYER PERCEPTION MATTER?

#### 2.1 Introduction

Tax evasion is as old as taxes themselves. It is a way of cheating the government (Cowell, 1990), with adverse effects on social welfare.<sup>19</sup> However, assessing the extent and determinants of tax evasion remains a challenge given its hidden nature.

In the economic literature, the benchmark model posits that people cheat if the probability of being caught and punished is low compared to potential monetary savings (Becker, 1968; Allingham & Sandmo, 1972). A popular comparison is between wage earners who are “unable” to cheat because their incomes are subject to withholding or third-party reporting, versus the self-employed who are “able” to cheat because their incomes are harder to detect for tax authorities (Slemrod, 2007; Kleven et al., 2011).

However, while tax authorities are certainly concerned about enforcement, they also emphasize “tax morale,” by which they generally mean increasing voluntary compliance with tax laws and creating a social norm of compliance (Luttmer & Singhal, 2014). Behavioural models in economics also suggest that tax decisions are influenced by perceptions of fairness and other factors that fall outside the standard, expected utility framework (Bordignon, 1993; Feld & Frey, 2002; Torgler 2003,

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<sup>19</sup> If widespread, tax evasion could constrain the provision of necessary public services. And if higher tax rates are applied to a narrow tax base to make up for the revenue shortfall due to evasion, there could be adverse welfare effects. Moreover, if concentrated among certain segments of society, tax evasion could undermine trust and social cohesion.

among other studies). Not accounting for such factors could result in over-attributing evasion to the lack of heavy enforcement.

To contribute to this debate on whether taxpayers are “unable” or “unwilling” to cheat, I examine the following hypothesis: Ability to cheat matters only if one is willing to cheat. If this were true, taxpayers with identical occupational or income characteristics may exhibit very different compliance behaviours.

To empirically test this hypothesis in the absence of reliable data on tax evasion, I extend the consumption-based method for estimating income tax evasion, which was pioneered by Pissarides and Weber (1989) and has been widely applied (Lyssioutou, Pashardes, & Stegnos 2004; Johansson, 2005; Hurst, Li, & Pugsley 2014; Kim, Gibson, & Chung 2017; Kukk & Staehr, 2017; Engstrom & Hagen, 2017, among other studies). This method is based on measuring “excess” consumption among the self-employed as evidence of undeclared income, compared to wage earners who serve as the benchmark.

My contribution is to introduce another layer of heterogeneity among taxpayers based on their perception of fairness with respect to public services and compared to other taxpayers. Applying the refined method to a longitudinal household survey data for Korea, I estimate a higher rate of tax evasion for the self-employed who feel unfairly treated, but a lower rate for those who feel fairly treated, compared to what the standard method predicts. While Korea is used as an illustration given its high degree of self-employment relative to income level, the refined method is replicable in other countries.

The paper is organized as follows. Section 2.2 lays out the conceptual framework. Section 2.3 explains the consumption-based method for estimating income tax evasion. Section 2.4 discusses the data. Section 2.5 reports the estimation results and provides some robustness checks. Section 2.6 concludes.

## **2.2 Conceptual Framework**

This section examines the conditions for tax evasion, as shown in the benchmark model in the literature and a simple extension which I propose to incorporate taxpayer perception. I then present a problem tree approach to determining which taxpayers are both “able” and “willing” to cheat.

### 2.2.1 Conditions for Tax Evasion

The standard framework for considering a taxpayer's choice of whether and how much to misreport income is a deterrence model first formulated by Allingham and Sandmo (1972), who adapted Becker's (1968) model of the economics of crime. In this model, people cheat if the probability of being caught and punished is low compared to potential tax savings. The expected utility function is given as:

$$[1] \quad E(U) = (1 - p)U(W - \theta X) + pU(W - \theta X - \pi(W - X))$$

, where  $W$  and  $X$  are the actual income and the reported income respectively. Tax is levied at a constant rate  $\theta$  on  $X$ . Importantly, the two states are separated by  $p$ , the probability of detection; and  $\pi$  is the penalty rate. Letting  $Y$  and  $Z$  stand for the net income without and with detection respectively, the first-order condition for an interior solution gives  $\frac{U'(Z)}{U'(Y)} = \frac{(1-p)\theta}{p(\pi-\theta)}$ , which implies that a higher probability of detection discourages tax evasion. Taking the derivative of the expected utility when  $W = X$ , the condition for evasion is  $p\pi < \theta$ , i. e. the ability to escape detection matters.

To this model, I add a parameter which applies regardless of detection, to account for factors other than the threat of punishment which may influence taxpayer behaviour. Specifically, taxpayers may be less inclined to cheat if they view the tax system as fair and are satisfied with the public services they receive. In contrast, if they feel that they are unfairly treated, they could perceive some tax evasion to be justified (Bordignon, 1993; Barth, Cappelen, and Ognedal, 2013). The expected utility function becomes:

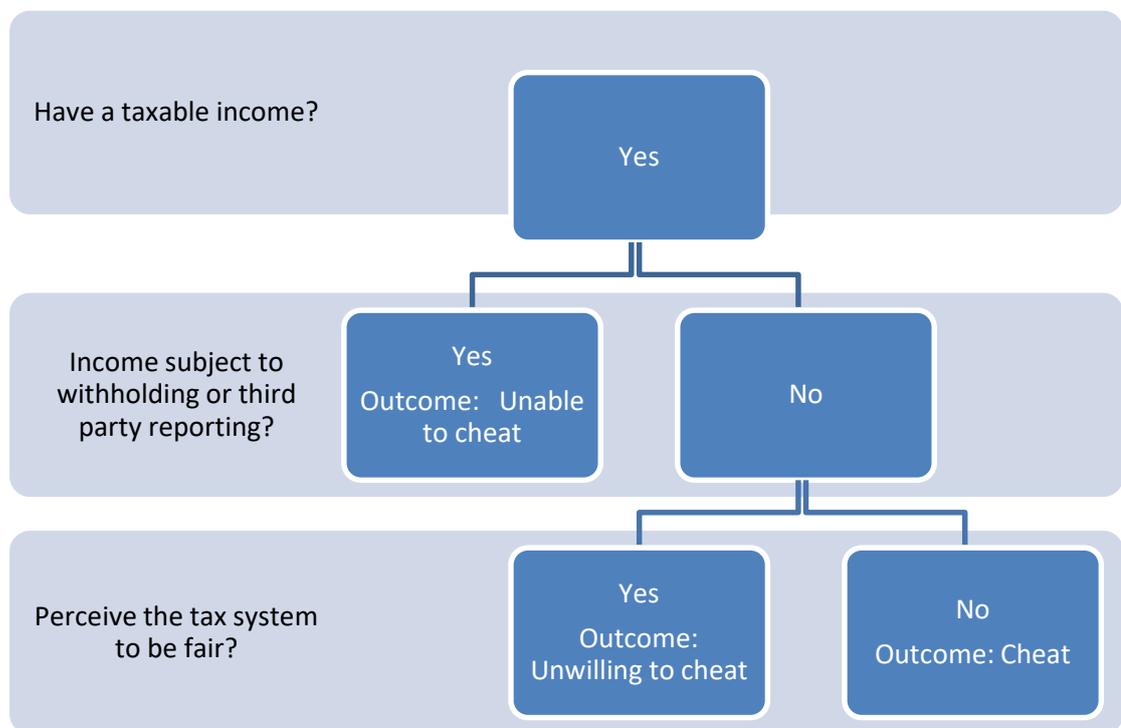
$$[2] \quad E(U) = (1 - p)U(Y) + pU(Z) - C(E - E^*)$$

, where the additional parameter is a function of evaded income,  $E = W - X$ , and what the taxpayer perceives to be "justified" evasion,  $E^* \geq 0$ . In equation [2], the condition for tax evasion not only depends on the probability of detection but also on

taxpayer perception, such that optimal evasion is lower than what is predicted under equation [1] if  $E > E^*$ , but higher if  $E < E^*$ .

### 2.2.2 Problem Tree Approach

As tax evasion decision has become more complex, I propose a problem tree approach to determine tax evasion outcomes based on key parameters contained in equation [2]. The steps are shown in Figure 2.1.



**Figure 2.1** Grouping Taxpayers by Income and Perception

Once the sample is restricted to households with a taxable income, I distinguish taxpayers by whether their income is subject to withholding or third-party reporting ( $W_T$ ) or simply self-reported ( $W_S$ ). The probability of detection would be close to 1 if the taxpayer declares an amount below  $W_T$  as such discrepancies are easy

to detect, whereas reporting below  $W_S$  may go undetected.<sup>20</sup> As taxpayers typically draw on various types of income, I apply a certain threshold on the ratio  $\frac{W_S}{W_S+W_T}$  to separate those who are “able” versus “unable” to cheat.

In practice, employees who rely mostly on labour income fall under the former, while the self-employed who rely on business income under the latter. Whether capital income from interest, dividend and rent qualifies as  $W_T$  or  $W_S$  depends on the extent to which the country’s financial sector is subject to third-party reporting, including at the international level, without which offshore accounts could facilitate tax evasion.

Once the sample is restricted to taxpayers that are “able” to cheat, I distinguish them base on their perception of fairness which is related to the “justified” tax evasion parameter  $E^*$  in equation [2]. However, accurately measuring taxpayer perception is challenging. For instance, in the World Values Surveys, respondents are asked whether tax evasion is “never, sometimes, or always justified”, but it is difficult to confirm whether they would act in such a manner.<sup>21</sup> In other cases, respondents are asked whether they would fully declare their income if misreporting would go undetected. But it is questionable why anyone would reveal such information if there is even a small chance that it might be used against them.

An alternative approach is to construct a latent variable based on taxpayer responses to questions such as: How does one’s tax burden compare to others’ earning similar income levels? Are the wealthy paying enough taxes? Is the quality of public services commensurate with your tax payment? Given that “fairness” is likely to

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<sup>20</sup> Today many countries make extensive use of withholding and third-party reporting, under which the audit rate alone is a poor proxy for the probability of detection. For instance, firms remit the majority of tax revenues to the government, including through withholding taxes owed by employees. The financial sector, including banks, insurers and pension funds, also reports taxable income earned by individuals to the government. Such information could be compared to what is declared by the taxpayer. See also Kleven et al. (2011).

<sup>21</sup> World Values Surveys have been used in empirical studies on tax morale, such as Torgler (2003).

reflect multiple dimensions such as horizontal and vertical equity as well as reciprocity, I use structural equation modeling (SEM) to pull these dimensions into a latent variable and then apply a certain threshold to distinguish those that are “unwilling” versus “willing” to cheat.<sup>22</sup> Such grouping of taxpayers by perception as well as income serves as a basis for incorporating taxpayer perception into the estimation of tax evasion, as discussed in the following section.

## 2.3 Consumption-based Method

This section explains the consumption-based method for estimating income tax evasion, which has been widely applied in the literature (Pissarides & Weber, 1989; Lyssioutou et al., 2004; Johansson, 2005; Hurst et al., 2014; Kim et al., 2017; Kukk & Staehr, 2017; Engstrom & Hagen, 2017, among other studies). Compared to other methods such as the currency demand approach, this method is based on household income and expenditure surveys which are widely available in most countries and lend themselves to incorporating micro-level information such as taxpayer perception. It is also more replicable compared to special audit programmes or experiments with actual taxpayers which have been deployed in few countries (see, for instance, IRS, 2016; Kleven et al., 2011) but could be costly and raise issues of legality in other countries.

### 2.3.1 Basic Approach and Assumptions

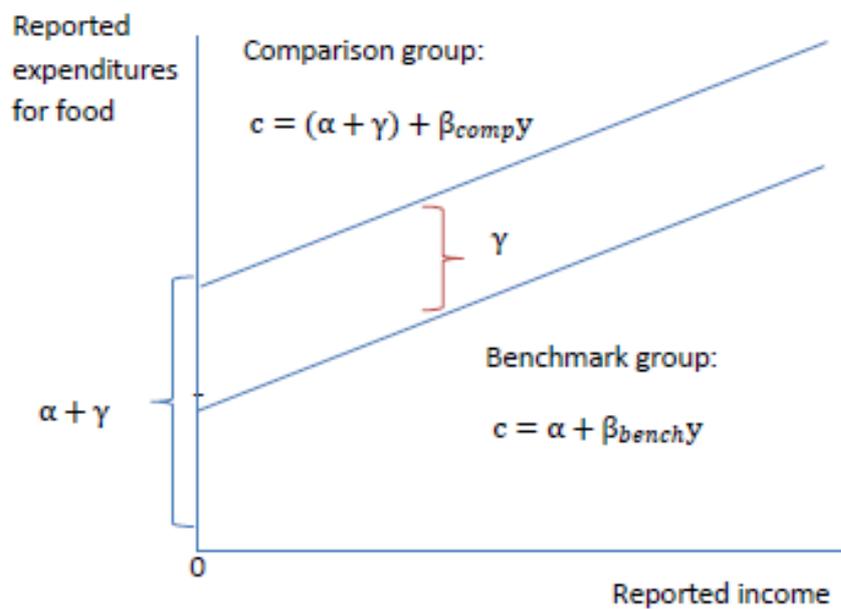
Figure 2.2 illustrates the consumption-based method. It shows two log-linear Engel curves, one for wage earners (benchmark group) and another for the self-employed (comparison group). Letting  $\mathbf{c}$  stand for log food expenditures and  $\mathbf{y}$  log disposable income,  $\beta$  denotes the elasticity of consumption with respect to income. The intercept difference  $\gamma$  between the two curves measures the “excess

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<sup>22</sup> SEM has emerged as a useful tool in other social sciences, including education and psychology. In the economic literature, Schneider and Enste (2000) applied SEM to estimate the extent of the shadow economy based on country-level variables.

consumption” of the self-employed, which is used to estimate the undeclared fraction of income:  $1 - \exp(-\gamma/\beta)$ .

This method relies on three central assumptions. First, the elasticity of consumption with respect to income,  $\beta$ , is equal for the two groups, as illustrated by the curves having the same slope. Second, neither group systemically misreports spending on certain items such as food or non-durables. Food is widely used in the literature, as it is mundane enough for individuals not to be afraid of reporting truthfully, and purchased regularly and thus less subject to unintended misreporting. An exception is Lyssiotou et al. (2004) who use nondurable expenditures to account for demand heterogeneity. Third, whereas wage earners are assumed to report their true incomes, the self-employed systematically underreport their income by a constant factor.<sup>23</sup> One additional assumption is that people misreport their income in surveys in the same way they do to the tax authorities (Hurst et al., 2014).



**Figure 2.2** Engel Curve Showing Consumption-income Relationship

<sup>23</sup> If wage earners also underreport their income, the method will only provide a lower bound estimate of tax evasion.

### 2.3.2 Accounting for Transitory Income

Given that household consumption is influenced not by current income but by a more permanent measure of income, estimating the Engel curve using the current income would result in a measurement error. Specifically, transitory income fluctuations would attenuate the estimate of the income elasticity (Wooldridge, 2009), which in turn would result in over-estimation of income misreporting among the self-employed. For household  $i$ , let  $c_i$  stand for food expenditure,  $y_i^P$  the permanent income, and  $X_i$  a vector of variables affecting consumption.  $D_{it}$  is a dummy taking the value 1 for the self-employed. A log-linear Engel curve is given as:

$$[3] \quad \ln c_i = \gamma D_{it} + \beta \ln y_i^P + \theta X_i + \varepsilon_i$$

Let  $g_i$  stand for a random variable showing the degree of transitory income variation such that  $y_i = g_i y_i^P$ . The mean of  $g_i$  is assumed to be the same for both groups, but the variance may differ. Substitution gives an Engel curve in terms of the current income, with the transitory element pushed to the error term:

$$[4] \quad \ln c_i = \gamma D_{it} + \beta \ln y_i + \theta X_i + (\varepsilon_i - \beta \ln g)$$

Pissarides and Weber (1989) and other early studies addressed this through instrumental variable (IV) techniques, but more recent studies (Hurst et al., 2014; Kim et al., 2017; Engstrom & Hagen, 2017) have exploited panel data and constructed multi-year average income measures. In this paper, I follow the latter approach. With average incomes, positive and negative variations of transitory income cancel each other over time, especially for the self-employed who typically have higher income variation from year to year. This also implies that the covariance between the degree of underreporting and the degree of transitory income variation disappears over time. The Engel curve is now written as:

$$[5] \quad \ln c_{it} = \alpha + \gamma D_{it} + \beta \overline{\ln y_{it}} + \theta X_{it} + \mu_t + \varepsilon_{it}$$

, where subscript  $t$  denotes year,  $\overline{\ln y_{it}}$  is the mean value of reported incomes over time for the same household  $i$ ,  $\mu_t$  is the time effect, and  $\varepsilon_{it}$  the cumulative effects of unobserved determinants over time.

### 2.3.3 Incorporating Taxpayer Perception

All previous studies have estimated income tax evasion based on a single comparison group, that is, the self-employed. However, as discussed in Section 2, such an approach could overlook factors other than tax savings from misreporting which may influence taxpayer behaviour. To test the hypothesis that *ability matters only if one is willing to cheat*, one could take the interaction term approach. Let  $D_{Ait}$  and  $D_{Wit}$  denote dummy variables taking the value 1 for the “able” and the “willing” to cheat respectively, and  $D_{Wit} * D_{Ait}$  be the interaction term. The log-linear Engel curve for estimation becomes:

$$[6] \quad \ln c_{it} = \alpha + \gamma D_{Ait} + \delta D_{Wit} + \omega D_{Wit} * D_{Ait} + \beta \overline{\ln y_{it}} + \theta X_{it} + \mu_t + \varepsilon_{it}$$

, where the parameter of interest is  $\omega$ . With the interaction term, the partial effect of ability to cheat on consumption would be  $\gamma + \omega D_{Wit}$ .

However, one question is whether the benchmark group should be the “unable and unwilling” to cheat as in equation [6] or simply the “unable” to cheat. In the former case, we would be allowing the “unable” to also cheat in a way which is inconsistent with the main assumptions discussed earlier. Therefore, in the present case I explicitly introduce two comparison groups “able but unwilling” and “able and willing” to cheat, as shown by  $D_{AUWit}$  and  $D_{AWit}$  respectively:

$$[7] \quad \ln c_{it} = \alpha + \gamma D_{AWit} + \delta D_{AUWit} + \beta \overline{\ln y_{it}} + \theta X_{it} + \mu_t + \varepsilon_{it}$$

If the concerned hypothesis were true,  $\delta$  would be insignificant, i.e. the “able but unwilling” to cheat would exhibit a similar behaviour to the benchmark group, those that are unable to cheat.

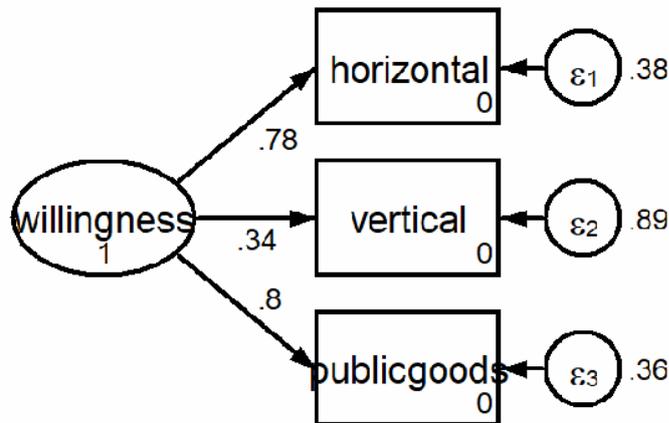
## 2.4 Data and Sample Restriction

Compared to other OECD members, Korea has a relatively high degree of self-employment and therefore presents a relevant case for testing this method. The Korean panel data, drawn from the National Survey on Tax and Benefit, contains information on about 5,000 households across nine years (2007-2015), including their occupation, incomes, assets, expenditures, taxes and social security, as well as gender, age and educational attainment of family members. Importantly, the most recent round of the survey for 2015 contains questions on how the respondents perceive the tax system and the factors which affect their taxpaying decision.

Following the steps outlined in Figure 2.2, I drop households with income levels below the exemption threshold. I also drop households with zero annual expenditures. To maintain some degree of homogeneity, I only keep households whose primary income earner is between the ages of 20 and 70.

The next step is to distinguish taxpayers by their occupational or income type. Following previous studies, I define the “able” to cheat as households which derive at least 25 percent of their total income from business income, and the “unable” to cheat as households with less than 1 percent of their total income from business income.

I then construct a latent variable “willing to cheat” based on responses to the questions regarding vertical and horizontal equity and satisfaction with public services, discussed in Section 2. All responses are scaled from 1 to 5 and I reverse the scale where necessary for consistency. These variables are standardized and combined into a latent variable using structural equation modelling. As shown in Figure 2.3, the latent variable “willing” to cheat is most closely associated horizontal equity and public services. I define the top and bottom quartile according to this measure as the “unwilling” and “willing” to cheat respectively, and drop the two middle quartiles from the sample.



**Figure 2.3** Constructing a Latent Variable Based on Taxpayer Perception

**Note:** The circle denotes the unobserved latent variable, and the squares the observed variables which are based on response to questions regarding horizontal and vertical equity and satisfaction with public goods and services. The latent variable is constructed based on maximum likelihood estimation.

**Table 2.1** Descriptive Statistics

	Unable (wage earner)	Able but unwilling (self-employed)	Able and willing (self-employed)
log of income	8.5582 (0.4357)	8.4850 (0.4160)	8.5793 (0.4733)
log of food expenditures	6.7493 (0.4911)	6.6891 (0.5162)	6.8673 (0.5584)
family size	3.8102 (1.0054)	3.8355 (1.1314)	3.7005 (0.9031)
capital city	0.2071 (0.4053)	0.2047 (0.4035)	0.3086 (0.4620)
age	47.0318 (9.1368)	47.7295 (9.0039)	47.1328 (8.9109)
education	2.4918 (0.6469)	2.3596 (0.6932)	2.5125 (0.6220)

**Table 2.1** (Continued)

	Unable (wage earner)	Able but unwilling (self-employed)	Able and willing (self-employed)
hours worked	42.1849 (8.9804)	46.3978 (15.5131)	49.1839 (13.0722)
Observations	17125	4475	2142

**Note:** Income is the 3-year average income. Capital city dummy denotes 1 if the household is based in Seoul, Korea and 0 otherwise. Age and education refer to that of the household head, or the primary income earner. Educational attainment is on a scale of 1 to 3, where 1 is lower-secondary or below, 2 is upper-secondary and 3 is tertiary. Working hour is the average per week.

Following previous studies, I consider the following control variables:

- 1) Family size: more mouths to feed or clothe, thus likely to have a positive sign.
- 2) Capital city dummy: price levels are higher, thus likely to have a positive sign.
- 3) Home ownership: without the need for rental fees, general spending may be higher, thus likely to have a positive sign.
- 4) Age of primary income earner: likely to spend more with age but at a diminishing rate, thus likely to have a positive sign but its quadratic would have a negative sign.
- 5) Education of primary income earner: higher educational attainment, through higher income, may result in more spending, thus a positive sign.
- 6) Hours worked: working more hours may increase income and spending, but long working hours may also indicate low wages; thus, the expected sign is unclear.

Table 2.1 presents the descriptive statistics for the benchmark group “unable” to cheat (17,125 observations), and the two comparison groups “able but unwilling” (4,474 observations) and “able and willing” to cheat (2,142 observations). About a fourth of the sample is self-employed, based on a definition of business income share

of 25% or above, and the rest are wage earners, based on a definition of business income share of 1% or below. Based on summary statistics, there are no marked differences across the three groups, but the “able and willing” to cheat are located in the capital city and work longer hours, perhaps to meet the higher cost of living.

## 2.5 Estimation Results

This section reports the main estimation results and provides some robustness checks. Full results are shown in the Annex.

### 2.5.1 Taxpayer Perception in the Food Engel Curve

I regress log food consumption on log disposable income and a set of control variables as in equations [5] and [7]. Table 2.2 reports the estimates of key parameters,  $\hat{\beta}$ ,  $\hat{\gamma}$  and  $\hat{\delta}$ , and the corresponding estimated amount of income underreporting, denoted as  $1 - \hat{k}$ . There are 23,946 observations. The estimated elasticity of consumption with respect to income,  $\hat{\beta}$ , is stable across different specifications, with a 1% increase in income resulting in just under 0.4% increase in food expenditures based on the OLS estimator.

Compared to the “unable” to cheat, the “able” to cheat consume about 6% more, as shown in column (2). The estimated tax evasion rate is 13%, assuming that people will cheat if they can. However, given that some taxpayers may be “able but unwilling” to cheat, I incorporate taxpayer perception in column (3) based on the latent variable approach. While  $\hat{\gamma}$  is positive and statistically significant, it is relatively small compared to  $\hat{\delta}$  for the “able and willing” to cheat who consumes 11% more than the benchmark group, which translates into a tax evasion rate of 25%, or double that of the “average” evasion rate for the “able” to cheat.

Columns (4) and (5) show the IV results. Following Hurst et al (2014), I use education as instrument for income, i.e. it would affect food consumption

only through the income effect. While it passes the endogeneity tests<sup>24</sup>,  $\hat{\beta}$  is implausibly large. This is similar to the findings of Engstrom and Hagen (2017), who compare the performance of several instruments including education, housing and capital income and conclude that the use of IV approach is inferior to a simple OLS based on multi-year average income. Given the large  $\hat{\beta}$ , the estimated tax evasion rates are lower than when using the OLS. Nevertheless, (4) and (5) exhibit the same trend as (2) and (3).

**Table 2.2** Estimation Results: Log of Food Expenditures as Dependent Variable

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	IV	IV
able		0.0554*** (0.00582)		0.0922*** (0.00698)	
able but unwilling $\hat{\gamma}$			0.0261*** (0.00680)		0.0819*** (0.00865)
able and willing $\hat{\delta}$			0.113*** (0.00851)		0.111*** (0.00928)
log(income) $\hat{\beta}$	0.387*** (0.007)	0.393*** (0.00734)	0.387*** (0.00737)	0.866*** (0.0295)	0.858*** (0.0305)
Observations	23,946	23,946	23,946	23,946	23,946
R-squared	0.282	0.284	0.287	0.144	0.149

	$\hat{k}$	$1 - \hat{k}$
OLS		
able	0.869	0.131
able but unwilling	0.935	0.065
able and willing	0.747	0.253

<sup>24</sup> The null hypothesis of the Durbin and Wu-Hausman tests is that the variable under consideration can be treated as exogenous. If the test statistics are highly significant, we can reject the null and treat as endogenous

**Table 2.2** (Continued)

	$\hat{k}$	$1 - \hat{k}$
IV		
able	0.899	0.101
able but unwilling	0.909	0.091
able and willing	0.879	0.121

**Note:** Robust standard errors in parantheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .  $\hat{k}$  is the general term for the fraction of the true income which is declared.

Full estimation results in the Annex show that all control variables have the expected sign, but whereas family size, capital city dummy, age and education are statistically significant, home ownership dummy and hours worked are not. The year dummies are included with 2008 as based year; the first and last years in the sample, 2007 and 2015 respectively, do not appear because of the use of 3-year average income.

To see whether taxpayer perception emerges as a significant factor under other specifications as well, I conduct two robustness checks.

### 2.5.2 Taxpayer Perception under Demand Heterogeneity

Following Lyssiotou et al (2004), to account for demand heterogeneity among households, Table 2.3 shows estimation results with log of nondurable expenditures as dependent variable.  $\hat{\beta}$  is stable across different specifications, with a 1 percent increase in income resulting in about 0.3% increase in nondurable expenditures based on the OLS estimator. Compared to the “unable” to cheat, the “able” to cheat consume about 7% more, as shown in column (2). This gives an “average” tax evasion rate of 19%.

With taxpayer perception in column (3), essentially the same trend is established as in the case of the food Engel curve. Compared to the “unable” to cheat, the “able but unwilling” consume about 4% more. On the other end of the spectrum, the “able and willing” consume about 13% more compared to

the same benchmark group. This gives an estimated tax evasion rate of 33%, three times than that of the “able but unwilling.”

**Table 2.3** Estimation Results: Log of Nondurable Expenditures as Dependent Variable

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	IV	IV
able		0.0693*** (0.00475)		0.0909*** (0.00543)	
able but unwilling $\hat{\gamma}$			0.0381*** (0.00552)		0.0700*** (0.00671)
able and willing $\hat{\delta}$			0.131*** (0.00697)		0.130*** (0.00722)
log(income) $\hat{\beta}$	0.321*** (0.006)	0.329*** (0.00588)	0.323*** (0.00588)	0.608*** (0.0231)	0.593*** (0.0239)
Observations	23,913	23,913	23,913	23,913	23,913
R-squared	0.318	0.324	0.328	0.254	0.263

	$\hat{k}$	$1 - \hat{k}$
OLS		
able	0.810	0.190
able but unwilling	0.889	0.111
able and willing	0.667	0.333
IV		
able	0.861	0.139
able but unwilling	0.889	0.111
able and willing	0.803	0.197

**Note:** Robust standard errors in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.  $\hat{k}$  is the general term for the fraction of the true income which is declared.

Columns (4) and (5) show the IV results. Again,  $\hat{\beta}$  is relatively large but within a more reasonable range. It may be that education is a better instrument for income in the case of nondurable expenditures, compared to food expenditures. Households with more educated parents are likely to spend more on children's education, for instance, although they may not necessarily spend more on food. The estimated tax evasion rate is slightly lower than in the case of OLS, at 14% on average and with a range of 11% to 20% depending on taxpayer perception.

### 2.5.3 Taxpayer Perception Based on an Alternative Measure

As noted in Section 2.2, there are different ways to measure taxpayer perception. Compared to the main result which is based on the latent variable approach, I use here an alternative measure which is based on the following hypothetical situation: "If you have a rent income which the tax authorities cannot observe, would you declare the full amount?" Those who indicate "Yes, all of the income" are defined as "unwilling" to cheat, while those who indicate "There is no need to declare if the amount is small" or "Declare none in any case" as the "willing" to cheat. The sample size is almost twice as in earlier specifications, as no observations are dropped to define willingness.

Table 2.4 shows the estimation results for food Engel curve.  $\hat{\beta}$ , is stable across different specifications, with a 1 percent increase in income resulting in just below 0.4% increase in food expenditures based on the OLS estimator. With taxpayer perception in column (3), essentially the same trend is established as in the latent variable approach, although the willingness to cheat now explains a much smaller portion of the overall variation. The difference between the "unable" and the "able" to cheat is much more significant compared to perception differences within the "able" to cheat. This seems to confirm the suspicion why anyone would reveal information which might be used against them.

**Table 2.4** Estimation Results: Alternative Measure of Willingness to Cheat

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	IV	IV
able		0.0462*** (0.00408)		0.0866*** (0.00492)	
able but unwilling $\hat{\gamma}$			0.0390*** (0.00539)		0.0745*** (0.00613)
able and willing $\hat{\delta}$			0.0518*** (0.00524)		0.0938*** (0.00609)
log(income) $\hat{\beta}$	0.372*** (0.005)	0.377*** (0.00509)	0.377*** (0.00509)	0.839*** (0.0211)	0.840*** (0.0211)
Observations	49,300	49,300	49,300	49,300	49,300
R-squared	0.284	0.286	0.286	0.150	0.150

	k	1-k
OLS		
able	0.885	0.115
able but unwilling	0.902	0.098
able and willing	0.872	0.128
IV		
able	0.902	0.098
able but unwilling	0.915	0.085
able and willing	0.894	0.106

**Note:** Robust standard errors in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.  $\hat{k}$  is the general term for the fraction of the true income which is declared.

## 2.6 Conclusion

This paper examined the question of why people cheat in the context of income tax evasion. The standard, expected utility model of tax evasion posits that people cheat if the chances of getting caught and punished is quite low. Given that this information asymmetry between taxpayer and the tax authority plays a key role, many countries have introduced third-party reporting schemes to complement traditional audit in increasing the probability of detection. Such efforts did improve tax compliance in many cases but only up to a certain extent. The remaining “residual” may be harder to explain and requires a deeper understanding of the human behaviour.

This paper explored one possibility in which people are “able” and yet “unwilling” to cheat the government. Because they feel fairly treated with respect to public services and compared to other taxpayers, they do not find tax evasion to be “justified.” While a plausible argument, empirically testing it is not so straightforward. Using the consumption-based method for estimating income tax evasion, this paper provided a way to tackle the issue. And based on an illustrative case of Korea, it turns out that taxpayer perception matters and that in some cases, monetary returns may play a relatively minor role in determining tax evasion, unlike in the case of the standard, expected utility model.

The policy implication is that, for curbing tax evasion, voluntary compliance measures and appropriate changes to the tax law may be just as necessary as third-party reporting and other enforcement measures. An optimal strategy for improving compliance may be to target both the extensive and the intensive margins: foster social and cultural norms for compliance while making cheating more difficult for those who are persistently inclined to cheat.

## CHAPTER 3

### Hide-AND-SEEK: CAN TAX TREATIES REVEAL OFFSHORE WEALTH?

#### 3.1 Introduction

Some 8 percent of the world's household financial wealth, or 10 percent of world GDP, is estimated to be held offshore (Zucman, 2013). In principle, there is nothing illegal about offshore accounts, for instance held in London for its superb financial services. However, those accounts could be used to dodge tax authorities whose reach on other jurisdictions is limited. Moreover, if held through sham corporations registered in the likes of Panama, the beneficial owner is effectively hidden. Such secrecy arrangements allow the evasion of not only interest, dividend and capital gains taxes but also property, inheritance and other wealth taxes. Aside from the direct revenue impact on governments, offshore evasion undermines the integrity of the tax system and severely limits options for progressive taxation. The stakes are even higher if accounts are used for money laundering and criminal purposes such as drug trafficking.

Given the potential scale and multi-faceted nature of the problem, governments have introduced various domestic and international measures. This paper focuses on a particular set of measures concerning offshore tax evasion, that is, the exchange of financial account information among tax authorities.<sup>25 26</sup> Over the past

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<sup>25</sup> Other prominent initiatives including the Financial Action Task Force (FATF), which sets standards and monitors progress on combating money laundering and financing of terrorism. FATF-related investigations would typically involve the prosecutor's office, the financial intelligence unit and others such as the drug enforcement agency and result in criminal charges, in comparison to most tax evasion cases which only result in civil penalties. However, these initiatives increasingly seem

decade, a momentum has built up to expand the information base of tax authorities to other jurisdictions, including traditional tax havens. While there is no agreed definition of a tax haven, it is characterized by strict bank secrecy laws, flexible corporate laws, and low or no tax burden. Switzerland is the most prominent, but the list of havens could go up to 60 jurisdictions. Given that bank secrecy does not allow the exchange of information, earlier initiatives such as the 2003 EU Savings Directive requested tax havens to withhold and remit a certain share of interest payment without disclosing the identity of the taxpayer. But in 2009, following FBI investigations triggered by whistleblowing, the US and Swiss governments agreed that the Swiss bank UBS reveal the identities of 4,450 customers to the IRS. This event demonstrated that bank secrecy of tax havens was no longer impenetrable (Johannesen et al., 2018). In that year, the G20 urged each tax haven to sign at least 12 information exchange treaties under the threat of economic sanctions. Then in 2010, the US Congress enacted the Foreign Account Tax Compliance Act (FATCA), which requires foreign financial institutions to report information on asset holders or be subject to a 30% withholding rate. In 2014, the OECD and the G20 endorsed a new standard for automatic exchange of information, known as the Common Reporting Standard (CRS), modelled after FATCA but which requires all signatories to reciprocate in the exchange of information.

This paper contributes to a nascent but growing literature on the effectiveness of recent tax treaties aimed at curbing offshore evasion. The literature has been somewhat divided. Several studies have found only marginal overall reduction in offshore tax evasion, as evaders simply relocated their activities to jurisdictions beyond the reach of the concerned treaties (Johannesen & Zucman, 2014; Hanlon, Maydew, & Thornock, 2015; Menkhoff & Miethe, 2017; De Simone, Lester, & Markle 2018). Indeed, despite the G20 declaring that the “era of bank secrecy is over”, further leaks such as the Panama Papers revealed that offshore evasion was

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to overlap, for instance, on the issue of beneficial ownership which are critical in both anti-money laundering and tax evasion cases.

<sup>26</sup> There are also prominent initiatives to address corporate profit shifting and transfer pricing, including through new country-by-country reporting requirements.

alive and well. Nevertheless, OECD (2018a) identified EUR 95 billion in additional tax revenue due to treaty-related enforcement and voluntary compliance schemes. OECD (2019) estimated FATCA-and CRS-based information exchanges to induce a reduction in tax haven bank deposits of 20-25%, over and above the reduction from earlier tax treaties.

Following previous studies, I examine how cross-border capital flows, in particular bank flows, have responded to the recent wave of information exchange among tax authorities. I conduct regression analyses on a large panel data of major international banking centres and their counterparties from the first quarter of 2003 to the fourth quarter of 2018, expecting that only deposits which are associated with tax evasion would see sudden reductions in response to treaties. I find that cross-border deposits in traditional havens have declined substantially with the introduction of new treaties, although the precise magnitude depends on how haven versus non-haven countries are defined. Moreover, given that all traditional tax havens were exchanging information by 2018, I provide regression-based evidence that offshore assets seem to be relocating to “non-haven” offshore financial centres<sup>27</sup>, most notably the United States, which has not committed to reciprocal and automatic exchange of information. This is in line with recent anecdotes which suggest that the US (States such as Delaware, Nevada and South Dakota) is becoming the new Switzerland.<sup>28</sup> To my best knowledge, there is only one previous study which uses similar regression method and data with a focus on the US (Casi, Spengel, & Stage, 2018).

The paper is structured as follows. Unlike previous empirical studies on offshore tax evasion, I start with a conceptual framework in Section 3.2. Section 3.3

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<sup>27</sup> IMF (2000) characterizes “international” or “offshore” financial centres (OFC) as having financial systems with external assets and liabilities out of proportion to domestic financial intermediation. However, the term is not clearly defined and some elements overlap with tax havens. Countries such as the UK and the US typically appear on the OFC list but not under the haven list.

<sup>28</sup> See, for instance: FT “US tax havens: The new Switzerland” (9 May 2016) and Bloomberg “The US is becoming the world’s new tax haven” (28 December 2017).

discusses the methodology and data, Section 3.4 presents the baseline regression results, and Section 3.5 the regression results on deposit shifting and sham corporations. Section 3.6 concludes with some policy implications.

## **3.2 Conceptual Framework**

This section provides a schematic view and some guidance from theory for the main empirical analyses to follow. I find this is necessary as the empirical literature still faces several limitations and cannot yet paint a robust picture of offshore tax evasion.

### **3.2.1 A Schematic View of Offshore Evasion**

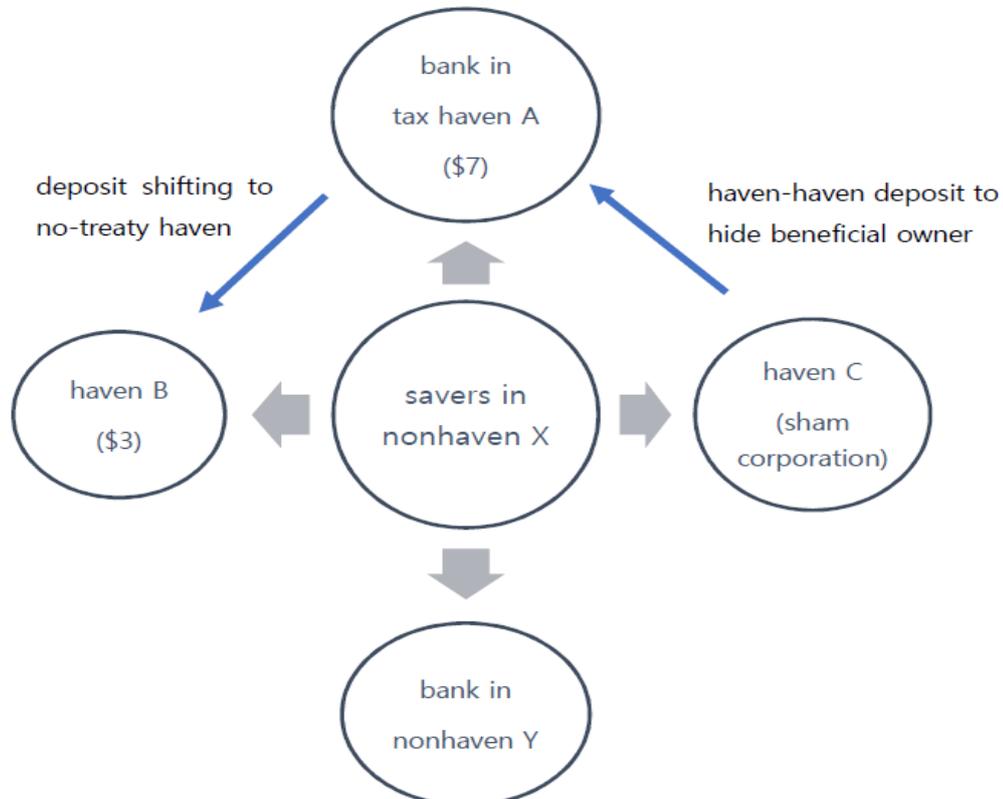
Say that an Indonesian taxpayer (X) opens an offshore financial account in Singapore (A) and does not declare it to tax authorities back home (Figure 3.1). Domestic financial institutions would typically report to home tax authorities, who could compare these third-party reports to the self-report of the taxpayer to detect any discrepancies. But this is not the case for offshore accounts, which significantly increase the information asymmetry between taxpayers and tax authorities. Subsequently, the two countries sign a tax treaty to exchange information on financial account, based on which tax authorities could conduct audit and impose a penalty. The tax evader may immediately voluntarily declare the offshore account during a grace period and pay taxes but try to avoid the penalty.<sup>29</sup> He may keep his deposits in Singapore or repatriate them back home; note that in the former case, there would be no sudden reduction in deposits.

A different option is to keep evading, which would be particularly attractive if offshore accounts were used to evade a wide range of taxes and played a pivotal role

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<sup>29</sup> Several countries including Indonesia introduced time-bound tax amnesty or voluntary disclosure schemes in the lead up to the implementation of CRS-based automatic exchange of information. This was meant to be a carrot to go with the stick. Under such schemes, evaders were able to avoid penalties or pay at a lower rate. The case of the United States is documented in Johannesen et al. (2018).

in one's wealth accumulation. There are two popular ways to keep evading. First, relocate offshore deposits from Singapore to a different tax haven, say Macau (B), which offers bank secrecy and has not signed a tax treaty with Indonesia (Figure 3.1). In such case, there would be a sudden reduction in deposits in Singapore but an increase in Macau. Second, keep the money in Singapore but through a sham corporation in another tax haven, say Panama (C), to hide one's identity. Such sham arrangements explain the disproportionately large share of haven-haven flows in international banking statistics (Johannesen & Zucman, 2014). Whether a new treaty between Indonesia and Singapore affects deposits from Panama to Singapore depends on whether Singapore requires its financial institutions to know who the ultimate owner of the assets they manage and agrees to exchange that information with Indonesia. Even in such case, trusts, foundations and similar arrangements held in or via offshore jurisdictions pose great challenge as they manipulate the very concept of ownership.



**Figure 3.1** Cross-border Bank Flows Involving Tax Havens

Regression-based evidence on these flows are presented in Sections 4 and 5. There are other possible types of tax evader response which are beyond the scope of this paper but worth noting. One could shift savings to certain retirement and pension accounts, insurance contracts, estate accounts and others which are non-reportable under current tax treaties but which offshore centres offer (e.g. Hong Kong's Occupational Retirement Scheme). Citizenship or residence by investment schemes are other possible loopholes, as the evader could disclose to financial institutions his country of residence for tax purposes only, and not his main country of residence. And yet another response is to shift from financial assets to real assets which are not reportable such as jewellery, art, cars and horses and real immovable property.

### 3.2.2 Extending the Standard Tax Evasion Model

As illustrated above, offshore tax evaders constantly exploit more opaque jurisdictions and arrangements to dodge the tax authorities. Theory provides some guidance in this respect. The standard model on income tax evasion (Allingham & Sandmo, 1972) views evasion as a gamble with an expected payoff based on two different states-not getting caught and enjoying higher disposable income and getting caught and paying the tax plus penalty. The probability of detection in turn depends on the level of information disclosure (Kleven et al., 2011). In the simplest model, income or wealth could be divided into that which is subject to third-party reporting ( $y_t$ ) and that which is only self-reported ( $y_s$ ), such that the probability of detection is very high for the former but very low for the latter. Information exchange between tax authorities would turn offshore capital income from  $y_s$  to  $y_t$ , and thereby increase the probability of detection and lower the expected payoff for evasion.

However, addressing information asymmetry becomes more complicated with multiple jurisdictions as in the case of offshore tax evasion. As long as the treaty network does not cover all jurisdictions, evaders can shift deposits to non-compliant ones. In a simple model with two jurisdictions, home and offshore, the evader's utility function is given as:  $max_s u = y - \tau(y - s) - ts - c(s, t)$ , where  $y$  is total wealth,  $s$  is wealth shifted to offshore accounts,  $\tau$  and  $t$  are home and offshore tax rates respectively, with  $\tau > t$ . "Tax rate" here is defined as the expected total payment to the government including penalty, upon different probabilities of detection at home

and abroad. Moreover, while shifting wealth offshore increases utility, there is a cost of shifting  $c(s, t)$ . Generalizing this into  $N = 1 \dots n$  jurisdictions, each with a different tax rate  $\tau_i \in [0, 1]$ , the utility function is given as:  $max_s u = \sum_{i=1}^n [y_i - \tau_i(y_i + \sum_{i \neq j}^n s_{ij}) - \sum_{i \neq j}^n c_{ij}(s_{ij}, \tau_j)]$ , where  $s_{ij}$  is the wealth shifted from tax base  $i$  to  $j$  and the associated shifting cost  $c_{ij}$  is a function of  $s_{ij}$  and the destination tax rate  $\tau_j$ .

Therefore, while a “big bang” multilateral agreement should be preferred to the current sequential approach (Elsayyad & Konrad, 2012), tax treaties may still reduce offshore evasion in the absence of a complete network if they drive up the cost of shifting—the fee paid for sophisticated accounting, legal and financial services catering to tax evader demands. Recall that additional tax evasion is optimal only if the marginal benefit is greater than or equal to the marginal cost. As a growing number of jurisdictions exchange information, the probability of detection increases in those jurisdictions, and fewer options are left for relocating wealth. Such restrictions on the supply could generally drive up the fee for evasion services.

### 3.3 Definition and Data

This section explains the key variables, and their data sources, to be used in the regression analyses in Section 3.4, notably tax treaties and cross-border banking flows, as well as the treatment group, tax havens, in contrast to other jurisdictions.

#### 3.3.1 Tax Havens and Offshore Centres

There is no precise definition of a tax haven. OECD (2000) identifies the following features of tax havens: no or low taxes, lack of effective exchange of information, lack of transparency, and no requirement of substantial activity. However, other studies also point out that tax havens tend to score high on governance indicators and have relatively sophisticated communication infrastructure (Dharmapala, 2008). Table 3.1 compares the tax haven lists provided in the literature – Hines and Rice (1994), OECD (2000), Johannesen and Zucman (2014) and Gravelle (2015) – which together identify about 60 jurisdictions. A different and yet overlapping concept is “offshore financial centre (OFCs).” According to the IMF

(2000), OFCs are jurisdictions that have: relatively large number of financial institutions engaged primarily in business with non-residents; financial systems with external assets and liabilities out of proportion to domestic financial intermediation; and centres which provide low or zero taxation; light financial regulation; banking secrecy and anonymity.

**Table 3.1** List of Tax Havens

	Hines and Rice (1994)	OECD (2000)	Johannesen and Zucman (2014)	Gravelle (2015)
Andorra	1	1	1	1
Anguilla	1	1	1	1
Antigua and Barbuda	1	1	1	1
Aruba		1	1	1
Austria			1	
Bahamas	1	1	1	1
Bahrain	1	1	1	1
Barbados	1	1	1	1
Belgium			1	
Belize	1	1	1	1
Bermuda	1	1	1	1
British Virgin Islands	1	1	1	1
Cayman Islands	1	1	1	1
Chile			1	
Cook Islands	1	1	1	1
Costa Rica			1	
Curacao*	1	1	1	1
Cyprus	1	1	1	1
Dominica	1	1	1	1
Gibraltar	1	1	1	1
Grenada	1	1	1	1
Guernsey**	1	1	1	1
Hong Kong	1	1	1	1
Ireland	1			1
Isle of Man	1	1	1	1
Jersey**	1	1	1	1
Jordan	1			1
Lebanon	1			1
Liberia	1	1	1	1
Liechtenstein	1	1	1	1
Luxembourg	1	1	1	1
Macao	1		1	1
Malaysia			1	
Maldives	1	1		1
Malta	1	1		1
Marshall Islands	1	1	1	1
Mauritius		1		
Monaco	1	1	1	1
Montserrat	1	1	1	1
Nauru		1	1	1
Netherlands				1
Niue		1	1	1
Panama	1	1	1	1
Saint Kitts and Nevis	1	1	1	1
Saint Lucia	1	1	1	1
Saint Vincent and Grenadines	1	1	1	1
Samoa		1	1	1
San Mariano		1	1	1
Seychelles		1	1	1
Singapore	1	1	1	1
Sint Maarten (Dutch part)*	1	1	1	1
Switzerland	1	1	1	1
Tonga		1		1
Trinidad and Tobago			1	
Turks and Caicos Islands	1	1	1	1
Uruguay			1	
US Virgin Islands		1	1	1
Vanuatu	1	1	1	1

### 3.3.2 Tax Treaties

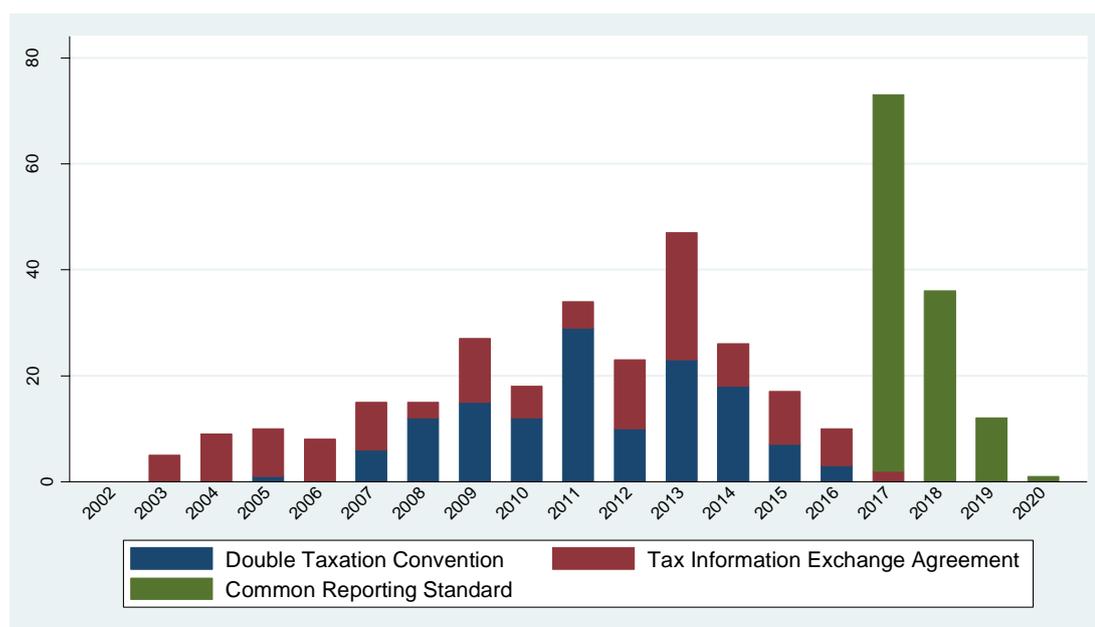
Tax treaties have a long history, dating back at least a century. The primary purpose of these treaties has been to facilitate cross-border trade and investment and avoid double taxation. Most double tax conventions (DTCs) do contain provisions for the exchange of information, but this has not been their main feature. In more recent decades, countries have also signed tax information exchange agreements (TIEAs), which is more explicitly aimed at curbing offshore tax evasion. Under DTCs and TIEAs, however, information was exchanged only upon request. Home tax authority had to have a well-documented suspicion that a resident was evading taxes through offshore accounts. Due to such restrictions, it is reported, for instance, that during the 2006-2010 period the US placed only 894 requests under its more than 80 tax treaties with foreign jurisdictions, which is very few as a single Swiss bank admitted to have more than 19,000 US clients with undeclared bank accounts (Johannesen & Zucman, 2014). However, under the new FATCA and CRS-based agreements, information gets exchanged automatically. Therefore, they are potentially more effective in curbing offshore evasion.

My main data sources are the Exchange of Tax Information Portal and the Automatic Exchange Portal, which are publicly available and represent the best effort of the OECD (2018a) to gather information on tax treaties.<sup>30</sup> Dropped from the sample are treaties which failed to meet OECD (2018b) standards based on a peer-review evaluation on whether the treaty signed was properly drafted and enforced. Most of the signed TIEAs are treaties between tax haven and non-haven pairs, whereas DTCs are more common between non-havens. My dataset covers treaties signed from as early as the 1950s and until 2018. There are several thousand treaty pairs, but Figure 3.2 shows only for BIS reporting countries. Whereas DTC and TIEAs are shown by their date of signature so that they come into effect later, CRS is shown by their date of commencement of automatic exchanges as there is no precise date of signature. In 2014, 44 “early adopters” committed to automatic exchanges under the CRS Multilateral Competent Authority Agreement and subsequently more

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<sup>30</sup> See [www.eoi-tax.org](http://www.eoi-tax.org) and [www.oecd.org/tax/automatic-exchange/international-framework-for-the-crs/](http://www.oecd.org/tax/automatic-exchange/international-framework-for-the-crs/)

countries followed, but actual exchanges begun in 2017. To increase the sample size for the recently launched CRS, I include CRS with planned date of commencement through the first quarter of 2020.



**Figure 3.2** New Treaty Pairs by Type

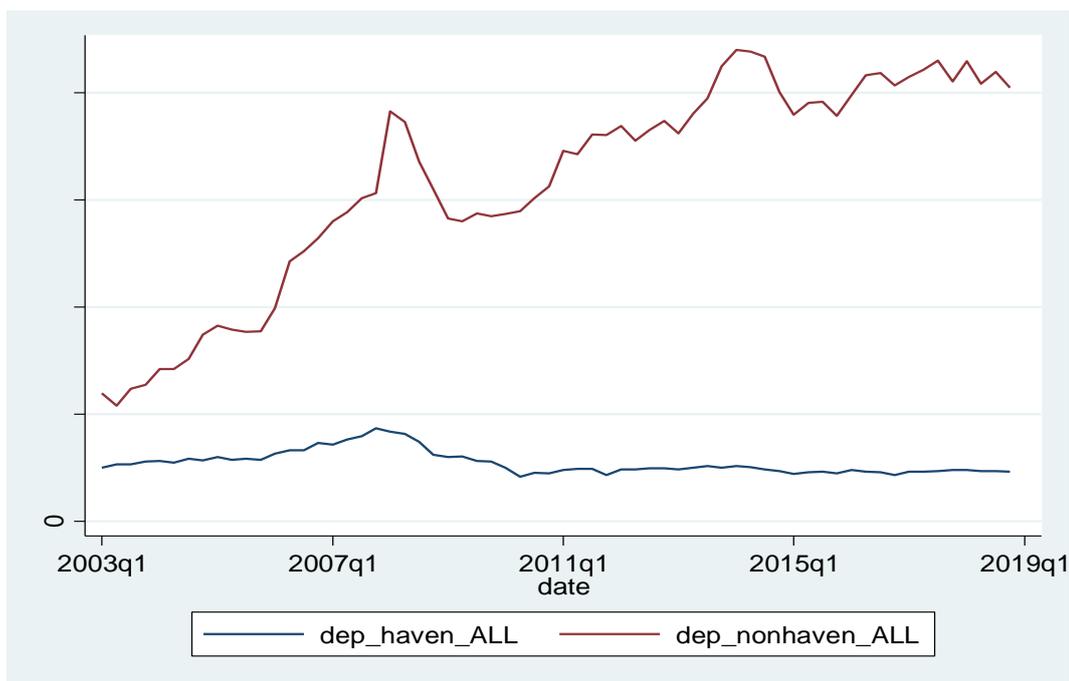
### 3.3.3 Cross-border Bank Flows

Given that hidden wealth is hard to observe directly, I consider the outstanding deposits in foreign-owned bank accounts in traditional tax havens or offshore centres, as published by the Bank for International Settlements (BIS, 2018), as a proxy for hidden financial wealth. The BIS locational banking statistics (LBS) are widely used in international economics and to calculate balance of payments. Total LBS reporting countries increased from 32 in 2002 to 47 in 2016.<sup>31</sup> BIS started publishing the matrix of creditor banking systems and borrower countries in September 2016 and has since expanded it. BIS Statistics Table A6.2. shows the bilateral cross-border positions of banks located in up to 29 LBS-reporting countries

<sup>31</sup> BIS, “Global coverage of BIS locational banking statistics”, January 2018. Available from [https://www.bis.org/statistics/lbs\\_globalcoverage.pdf](https://www.bis.org/statistics/lbs_globalcoverage.pdf)

against counterparties in more than 200 countries with breakdowns by instrument (all instrument, loans and deposits) and sector (all sector, non-bank sector).<sup>32</sup>

Figure 3.3 shows that while deposits in non-haven have recovered after the global financial crisis, the same cannot be said for deposits in tax havens where the deposits declined further, especially if one excludes Hong Kong and Macao. There is variation across tax havens. Declines were most evident in Guernsey, the Isle of Man, Jersey and Switzerland.



**Figure 3.3** Offshore Deposits in Tax haven Versus Non-haven Jurisdictions (Millions of US\$, 2003q1 to 2018q4)

**Note:** Data are provided for non-bank counterparties only. Data are aggregated across currencies, type of currency and reporting institution. This figure only shows for treaty pair countries, and thus could be different from Figure 3.4.

<sup>32</sup> BIS, “Recent enhancements to the BIS statistics”, *BIS Quarterly Review*, September 2016. Available from [https://www.bis.org/publ/qtrpdf/r\\_qt1709c.htm](https://www.bis.org/publ/qtrpdf/r_qt1709c.htm)

The BIS data has a number of limitations. First, it does not tell what fraction of the deposit in tax havens belong to households evading taxes. The BIS provides a sectoral decomposition between deposits owned by banks and by “non-banks”, which includes multinational firms that hoard cash offshore as well as households trying to evade tax. Zucman (2013) estimates that tax evaders own about half of the non-bank deposits in tax havens. In addition, disaggregated data between households and corporates, while available for a smaller number of countries, provides supporting evidence that the main impact of information exchange has been on individuals (OECD, 2019). Second, the BIS data is based on immediate rather than beneficial ownership. About 25% of all deposits in tax havens are registered as belonging to other havens, reflecting the widespread use of sham corporations. Third, the BIS data does not provide information on the equity and bond portfolios that are entrusted to tax haven banks. The Swiss National Bank reports that about 25% of the funds held by foreigners in Switzerland take the form of bank deposits, while 75% are equities and bonds (Zucman, 2013). Fourth, although unlikely, it is possible that individuals do pay tax on their deposits held in tax havens, but there is no way to know this from the BIS data.

### 3.4 Regression-based Evidence on Direct Impact of Treaties

This section provides regression-based evidence on the direct impact of tax treaties on traditional tax havens, while Section 5 addresses specific issues of deposit shifting and the use of sham corporations. In these two sections, I consider various models which share the following notations:  $Deposits_{ijq}$  denotes the deposits held by residents of country  $i$  with banks of country  $j$  at the end of quarter  $q$ ,  $Signed_{ijq}$  is a dummy equal to 1 if a treaty allowing for information exchange between  $i$  and  $j$  exists in quarter  $q$ ,  $\gamma_{ij}$  denotes country-pair fixed effects (time invariant characteristics such as distance, border, common language or common legal systems) and  $\theta_q$  time fixed effects (which control for all common time trends affecting the deposits in tax havens, such as financial crises, changes in financial market activity or the regulatory environment). In most models, I also control for log of GDP. Based on the Hausman

test, I use the fixed effects estimator with robust standard errors clustered at the country-pair level for all regressions.

### 3.4.1 Treaty Impact on Deposits in Haven vs. Non-haven Banks

I first compare changes in cross-border deposits held in traditional tax havens with those held in non-haven countries. Should treaties have any effect at all,  $\beta_1$  should be statistically different from zero. Moreover, a negative coefficient on the treaty variables for the haven locations,  $\beta_2$ , relative to non-haven locations, would be consistent with deposits in havens declining after tax evasion becomes more costly.

$$[1] \quad \log(\text{Deposits}_{ijq}) = \alpha + \beta_1 \text{Signed}_{ijq} + \beta_2 \text{Signed}_{ijq} * \text{Haven}_j + \gamma_{ij} + \theta_q + \epsilon_{ijq}$$

**Table 3.2** Treaty Impact on Bilateral Bank Deposits

	(1)	(2)	(3)	(4)	(5)	(6)
reporting BANK	Haven or Non-haven					
counterparty	Non-haven					
SAVER	Non-haven					
DTC		-0.4156*** (0.0039)	-0.5110*** (0.0064)			
DTC*Haven			0.2534 (0.3766)			
TIEA	-0.9394*** (0.0000)	-0.9461*** (0.0000)	-0.1377 (0.1884)		-0.9221*** (0.0000)	-0.1409 (0.1727)
TIEA*Haven			-0.8248*** (0.0000)			-0.7831*** (0.0000)
CRS				-1.0210*** (0.0000)	-0.9508*** (0.0000)	-0.8629*** (0.0004)
CRS*Haven						-0.7074 (0.1407)
log(GDP)	0.8473*** (0.0000)	0.8833*** (0.0000)	0.8871*** (0.0000)	0.7547*** (0.0000)	0.8661*** (0.0000)	0.8693*** (0.0000)
Constant	-17.4473*** (0.0000)	-18.3355*** (0.0000)	-18.4252*** (0.0000)	-15.0455*** (0.0000)	-17.9395*** (0.0000)	-18.0247*** (0.0000)

**Table 3.2** (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
reporting BANK						
counterparty						
SAVER						
Observations	37,212	37,212	37,212	37,212	37,212	37,212
R-squared	0.0393	0.0412	0.0417	0.0249	0.0442	0.0448
Number of panelid	860	860	860	860	860	860
countrypair FE	YES	YES	YES	YES	YES	YES
time FE	YES	YES	YES	YES	YES	YES

**Note:** Robust p-values in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1. DTC = double taxation convention; TIEA = tax information exchange agreement; CRS = Common Reporting Standard based exchanges.

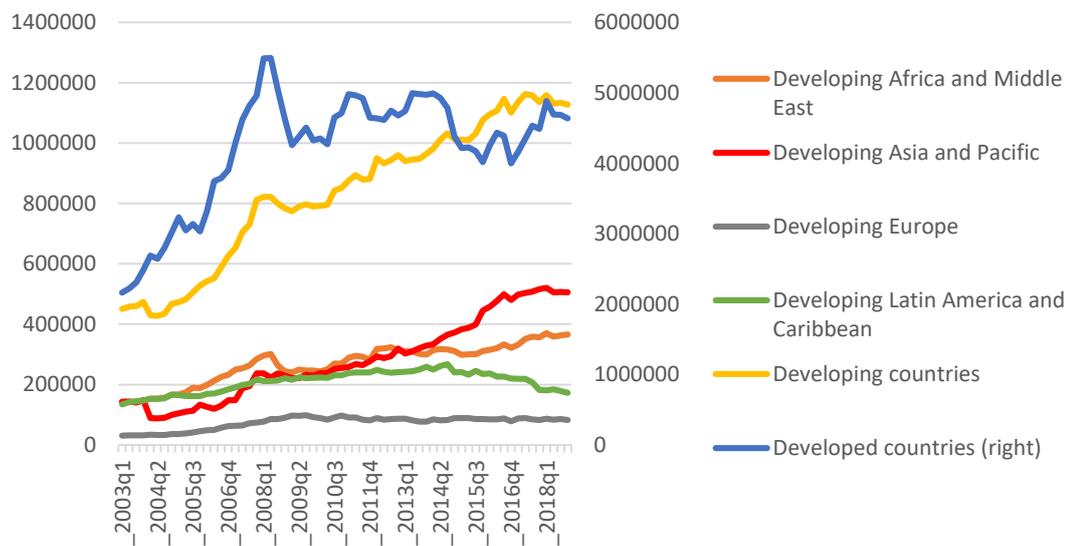
Table 3.2 shows that for TIEAs and to a lesser extent DTCs, the deposits of the “treaty” pairs are about 60% smaller after treaty signature than before, relative to the deposits of the “no treaty” pairs. This is based on transforming the estimated coefficient for percentage results,  $100 * (\exp(\beta) - 1)$ . In column 3, using interaction terms, I then separate the treaty pairs into those signed by non-haven savers with haven banks versus non-haven banks. It shows that most of the reduction happens in the “haven bank – non-haven saver” pairs. All the negative coefficients are statistically significant. In columns 4 to 6, a similar trend is shown for CRS-based exchanges, although the haven interaction term is not statistically significant.

### 3.4.2 Treaty Impact on Developed vs. Developing Country Savers

I then examine how different saver countries responded to the introduction of tax treaties. Figure 4 shows that developed countries, including Europe and the United States, still own most of the offshore wealth, at about \$4.6 trillion at the end of 2018 whereas developing countries held about \$1.1 trillion, of which Africa and Middle East (AME) accounted for \$366 billion, Asia and Pacific (AP) for \$506 billion, Europe (EE) for \$83 billion, and Latin America and Caribbean (LAC) for \$173 billion.

Given that the initial conditions are different, I suspect that the impact of new treaties also vary. Taking developed countries as the benchmark, I add regional dummies for developing countries in the following model:

$$[2] \quad \log(\text{Deposits}_{ijq}) = \alpha + \beta_1 \text{Signed}_{ijq} + \beta_2 \text{Signed}_{ijq} * \text{AME}_i + \beta_3 \text{Signed}_{ijq} * \text{AP}_i + \beta_4 \text{Signed}_{ijq} * \text{EE}_i + \beta_5 \text{Signed}_{ijq} * \text{LAC}_i + \gamma_{ij} + \theta_q + \epsilon_{ijq}$$



**Figure 3.4** Offshore Deposits by Savers (millions of US\$, 2003q1 to 2018q4; left axis unless otherwise indicated)

**Note:** Data are provided for non-bank counterparties only. Data are aggregated across currencies, type of currency and reporting institution.

In Table 3.3 shows the estimation result. As before, treaty signature has a negative impact on offshore deposits. However, all the interaction terms with developing regions have a negative coefficient, relative to developed countries. This is especially the case when the deposits are held in tax haven jurisdictions, as shown in columns 3 and 6 for TIEA and CRS respectively. Albeit from a low base, the use of offshore accounts is increasing rapidly in developing regions, especially Asia and Pacific. This may reflect increasing wealth at the top. Also, primary tax havens or offshore centres in Asia-Hong Kong, China and Singapore-were until recently under

less pressure to disclose customer information, compared to Switzerland for instance. On the other hand, GDP is not statistically significant for deposits held in havens, compared to those in non-havens which are likely to be associated with real cross-border activities.

**Table 3.3** Treaty Impact on Bilateral Bank Deposits of Different Savers

	(1)	(2)	(3)	(4)	(5)	(6)
type of TREATY	TIEA			CRS		
reporting BANK	All	Non-haven	Haven	All	Non-haven	Haven
counterparty						
SAVER	Developing regions (Benchmark: Developed countries)					
Treaty	-0.7967*** (0.0000)	-0.1385 (0.1301)	-0.7745*** (0.0000)	-0.7988*** (0.0003)	-0.7001*** (0.0029)	-1.6392*** (0.0001)
Treaty*AME	0.5407*** (0.0066)	0.4402*** (0.0000)	0.4253** (0.0319)	1.0723*** (0.0061)	0.8765* (0.0662)	2.1719*** (0.0010)
Treaty *AP	0.5691*** (0.0017)		0.7524*** (0.0001)	0.4976 (0.1344)	0.3178 (0.4051)	1.7036*** (0.0002)
Treaty *EE	0.4327* (0.0875)		0.4690* (0.0639)	1.2783*** (0.0065)	1.2462** (0.0262)	1.7897*** (0.0000)
Treaty *LAC	0.2985 (0.4038)	-1.0662* (0.0861)	1.0207*** (0.0000)	0.5350** (0.0356)	0.3898 (0.1590)	1.6402*** (0.0003)
log(GDP)	0.2558*** (0.0000)	0.2905*** (0.0000)	-0.0018 (0.9733)	0.2556*** (0.0000)	0.2890*** (0.0000)	0.0137 (0.8050)
Constant	-3.3733*** (0.0000)	-4.2098*** (0.0000)	2.8691** (0.0352)	-3.3761*** (0.0000)	-4.1809*** (0.0000)	2.4870* (0.0691)
Observations	159,499	133,062	26,437	159,499	133,062	26,437
R-squared	0.0114	0.0109	0.0283	0.0121	0.0115	0.0253
Number of panelid	4,432	3,560	872	4,432	3,560	872
countrypair FE	YES	YES	YES	YES	YES	YES
time FE	YES	YES	YES	YES	YES	YES

**Note:** Robust p-values in parantheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Developing countries in Africa and Middle East (AME), Asia and Pacific (AP), Europe (EE), Latin America and Caribbean (LAC). DTC is controlled for in columns 1 to 3 and TIEA for columns 4 to 6.

### 3.4.3 Treaty Impact Over Time

To examine the timing of the response to treaty signature, I now consider lagged and anticipation effects. For TIEAs, I include a dummy equal to 1 in the quarter  $q$  of the legal event establishing information exchange, three dummies equal to 1 in  $q + 1$ ,  $q + 2$  and  $q + 3$  respectively, and a dummy equal to 1 in all quarters after  $q + 3$  (“long run”). For CRS-based automatic exchanges, I focus on anticipation effects because it is based on the entry into force date, rather than the signature or commitment date. I include three dummies equal to 1 in  $q - 1$ ,  $q - 2$  and  $q - 3$  respectively, and a dummy equal to 1 for fourth to eighth quarters before the commencement of automatic exchange.

$$[3] \quad \log(\text{Deposits}_{ijq}) \alpha + \beta_1 \text{Signed}_{ijq} + \beta_2 \text{lagged effect} + \\ \beta_3 \text{anticipation effect} + \gamma_{ij} + \theta_q + \epsilon_{ijq}$$

**Table 3.4** Treaty Impact on Bilateral Bank Deposits Over Time

	(1)	(2)	(3)	(4)	(5)
type of TREATY		TIEA		CRS	
reporting BANK		Haven			
counterparty SAVER	Non-haven	Developed countries		All non-havens	
(-4 to -8 quarters)			-0.8172** (0.0276)		-1.5361*** (0.0000)
(-3 quarter)			-0.9146** (0.0211)		-1.5739*** (0.0000)
(-2 quarter)			-0.8874** (0.0301)		-1.1502*** (0.0000)
(-1 quarter)			-0.9154** (0.0231)		-1.8369*** (0.0000)
(Contemporary)	-0.3534*** (0.0004)	-1.3158*** (0.0001)	-1.1435*** (0.0000)	-1.0465*** (0.0000)	-1.1102*** (0.0000)
(+1 quarter)	-0.4171*** (0.0002)	-1.3311*** (0.0001)		-0.8205*** (0.0024)	

**Table 3.4** (Continued)

	(1)	(2)	(3)	(4)	(5)
type of TREATY		TIEA		CRS	
reporting BANK		Haven			
counterparty SAVER	Non-haven	Developed countries		All non-havens	
(+2 quarter)	-0.5107*** (0.0002)	-1.3899*** (0.0001)		-0.8390*** (0.0017)	
(+2 quarter)	-0.5523*** (0.0000)	-1.4487*** (0.0003)		-0.9894*** (0.0005)	
(long run)	-0.7934*** (0.0000)	-1.5294*** (0.0004)		-0.8306*** (0.0009)	
log(GDP)	-0.3320 (0.1182)	-0.3092 (0.1286)	-0.0738 (0.6441)	0.7200*** (0.0000)	0.8726*** (0.0000)
Constant	13.5277** (0.0170)	12.9176** (0.0173)	6.7701 (0.1117)	-14.0969*** (0.0000)	-18.0791*** (0.0000)
Observations	6,110	6,110	5,962	35,601	34,954
R-squared	0.1214	0.1273	0.1302	0.0320	0.0544
Number of panelid	164	164	164	860	855
countrypair FE	YES	YES	YES	YES	YES
time FE	YES	YES	YES	YES	YES

**Note:** Robust p-values in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1. DTC is controlled for in column 1 and TIEA for columns 2 to 5.

Table 3.4 shows as TIEAs do not enter into force immediately after they are signed, the effect becomes stronger over time towards the entry into force. For CRS-based automatic exchanges, lagged effects are stronger for developed country savers (column 2) whereas anticipation effects are stronger for all non-havens including developing countries (column 5). Generally lagged effects would be strong if the exchanged information is effectively used for tax audits. Anticipation effects would be strong if the government introduces enticing measures such as time-bound tax amnesties or voluntary disclosure schemes in the lead up to the exchange of information, which was the case for several developing countries such as Argentina, India and Indonesia.

### 3.4.4 Treaty Formation

Before turning the specific issues of deposit shifting and the use of sham corporations, I conduct a simple identification test. Following Johannesen and Zucman (2014), I examine the possibility that tax havens systematically signed treaties with countries that were placing less and less deposits in their banks relative to the global trend. This would introduce a spurious relationship between treaty signature and deposit growth. I run probit models of the form:

$$[4] \quad Treaty_{ijq} = \alpha + \beta Growth_{ijq} + \delta X_{ijq} + \gamma Distance_{ij} + \tau_i + \theta_q + \epsilon_{ijq}$$

, where  $Treaty_{ijq}$  is a dummy equal to 1 if  $i$  and  $j$  sign an information exchange treaty in quarter  $q$ ,  $Growth_{ijq}$  captures the growth rate of the deposits held by savers of country  $i$  in haven  $j$  before quarter  $q$ ,  $X_{ijq}$  includes other bilateral factors,  $\tau_i$  denotes saver-country fixed effects and  $\theta_q$  time fixed effects. I consider the percentage growth over the four quarters before  $q$  and as an alternative measure, the percentage growth from eight quarters to four quarters before  $q$ . Table 3.5 shows that the level of deposits, distance and GDP (all in logs) are generally significant determinants of the probability to sign a treaty. Controlling for those factors, past growth rates of deposits remain insignificant. This result is consistent with Bilicka and Fuest (2014) who find that tax havens do not systematically undermine tax information exchange by signing TIEAs with irrelevant countries.

**Table 3.5** Probit Model on Why Havens Sign Treaties

	(1)	(2)	(3)	(4)	(5)	(6)
type of treaty		TIEA			CRS	
reporting BANK				Haven		
counterparty SAVER				Non-haven		
Deposit growth,						
-4q to 0q	-0.0016 (0.1257)	-0.0017 (0.2073)	-0.0031 (0.5510)	0.0008 (0.2299)	0.0006 (0.1726)	0.0008 (0.9449)

**Table 3.5** (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
type of treaty		TIEA			CRS	
reporting BANK			Haven			
counterparty SAVER			Non-haven			
Deposit growth, -8q to -4q	0.0000 (0.9968)	0.0004 (0.7912)	0.0040 (0.4296)	-0.0004 (0.4435)	-0.0005 (0.5280)	-0.0291 (0.3550)
log(deposit)		-0.0001 (0.6315)	-0.0016 (0.3180)		0.0002 (0.4194)	-0.0086 (0.1536)
log(distance)		-0.0008 (0.1091)	-0.0101*** (0.0081)		-0.0001 (0.9100)	-0.0546** (0.0224)
log(GDP)		0.0022*** (0.0000)	0.0110 (0.5030)		0.0015*** (0.0025)	2.3389*** (0.0050)
Observations	12,437	11,687	3,581	5,593	5,167	228
time FE	YES	YES	YES	YES	YES	YES
country FE	NO	NO	YES	NO	NO	YES

**Note:** Robust p-values in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

### 3.5 Deposit Shifting and Sham Corporations

While the previous section suggest that tax treaties have been generally effective in curbing offshore evasion, further assessment is required specifically on the issues of deposit shifting and the use of sham corporations.

#### 3.5.1 Deposit Shifting

Several previous studies find that information exchange agreements do not reduce tax evasion overall but rather induce a relocation of wealth from collaborative tax havens to non-collaborative ones (Johannesen & Zucman, 2014; Hanlon et al., 2015). However, there has been a dramatic increase in treaty network in recent years, especially with the commencement of automatic exchanges. For instance, more than 100 jurisdictions have committed to the CRS, including most of the traditional tax

havens. Therefore, it is not clear whether updated data will yield similar results showing deposit shifting amongst tax havens.

Augmenting the basic model used in Section 3.4, I introduce a treaty coverage (TC) variable, expressed by the number of treaties signed by the non-haven country with tax havens other than  $j$ . An additional treaty signed is expected to increase the deposits held in a haven which has not signed a treaty, resulting in a positive coefficient for the interaction term TC and “no treaty” pair (shown as 1-Signed). Following Johannesen and Zucman (2014), I construct a second measure of treaty coverage which weighs treaties according to their importance. For each country  $i$  and haven  $j$ , I compute the share of  $i$ 's deposits in tax havens which were placed in  $j$  during 2003, the first year of the sample, when no major treaties were yet signed.

$$[5] \quad \log(\text{Deposits}_{ijq}) = \alpha + \beta_1 \text{Signed}_{ijq} + \beta_2 \text{Treaty coverage}_{iq} + \beta_3 \text{TC}_{iq} * \text{Signed}_j + \beta_4 \text{TC}_{iq} * (1 - \text{Signed})_j + \gamma_{ij} + \theta_q + \epsilon_{ijq}$$

**Table 3.6** Treaty Impact on Bilateral Bank Deposits, Account for Deposit Shifting

	(1)	(2)	(3)	(4)
measure of TREATY COVERAGE reporting BANK counterparty SAVER		Number of treaties Haven Non-haven		Weighted share
Signed	-0.5178*** (0.0000)	-0.3384 (0.1687)	-0.5338 (0.2086)	-0.4137 (0.3113)
Treaty coverage	-0.0553** (0.0101)		-0.7023** (0.0208)	
Treaty coverage*Signed		-0.1639 (0.2069)		-2.9109*** (0.0000)
Treaty coverage*(1-Signed)		-0.0503** (0.0201)		-0.4606 (0.1241)
log(GDP)	0.0882** (0.0254)	0.0877** (0.0262)	0.1060** (0.0380)	0.1067** (0.0369)

**Table 3.6** (Continued)

	(1)	(2)	(3)	(4)
<b>measure of TREATY COVERAGE reporting BANK counterparty SAVER</b>	<b>Number of treaties</b>		<b>Weighted share</b>	
		<b>Haven</b>	<b>Non-haven</b>	
Constant	1.2378 (0.1977)	1.2492 (0.1936)	1.4291 (0.2469)	1.4143 (0.2520)
Observations	59,296	59,296	31,445	31,445
R-squared	0.0140	0.0143	0.0078	0.0090
Number of panelid	1,435	1,435	515	515
countrypair FE	YES	YES	YES	YES
time FE	YES	YES	YES	YES

**Note:** Robust p-values in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1 DTC is controlled for in columns 1 to 4.

Table 3. 6 shows the estimation results. Unlike Johannesen and Zucman (2014), I do not find that an additional treaty signed by the non-haven country increase the deposits held in a haven which has not signed a treaty. Nevertheless, compared to a haven which has signed a treaty, they experience only marginal reductions in deposit, as shown in columns 2 and 4.

Given the somewhat inconclusive evidence, I consider a model in which certain non-haven jurisdictions are also considered as potential destinations for deposit shifting, along with traditional tax havens. These are the US, the UK, and selected European countries including Germany, France, Italy and Spain. In particular, the US is the only major economy which has not committed to reciprocal and automatic exchange of information on financial accounts. While the FATCA intergovernmental agreements require non-US financial institutions to report the identities and assets of US taxpayers to the IRS, this is not reciprocated to other jurisdictions. This is reason to suspect that tax evaders may find US an attractive place to park hidden wealth. For instance, Bloomberg editorial board (28 December

2017) notes: “Financial institutions catering to the global elite, such as Rothschild & Co. and Trident Trust Co., have moved accounts from offshore havens to Nevada, Wyoming and South Dakota. New York lawyers are actively marketing the country as a place to park assets.”

The below model includes an interaction term that indicates the change in cross-border deposits non-residents hold in the US after CRS implementation. But given that the US does not have an implementation date, I create a dummy “PostCRS” which equals 1 starting from 2016 when the first wave of CRS adopters started collecting information for exchange in 2017.

$$[6] \quad \log(\text{Deposits}_{ijq}) = \alpha + \beta_1 \text{Signed}_{ijq} * \text{Haven} + \beta_2 \text{PostCRS}_{ijq} * \text{US}_j + \beta_3 \text{Signed}_{ijq} * \text{UK}_j + \beta_4 \text{Signed}_{ijq} * \text{Europe}_j + \gamma_{ij} + \theta_q + \epsilon_{ijq}$$

Table 3.7 shows that deposits in the US significantly increased since 2016, even as there was no change in the UK and reductions in Europe as well as in traditional tax havens. This is consistent with the findings of Casi et al (2018), who find that after the CRS implementation, deposits held in the US are on average 9% higher compared to other non-haven countries and that this effect is both immediate and persistent.

**Table 3.7** Treaty Impact on Bilateral Bank Deposits in Certain Non-haven Jurisdictions

reporting BANK counterparty SAVER	(1)	(2)	(3)	(4)
		US, UK, Europe as well as Haven Non-haven		
CRS*Haven		-0.4121** (0.0260)	-0.4133** (0.0255)	-0.4165** (0.0243)
PostCRS*US	0.3087*** (0.0000)	0.3094*** (0.0000)		
CRS*UK	0.0278 (0.6758)		0.0280 (0.6740)	
CRS*Europe	-0.0571* (0.0559)			-0.0588** (0.0493)

**Table 3.7** (Continued)

	(1)	(2)	(3)	(4)
reporting BANK counterparty SAVER	US, UK, Europe as well as Haven Non-haven			
log(GDP)	0.2422*** (0.0000)	0.2384*** (0.0000)	0.2417*** (0.0000)	0.2502*** (0.0000)
Constant	-3.0572*** (0.0000)	-2.9670*** (0.0000)	-3.0467*** (0.0000)	-3.2507*** (0.0000)
Observations	159,499	159,499	159,499	159,499
R-squared	0.0081	0.0081	0.0073	0.0075
Number of panelid	4,432	4,432	4,432	4,432
countrypair FE	YES	YES	YES	YES
time FE	YES	YES	YES	YES

**Note:** Robust p-values in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1. “Europe” consists of selected countries including Germany, France, Italy and Spain.

### 3.5.2 Sham Corporations

Some tax havens such as British Virgin Islands and Panama are well known for hosting sham corporations, thanks to flexible corporate laws that make it simple to create new companies without much activities. How did deposits held through sham corporations respond to the recent wave of tax treaties? To answer this, I regress haven-haven deposits on the number of treaties (or their weighted share) concluded by banking havens with non-haven countries. The idea is that with anti-money laundering regulations and other international pressures, banks are increasingly required to know who the ultimate owner of the assets they manage – in which case, haven-haven flows would also be affected.

$$[7] \quad \log(\text{Deposits}_{ijq}) = \alpha + \beta_1 \text{Signed}_{ijq} + \beta_2 \text{Treaty coverage}_{jq} + \beta_3 \text{TC}_{jq} * \text{Haven}_i + \beta_4 \text{TC}_{jq} * \text{Nonhaven}_i + \gamma_{ij} + \theta_q + \epsilon_{ijq}$$

Table 3.8 shows the expected negative signs for treaty coverage of the banking haven with non-havens, in columns 2 and 4. In particular, the reduction is deposit is

significant based on the weighted treaty coverage. In comparison, haven-haven treaties do not have a significant impact on haven-haven deposits, in line with the findings of Johannesen and Zucman (2014).

**Table 3.8** Treaty Impact on Bilateral Bank Deposits, Accounting for Sham Corporations

	(1)	(2)	(3)	(4)
measure of TREATY COVERAGE reporting BANK counterparty SAVER		Number of treaties Weighted share Haven Haven		
Treaty coverage, banking haven with non-havens	0.0003 (0.9446)	-0.0089** (0.0199)	-0.2817 (0.2944)	-0.5821** (0.0144)
Treaty coverage, banking haven with other havens		0.1967* (0.0591)		1.5956 (0.1398)
Constant	4.7440*** (0.0000)	4.7941*** (0.0000)	5.3280*** (0.0000)	4.8016*** (0.0000)
Observations	3,257	3,257	6,807	3,257
R-squared	0.0000	0.0301	0.0019	0.0281
Number of panelid	87	87	146	87
countrypair FE	YES	YES	YES	YES
time FE	YES	YES	YES	YES

**Note:** Robust p-values in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Similar to the case of deposit shifting, however, there is a possibility that certain non-haven jurisdictions are increasingly hosting the sham corporations. Again, there is reason to suspect that tax evaders would find the US an attractive place to create sham corporations as part of their offshore evasion network. The US Congress has to date opposed a public register of ultimate beneficial ownership (UBO) for companies, LLCs and trusts. In comparison, countries such as the UK launched its

first public UBO registry in 2016 for about three million UK companies and LLCs and took further measures in 2018 to expand the registry coverage.

I consider three models based on the “PostCRS” dummy which equals 1 starting from 2016 when the first wave of CRS adopters started collecting information for exchange in 2017. I create a similar dummy which equals 1 starting from 2017 when the second wave of CRS adopters also started collecting information. Equation [8] simply tests haven-haven flows as in Table 8 but based on a non-country specific dummy, and I expect a negative coefficient as found earlier. Equation [9] tests whether sham corporations in tax havens increased their deposits in the US after the CRS implementation, in which case the coefficient would be positive. Lastly, equation [10] tests the possibility that US is becoming the choice location for creating sham corporations. For instance, a non-US taxpayer could set up an investment entity in the US, through which he could hold deposits in a Swiss bank.

$$[8] \quad \log(\text{Deposits}_{\text{haven,haven},q}) = \alpha + \beta_1 \text{PostCRS}_q + \gamma_{\text{haven,haven}} + \theta_q + \epsilon_{\text{haven,haven},q}$$

$$[9] \quad \log(\text{Deposits}_{\text{haven,US},q}) = \alpha + \beta_1 \text{PostCRS}_q + \gamma_{\text{haven,US}} + \theta_q + \epsilon_{\text{haven,US},q}$$

$$[10] \quad \log(\text{Deposits}_{\text{US,nonhaven},q}) = \alpha + \beta_1 \text{PostCRS}_q + \gamma_{\text{US,nonhaven}} + \theta_q + \epsilon_{\text{US,nonhaven},q}$$

Table 3.9 shows the expected signs, although only estimated coefficients for the haven-to-US deposits are statistically significant, in line with what is found in Table 3.7 under deposit shifting. While the coefficient on nonhaven-to-US deposits are not statistically significant, the two PostCRS dummies in columns 5 and 6 suggest that the deposits are increasing at faster pace over time.

**Table 3.9** Evolving Landscape in the Wake of CRS Implementation

	(1)	(2)	(3)	(4)	(5)	(6)
reporting BANK	Haven		US		Non-haven	
counterparty	Haven		Haven		US	
SAVER	Haven		Haven		US	
VARIABLES	Haven		Haven		US	
PostCRS (2016)	-0.0890 (0.3882)		0.3059** (0.0336)		0.0276 (0.8573)	
PostCRS (2017)		-0.0998 (0.3334)		0.3293** (0.0165)		0.1352 (0.3378)
log(GDP)	0.0015 (0.9948)	-0.0056 (0.9810)	0.7057*** (0.0001)	0.7399*** (0.0000)	-0.2901 (0.5844)	-0.4158 (0.4548)
Constant	4.2996 (0.4383)	4.4613 (0.4252)	-9.5226*** (0.0060)	-10.3149*** (0.0031)	17.6108 (0.2823)	21.4197 (0.2137)
Observations	2,089	2,089	550	550	767	767
R-squared	0.0026	0.0026	0.3496	0.3426	0.0040	0.0078
Number of panelid	64	64	13	13	15	15
countrypair FE	YES	YES	YES	YES	YES	YES
time FE	YES	YES	YES	YES	YES	YES

**Note:** Robust p-values in parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

### 3.6 Conclusion

International tax cooperation is critical if countries want to maintain the integrity of their tax base. Without exchange of information between jurisdictions, personal income taxes particularly on capital income would be difficult to enforce effectively. Given the limitations of information exchange upon request, countries have begun to shift towards automatic exchanges, which are believed to have a much stronger impact on offshore tax evasion.

This paper is an early attempt to provide a more systematic assessment on this issue. As automatic exchanges are still fairly recent, more time would be needed to assess their effectiveness on curbing offshore evasion. Depending on how well the

received data could be analysed and applied in tax audits, especially for high net wealth individuals, the lagged effects could be potentially very strong. The overall findings suggest that automatic exchanges, when combined with other measures on beneficial ownership, could help to enhance tax transparency. My paper also finds that deposit shifting remains a challenge, and further treaty network expansion to all jurisdictions would be desirable, including to jurisdictions which are not typically considered tax havens but nevertheless score high in terms of financial secrecy. Perhaps a broader finding is that offshore tax evasion keeps evolving in response to new policy measures. Sophisticated accounting, legal and financial services for the wealthy will continue to find ways to exploit loopholes in the tax law if not facilitate outright evasion. Therefore, tax authorities should remain vigilant of new and emerging risks to tax compliance, while at the same time implementing new measures in a clear and efficient manner.

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## APPENDIX

**Table A.1** Estimation Results: Log of Food Expenditures as Dependent Variable

	(1) OLS	(2) OLS	(3) OLS	(4) IV	(5) IV
able		0.0554*** (0.00582)		0.0922*** (0.00698)	
able but unwilling			0.0261*** (0.00680)		0.0819*** (0.00865)
able and willing			0.113*** (0.00851)		0.111*** (0.00928)
log(income)	0.387*** (0.007)	0.393*** (0.00734)	0.387*** (0.00737)	0.866*** (0.0295)	0.858*** (0.0305)
family size	0.076*** (0.004)	0.0761*** (0.00357)	0.0766*** (0.00355)	0.0543*** (0.00383)	0.0547*** (0.00384)
capital city	0.215*** (0.007)	0.210*** (0.00690)	0.206*** (0.00688)	0.179*** (0.00818)	0.178*** (0.00809)
home ownership	0.010* (0.006)	0.0104* (0.00591)	0.0101* (0.00590)	-0.0372*** (0.00704)	-0.0368*** (0.00705)
age	0.034*** (0.003)	0.0327*** (0.00312)	0.0332*** (0.00314)	0.00620 (0.00378)	0.00669* (0.00382)
age squared	-0.000*** (0.000)	-0.000335*** (3.34e-05)	-0.000338*** (3.35e-05)	-0.000105*** (3.94e-05)	-0.000108*** (3.96e-05)
education	0.081*** (0.005)	0.0855*** (0.00512)	0.0825*** (0.00513)		
hours worked	-0.001*** (0.000)	-0.00160*** (0.000274)	-0.00174*** (0.000274)	-0.00107*** (0.000301)	-0.00112*** (0.000304)
2009.year	0.000 (0.011)	-2.97e-05 (0.0110)	-0.000688 (0.0110)	-0.0128 (0.0120)	-0.0129 (0.0120)
2010.year	0.069*** (0.011)	0.0686*** (0.0108)	0.0686*** (0.0108)	0.0486*** (0.0120)	0.0489*** (0.0120)
2011.year	0.066*** (0.011)	0.0661*** (0.0108)	0.0659*** (0.0108)	0.0162 (0.0123)	0.0168 (0.0123)
2012.year	0.168*** (0.011)	0.169*** (0.0108)	0.169*** (0.0108)	0.120*** (0.0123)	0.121*** (0.0123)
2013.year	0.160*** (0.011)	0.163*** (0.0108)	0.162*** (0.0108)	0.106*** (0.0125)	0.107*** (0.0125)
2014.year	0.197*** (0.011)	0.199*** (0.0109)	0.199*** (0.0109)	0.134*** (0.0127)	0.135*** (0.0127)
Constant	2.060*** (0.084)	2.028*** (0.0835)	2.074*** (0.0836)	-0.965*** (0.212)	-0.913*** (0.219)
Observations	23,946	23,946	23,946	23,946	23,946
R-squared	0.282	0.284	0.287	0.144	0.149

**Note:** Robust Standard Errors in Parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

**Table A.2** Estimation Results: Log of Nondurable Expenditures as Dependent Variable

	(1) OLS	(2) OLS	(3) OLS	(4) IV	(5) IV
able		0.0693*** (0.00475)		0.0909*** (0.00543)	
able but unwilling			0.0381*** (0.00552)		0.0700*** (0.00671)
able and willing			0.131*** (0.00697)		0.130*** (0.00722)
log(income)	0.321*** (0.006)	0.329*** (0.00588)	0.323*** (0.00588)	0.608*** (0.0231)	0.593*** (0.0239)
family size	0.092*** (0.003)	0.0914*** (0.00281)	0.0919*** (0.00279)	0.0785*** (0.00298)	0.0794*** (0.00298)
capital city	0.183*** (0.006)	0.178*** (0.00565)	0.173*** (0.00561)	0.159*** (0.00633)	0.157*** (0.00624)
home ownership	-0.010** (0.005)	-0.00960* (0.00491)	-0.00998** (0.00489)	-0.0377*** (0.00559)	-0.0368*** (0.00558)
Age	0.048*** (0.003)	0.0471*** (0.00262)	0.0477*** (0.00263)	0.0315*** (0.00300)	0.0325*** (0.00303)
age squared	-0.000*** (0.000)	-0.000466*** (2.80e-05)	-0.000469*** (2.81e-05)	-0.000329*** (3.14e-05)	-0.000337*** (3.15e-05)
education	0.045*** (0.004)	0.0505*** (0.00415)	0.0472*** (0.00415)		
Hours worked	-0.000 (0.000)	-0.000763*** (0.000231)	-0.000907*** (0.000230)	-0.000453* (0.000245)	-0.000558** (0.000245)
2009.year	0.006 (0.009)	0.00564 (0.00885)	0.00487 (0.00883)	-0.00172 (0.00938)	-0.00191 (0.00932)
2010.year	0.055*** (0.009)	0.0548*** (0.00874)	0.0547*** (0.00873)	0.0432*** (0.00937)	0.0436*** (0.00931)
2011.year	0.074*** (0.009)	0.0741*** (0.00875)	0.0738*** (0.00874)	0.0449*** (0.00958)	0.0459*** (0.00954)
2012.year	0.133*** (0.009)	0.134*** (0.00874)	0.134*** (0.00872)	0.105*** (0.00962)	0.106*** (0.00957)
2013.year	0.130*** (0.009)	0.133*** (0.00873)	0.133*** (0.00872)	0.0998*** (0.00974)	0.101*** (0.00971)
2014.year	0.151*** (0.009)	0.154*** (0.00885)	0.154*** (0.00884)	0.116*** (0.00997)	0.117*** (0.00995)
Constant	2.701*** (0.071)	2.661*** (0.0704)	2.710*** (0.0702)	0.895*** (0.168)	1.000*** (0.172)
Observations	23,913	23,913	23,913	23,913	23,913
R-squared	0.318	0.324	0.328	0.254	0.263

**Note:** Robust Standard Errors in Parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

**Table A.3** Estimation Results: Alternative Measure of Willingness to Cheat

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	IV	IV
able		0.0462*** (0.00408)		0.0866*** (0.00492)	
able but unwilling			0.0390*** (0.00539)		0.0745*** (0.00613)
able and willing			0.0518*** (0.00524)		0.0938*** (0.00609)
log(income)	0.372*** (0.005)	0.377*** (0.00509)	0.377*** (0.00509)	0.839*** (0.0211)	0.840*** (0.0211)
family size	0.079*** (0.002)	0.0792*** (0.00229)	0.0790*** (0.00229)	0.0522*** (0.00258)	0.0519*** (0.00259)
capital city	0.187*** (0.005)	0.186*** (0.00475)	0.187*** (0.00475)	0.143*** (0.00588)	0.143*** (0.00588)
home ownership	0.007 (0.004)	0.00685* (0.00410)	0.00686* (0.00411)	-0.0366*** (0.00487)	-0.0368*** (0.00487)
age	0.041*** (0.002)	0.0392*** (0.00219)	0.0395*** (0.00218)	0.0172*** (0.00262)	0.0177*** (0.00260)
age squared	-0.000*** (0.000)	-0.000415*** (2.33e-05)	-0.000417*** (2.32e-05)	-0.000224*** (2.73e-05)	-0.000227*** (2.72e-05)
education	0.078*** (0.004)	0.0810*** (0.00356)	0.0812*** (0.00356)		
Hours worked	-0.000 (0.000)	-0.000526*** (0.000181)	-0.000520*** (0.000181)	0.000459** (0.000207)	0.000486** (0.000208)
2009.year	0.013* (0.007)	0.0124* (0.00748)	0.0124* (0.00748)	0.000763 (0.00815)	0.000746 (0.00815)
2010.year	0.068*** (0.007)	0.0678*** (0.00748)	0.0676*** (0.00748)	0.0442*** (0.00828)	0.0437*** (0.00829)
2011.year	0.070*** (0.007)	0.0707*** (0.00741)	0.0705*** (0.00741)	0.0170** (0.00856)	0.0164* (0.00857)
2012.year	0.171*** (0.007)	0.172*** (0.00743)	0.171*** (0.00743)	0.112*** (0.00867)	0.111*** (0.00868)
2013.year	0.163*** (0.007)	0.165*** (0.00741)	0.164*** (0.00741)	0.0961*** (0.00889)	0.0950*** (0.00890)
2014.year	0.201*** (0.007)	0.203*** (0.00741)	0.203*** (0.00742)	0.124*** (0.00911)	0.123*** (0.00912)
Constant	1.999*** (0.059)	1.986*** (0.0591)	1.982*** (0.0591)	-1.042*** (0.154)	-1.057*** (0.154)
Observations	49,300	49,300	49,300	49,300	49,300
R-squared	0.284	0.286	0.286	0.150	0.150

**Note:** Robust Standard Errors in Parantheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

### Engel Curve Estimation in Pissarides and Weber (1989)

For household  $i$ , let  $C_i$  stand for the expenditure share of food and  $Y_i^P$  the permanent income which influences consumption decisions.  $Z_i$  is a vector of household characteristics.

$$\ln C_i = Z_i \alpha + \beta \ln Y_i^P + \varepsilon_i$$

The true income  $Y_i$  is a function of the reported income  $Y_i'$  and the permanent income

$$Y_i = k_i Y_i' \quad Y_i = p_i Y_i^P$$

, where  $k_i \geq 1$  and  $p_i$  are random variables showing the degree of underreporting and the degree of transitory income variation, respectively. Note that  $k_i = 1$  for employees. The distinction between permanent and transitory income may seem redundant but could be important as it is likely that the covariance of underreporting and transitory income is not zero; if an individual had an exceptionally good year in self-employment income, he may be less inclined to declare the full income as it would only arouse the curiosity of the tax authority. The mean of  $p_i$  is assumed to be the same for both groups, although the variance may differ.  $k_i$  and  $p_i$  are assumed to be log normal,

$$\ln k_i = \mu_k + v_i \quad \ln p_i = \mu_p + u_i$$

, with errors that have zero mean and constant variances  $\sigma_v^2$  and  $\sigma_u^2$ . Substitution gives

$$\begin{aligned} \ln C_i &= Z_i \alpha + \beta \ln Y_i' - \beta \ln p + \beta \ln k_i + \varepsilon_i \\ \ln C_i &= Z_i \alpha + \beta \ln Y_i' + \beta (\mu_k - \mu_p) + \beta (v_i - u_i) + \varepsilon_i \end{aligned}$$

Let  $SE_i$  be a dummy taking the value 1 if the household is self-employed and 0 if not, and SE and EE stand for the two groups. Then

$$\ln C_{ij} = Z_i \alpha_j + \beta_j \ln Y'_i - \gamma_j SE_i + \eta_i$$

$$, \text{ where } \gamma = \beta [(\mu_{kSE} - \mu_{kEE}) - (\mu_{pSE} - \mu_{pEE})] = \beta [\mu_{kSE} + \frac{1}{2}(\sigma_{uSE}^2 - \sigma_{uEE}^2)]$$

This gives us a rough estimate of underreporting, as  $\ln k = \gamma/\beta$ . The mean of the underreporting component can be derived as

$$\ln \bar{k} = \mu_{kSE} + \frac{1}{2}[\sigma_{vSE}^2 - (\sigma_{uSE}^2 - \sigma_{uEE}^2)]$$

P-W introduce a reduce form equation out of concern for endogeneity but also to gain an independent estimate of the variances of underreporting and transitory income.

$$\ln Y'_i = Z_i \delta_1 + X_i \delta_2 + \tau_i$$

, where  $X_i$  is a set of identifying instruments. Here the error term consists of deviations of actual from permanent income and actual from reported income as well as the unexplained variation in permanent income. The residual variances for the two groups are related by

$$\sigma_{\tau SE}^2 - \sigma_{\tau EE}^2 = \sigma_{vSE}^2 + (\sigma_{uSE}^2 - \sigma_{uEE}^2) - 2cov(uv)_{SE}$$

The lower ( $\sigma_{vSE}^2 = 0$ ) and upper ( $\sigma_{uSE}^2 = \sigma_{uEE}^2$ ) bounds give an interval

$$\ln \bar{k} \in \left[ \frac{\gamma}{\beta} - \frac{1}{2}(\sigma_{\tau SE}^2 - \sigma_{\tau EE}^2) + cov(uv)_{SE}, \frac{\gamma}{\beta} + \frac{1}{2}(\sigma_{\tau SE}^2 - \sigma_{\tau EE}^2) + cov(uv)_{SE} \right]$$

## **BIOGRAPHY**

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