Tax Compliance and Enforcement: New Research and its Policy Implications

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Abstract:

This paper reviews recent economic research in tax administration, compliance, and enforcement and discusses the implications of the results of this research for realistic policy options.

Introduction

Policy attention to tax evasion and enforcement picked up after the financial crisis of 2008, the Great Recession, and the large deficits that followed. Particular attention on high-income individuals and corporations has accompanied heightened attention to income and wealth inequality. In the United States this momentum led to a major initiative aimed at reducing income tax evasion via unreported foreign accounts, although this occurred in the context of a decline in budget allocation to the IRS. The issue has had longer political legs elsewhere. For example, in the 2015 U.K. budget, Chancellor Osborne announced an ongoing crackdown on tax avoidance, tax evasion, and "imbalances" in the tax system that would bring in £5 billion in additional revenue each year.

Academic research in tax evasion and enforcement has exploded in the new millennium, perhaps inspired by the renewed policy interest and certainly facilitated by increased academic access to administrative tax-return data and increased willingness of tax authorities to partner with researchers including collaboration on randomized field trials that hold the promise of compelling identification of the impact of alternative enforcement strategies.

In this paper I review and discuss the implications of recent economic research for tax policy reform in tax compliance and enforcement, and analyze realistic policy options in light of the results of this research. This essay is not meant as a comprehensive survey. Rather it emphasizes the new research since 2000, and reflects my own views about what are the most compelling research designs and issues. It addresses mostly income tax, but not only income tax. It focuses on issues related to individuals and small businesses, and does not touch on at all tax compliance of multinational companies, because this is an area where the institutions are quite special. Although the focus of the paper is fairly narrow, the methods and models that have been developed have wide application. The recent headlines about evasion of fuel efficiency standards by Volkswagen illustrate that private actors have incentives to, and may face costs of, evading regulations.

I proceed as follows. Section 1 provides some background on the theory of tax evasion, both its positive and normative aspects. Section 2 discusses critically the research designs that can be used to learn about tax evasion and enforcement, with an emphasis on those that have achieved prominence recently. Section 3 examines what we have learned over the past 15 years or so. Section 4 draws out the implications for U.S. policy of this research and of policies in place in other countries. Section 5 concludes by predicting (or fantasizing about?) how tax evasion and enforcement will figure in the President's State of the Union Address of 2017.

1. The Economics of Tax Evasion

Discussion of tax administration, compliance, and enforcement fits naturally into what Slemrod and Gillitzer (2014) call a "tax-systems" framework. A tax system is defined as a set of rules, regulations,

and procedures with three aspects. First, it defines what events or states of the world trigger tax liability, for example the earning of income, the ownership of a residence that might be subject to property tax, or the sale of a capital asset. Although this first aspect, *tax bases and rates*, is the principal object of modern tax analysis, it's only one part. Second, a tax system specifies who or what entity must remit that tax and when, which we might call *remittance rules*. For example, under most income tax systems, it is the employer that remits—actually sends to the government—an approximation of what tax their employees owe on that income. Third and finally, a tax system details procedures for ensuring compliance, including the provision of third-party information-reporting requirements and the consequences, including penalties, of not remitting legal liability: these are the *enforcement rules*. This essay focuses on the third aspect of a tax system, but clearly there is substantial overlap among the three issues: the tax base and the remittance system can have a profound effect on the enforcement of taxation.

Tax evasion is an important issue because it affects the distribution of the tax burden as well as the resource cost of raising taxes—bread-and-butter concerns of public economics. If the tax gap could somehow be costlessly eliminated and the true liability remitted, that money could be used to finance worthy government projects, or used to finance an across-the-board cut in tax rates that would benefit most compliant taxpayers. But expanding government programs could be financed in a number of other ways, such as raising tax rates or broadening the income tax base, and a tax reduction could be financed by cuts in overall spending. The real question is whether curbing evasion would improve the equity and efficiency implications of the public finances.

If opportunities or predilections for evasion were systematically related to income, as shown by Johns and Slemrod (2010), then the tax rate schedule could just be adjusted to achieve whatever degree of progressivity is deemed optimal. Of course, not everyone evades taxes by the same proportionate amount or by an amount strictly related to income, both because of differences in personal characteristics—like attitudes toward risk, the tax system, and honesty— and because of different opportunities and potential rewards for evasion. As a result, tax evasion can cause serious inequities and inefficiencies. Evasion creates horizontal inequity because, unintendedly, equally well-off people end up with different tax burdens. Attempts to reduce tax evasion can create vertical equity concerns, as when the IRS is criticized for spending resources to reduce fraud related to the Earned Income Tax Credit, whose recipients are low-income households, instead of devoting those enforcement resources to the types of noncompliance more likely to be pursued by high-income households, such as the use of unreported foreign accounts.

Tax evasion also imposes efficiency costs. The most obvious are the resources taxpayers expend to implement and camouflage noncompliance, and the resources the tax authority uses to address it. In addition, tax evasion generally provides a socially inefficient incentive to engage in those activities for which it is relatively easy to evade taxes. For example, because the income from house painting can be done on a cash basis and is therefore harder for the IRS to detect, this occupation is more attractive than otherwise. Although a supply of eager and cheap housepainters undoubtedly is greeted warmly by prospective buyers of that service, the effort of the extra people drawn to house painting, or any

activity that facilitates tax evasion, would have higher social value in some alternative occupation. The same argument applies to self-employment generally, as the enhanced opportunity for noncompliance inefficiently attracts people who would otherwise be employees. The opportunity for noncompliance can distort resource allocation in a variety of other ways, such as causing companies that otherwise would not find it attractive to set up a financial subsidiary, or set up operations in a tax haven, to facilitate or camouflage evasion.

A tax incidence story also lurks here. The supply of eager housepainters bids down the market price of a house-painting job. Thus, the amount of taxes evaded overstates the benefit of being a tax-evading housepainter. The biggest loser in this game is the scrupulously honest (or risk-averse) housepainter, who sees his or her wages bid down by the unscrupulous competition, but who dutifully complies. Similarly, a tax policy instrument that facilitates evasion for all corporations (as opposed to noncorporate businesses) might attract entry, so that its effects are shifted to corporations' customers through lower prices. The windfall gains to those companies that successfully play the tax lottery by acting aggressively probably accrue to the shareholders in their role as residual claimants, perhaps shared to some extent with the tax managers through their compensation contracts. If there are particular characteristics of corporations in certain sectors that facilitate evasion or abusive avoidance, such as the presence of corporate intangibles, the apparent gains that accrue to firms in these sectors via a lower effective tax rate will be partially eroded to the extent that competitors have similar characteristics, and thus the apparent tax gains will partly benefit some other constituency, including this sector's customers.

The recognition of tax evasion introduces a new set of policy instruments, the appropriate setting of which can be illuminated by optimal tax reasoning and fleshed out with empirical analysis. For instance, what should be the extent of audit coverage, the strategy for choosing audit targets, and the penalty imposed on detected evasion? The reality of tax evasion also invites a rethinking of standard taxation problems. With respect to penalties, it has been well known since Becker (1968) that under certain conditions a government concerned with maximizing the expected utility of a representative citizen will want to set the penalty for detected crimes as high as possible, so that even with a low resource cost of enforcement, the overall expected deterrent effect will be large. But this argument ignores such issues as the possibility of a corrupt tax administrator who abuses the system or, alternatively, harshly punishes someone who makes an honest mistake. The harsher the penalty, the more damage a corrupt administrator could inflict and, in the case of an honest mistake, the more capricious the system. Hence the harsher the penalty, the more detailed and cautious the prosecution process must be. In addition, with harsher penalties, courts may be more reluctant to find the taxpayer guilty of evasion, so that one practical consequence may be fewer penalties imposed. This argument also flies in the face of the common notion that the level of punishment should in some sense "fit" the crime. In the absence of explicitly modeling the interaction between the penalty rate and administrative costs, normative models of tax enforcement usually presume there is an (exogenously set) ceiling on the penalty rate.

In reality curtailing tax evasion is not costless, and its costs must be considered in developing optimal policy. The mere presence of tax evasion does not imply a failure of policy. Just as it is not optimal to station a police officer at each street corner to eliminate robbery and jaywalking completely, it is not optimal to eliminate tax evasion.

Just how many resources should be devoted to enforcing the tax laws? Slemrod and Yitzhaki (1987) show that one superficially intuitive rule—increase the probability of detection until the marginal increase of revenue thus generated equals the marginal resource cost of so doing—is incorrect. Although the cost of hiring more auditors, buying better computers, and the like, is a true resource cost, the revenue brought in does not represent a net gain to the economy, but rather a transfer from private (noncompliant) citizens to the government. The correct rule equates the marginal social benefit of reduced evasion (which is not well measured by the increased revenue) to the marginal resource cost. The distinction suggests that unregulated privatization of tax enforcement, in which profit-maximizing firms would maximize revenue collection net of costs, would lead to socially inefficient overspending on enforcement. Greater enforcement might also entail non-pecuniary costs, such as invasion of privacy (Slemrod, 2006). In Slemrod and Yitzhaki (1987), the social benefit is related to the reduced risk-bearing that comes with reduced tax evasion. More generally, social benefits can accrue via increased efficiency; it would also tend to mitigate the inefficiencies discussed earlier. Cowell (1990, p. 136) suggests another complication: perhaps a specific social welfare discount should apply to the utility of those who are found to be guilty of tax evasion and thus "are known to be antisocial."

As Slemrod and Gillitzer (2014) have elaborated, optimal tax theory can be naturally extended to cover enforcement policy instruments. Ignoring distributional concerns, these tools reveal that all tax policy instruments—not just the standard instruments such as tax rates—should be utilized so as to equalize the marginal efficiency cost per dollar of revenue raised, which should in turn equal the marginal social benefit of raising revenue (Mayshar, 1991; Slemrod and Yitzhaki, 1996, 2002). Distributional considerations can be introduced into this framework, as well.

1.1 The Evasion Decision

Why would an individual or business evade taxes? To an economist, the natural starting point is to consider the private costs and benefits of evasion. And indeed the standard framework for considering whether and how much to evade taxes is a deterrence model. This was first formulated by Allingham and Sandmo (1972), who adapted Becker's (1968) model of criminal behavior to the economics of tax evasion. In this model, a risk-averse taxpayer decides whether and how much to evade taxes in the same way she would approach any risky decision or gamble. People are influenced by possible legal penalties no differently than any other contingent cost: there is nothing per se about the illegality of tax evasion that matters. Nor is there any intrinsic willingness to meet one's tax obligations, sometimes referred to as "tax morale." The model predicts that an increase in either the probability of detection or the penalty if detected will reduce evasion, but does not pin down how big these effects are, so it becomes the task of empirical analysis. The effect of a change in the marginal tax rate is less clear, and depends on the form of the penalty function, as shown by Yitzhaki (1974).

The basic model does not address the crucial fact that the probability of detection varies by the *type* of evasion contemplated. For example, in most countries, because of employer information reporting the probability of detection is close to one for unreported employee income. It is generally much lower, but increasing with the magnitude, for underreported self-employment income. For someone with multiple sources of income, the probability would rise with the total amount of income evaded as one first underreports those sources with the lowest probability, and then moves on to underreport those types of income with higher probability. When there are private costs incurred for *any* amount of evasion, such as social stigma or conscience, then the level of evasion is lower than predicted by the deterrence model. A fixed cost of filing may also induce some people to not file at all, which usually implies noncompliance but also may deter some individuals from claiming benefits, including tax refunds, to which they are entitled.

1.2 The Informal Economy

A related but distinct concept to evasion is the informal economy, also known as the underground, hidden, or black, economy. The definition of the informal economy varies by author, but have in common the notion of small-scale economic activities that are unobserved by official authorities. The informal economy includes small firms that don't register with the relevant tax or labor regulation authorities, employees who are not on the payroll, freelancers who don't file tax returns, and so on. Many evasion activities are clearly outside of its scope, such as overstating deductible charitable contributions or setting up a foreign bank account and not reporting the taxable income it generates. Not all informal enterprises are evading, say, income taxes, as their income may be legitimately below the filing threshold while ignoring labor and safety regulations.

In situations where labor income in the formal sector is routinely reported by the employer to the tax enforcement agency, the only way to evade tax may be by "moonlighting"—working extra hours for oneself at a different job—or by switching completely to the informal sector. The standard deterrence model can be easily modified to address the choice between formal- and informal-sector work by supposing that the taxpayer receives a higher pre-tax wage rate for formal-sector work but the income is taxed at the statutory rate and cannot be evaded, while informal-sector income is untaxed unless detected by a random audit. One can assume that total hours are fixed or that the labor supply decision is made concurrently with the evasion/informality decision, but before the resolution of the detection chance is known. Note that a sample selection issue is at work here. On average less risk-averse people are attracted to self-employment, and as such are relatively attracted to tax evasion. If evasion is a necessary part of being competitive in jobs with much self-employment, then we would expect that self-employed people are more likely to be evaders.

There is certainly evidence that evasion is concentrated in particular sectors, such as those that supply services directly to homeowners, because of the small scale of production that can aid concealment and the lesser need for receipts compared to services provided to businesses. Erard and Ho (2003) estimate noncompliance by occupation using random-audit data on filers and non-filers in 1988. They find that compliance is positively associated with the degree of third-party reporting and negatively associated with the filing burden for a given occupation. Measured as a percentage of tax unpaid, the

occupations with the most noncompliance are vehicle dealers, tip earners, informal suppliers, and other service occupations.

The standard deterrence framework applies naturally to tax compliance decisions made by individuals and small, single-owner businesses, but the applicability to big business is less clear. Arguably, large public companies should act as if they are risk-neutral, rather than like the risk-averse decision makers in the standard model. If this is true, we must look elsewhere for what constrains positive-expected-value evasion. Some firms might be concerned that publicized tax aggressiveness turns off some potential customers who would prefer to deal with civic-minded companies. On the other hand, some investors might take tax aggressiveness as a signal that a company is optimally aggressive both in its dealings with the tax authority but also with suppliers and customers (but not with investors themselves!). Hanlon and Slemrod (2009) look at the stock-market response to publicized tax aggressiveness to sort out empirically these two concerns of public corporations, finding that on average stock prices decline when news about involvement in tax shelters becomes public. Stock price falls tend to be larger for retail-sector firms, which Hanlon and Slemrod (2009) suggest may be due to a possible consumer/taxpayer backlash, while the reaction is less negative for firms with higher cash-effective tax rates, which they see as being consistent with the market rewarding tax aggressiveness.

1.3 Non-deterrence Considerations

Some social scientists have argued that the deterrence framework misses important elements of the tax evasion decision, and question some of its central assumptions, including that (1) nothing per se about the illegality of evasion matters, and (2) everyone acts as a free rider, so that there is no issue of intrinsic willingness to pay, or "tax morale." Some have gone further to suggest that, in thinking about tax evasion, it is necessary to abandon the standard expected utility maximization model and incorporate "behavioral" considerations.

The models that abandon one or both of these assumptions take different tacks. One approach stresses that some people may fully comply with their legal obligation because of a sense of civic duty regardless of, or in addition to, the possible expected pecuniary gains and argue that the tendency to perform one's duty is susceptible to aspects of the enforcement process. Indeed, Frey (1997) argues that imposing more punitive enforcement policies may crowd out the "intrinsic" motivation to comply by making people feel that they pay taxes because they *have* to, rather than because they *want* to.

Another approach suggests that, rather than behaving as free riders, some individuals' behavior depends on the process by which the tax and tax enforcement system are formulated and its features, holding constant the incentives the system provides. For example, they may be more willing to comply with a system whose formulation they had a part in through voting; compliance may be lowered by the imposition of an unpopular program, as investigated in a lab-experiment setting by Alm et al. (1992).

Taxpayer attitudes toward authority may also influence compliance behavior. Tyler (2006) argues that citizens are more likely to be law-abiding if they view legal authorities as legitimate and the degree of legitimacy may itself be a function of the level of enforcement. When explicit enforcement is weak

(e.g., few audits), legitimacy may erode, undermining the intrinsic willingness of taxpayers to comply with the law. Tyler (2006) also stresses the role of personal morality in affecting compliance behavior. People may be willing to comply with a law because they perceive it to be just, quite aside from their beliefs regarding the authority government has to enforce it. Such individual judgments can be complex; for example, expenditures on warfare might contribute to a sense of fairness tolerated in a patriotic period, but rejected during another period characterized by antimilitarism. Levi (1989) stresses the role of a form of reciprocal altruism in which some taxpayers' behavior depends on the behavior, motivations, and intentions not of any subset of particular individuals, but of the government itself: when citizens believe that the government will act in their interests, that its procedures are fair, and that their trust of the state and others is reciprocated, then people are more likely to become "contingent consenters" who cooperate in paying taxes even when their short-term material interest would make free riding the individual's best option.

Much of the evidence related to these nonstandard behaviors comes from how people react to other people, as in lab experiments. But the psychological attitudes of individuals toward government might be fundamentally different than their attitudes toward other people, or even other organizations. Individuals might feel more dutiful and even obedient toward government. Invocation of the word *obedience*, though, invokes a darker side of the relationship between individuals and government as an authority figure. Indeed, notorious experiments conducted by the Yale University psychologist Stanley Milgram (1963), showed that unwitting subjects were willing to deliver what they thought were substantial electric shocks when instructed to, and encouraged to, by authority figures.

2. Methodology—How Have We Learned New Things?

The empirical analysis of evasion is highly challenging due, fairly obviously, to tax evaders' concealment activities. The threat of punishment and perhaps social shame make taxpayers unwilling to respond accurately even to surveys. Many years ago a colleague of mine remarked at an academic conference, sarcastically but somewhat accurately, that the empirical analysis of tax evasion is very straightforward, except for two things: (1) you can't measure the right-hand-side variables, and (2) you can't measure the left-hand-side variable. Almost all the empirical analyses of evasion, including the credible ones, don't actually have a reliable measure of evasion, but instead rely on indirect measures of evasion. Tax administrations have the same problem: it's not easy to measure evasion.

But scholars have risen to the challenge, and there are several promising developments in measuring tax evasion and, more importantly, measuring the determinants of tax evasion and how different policies might affect tax evasion.

2.1 Random Audits

The National Research Program (NRP) was started in 2001 to replace its predecessor, the Taxpayer Compliance Measurement Program (TCMP). The goal of these programs is to provide a snapshot of compliance and evasion from a random sample of approximately 46,000 returns. Under the TCMP auditors performed a line-by-line audit of all sampled returns. In the NRP, experienced auditors

manually review each return and decide on one of three possible courses of action. They can accept the return as corroborated by third-party information, write to the taxpayer for additional information on up to three items that could not be corroborated, or conduct an in-person audit. The NRP oversamples returns from high-income taxpayers and individuals who report (Schedule C) sole proprietorship income. Because the line-by-line audits can fail to uncover substantial amounts of noncompliance, the tax gap estimates based on both the TCMP and NRP studies make significant adjustments for undetected noncompliance that rely on special studies of particular sources of income and deductions. For several categories of income, a multiplier is constructed and applied to the detected but unreported income to generate an estimate of the total amount that should have been reported—covering both the portion detected and the portion undetected by the examiner.[1] Analyses of the National Research Program data form the basis for the individual income tax underreporting gap.

One problem with this approach is that, given the scale of the program required (and perhaps its political sensitivity), tax authorities in very few countries have done such studies, and so it is impossible to draw inferences from cross-country studies of this nature. Even for the United States, where these studies were done regularly for many years, it is difficult to draw inferences over time, because the methodologies used have varied. The limited usefulness of these estimates for these purposes is not really a surprise, because the main objective of the TCMP/NRP is not to come up with aggregate "tax gap" measures of the magnitude of evasion or of the nature of evasion, but rather to help identify returns that are more likely to feature evasion, so as to guide the allocation of enforcement resources.

2.2 Randomized Field Experiments

One thing that is new under the sun, at least since 2001, is the use of randomized field experiments to assess the impact of policies. Randomized field experiments have been heralded as in the vanguard of the "credibility revolution" (Angrist and Pischke, 2010) in empirical economics because they facilitate identification of the causal impact of, for example, a policy intervention. When done correctly, the researcher need not worry about getting a control group, because the control group is built into the randomization; there are two otherwise statistically identical groups, one that gets the policy treatment of interest and the other that doesn't.

When the promise of randomized field experiments became widely recognized, as a tax researcher I was concerned, even despairing, because I presumed there was no way any government was ever going to allow for research purposes the randomization of tax rates. Imagine: "Loyal citizens, next year half of you—chosen for no substantive reason at all—will be subject to one tax rate schedule, while the other half will be subject to a different tax rate schedule." I was very afraid that the credibility revolution was going to leave tax researchers behind. It turns out that I was way too pessimistic. Although it's true that tax rates and bases are probably never going to be randomized in the field, for other tax-system instruments policy randomization is possible and, more important, has become a reality. The researcher must overcome tax authorities' understandable reluctance to randomize tax

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[1] See Mazur and Plumley (2007).

rates or bases, so that randomized tax experiments have heretofore mostly concerned tax-system instruments such as communication with taxpayers.

Note that in some cases randomization might be naturally generated, rather than consciously introduced in order to learn about the impact of alternative policies. Think of, for example, the use of the Vietnam-era draft lottery number as a randomly assigned risk of induction, as in Angrist (1990), to estimate the effect of veteran status on civilians earnings. Closer to the topic at hand is the study of Dobbie and Song (2014), who exploit the fact that U.S. bankruptcy courts use a blind rotation system to assign cases to judges who are of measurable heterogeneous "toughness" in order to study the impact of bankruptcy protection on debtor outcomes. If, in some situations tax auditors are randomly or quasi-randomly assigned to cases, one might be able to learn about the impact on behavior of auditor toughness.

Despite the unrivaled internal validity of well-designed randomized control trials, it is not always clear that the results can be "scaled up." General equilibrium effects may matter, and without understanding the causal channels through which policy interventions affect taxpayers' behavior, it may not be possible to predict the effect of variations in the policy intervention without running repeated experiments. In addition some interventions that are credible in an experimental setting may not be credible in an economy-wide setting. For example, Kleven et al. (2011) sent treatment groups 50 percent probability and 100 percent probability audit threat letters; savvy taxpayers would know that either policy is prohibitively expensive were either of these treatments to be expanded to the entire population.

2.3 Administrative Data

A very promising recent development is the availability for analysis of administrative tax return data, sometimes linked to other administrative records, often on the whole population of a country. These kinds of data first became available in Scandinavia, but now they're available under varying protocols in Canada, in the United Kingdom, many other European countries, and the United States (here explicitly not linked to other administrative data). Compared to having small samples of tax-return data, when a researcher has *all* returns, she has much more (statistical) power to reach reliable conclusions about the effect of taxation.

2.4 Analysis of Archival Data, with Kinks, Notches, and Regression Discontinuity Research Designs

Empirical analysis outside of the randomized control paradigm is by no means dead, nor should it be. But the bar for credible identification strategies in archival research (and randomized field experiments) has gotten higher. The credibility revolution in empirical economics I referred to earlier aspires to overthrow poorly identified causal interpretations and casual use of instrumental variables, and to instill a skepticism with inference based on cross-sectional rather than longitudinal data for which one can plausibly argue that unobserved influences do not change over time.

Two research designs other than randomized controlled trails hold particular promise and have been exploited recently: regression discontinuity and analysis of kinks and notches in policy. In a regression discontinuity design, there is a cutoff or threshold above or below which a treatment is assigned. By comparing observations lying closely on either side of the threshold and therefore arguably quite similar, one can estimate the average effect of the treatment in that local area of the threshold, even in environments where randomization is not feasible. Note that it is crucial that the assignment of people to treatment must be random and that it is impossible for the people to manipulate their treatment status.

When policy introduces kinks in budget sets, so that the marginal tax rate changes discontinuously around the kink, this offers the hope of identification because arguably in many cases the people on either side of the kink are on average fairly similar. How many people "bunch" at the kink provides, with some assumptions, a measure of how flexible ("elastic") people are on average with respect to the tax rate. Even more potentially powerful is the analysis of behavior in the presence of policy-induced notches, where the budget set itself is discontinuous, so for example reporting one additional dollar of income increases one's tax liability by a few hundred dollars. Ever since their potential for identification was understood, a surprisingly high number of policy notches have been discovered and analyzed. What makes the study of notches particularly promising is that their presence implies that there is some region of behavior that is always dominated by another region, regardless of one's preferences (utility functions): earning one less dollar to get below the kind of notch I just discussed saves money and requires less labor, a win-win for the majority of folks who prefer more leisure to less. The fact that in all cases so far examined there are some people residing in the dominated region sheds light on the constellation of reasons that might apply: irrationality, cluelessness, adjustment costs, and so on.[2]

2.5 Traces of True Income and Evasion with Micro Data

The classic research design of the traces-of-income approach to measuring tax evasion is due to Pissarides and Weber (1989). They assume reasonably that how much food someone purchases is a function of income, but doesn't depend on what *kind* of income—salary versus self-employment—a person has. Next they look at what the ratio of food purchases to reported income is, separately for employees and self-employed people. Thus, they infer (relative) income from food, and compare this "trace" of true income to (relative) reported income. Pissarides and Weber discovered that the ratio of food purchases to the income reported by self-employed people is considerably higher than that reported by employees. Given their assumption, this implies that self-employed people are more likely to underreport their income. Feldman and Slemrod (2007) did something similar using actual income tax returns in the United States where charitable contributions rather than food expenditures are the trace of income. They find that charitable contributions as a fraction of reported income is substantially higher for people who are self-employed. This means either that self-employed folks are

[2] See Kleven and Waseem (2013).

(way) more charitable, which is conceivable, but I think the bigger explanation is that they're underreporting their income relative to employees.

Consider also a traces-of-evasion approach. Let me explain with a non-tax analogy. Here in the United States, there are posted speed limits on most roads, but the typical driver (especially in my home state of Michigan) likes to drive faster than that. Many people have a radar detector in their cars, often called fuzz busters (for non-Americans, fuzz is a slang term for police). A fuzz buster can detect police radar within a certain area; when it does, it makes a sound and the driver knows it would be prudent to slow down. Why would a person have a fuzz buster if they weren't thinking of evading the speed limit? There would be no point. So, one can imagine the presence of fuzz busters, their change over time and across states, as a trace of the amount of speed-limit violations that occurs. With regards to evasion, we would look for behavior that can reasonably only be explained by tax evasion, for example the hoarding of high-value currency. This approach is related to the broader topic of "anomaly detection," used to assist, for example, in the detection of credit card fraud, as discussed in Chandola et al. (2009).

2.6 Lab Experiments

Lab experiments provide a less expensive means to evaluate a wide range of policy interventions and to control the environment very precisely, but suffer from the drawback that subjects—usually students—may not respond in the same way in the lab as they, or a more representative sample of taxpayers, would if the same interventions were implemented in reality, in part because in reality taxpayers bring vast experience and subtle perceptions of the tax system.

Defenders of lab experiments argue that there is no reason that the cognitive processes of students should differ from adults. Alm et al. (2013) compare the behavior of a group of undergraduate students to adults who participate in the same lab experiment. Participants performed a real task to generate income, filed a "tax return," got audited with some probability, and paid penalties. They find that, on average, the adults are more compliant than students, but that the effect of the treatment (provision of tax information services and benefits) is similar across the two groups.

A recent study casts some doubt on this argument. Choo et al. (2015) conduct a similar experiment separately with a student sample and a sample of taxpayers. The sample of students consisted of undergraduates in the United Kingdom who had never been subject to income taxes, while the sample of taxpayers comprised both employees and self-assessed taxpayers whose income outside the experiment is not subject to third-party reporting. Contrary to what Alm et al. (2013) find, the students behaved differently from the taxpayer samples. They were more sensitive to uncertainty about the probability of audit and were much more likely to comply when the audit probability was unknown. The authors suggest that norms of compliance formed in the real world are carried into the experiment, which imposes limits on how much lab experiments with student samples can tell us about taxpayer behavior in the field.

Although, like all methods subject to caveats, lab experiments can be useful in testing the impact on compliance of aspects of the environment that are not feasible to analyze in field and natural

experiment settings, such as tax rates and also of many of the hypothesized non-deterrence influences. While one cannot, in a field experiment, experimentally manipulate environmental aspects such as deep-seated trust in government, neither can a lab experiment. However, in a laboratory setting, subjects respond not only to the probabilities and stakes of a tax evasion game, but also to the context provided to them. For example, Alm et al. (1992) found that experimental subjects are willing to remit more in taxes when they first choose the use of their taxes by voting than when the identical use is imposed upon them, that compliance is somewhat greater when the vote is decisive compared to when the vote is close, and that tax compliance is significantly lowered by the imposition of an unpopular program.

2.7 Cross-Country, Top-Down Approaches

A large literature has analyzed traces of true income to shed light on the size of the informal economy across countries. A standard focus of attention is electricity use. Electricity use by firms is an input to production, and as such is a derived demand from value added. Electricity use by final consumers is arguably a function of true income (as are food and charity, as discussed below in Section 3.1). Electricity is a good example of something where aggregate use might be measurable with some accuracy, even while use by an individual or firm is difficult to ascertain. Intuitively, conditional on other determinants a high ratio of aggregate electricity use to formal income is an indication of a relatively large informal sector, just as a high ratio of expenditure on food or charitable giving to reported individual income is an indication of relatively high underreporting of true income. If one is interested in the determinants of the size of the informal economy across countries, one could proceed in the same manner as Pissarides and Weber (1989) discussed above, except with observations aggregated to the country level and GDP instead of reported individual income.

The macro version of the traces-of-evasion approach has focused on what can be learned from demand for currency, based on the plausible argument that $1,000 bills are of particular value to launder illegal transactions or evade regulations. Feige (1990) estimates the size of the underground economy by assuming that most unreported economic activity takes place in cash, and that there is a "base year" when the underground economy did not exist. Similarly, Tanzi (1980, 1983) interprets the portion of the ratio of currency to money more broadly defined explained by changes in the tax level as an indication of changes in the size of the underground economy. The most complex empirical approach to measuring the informal economy and its determinants at a country level makes use of information about traces of true income, traces of noncompliance, and measures of official GDP, using a latent variable approach, also known as MIMIC (multiple-indicators, multiple-causes) modeling. As detailed in Slemrod and Weber (2012), I believe that the estimates of the informal economy that come from such studies are very difficult to interpret.

A more promising aggregate approach would be to make use of the voluminous country-level data on tax administration now regularly made available in OECD information reports. The latest edition, OECD (2015), covers all the OECD countries plus 22 others, and contains scores of tables with data on institutional arrangements, organization, resources, measures of operational performance, the use of online services, withholding regimes, the use of third-party information reporting, penalties, and

the like, plus literally hundreds of changes in these details by country. Cross-country analysis of the consequences of administration and enforcement changes would be subject to the standard concerns about bias from unmeasured country influences, but we are now to the point where longitudinal analysis is possible, as the first such report was issued in 2004. Not "deterred" by this concern, Robinson and Slemrod (2012) used these OECD data to analyze 10 non-rate tax-system aspects, and discovered that a standard measure of trust in government is positively associated with greater administrator coverage and administrative assessment, as well as more serious sanctions for noncompliance. Ethnic heterogeneity, individualism, and a history of external conflict are also associated with certain aspects of tax systems; for example, more individualistic societies are less likely to feature high penalties for tax evasion and greater support for alternative methods of deterrence, specifically greater administrator coverage. The paper also found that adding a measure of the number of tax authority employees can eliminate the otherwise significant positive estimated coefficient of GDP per capita on the tax level, and attracts a significant positive correlation itself, suggesting that the extent of tax administration and enforcement is part of the story that explains the enduring cross-country statistical regularity between tax levels and per capita income.

3. What Have We Learned?

I will begin by focusing on the deterrence model, and defer discussion of non-deterrence approaches to the end of this section. The two key parameters of the deterrence model are the probability that an act of evasion will be detected, and the penalty one receives upon detection--its severity, nature, and celerity. Of interest to policy is the extent of the reaction of compliance to changes in the probability of detection and the most efficient ways to achieve a given vector of detection probabilities that apply to types of evasion.

3.1 The Magnitude and Nature of Evasion

The IRS most recently updated their estimates in 2012, based on 2006 returns. The overall gross tax gap is estimated as $450 billion, which amounts to 16.9 percent of the estimated actual (paid plus unpaid) tax liability; the IRS calls the 83.1 percent that is remitted the "voluntary compliance rate."[3] The IRS expects to uncover $65 billion of the $450 billion gross tax gap estimate, which results in a "net tax gap" of $385 billion. In other words, 14.5 percent of the estimated tax liability will never be paid. The non-compliance rate varies widely by the source of information reporting to the IRS. When there is little to no third-party-reported information, the noncompliance rate is as high as 56 percent. It is 11 percent when there is "some" reporting, 8 percent when there is "substantial" information reporting and as low as 1 percent when there is both withholding and substantial reporting. Small

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[3] Of note is the fact that the IRS' 2014-2017 strategic plan states a target voluntary compliance rate of 87 percent by 2017 (IRS, 2014).

businesses represent a large portion of the tax gap in individual income; approximately 52 percent of underreporting of individual income tax comes from business income.[4]

The "traces-of-evasion" approach makes progress by looking for a variable correlated with true income, allowing the researcher to predict true income and back out inferences about evasion by comparing the prediction of its level and/or trends to taxpayers' reports. Pissarides and Weber (1989) pioneered this approach using U.K. Family Expenditure Survey data on food consumption to estimate the extent of evasion. Assuming that (1) only the self-employed evade, and (2) that the relationship between food consumption and true income is independent of employment status, they are able to predict true income—and therefore underreporting—for the self-employed survey respondents. Assuming income reports in the survey match those given to the tax authority, they estimate that self-employed people in the United Kingdom on average underreported their income by about one-third.[5] The survey measures income as reported by individuals. Hurst et al. (2014) find a similar pattern in self-reported income data from the Consumer Expenditure Survey (CES) and the Panel Study of Income Dynamics (PSID). The self-employed seem to underreport income even in a household survey setting where there is no evasion incentive to do so.

Feldman and Slemrod (2007) follow a similar approach, but avoid the need to use survey data by instead using as the trace of evasion charitable donations reported on income tax returns relative to reported income. They find that, other things equal, reported positive self-employment income of $1 is associated with the same level of contributions as $1.54 of wage and salary income, which implies—assuming a negligible wage and salary noncompliance rate and that the self- employed are not inherently more charitable than others—a self-employment noncompliance rate of 35 percent (0.54/1.54); for positive farm net income, the implied noncompliance rate is 74 percent. Intriguingly, negative reported values for self-employment income are also associated with more contributions than reported by taxpayers with no self-employment income, suggesting that on average these reported losses are associated with *higher* true incomes. Relative to the Pissarides-Weber tradition, two aspects of this study are particularly worthy of note, one good and one not so good. First, the method does not require the researcher to classify a taxpayer as either an employee or self-employed. Second, the key assumption that the conditional charity-income ratio does not vary by employment status, is stronger than the equivalent assumption about food; for example, Glazer and Konrad (1996) argue that some people give to charities to signal wealth (or integrity), a motive which is arguably more relevant for self-employed people.

A related approach was used by Gorodnichenko et al. (2009) to estimate the effect of Russia's 2001 flat tax reform on the extent of evasion. Using household panel data containing reports on

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[4] As a comparison, the HM Revenue & Customs uses both top-down and recently calculated the overall tax gap in the United Kingdom as 6.4 percent of true liability: 5.0 percent for the individual income tax, 6.4 percent for the corporation tax and 11.1 percent for the value-added tax. Small and medium-sized enterprises account for over half of the overall tax gap.

[5] Tax evasion estimates for other countries using this method include Schuetze (2002) for Canada, Johansson (2005) for Finland, Engström and Holmlund (2009) and Engström and Hagen (2015) for Sweden, Martinez-Lopez (2013) for Spain, Paulus (2015) for Estonia, and Hurst et al. (2014) for the United States.

consumption, income, and a range of household characteristics, they estimate an observed consumption–income gap function (as a trace of evasion) for each household, and then use a difference-in-difference technique to estimate the effect of the tax reform on the consumption–income gap. Their treatment group consists of high-income households experiencing a decline in marginal tax rates from either 31 percent or 21 percent to the same 13 percent marginal tax rate faced by a low-income control group before and after the tax change. They find that the consumption–income gap fell by about 10 percent more for the treatment group, whose tax rates declined, than the control group. Assuming that the true relative consumption-income gap did not change over this period, one can interpret this finding as indicating a relative increase in reported income by those whose tax rate declined. Notably, the consumption–income gap fell by about 17 percent for the control group despite no change in marginal tax rates, suggesting an improvement in tax enforcement practices accompanying the change in tax rates, although the authors found no clear evidence that the decline was due to changes in tax administration.

In this class of analyses income reports in household surveys have usually been treated as free of systematic misreporting, largely because underreporting income on a survey does not change tax liability. However, Hurst et al. (2014) argue that the benefit to a noncompliant individual household of reporting accurately in a survey setting is so small that even a slight probability that their report is not confidential could result in underreporting. Using a Pissarides-Weber-style methodology, they estimate that the self-employed underreport income in both the Consumer Expenditure Survey and the Panel Study of Income Dynamics by about 30 percent. They point out that failure to take account of income underreporting by the self-employed in household surveys can lead to bias in a wide range of situations, such as comparisons in income across municipalities that differ in the share of self-employed workers, in studies of life-cycle earnings because self-employment probabilities differ over the life cycle, or in comparisons of wealth holdings for wage earners and the self-employed. This finding suggests that evidence on traces of evasion from survey data can be just as valuable as what one finds in tax returns, as taxpayer reporting behavior is similar in both settings.

Gonzalez-Cabral et al. (2014) employ the same methodology to measure evasion among the self-employed in the United Kingdom. They find a similar pattern of underreporting–assuming that salaried workers report truthfully, self-employed workers' true income is on average 28 percent higher than what they report. They also identify characteristics of individuals that are correlated with underreporting and find that older individuals, white-collar workers and women are more likely to be compliant.

All of these studies have specifically addressed the behavior of self-employed individuals relative to employees who are assumed cannot or do not underreport their tax liability. The incentive for the self-employed to evade over and above that of employees is clear, as their income is not subject to third-party reporting and it is costly for them to accurately account for their income. The papers vary in their definition of a "self-employed" individual. Pissarides and Weber (1989) treat anyone who reports more than 25 percent of their income as due to self-employment as self-employed. Others such as

Gonzalez Cabral et al. (2014) use taxpayers' own categorizations of themselves as self-employed. Some recent research has questioned the assumption that employees do not evade. This could be particularly relevant for studies that do not identify taxpayers as self-employed by their source of income, because the main channel of underreporting for employees would be undeclared self-employment income. Individuals who might be full-time or part-time employees of a firm may also hold other jobs or perform freelance work. They may identify as employees in a household survey but also receive income from self-employment. If they fail to report this additional income, studies that assume no evasion among "employed" workers would underestimate evasion by those identified as "self-employed." Dunbar and Fu (2015) examine this issue using data from the Canadian Survey of Financial Security and the Survey of Household Spending to estimate the incidence and extent of income underreporting in Canada in 1998 and 2004. They estimate that the proportion of households that underreport income is roughly 35 to 50 percent in both years. They find evidence that income underreporting is pervasive and is not confined only to households that report self-employment income in the survey data. Consistent with other studies, they find that the self-employed underreport 10 to 20 percent more than other workers.

In the context of private sector employees in Estonia, Paulus (2015) also finds that employees underreport salary income. He uses a dataset that links information from tax forms to a more comprehensive household survey. He uses this data to estimate the extent of underreporting of income by employees whose income is subject to third-party reporting. This channel of evasion would require employers and employees to cooperate, and is usually assumed to be almost zero. Yet both the employee and the employer have an incentive to coordinate and underreport income: the employer gains from owing lower payroll taxes and can also credibly lower reported revenue to save on the VAT. Making the slightly less restrictive assumption that (only) public-sector employees must (and do) report truthfully, he uses the correlation between income information in survey data and administrative data for these employees as a benchmark to compare to private-sector employees. He estimates that about 20 percent of private-sector employees in Estonia underreport income.

Artavanis et al. (2012) employ a clever research design that takes advantage of household microdata from one of ten large banks in Greece to estimate the extent of underreported income for self-employed Greek workers by type of occupation. They rely on the fact that financial-sector formalization coexists with widespread underreporting of income, and note that southern European banks have had to become skilled at inferring true income from reported income in order to remain competitive. Using this insight, and assuming that income is accurately reported for wage earners, they estimate a credit supply equation for wage earners using reported income, hard information (such as credit history, borrower characteristics), and soft information (such as local economic growth) available to the bank. Supposing this credit supply equation to be valid for wage earners, they infer the "multipliers" that the bank implicitly applies to reported self-employment income. For doctors, lawyers, engineers and scientists, and accountants and financial service agents, their estimated multipliers are greater than two, indicating that for these professions reported income is less than half of true income as inferred by the bank. Even this may be an underestimate if the bank applies a

discount for any additional income or collection risk assessed, or if the credit supply equation is biased because a multiplier is also applied to wage earners' reported income because of employee evasion.

These studies consistently show that evasion is substantially higher for income that is not subject to third-party reporting. The *level* of evasion, however, is more difficult to pin down. We can consider estimates from studies like Pissarides and Weber (1989), Gonzalez Cabral et al. (2014), and Feldman and Slemrod (2007) as a lower bound of evasion by the self-employed. As Dunbar and Fu (2015) suggest, their crucial assumption that employees do not underreport may not always hold. Individuals identified as "employees" in survey data underreport income earned outside of their primary job. Studies that estimate evasion by source of income instead of the employment status of the worker can come closer to a true estimate of the level of evasion. However, as Paulus (2015) finds, to a small extent, employees may in some situations underreport the portion of their income that is subject to third-party reporting. Looking for traces of evasion using data sources other than tax returns appears to be a fruitful way to detect underreporting. As Artavanis et al. (2012) show, this approach can be applied to more creative settings than survey data. It provides a tool to measure evasion in areas where it may be difficult or impossible to detect through a random audit like the NRP.

3.2 Deterrence
3.2.1 Audits
As already mentioned, one of the stimulants to the wave of recent empirical research in tax compliance has been the willingness of some tax authorities to partner with researchers to design and implement randomized controlled trials to learn about aspects of tax enforcement. (No authority has yet shown willingness to randomize tax rates or bases, or tax remittance regimes.) The most prominent example is threat-of-audit letters, which I discuss next.[6]

In the first application to tax compliance of an RCT design, Slemrod et al. (2001) analyzed the results of a randomized controlled experiment conducted by the State of Minnesota Department of Revenue. Randomly selected taxpayers who filed a return for tax year 2013 were sent a letter from the IRS in January of 1995. This treatment group was informed that their 1994 federal and state income tax returns would be "closely examined" for any irregularities. The effect of this statement on the beliefs of the treatment group depends on their prior beliefs about the probability of an audit. If the individual expected that their returns were examined every year then there would be no change in behavior. Others may have correctly perceived the letter as increasing the probability of an audit. The letter was timed so that individuals could only respond by changing their reporting behavior (with a few exceptions). The authors compared income reported by this treatment group to that of a control group that did not receive any communication from the IRS. The study found that low- and middle- income taxpayers who received a letter promising a certain audit reported slightly more, but statistically significantly more, income than those who did not receive such a letter, and the difference was larger for those with greater opportunities to evade in the form of income not subject to information reporting. Strikingly, though, high-income taxpayers receiving an audit threat on average reported *lower*

income. The authors speculate that sophisticated, high-income taxpayers (and their accountants) understand an audit to be a negotiation, and view reported taxable income as the opening (low) bid in a negotiation that does not necessarily result in the determination and penalization of all noncompliance; this implies that the initial lower tax liability report might not indicate that the eventual tax remittance was lower, as well. This result provides a caveat that the dynamics of tax evasion for very high-income individuals may be different than for others.

Kleven et al. (2011) conduct a similar audit experiment in Denmark. In the first year of their study, one-half of their sample was randomly chosen to be thoroughly audited (100 percent audit group) while the rest were not audited or contacted in any way (0 percent audit group). The following year, randomly chosen individuals from both groups received letters announcing either a 100 percent probability of audit or a 50 percent probability of audit. A control group received no letter. The initial unannounced audit found overall evasion equal to 2.2 percent of net income but a much higher rate of 14 percent for self-employment income. The audited group was almost 1 percentage point more likely to report higher net income in the year following the audit. When they decompose this effect into the change in reporting by the self-employed versus employees, they find that most of the effect is coming from the change in behavior of the self-employed. Income that is not subject to third-party reporting is 2.1 percentage points more likely to increase following an audit. Third-party reported income on the other hand is only 0.2 percentage points more likely to increase if audited in the previous year.

The threat-of-audit experiment was conducted only on a sample of employees (i.e., it excluded any self-employed individuals) for administrative reasons. The individuals received the letter shortly after they received their pre-populated returns, and had one month to make adjustments to the return. The baseline probability of an adjustment to net income is 13.3 percent. Among the 0percent audit group, those who received a letter were 1.5 percentage points more likely to make an upward adjustment to net income than those who didn't receive a letter. The effect of the threat was similar in the 100 percent audit group. The letter raised the probability of adjustment of net income by 1.6 percentage points in this group. The paper also tests the effect of different probabilities of audit. Individuals who were threatened with a 50 percent probability of audit were about 1.1 percentage points more likely to adjust net income upwards than those who received no letter. Those who received the 100 percent probability of audit were 0.9 percentage points more likely than the 50 percent threat of audit to adjust net income upwards.

Doerrenberg and Schmitz (2015) conduct a field experiment in Slovenia that sheds light on the effect of audit threats as well as on the mode of communication of this audit threat. In the first treatment, a sample of accounting firms were sent a letter from the tax authority informing them of a 10 percent probability of audit of a return they were due to file. A second treatment group received the same letter, but it was delivered to them in person by a "mobile unit" of tax officers. A tax officer approached the highest company representative available and read the letter to them out loud, and provided no additional information. This second treatment captures the influence of personal interaction on the effect of moral persuasion and threat of audit. Compared to a control group that

received no communication from the tax authority, the increase in taxable income in the first treatment group was approximately 10 percentage points, while taxable income in the second treatment group increased by about 8 percentage points more than in the first treatment group. Note, though, that none of the estimated effects are statistically significant, in part because the sample consisted of only 142 accounting firms. It is also worth remarking that the implied enforcement effect must be calculated relative to the prior perceived probability of audit.

Some recent research involving randomized controlled trials focuses on the enforcement of forms of tax payments other than income tax. Castro and Scartascini (2013) focus on payment of a municipal property tax in Argentina. This municipal property tax differs from an income tax in some important ways relevant for enforcement. For one, revenue is directly linked to visible provision of public goods like street lights and trash collection. This means taxpayers are more directly able to link their payments to provision of these public goods, which provides an incentive for them to contribute. Second, payments are calculated on the basis of length of the property facing the street, number of street lights and trash collection services received at the property. There is little room for misreporting on these measures. The authors send three types of letters to test the effect of appeals to fairness, equity, and deterrence. They find that the deterrence messages have the strongest effect. Informing taxpayers of the penalties of non-payment increases the probability of payment by 5 percentage points from a base of 40 percent. These messages also encourage taxpayers to pay earlier.

In a field experiment in Austria, Fellner et al. (2013) use a randomized design to test the effect on compliance with Austrian television and radio licensing fees of various mailings to potential noncompliers. Austrian households owning a radio or television are required to remit a licensing fee; payment of the annual fee relies on self-reporting and individuals can access public broadcasting channels without paying the fee. In 2005, 94 percent of households were registered and paid a licensing fee but only 1 percent of households owned neither a TV nor a radio, suggesting the presence of evasion. The authors sent letters emphasizing different messages to five treatment groups. One publicized the threat of detection and sanction, another was a moral appeal equating compliance with fairness, and a third variant provided social information on the overall high level of compliance. Two others interacted the threat of detection with the moral appeal treatment and with the provision of social information. Those receiving any type of mailing were significantly more likely to make a payment within 50 days of receiving the letter, but only the variant emphasizing the threat of punishment induced an additional increase in compliance. The authors interpret the generic effect of the mailing as an "alert effect" signaling that nonpayment had been noticed, with the consequences of noncompliance amplified by the threat variant. The fact that *any* contact from the tax authority might affect compliance, at least in the short term, is a very common finding in recent compliance research.

Many of the tax compliance RCT treatments involve letters sent by the tax authority. Ortega and Scartascini (2015a) investigate another dimension of such interventions, the delivery mechanism. They conduct a field experiment in Colombia that varies the way the National Tax Agency contacts

taxpayers with due payments for income, value added, and wealth taxes (tax delinquencies). Taxpayers were randomly assigned to a control, or to one of three possible delivery mechanisms: letter, email, and personalized visit by a tax inspector. They find sizable differences across delivery methods. Personal visits by a tax inspector are more effective than the impersonal methods; they are, alas, much more expensive, too. Ortega and Scartascini (2015b) find that the effect of phone calls falls between those of the impersonal methods and the personal visits.

3.2.2   Specific Deterrence: The Impact of Audits

To this point I have been discussing the impact on compliance of a change in the perceived probability of detection of noncompliance, usually referred to as general deterrence. Another issue of interest is the effect of audits on the audited, referred to as specific deterrence.[7] A priori taxpayers' behavior following an audit is ambiguous. On the one hand, a taxpayer may assume that the probability of getting audited a second time might be low, sometimes referred to as the "crater effect," which would mean that taxpayers are less likely to comply in the years following an audit. On the other hand, taxpayers may revise upwards their prior on the probability of an audit; these taxpayers would be more likely to comply in the years following an audit.

Two recent studies have examined this issue. DeBacker et al. (2015) use IRS data from the National Research Program (NRP) to study the behavior of audited individuals in the years following an audit. They construct a control group by randomly selecting returns from the same sampling pool as the NRP – tax filers in the years 2006 to 2009. This group of individuals forms a control group of unaudited individuals with similar characteristics to the audited NRP sample. They find that in the five years following an audit the treatment group reports an additional $7,111 of income on average as compared to the control group. An audit increases reported wage income over three years after the audit by 0.4 percent and increases Schedule C income by 7.5 percent. However, this large short-term estimated effect on Schedule C income is short-lived; indeed, five or six years following the audit, the treated group actually reports lower Schedule C income as compared to the control group. When they compare the reporting behavior of the same individual pre- and post-audit, they find the same positive effect of an audit. De Backer et al.'s findings suggest that taxpayers' beliefs about enforcement are positively affected by both the occurrence and stringency of an audit. Because taxpayers audited under the NRP are informed that they have been randomly selected for research purposes, these audits may not have the same impact on the perceived probability of a future audit. They also find that characteristics that are likely to suggest tax literacy are associated with a smaller response in reported income in the years following an audit. Taxpayers who use paid preparers and who are older (more experience with the IRS) show less of a change in behavior on average in years following the audit.

Advani et al. (2015) pursue a similar research strategy using data from the United Kingdom. The HM Revenue & Customs conducts a random audit each year similar to the NRP. Instead of resampling

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[7] It might be useful to define an intermediate concept of deterrence, which includes the impact on those taxpayers who learn of specific enforcement actions directed to others, and possibly thereby modify their behavior. The links may be by word-of-mouth via taxpayers through various networks, including tax preparers. Let me tentatively propose "network deterrence."

the subject pool as DeBacker et al. (2015), Advani et al. use individuals who appear in the treatment group in future years as the control group for those audited in the current year. For instance, individuals who were selected for random audit in 2006 and beyond are used as the control group for those audited in 2005. As DeBacker et al., Advani et al. find that those who are audited increase their reported tax liability more than the control group in years following the audit. Allowing for the lag between when the return is selected for audit and when the audit is completed, there is a 26 percent increase in reported liabilities in the treatment group compared to the control group, four years following the audit. One drawback of this strategy is that individuals in the treatment groups would have to continue to file as "self-assessment" taxpayers for more years than those in the control group in order to appear in the data in years after the audit. Self-assessment taxpayers have some form of income that is not subject to withholding such as self-employment income. Thus, for any given time horizon, the sample in the treatment group would have to have been self-employed for longer than the control group. This may mean that treated individuals report higher tax liability simply because they are more successful than the average individual in the control group. Still, their findings suggest that the long-term (specific-deterrent) benefits of an audit are significant, corroborating the finding of DeBacker et al. in the United States.

3.3. Third-party Information Reporting

Up to now in this essay the focus has been on understanding the effect of increasing the probability of detection via a direct communication (i.e., a letter) from the tax authority to the taxpayer stating or implying that this probability has gone up, with the necessary increase in resources to achieve this presumed to be forthcoming. Another set of studies makes explicit why the probability has gone up. Next I review research where the reason is increased information reporting.

The value-added tax (VAT) provides a fascinating case study of the consequences of information reporting on compliance. Field evidence on Chilean firms' compliance with the VAT highlights the connection between information reports received by the tax authority and levels of evasion. Because firms can only claim tax credits for inputs bought from tax-compliant suppliers, the invoice-credit VAT system has a built-in (albeit imperfect) self-enforcement mechanism. Noncompliant firms purchasing inputs would like to overstate purchase costs to inflate tax credits, but sellers have the incentive to understate sale proceeds to minimize VAT liability. Because these incentives conflict and—except for final sales to consumers—information reports are made by both parties to each transaction to the tax authority, the VAT system is believed to dramatically increase the probability of detection of evasion related to business-to-business transactions. Pomeranz (forthcoming) tests this hypothesis by mailing increased-audit-threat letters to over 100,000 randomly selected Chilean firms, using a sample of over 300,000 firms receiving no letter as the control group. Consistent with theoretical predictions on the self-enforcement mechanism, the increase in VAT receipts (and therefore the level of inferred evasion) induced by the letters is concentrated at the level of sales from firms to final consumers, for which there is no paper trail.

VAT liability can be lowered by over-reporting deductible items or shifting costs into categories that are tax deductible. In Chile, diesel tax is fully deductible as a cost if it is used in industrial activities but only partially deductible if used for freight or transportation. Noncompliant firms evade taxes by purchasing tax-deductible fuel for use in nondeductible activities. In 2003, the Chilean tax authority sent a letter to 200 firms with the largest change in fuel tax credits between 2001 and 2002, requesting more information, and then subjected 66 of the 183 firms that responded to an intensive audit. Agostini and Martinez (2014) analyze the returns of all firms that claimed any fuel tax credit in all months between October 2002 and September 2004. Although the firms in the treatment group were not randomly selected, the authors use their knowledge of the selection criteria to create a quasi-experimental sample through propensity score matching. On average, the firms that received the letter reduced their tax credit claims by 10 percent. Additionally, the authors found that there were no reductions on any other VAT credit claims even though these claims are made on the same form as the gasoline tax credit.

Carrillo et al. (2014) examine the effect of a change of the tax authority's use of third-party information on reported firm revenues in Ecuador. The government has a few sources to verify firms' self-reports of revenue, including other firms' reports of purchases from the firm in question, credit-card sales from credit-card companies, as well as exports and imports information from the Ecuadorian customs authority. For a few years, the revenue service had collected such third-party reports of firm revenues, but had not utilized this information to verify firms' self-reported revenue. In the episode they study, the Ecuadorian tax authority (SRI) informed some firms of the discrepancy between the two reports and offered them the opportunity to file an amended return. The selection of notified firms was based on methodology, which is critical to distinguishing causal effects of enforcement actions from sample selection effects, that is confidential to the SRI, but is known to have depended on the magnitude of the reporting discrepancy. The authors compare the reporting behavior of firms before and after notification. They find that 24 percent of firms underreport revenue in years when the government did not use the third-party-verified information. They also find no bunching of reporting revenue around the third-party reported amount, suggesting that firms did not believe the government was using this information. In the three rounds of the experiment, between 11 and 19 percent of notified firms filed an amended return. In amended returns, firms correctly report their revenues but they increased their reported costs almost one-for-one with the increase in revenues (96 cents for each dollar!). Thus, although reported revenue increased substantially, overall evasion of income tax liability did not fall by much. Because the SRI does not have a comprehensive picture of firms' costs and revenues through third-party information, many firms apparently continued to reduce their tax liability through channels not covered by third-party reporting.

The experience of the SRI here suggests that the comprehensiveness of third-party information is crucial. In the context of many developing countries where such comprehensive information is not available, one might not observe a fall in overall evasion from using an additional source of third-party information. They also find that reported costs were lower than third-party information on costs. This finding seems to be at odds with a model of firms that seek to only maximize after-tax

profits. The authors propose that this behavior is consistent with firms who may believe that the probability of an audit is a function of firm size and profits. In order to appear small, firms may underreport both revenues and costs.

3.3.1 Involving Charities

In the United States contributions to qualifying charitable organizations are deductible against taxable income for those who itemize their deductions, and receipts are checked only upon audit. In the United Kingdom, donations by individuals who face the basic income tax rate of 20 percent are matched by the government. Individuals make the donation from their net-of-tax income and the charity must claim the tax rebate; for example, if a donor subject to the basic rate gives £100, the charity will receive £125 in total. For individuals who face the higher income tax rate of 40 percent, both the donor and the charity can claim a rebate of 20 percent on the amount donated. Other than for the remittance detail, which may be important, this system is equivalent to one where charitable donations are fully deductible from taxable income. Changes in the information-reporting system make possible identification of this aspect of an enforcement system, holding constant the tax rate schedule, the tax base, and possibly the remittance system.

Two recent papers examine the impact on charitable contributions of altering the information reporting system involving charities. Fack and Landais (2013) examine the effect of information reporting on claimed charitable contributions by exploiting a change in the French tax treatment of charitable donations. Since the early 1970s, charities in France had been required to issue standardized receipts to donors but, starting in 1983, the reporting rules began to require taxpayers to attach these receipts to their tax filing when they claim deductions. Fack and Landais find that reported donations fell by 75 percent after the introduction of this change. The authors make a convincing case that this decline resulted from a decrease in over-reporting rather than a decline in actual donations. Because the new rule only required donors to attach receipts they were already receiving, it is plausible that the decline was not due to compliance costs, which were arguably quite small. The authors also calculate the net-of-tax price elasticity of contributions before and after this increase in enforcement intensity, and find that the estimated elasticity before the enforcement change is about three times larger than the estimate after 1983. This is an illustration of the endogeneity of the elasticity of (one component of) taxable income to the vector of tax policy instruments, as stressed by Slemrod and Kopczuk (2002) and investigated empirically by Kopczuk (2005): a more effective enforcement regime reduced the tax-price elasticity substantially.

Gillitzer and Skov (2014) examine the effect of third-party reporting on claims of charitable contributions in Denmark. Starting in 2008, charities in Denmark were required to report contributions to the tax authority, which would then pre-populate individual tax returns with the information; taxpayers could either accept this information or amend it. This reduced compliance costs to individual donors, while also increasing the probability that a false claim by an individual would be detected. Gillitzer and Skov find that the number of claims actually increased substantially. In other words, the effect of lower compliance costs far outweighed the effect of increased

enforcement from third-party reporting, inducing people on average to report tax deductible contributions that they otherwise would not have bothered to claim.

At first blush this result might appear to contradict the findings of Fack and Landais (2013), who find that requiring receipts from donors greatly reduced claims, but who interpreted this as a fall in evasion, arguing that the increased compliance cost implied by the requirement of receipts was insubstantial. This assumption does not seem justifiable in light of the Gillitzer and Skov (2014) results. Gillitzer and Skov calculate the average value of foregone after-tax income before the change is DKK 262, which is about 35 euros. The average contribution in the Fack and Landais sample drops from 41 to 17 euros–a similar amount. Even if the system of receipts is standardized and established for many years, the cost to storing and attaching them to tax returns may not be insignificant. Fack and Landais try to account for some underreporting based on a survey of active donors that found that they report 80 percent of their contributions to the tax administration, and use the results from this survey to impute what portion of the fall in reported contributions post-1983 could be attributed to underreporting. This adjustment still assumes that there was no change in behavior due to compliance costs.

There may also be important differences in the tax rules for charitable contributions, which give rise to the contradicting results. The French rules allow taxpayers to claim a deduction on any amount of contributions up to 1 percent of taxable income. The Danish rules are more restrictive. Gillitzer and Skov (2014) analyze two categories of contributions, "regular" and "long-term." For "regular" contributions, taxpayers can claim a deduction only on amounts given above DKK 500; small contributions receive no tax preference. "Long-term" contributions are defined as commitments that are in place for at least 10 years or more, and therefore the scope for over-reporting on such donations may be more limited than in smaller, more occasional contributions. Finally, it is possible that the difference in the tax systems of the two countries means that over-reporting of charitable contributions as a means of tax evasion may not be as pervasive in Denmark as in France due to the difference in costs of this channel of evasion. Recall that the audit study by Kleven et al. (2011) suggests that this is the case, since only 7 percent of individuals over-report charitable contributions compared to the 42 percent evasion rate for self-reported income. A similar audit study for France would give us a more accurate idea of the comparability of the culture of evasion in the two countries.

3.3.2 Involving Credit-Card Companies

In 2011, the IRS began to require credit-card companies and other third-party payment organizations to report electronic payments received by businesses in order to reduce understatement of revenues. Slemrod et al. (2015) find that this new reporting requirement increased the number of sole proprietorships that filed tax returns. Analyzing administrative data on the universe of individual income tax returns that report sole proprietor income, they find a large increase in the number of businesses reporting income that is exactly equal to the amount in the 1099-K report, consistent with a simple model of reporting behavior. Although the new reporting requirement increased reported receipts of this relatively small group by up to 24 percent, this was offset by a 13 percent increase in reported expenses. They also find that at least 20 percent of the group in 2011 were induced to file

Schedule C by the introduction of Form 1099-K. Thus, information reporting seems to have had the intended effect of increasing compliance on income that is subject to third-party reports on some small businesses. Yet the overall effect on evasion was dampened by reported expenses, which are not directly observable to the tax authority, and may also have been offset by firms moving to cash receipts that are not covered by this information-reporting regime.

3.3.3 Involving Consumers and Workers

On the grounds of administrative efficiency, modern tax systems have for the most part completely excluded people in their role of consumers from tax collection, relying on tax remittance from firms even for consumption taxes; neither retail sales tax nor value-added taxes involve consumer participation. Modern systems have also de-emphasized the role of people as employees, looking to employers via withholding for the bulk of tax collection--and in exact withholding systems for *all* of collection. In general it is more efficient to rely on firms, especially larger firms that can take advantage of economies of scale and accounting systems already in place for non-tax reasons, to take the lead role in remittance.

Naritomi (2013) adds to the evidence on the importance and effectiveness of third-party information trails with findings from the Nota Fiscal Paulista (NFP) program in São Paulo, Brazil. Beginning in 2007, in an effort to reduce VAT evasion by retail firms, the Brazilian tax authority provided monetary incentives to customers to report evasion by firms. Consumers receive tax rebates and are entered into lotteries in exchange for requesting receipts. They can also check firms' reports of their transactions with the consumer online and report any discrepancies. Similar programs exist in Portugal, Taiwan, China, Puerto Rico, Philippines, and Malaysia.[8] Naritomi finds that retail firms increase their reported revenues by 22 percent more than the control group of wholesale firms over a 4-year period after the introduction of the NFP. Because retail firms are directly affected by the NFP and wholesale firms are not, she interprets this as a lower bound on the effect of the NFP. She finds other indicators that firms respond to the threat of whistle-blowing by their consumers. On average a firm's reported receipts go up by 14 percent right after they receive their first consumer complaint. As one might expect, this is an expensive program for the government to run. Consumers receive a rebate of 30 percent of tax collected, plus another 3 percent for the cost of the lottery program. Even though 50 percent of potential consumer rewards go unclaimed, the program is just breaking even. This cost-benefit analysis does not take into account administrative costs of the government or compliance costs borne initially by firms and consumers. Nor does it account for benefits in the form of improved tax morale or other less quantifiable measures.

Note that the São Paolo policy involves changes both to the information-reporting and remittance regimes. Consumers are encouraged to utilize what they know to check against what firms reported; this system is facilitated by the fact that each retail purchase receipt contains the Social Security number of the purchaser. It also changes the remittance regime by providing rebates, some in the form of

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[8] Marchese (2009).

lottery winnings to consumers. For a given total revenue collection, the modified-VAT remittance regime now collects from firms all along the production and distribution chain and collects *negative* revenue from consumers themselves, thus requiring higher remittances by firms. Adding consumers to the remittance/collection system certainly adds compliance costs, which may be offset or even dwarfed by the social value of improved compliance and the reduced cost of traditional enforcement techniques such as firm audits.

Kumler et al. (2013) study the effects on evasion of a 1997 pension reform in Mexico that tied younger workers' retirement benefits more closely to their reported wage. This reform provided a new incentive for this group of workers to ensure that their employers accurately report their wages, which in turn would lower payroll tax evasion by firms. To examine the impact of this initiative the authors combine two sources of data on wages: administrative data from the Mexican Social Security agency (IMSS) and household survey data from the Encuesta Nacional de Empleo Urbano (ENEU). Because the ENEU does not link the employee to his firm, the authors compare reported wages in the two datasets within cells constructed by firm size and sector of the employee's firm, metropolitan area, and age group. They find that that the gap in median or mean wage within a cell between ENEU data and IMSS data falls for younger age groups after the pension reform. As predicted, older workers not affected by this reform do not see such a decrease in gap between the two income reports.

3.4. Changes in the Remittance Regime

As noted, the São Paolo regime studied by Naritomi (2013) concerns not only an innovation in information reporting, but also a change in the remittance regime, because it introduces rebates to consumers. In this case rebates were introduced in order to incentivize information reporting. But this is a version of the well-known self-enforcing aspect of the VAT: firms are entitled to credit/deduct the cost of inputs purchased from other firms if and only if they verify that the selling firm was compliant with its VAT obligations.

Many countries offer to smaller firms some form of a minimum alternative tax with an otherwise less attractive, but more easily measurable, tax base where the tax base changes at a revenue or profit rate threshold. In Pakistan, corporations either pay a tax on profits or on turnover depending on whichever liability is greater. This effectively implies that at a profit rate lower than the ratio of the turnover tax rate to the profit tax rate, firms cannot deduct costs. Because a large portion of evasion is through misreporting of costs, this tax regime trades off loss in production efficiency for a gain in revenue collection efficiency. Best et al. (2013) use administrative data on the universe of corporations in Pakistan to estimate the elasticity of taxable income using the bunching of firms below the threshold profit rate. They find clear evidence of such bunching, whose location shifts along with changes in tax rates that move the threshold. Using the analysis-of-bunching methodology introduced by Saez (2010), they estimate that turnover taxes reduce evasion by between 60 and 70 percent, but have a small effect on actual production.

To combat sales and profit tax evasion by small firms and the self-employed, many developing countries have adopted some form of "reverse withholding," where large firms remit to the tax authority a fixed share of their purchases from small firms and these sellers can apply the withheld amount as a credit against their self-reported tax liability. Because cost-sales ratios differ across firms, true tax liability can fall short of or exceed the withheld amount, entitling firms to a tax refund or requiring additional tax payments. While withholding does not affect the firms' true tax liability, there is typically a discontinuity in the audit probability at the withholding rate; firms seeking tax refunds because self-reported tax liability is lower than the withheld amount are audited at a higher rate than firms making additional tax remittances. Examining data from Ecuador, Carrillo et al. (2011) find evidence of bunching in reported tax liability just above the 1 percent withholding threshold, suggesting firms manipulate their self-reported tax liability and possibly real economic choices to minimize tax payments subject to the discontinuity in the audit probability. The pattern of bunching changed dramatically in 2007 only for firms subject to a change in the required withholding rate, ruling out the possibility that the withholding rate had been chosen to match the distribution of true tax liabilities. Third-party data on sales and intermediate input costs filed by large firms as withholding agents indicate bunching is indeed associated with tax evasion: self-reported sales are smaller than third-party reports for at least 10 percent of firms.

Almunia and Lopez-Rodriguez (2014) study the behavior of Spanish firms in response to a notch in enforcement intensity due to the fact that the Spanish Large Taxpayer's Unit (LTU) monitors firms with revenues above 6 million euros. Even though the compliance requirements and tax rates are the same above and below this threshold, enforcement changes discontinuously because the LTU has the manpower and resources to conduct more audits and to utilize technology to cross-check reported information. Revenues, and certainly reported revenues, are subject to firm choice, so that in the absence of prohibitive costs to changing firm size, one would expect a hole in the distribution of firms that report revenues just above the 6 million euro cutoff. Firms can earn the same pre-audit, after-tax income if they remain smaller and escape the intensive monitoring by the LTU. Sure enough, there is significant bunching of firms just below the threshold. The bunching is more pronounced for intermediate-goods firms, which is consistent with expectations because their transactions create more of a paper trail than firms that sell to final consumers and thus the discontinuous increase in enforcement intensity affects these firms more than retailers.

The introduction of VAT in Japan in 1989 included an allowance for firms below a threshold of 500 million yen in sales to opt for simplified filing. This option translated to a potential tax benefit for many firms because it allowed them to claim a fixed portion of their sales (usually 80 percent) as input costs. Firms whose input costs are below this threshold (i.e. their value added is above 20 percent of sales) have an incentive to manipulate their size or structure to be eligible for this simplified filing. Firms accomplish this through "tax-motivated splitting"--either transferring a portion of their operations to an existing small firm or incorporating a portion of their firms as a new firm below the size threshold—or simply misreporting their sales. Onji (2009) studies the behavioral response to this system by constructing a counterfactual density of firms using a decomposition method by DiNardo

et al. (1996) that allows him to separate changes in the density due to changes in the distribution of characteristics of firms and due to the introduction of the tax benefit threshold. He finds that there is a bunching of firms below the threshold and a "missing" mass of firms right above the threshold. This suggests that Japanese firms did respond to the new tax incentive, with evasion being one possibility.

3.5 Penalties

The letter experiments tell us that taxpayers respond most to an explicit threat of audit or to information on penalties. But letter experiments cannot randomize on the magnitude (or nature) penalties that detected evasion actually attracts, just their salience, so we need to look to other dimensions of punishment.

Twenty-three U.S. states currently try to encourage delinquents to remit their tax through shaming– usually by publishing their name and amount owed online. Perez-Truglia and Troiano (2015) conduct the first study of the impact these programs can have on the probability of payment. They compare the effect of shaming to the effect of financial penalties through an experiment where letters sent to delinquents are worded to emphasize one or the other. They contact all delinquents with names and addresses published online in 3 states: Kentucky, Kansas, and Wisconsin. The theoretical effect of the shaming penalty on taxpayers is ambiguous. Individuals may be more likely to pay off their debt if their perceived shaming adversely impacts their social capital. On the other hand, shaming might shift their motivation to pay from an intrinsic to an extrinsic one and therefore decrease the likelihood that they remit. Because the amounts owed ranged from $250 to $150,000, the authors were also able to look at whether the effect of the penalties varies by size of debt.

The authors find that both shaming and financial penalties increase the likelihood of payment within ten weeks of receiving the letter. This probability varies by the size of their initial debt. For those with debt between $250 and $2,273, the shaming penalty increases the likelihood of payment by 2.1 percentage points. The effect declines for higher amounts of debt suggesting that there is a limit to the value of preventing social stigma. Since tax authorities warn individuals and give them an opportunity to clear their debts before publishing their names online, we can consider this effect as a lower bound. The optimal policy predicted by their model uses a mix of financial and shaming penalties.

3.6 Take-up

Although IRS enforcement efforts, and this paper, focus mainly on limiting tax evasion, what limits take-up of credits and other tax benefits is of both policy and intellectual interest. Bhargava and Manoli (2015) address the determinants of incomplete take-up with the earned income tax credit (EITC) in the United States with a comprehensive randomized field experiment involving 35,050 eligible individuals. They investigate, using alternative mailings, the role of program information (regarding benefits, costs, and rules), informational complexity, and stigma on response to experimental mailings notifying 35,050 eligible individuals of $26 million in unclaimed EITC benefits. They find that the

take-up rate increases due to the mere receipt of a plain-vanilla mailing, suggesting consistent with other studies discussed here that simple contact from the tax authority can have a significant effect on taxpayer behavior, at least in the short run. In addition, both simplification and the visual display of benefits increase take-up. Consistent with the experimental findings, surveys affirm pervasive low awareness and misunderstanding of program incentives among people eligible for the EITC. All in all, Bhargava and Manoli suggest that the tested interventions could reduce incomplete EITC take-up from 25 percent to 22 percent. A follow-up study by Manoli and Turner (2014) examined whether these effects persist past the year of the intervention using population-level administrative tax data and studying the results of a natural experiment in 2005, a randomized experiment in 2009, and quasi-random audits between 2006 and 2009. The evidence from each of these settings indicates that the informational interventions caused economically significant increases in EITC take-up in the short-term, but that there are little to no long-term increases in EITC take-up.

3.7 Non-Deterrence Policies to Reduce Noncompliance

What have we learned about the role of norms and other non-deterrence influences on tax compliance? Many of the threat-of-audit letter RCTs discussed so far also contained a non-deterrence treatment. Blumenthal et al. (2001) find no evidence that either of two written appeals to taxpayers' consciences had a significant effect on compliance. One letter stressed the beneficial effects of tax-funded projects, while the other conveyed the message that most taxpayers were compliant. Torgler (2004), using a controlled field experiment in Switzerland, also found that moral suasion has hardly any effect on taxpayers' compliance behavior, nor did Fellner et al. (2013). Pomeranz (2015) found that a mailing appealing to tax morale but promising no increased enforcement had little effect on VAT remittances. In Castro and Scartascini (2015), messages that emphasized fairness (taxes are used to pay for public services, which the individuals benefits from) or equity (most citizens fulfil their tax obligations) do not have a significant effect. Bhargava and Manoli (2015) also find the social stigma does not affect take up of the EITC. For the most part, it has been difficult to find evidence that appeals to tax morale, defined broadly, affect taxpayer behavior in the short run when delivered via a one-time mailing. As discussed below, part of the reason could be the wording of these appeal-to-conscience letters. Psychological research suggests that using terms wording such as "cheater," as in "Please don't be a cheater," might affect behavior more than the standard letter-based appeal to conscience wording such as "the entire community suffers." Whether any government would be willing to employ such loaded terms remains to be seen.

Recently a few studies have broken the solid set of field-experimental evidence finding no effect of such appeals. Bott et al. (2014) reports the results from a randomized field experiment in Norway conducted with 18,000 taxpayers who the tax authority deemed were likely to have misreported their foreign income. Shortly after sending the pre-populated tax returns for 2012, the tax administration in Norway mailed a letter to these tax subjects with information about how to report foreign income that randomly included two types of moral appeal. They find that including a moral appeal in this letter almost doubled the average foreign income reported compared to a base letter without such an appeal, an effect similar in size to the effect of including a sentence that increases the perceived

probability of detection. However, moral appeals and detection probability influence tax compliance in fundamentally different ways. The moral appeals mainly work on the intensive margin, by increasing the amount reported of those who report any foreign income. The probability of detection, on the other hand, mainly works on the extensive margin, by increasing the share of tax subjects who report any foreign income.

Hallsworth et al. (2014) run a large field experiment in the United Kingdom to investigate whether letters that appeal to individuals' sense of social norms and public good induce individuals to remit their taxes fully and on time. They run two large natural field experiments using administrative data from more than 200,000 individuals in the United Kingdom, and conclude that including social norms and public goods messages in standard tax payment reminder letters can considerably enhance tax compliance. As with other randomized studies of enforcement mechanisms, they mail letters to taxpayers that are identical save for one sentence. Six versions of the letter are differentiated by a single sentence that is modified to test a specific channel of persuasion. The authors found wording that emphasized that the individual was in the minority of nonpayers was the most effective in getting individuals to remit their taxes. They also find that mentioning financial penalties and remittance plans significantly increased the likelihood of compliance.

There are a number of differences between Hallsworth et al. (2014) and the earlier studies that find no effect of such appeals. One is that Hallsworth et al.'s outcome is payment of *already reported* liabilities whereas Blumenthal et al. (2001) and most letter-based interventions look at the effect on truthful reporting behavior. One could argue that a taxpayer who is simply procrastinating on paying their taxes is more likely to be persuaded by social norms than one who is evading taxes. Second, Hallsworth et al. (like Perez-Truglia and Troiano, 2014 discussed above) specifically study taxpayers who missed payment deadlines. Finally, there are important differences in how the treatment could have been perceived by the recipients. In Hallsworth et al. the letter informs the taxpayer that the U.K. tax authority (HMRS) is aware of their delinquency. It says, "Nine out of ten people in the U.K. remit their tax on time. You are currently in the very small minority of people who have not paid us yet". In contrast, the letter in the Minnesota experiment says, "people who file tax returns report correctly and pay voluntarily 93% of income taxes they owe […] a small number of tax payers who deliberately cheat owe the bulk of unpaid taxes." In this case, the letter does not convey to the taxpayer that the IRS is aware of any wrong-doing by the individual. Thus the difference in results could be due to the difference between informing an individual that the government has evidence of their actual evasion and appealing to their sense of duty without conveying any information on their avoidance behavior.

Del Carpio (2013) examines the role of norms and enforcement perceptions on tax compliance through a field experiment on property taxes in Peru. Randomly chosen subsets of residents in two municipalities in the Lima province were informed, through an official letter from the municipality, about the average rate of compliance, the average level of municipal enforcement, or both, while a third group was only reminded of the payment deadline. The results suggest that simple nudges in the form of one-time letters can have substantial effects. Analysis of the administrative data reveals that disclosing information on the level of compliance had a large positive impact on compliance (20

percent relative to the control group). The payment reminder also raised compliance by 10 percent. Notably, the enforcement treatment did not have a significant effect on compliance net of the reminder effect, corroborating other evidence that *any* contact from the tax authority to the taxpayer increases compliance, and additional treatments may or may not. Surveys conducted both before and after the intervention, in which a subsample of taxpayers was asked about their beliefs concerning the levels of compliance and enforcement, indicate that both the norms and the enforcement treatments raised beliefs about compliance as well as about enforcement, as did the reminder letter regarding beliefs about compliance. Del Carpio interprets these results as showing that manipulation of a norm—in this case a disutility from evading when others comply—can affect compliance.

Besley et al. (2015) develop a theoretical model to investigate the importance of social norms, specifically a desire to acquire a pro-social reputation, on tax evasion. They then examine the empirical implications of the model in the context of the poll-tax episode in the United Kingdom utilizing a regression discontinuity design based on analyzing shifts in enforcement generated by quasi-random (i.e., looking at close elections only) switches in single-party majority control of local tax councils. They find persistent effects of the poll-tax shock on post-poll-tax evasion behavior. Although the regression discontinuity design facilitates identification of the causal effect of the change in party control, it does not separate out the impact of the change in party control on tax enforcement from whatever other compliance-relevant policy changes the party control brings.

This set of results has somewhat moved my pre-2013 prior that the evidence overwhelmingly supported that deterrence inhibits noncompliance but that manipulation of norms has no measurable effect.[9] Rather in some settings norm-directed letter interventions seem to matter. It now behooves us to understand better why this can work in some settings, but not others.

3.8 Public Disclosure

Public disclosure[10] is designed to reduce the attractiveness of tax noncompliance as well as aggressive, but arguably legal, tax avoidance. Disclosure may complement deterrence by encouraging people with relevant information about others' true tax liability to come forward, and the fear of that and subsequent tax noncompliance penalties (explicit and shaming) dampens such behavior. Disclosure may also affect tax reporting because taxpayers reduce reported taxable income in order to minimize the attention of the press and of unsavory characters wishing to take advantage of their economic situation. On the other hand, some people might get satisfaction (bragging rights, if you will) from public appreciation of their level of affluence, and may be willing to pay for it in the form of a higher tax liability. The empirical evidence on public disclosure in the income tax context is sparse, but growing. Slemrod et al. (2011) study the effect of the Japanese income tax disclosure system that was abolished in 2004/2005 on tax reports of individuals and businesses. They take advantage of the abolition and the fact that disclosure applied only to taxable incomes above 40,000,000 yen (about

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[9] This is different from saying that variations in norms across countries matter.

[10] Public disclosure is different than a set of programs known as "voluntary disclosure," which refers to opportunities offered to previously noncompliant taxpayers to correct their tax affairs under specified terms that typically do not waive tax liability (in contrast to amnesty programs).

$400,000). They find strong evidence based on bunching of observations right below the disclosure threshold that, on average, individuals and businesses prefer to avoid disclosure; for the latter, this is consistent with the local characterization of so-called "39 companies," whose reported taxable income is kept below the disclosure threshold so as not to provide evidence about their profitability, which might affect the deals they can make with other companies. However, Slemrod et al. uncover no evidence that disclosure increased reported business taxable income generally.

Bø et al. (2015) explore the effect of public disclosure in Norway, which has a long tradition of disclosing tax filings, and beginning in 2001 anyone with access to the Internet could obtain individual information on taxable income and income tax liability. They exploit this change in the degree of exposure to identify the effects of public disclosure on income reporting. Identification of the deterrence effects of public disclosure is facilitated by the fact that, prior to the shift to the Internet in 2001, some municipalities had exposure which was close to the Internet type of public disclosure because tax information was distributed widely through paper catalogues that were locally produced and disseminated. They observe income changes that are consistent with public disclosure deterring tax evasion: an approximately 3 percent higher average increase in reported income is found among business owners living in areas where the switch to Internet disclosure represented a large change in access.

Note the difference between public disclosure of reported tax liabilities and public disclosure of unpaid tax debts or of tax noncompliance judgments, as discussed earlier. Several countries have some form of the latter kind of disclosure. For example, under Greek law the presentation of a new budget is accompanied by the names of tax evaders in the previous year compiled by the finance ministry. Since 1994 in New Zealand the Commissioner of Inland Revenue regularly releases a document entitled "Tax Evaders Gazette" that lists those taxpayers who have been prosecuted or had penal tax imposed for evading their taxation obligations; as of 1997 the Commissioner is able to also publish the names of those taxpayers involved with "abusive tax avoidance." The Canadian Customs and Revenue agency compliance strategy includes publicizing court convictions for tax fraud. In Ireland a list of tax defaulters is published on a quarterly basis in Iris Oifigiuil (the official newspaper of record in Ireland) and are reported in the national and local newspapers.

3.9 Understudied Issues

It is obvious from the foregoing selective survey that in the last 15 years there has been a lot of exciting research on many important topics. As is natural, there is a flavor of searching for one's lost keys at night under the one working lamppost. We have learned much more about the compliance effect of various letter interventions than their relative importance to enforcement because tax authorities have been willing to undertake them, in part because they are inexpensive and non-disruptive. On the plus side, for the same reason the research can have a real and fairly immediate effect on policy, in contrast to learning about how relatively inflexible norms affect tax compliance.

In what follows I discuss a few topics that I think deserve some more attention in the next 15 years. One understudied issue is the role of professional tax preparers in tax administration and enforcement.

OECD (2008) distinguished two kinds: tax advisers and those banks and financial institutions that design, promote, and facilitate tax-driven financial instruments and strategies. Their role is potentially important given their ubiquity. In the United States, 63 percent of individuals and 97 percent of corporations use some professional assistance. An earlier literature investigated some aspects of this issue. For example, Klepper et al. (1991) develop a model that predicts that a professional preparer's participation will discourage noncompliance on legally unambiguous income sources but encourage noncompliance on ambiguous sources, and that the magnitude of the enforcer/ambiguity-exploiter influence will be directly related to the quality of an evasion opportunity. They find some support for these predictions in cross-section regressions on summary tabulations of the 1982 TCMP relating line-item noncompliance with a measure of the line item's legal ambiguity based on the number of revenue rulings relating to the item. Countries vary substantially in how the tax law and authority relate to professional preparers, from no official contact to significant regulation. In the United States, as part of the Professional Preparer Initiative, about 750,000 tax preparers registered with the IRS by 2011, but no evaluation has been made of registration's impact on tax compliance. More recently, Mahon and Zwick (2015) examine the role of paid preparers in the take-up of a tax refund for corporate losses, and endeavor to explain why only 37 percent of eligible firms claim their refund. They discover that firms with sophisticated preparers, such as licensed accountants, are more likely to claim the refund, such that moving from the 10th to 90th percentile in a predicted preparer effect based on observables would increase take-up by 9.4 percentage points. They reject the possibility that firm selection—savvier firms hire savvier accountants--explains the observed preparer effect with a research design based on preparer deaths and relocations.

I'd also like to see more research on the networks through which information about tax enforcement and evasion opportunities spread. The networks might involve families, as in _Alstadsæter et al. (2014)), who use detailed administrative data to identify family networks and describe how take-up of tax avoidance progresses within a network. As discussed above, it might also involve tax preparers. It might involve the Internet. Hoopes et al. (2015) examine data on capital-gains-tax-related information search—on Google, Wikipedia, and IRS information services--to determine when and how taxpayers acquire information and find seasonal increases in information search around tax deadlines, suggesting that taxpayers seek information to comply with tax law. Positive correlations between stock market activity and search as well as year-end spikes in information search on capital losses when the market performs poorly suggest that taxpayers seek information for tax planning purposes. Keep in mind also that the policies of public disclosure discussed earlier might rely on networks for evasion-restraining whistle-blowing behavior.

Now that there are randomized-experiment results for interventions aimed at compliance and collection, it is time to think more carefully about why some interventions work better in one setting than another, and to integrate the two issues in future theoretical models. One aspect of the setting is the country. A disproportionate amount of research has been carried out in Scandinavian countries, in part because these countries maintain the most extensive administrative records (including linking

tax return data to other demographic data).[11] But a citizenry that tolerates such government monitoring is undoubtedly different from other citizenries in ways that are relevant to the questions at hand: the magnitude and nature of noncompliance, the norms that matter, and the institutional environment. The setting of much of the recent research discussed here is South America. This is a wonderful development, to be sure, as the issues of compliance and enforcement are especially critical in middle- and low-income countries. But we cannot -assume that the findings translate to the United States.

Given the central enforcement role played by withholding, we need to focus more on compliance by firm-withholders and other withholding agents. Conventional wisdom maintains that this is not a major issue, but little evidence exists in the public domain in support of this supposition. I also urge that we take a closer look at the relationship of tax compliance and self-employment. A mountain of micro evidence, using multiple methodologies, documents a strong association between self-employment and noncompliance and between self-employment and "flexibility" of reported taxable income locally to kinks and notches in tax schedules. Kleven (2015, p. 82) plots for over 80 countries the fraction of workers who are self-employed against the tax/GDP ratio, and documents a strong negative relationship; although he rightly cautions that no causal inferences can be drawn from such a graph, I agree with his conclusion that the availability of third-party information on employee income plays a key role in tax compliance and in explaining a country's overall tax take. Theory suggests why this might be so, but in an over-identified way (i.e., there are too many theories). Third-party information reporting is not easily done (although see the programs in place in other countries discussed in Section 5). Self-employed enterprises are by definition small, and the agency argument formalized by Kopczuk and Slemrod (2006) and Kleven et al. (2015) suggests that evasion is more sustainable. Self-employed people self-select into that status, and may be less risk-averse to all forms of uncertainty, including potentially costly detection of evasion. Future empirical analysis might aim at sorting out these issues, perhaps by leveraging the fact that some people, and some families, have both employee income and self-employment income. The welfare implications of this issue are fascinating, because it implies that in the presence of taxes the equilibrium distribution of firm borders/size is not optimal, contrary to the suggestion of Coase (1937). Taxes can be collected with less cost when the tax authority can make use of information generated (and reported) by arms-length transactions between firms and between firms and employees. Sole proprietorships and small businesses, especially family firms,[12] as well as large multinational companies, are difficult for the tax authority to penetrate, providing an example of when production efficiency may not be desirable when taxes must be raised, contrary to the classic result of Diamond and Mirrlees (1971).

As the empirical literature on tax compliance and enforcement matures, it is time to better connect it with the bread-and-butter normative issues of efficiency and equity. This essay has not focused on

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[11] The Scandinavian countries also have a disproportionate number of excellent public finance economists.

[12] Kopczuk and Slemrod (2010) provide a sketch of how to model the taxation of family firms, stressing that in some developing countries the weakness of legal institutions encourages the formation of family firms, whose family bonds informally enforce against theft; these bonds have a social cost because they increase the opacity of firms and make tax enforcement more difficult.

these issues, but they are of course what ultimately motivates empirical research. Regarding efficiency, the focus on evasion may seem puzzling to those who are steeped in the idea of the elasticity of taxable income, or more generally, the elasticity of tax base, which holds that under some conditions this elasticity is a sufficient statistic for the marginal welfare cost of changing tax rates, and therefore understanding the anatomy of the behavioral response (e.g., labor supply versus evasion) is irrelevant. How evasion fits into his framework has been the subject of some controversy,[13] but in any event knowing how evasion contributes to the behavioral response helps focus policy discussions; in the extreme, if we were to discover that there is no evasion under any circumstances, pondering optimal enforcement would be a waste of time.

Integrating compliance and enforcement into optimal tax will require attention to one of the most difficult empirical issues, the effect of evasion and enforcement on real decisions such as labor supply. Sometimes in policy debates this is ignored, when supporters imply that cracking down on evasion can raise revenue while avoiding the real behavioral responses we associate with raising tax rates. But this is logically flawed. Increased enforcement of, say, income taxes raises the expected tax rate (only for prospective evaders), and will trigger similar real responses as an explicit tax rate increase. For sure many of the empirical papers discussed here investigate both real and compliance responses, but they generally do not focus on this interaction. This is a particular challenge in the case of labor supply, because most of the administrative data sets naturally contain information on reported taxable income, but do not match it with data on labor supply.

Paying attention to the distributional implications of compliance and enforcement policies is another logical extension of the recent wave of empirical analysis using administrative data. There is an active literature on this issue. See, for example, Johns and Slemrod (2010), who assess the distributional consequences of income tax noncompliance in the U.S. federal income tax for the tax year 2001 using the data from the IRS's National Research Program, and Matsaganis and Flevotomou (2010), who address this question for pre-crisis Greece. Of particular interest is understanding the scope and nature of tax evasion by the highest income groups and its susceptibility to enforcement initiatives such as the Foreign Account Tax Compliance Act (FATCA), especially given the burgeoning attention to the level and growth of inequality in the U.S. and other countries.

A complete analysis of incidence must address the general equilibrium incidence of tax evasion. An early literature (e.g., Kesselman, 1989, and Martinez-Vazquez, 1996) discuss the theory, but this theory has not been updated to a tax-systems framework, nor pursued much empirically. One recent exception is Kopczuk et al (forthcoming), who examine empirically how the identity of the tax remitter affects incidence in the diesel fuel market and present empirical evidence that the identity of the remitting party affects both collections and the incidence of taxes. Retail diesel prices are higher, and diesel taxes are passed through to retail prices to a greater extent, in states where the point of collection is at the distributor or prime supplier level rather than at the retail level, suggesting that this collection regime reduces evasion.

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[13] Compare Chetty (2009) with Gillitzer and Slemrod (2014).

4. What Should Be Done?

Increased enforcement is just one way to raise revenue, with the obvious alternatives being to raise tax rates or broaden the tax base. In formulating optimal policy one needs to consider the marginal costs of enforcement relative to the costs of alternative ways to raise revenue. Thus, the overall objective of this aspect of tax policy is not different than the objective of choosing tax rates, bases, and other elements of a tax system. The costs of increased enforcement include administrative costs (that show up in IRS budget), compliance costs (that don't show up in the IRS budget), excess burden (due to behavioral response), and the extra uncertainty to taxpayers that the "tax lottery" creates.

Consideration of the social costs of tax evasion highlights the difference between the "recoverable" portion of the tax gap and the "economically recoverable" portion, borrowing language usually applied to oil reserves. The optimal tax gap is not zero any more than it is appropriate to extract all the oil beneath the ground, or to put a police officer at every corner to eliminate all street crime. For this reason ascertaining the size of the tax gap may not be that helpful for policy. Small noncompliance rates do not necessarily indicate that there are worthwhile policy initiatives aimed at noncompliance, nor do high noncompliance rates automatically mean that there are enforcement gaps. In the extreme, even if the gap related to some activity is *zero*, there may be over-enforcement.

Two separate policy issues arise: (1) how big should the IRS enforcement budget be, and (2) how best to allocate a given budget. For the former, pushing the budget until the marginal revenue obtained equals the cost of obtaining is not the right rule, because it ignores that the revenue collected has value to taxpayers. The social benefits of more enforcement should be compared to its social costs. Because these benefits defy easy measurement, the optimal tax authority budget cannot easily be determined by plugging in some elasticities and shares into the appropriate formula. For the allocation question, a useful rule of thumb is that all tax policies should equalize the marginal efficiency cost of funds, or MECF, a simple expression that accounts for all the costs of raising revenue.[14]

In what follows I summarize what I conclude about policy from the recent academic literature I have reviewed above and observations about policies in place in other countries, plus the unquantifiable value judgments that all policy pronouncements unavoidably involve and the unquantifiable non-pecuniary values, such as privacy and intrusiveness that come into play under some enforcement strategies. I will take the tax law (but not the remittance system—see below) as given, and avoid the implications of the fact that some tax bases are easier to enforce than others; there was a good reason that in the 17th century the English government switched from a tax on hearths to one on windows: the latter was less costly to measure as well as less intrusive on the taxpayer.

4.1 Increase the IRS Budget

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[14] Slemrod and Yitzhaki (1996) discuss the appropriate formula and its application to tax-system policy.

I can't prove it's optimal, but I believe the IRS budget should be increased. If the budget was anywhere close to optimal in 2010, it must be too small now. Since then the budget has declined by more than 10 percent, while the responsibilities of the IRS have expanded, due to the Affordable Care Act, the FATCA, and other new initiatives. Not that this makes it right or wrong, but tax agencies in many countries have also been facing cuts. For example, staffing at the U.K. tax authority, the HMRC, fell from 91,167 in 2005 to 61,370 in 2014.[15] A recent report by the U.S. National Taxpayer Advocate describes the decline in the quality of service to taxpayers due to the IRS budget cuts. It notes that taxpayers had to wait on hold for an average of 23 minutes, and when they did get through could only get an answer to a more limited set of questions. Any questions that required expertise were newly considered "out of scope" and would not be answered; after the filing deadline, the IRS would not answer any tax law questions. For the 2015 fiscal year, the IRS projects that it will only be able to answer 50 percent of the 100 million calls they expect to receive with wait times exceeding 30 minutes. To cope with the budget cuts, the IRS has had to reduce their workforce by 12.3 percent in the last year. This smaller workforce is also less prepared because the training budget is 83 percent lower than what it was in 2010. My sense is that the horizontal equity, vertical equity, and efficiency of the tax system would be improved if the IRS had more resources.

4.2 Focus on Deterrence

What should the IRS do with what money it is appropriated? The recent evidence has strengthened my belief that deterrence remains the most crucial policy instrument in addressing noncompliance, and thus attention must focus on its two crucial parameters: the probability that evasion will be detected and punished, and the severity of the punishment.

By saying this I do not intend to dismiss the importance of the non-deterrence aspects of tax administration. IRS agents should treat taxpayers with respect and civility. The IRS should provide taxpayers with education through its website, phone services, and outreach, and should provide taxpayers with information about -what purposes tax revenues are used. A few TV commercials running at 3:00 a.m. appealing to norms wouldn't hurt. In the United Kingdom, an evaluation of advertising campaigns by HMRC indicated that 8,300 additional taxpayers had been induced to register in the tax system, remitting £38 million over three years, providing a return of 19-to-1 for the expenditure of £2 million.[16] I doubt, though, that a tax authority can do much at the margin to enhance the legitimacy of government. The recent literature, with recent exceptions noted earlier, does not find compelling evidence that sending letters emphasizing the duty to be tax-compliant or stressing the civic duty aspects affects tax compliance. What provides the biggest deterrence bang per buck?

4.3 Expanded Information Reporting

We are probably not ready, on intrusiveness grounds, to involve consumers in the tax enforcement process the way that São Paulo in Brazil has or to reintroduce public disclosure of income tax

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[15] OECD (2015, p. 173).
[16] Williams, (2014, p. 185 and National Audit Office, 2008).

information, although the evidence suggests that each of these measures did, in other countries, have at least modest pro-compliance effects.

The margin of standard information reporting is certainly at issue, though. The 1099-K initiative regarding credit-card receipts apparently increased compliance of a small segment of sole proprietors, but its effectiveness was undermined by its lack of coverage of expenses or of cash receipts. A cost-benefit analysis of that program using the framework outlined earlier is worth doing.

The FATCA initiative takes information reporting to another level, by requiring/inducing foreign financial institutions to report to the IRS, directly or through their home government, about the foreign accounts of U.S. citizens. Much anecdotal evidence (or is it whining?) suggests that the compliance costs of this effort (mostly borne initially by foreign institutions) are substantial, so (at least from a global perspective) the hurdle should be high for its compliance impact. Moreover, because the compliance effects apply mostly to high-income households, the dollar-against-dollar hurdle is somewhat lower than otherwise. Because much of the world has committed to implement something similar to FATCA, called the Common Reporting System (CRS), by 2016, it behooves the IRS to carefully analyze the early results of the FATCA initiative.[17]

4.4 Better DIF Scores

One of the methods the IRS uses to select returns for examination is computer scoring. The Discriminant Function System (DIF) provides numeric scores for each return that rates the potential for change in tax liability upon audit, based on past IRS experience with similar returns. The Unreported Income DIF (UIDIF) score rates the return for the potential of unreported income. This score is a principal criterion used by IRS personnel to select returns for audit and identifying the items on these returns that are most likely to need review. The IRS puts considerable effort into getting the right formula.

Because the DIF and UIDIF are tightly guarded secrets (but see just below), I have no standing to say that the IRS could do better. But I do have a suggestion and a question. The suggestion is that the IRS make available to academics and private firms (on a controlled basis, of course) a large sample of anonymized returns as filed and as "corrected" by auditors, indicate a menu of possible objective functions (e.g., maximize dollars of noncompliance discovered, number of noncompliant returns discovered, number of noncompliant returns with the amount above a certain threshold discovered), and let them submit a new discriminant formula (NDIF). The IRS would then evaluate these NDIFs on a separate large sample of tax returns as filed and as amended by audit. The reward for discovering a better NDIF is to be specified. I suggest that this would, at relatively small cost, lead us to a better DIF.

My question is why the DIF needs to be such a closely guarded secret. I understand that public knowledge of the formula would facilitate people gaming the probabilities (by say, reporting less

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[17] For full disclosure I must reveal that this sentence is highly self-serving as I, with Niels Johannesen and Daniel Reck, am currently working with the Research and Analysis Division of the IRS to do just this.

charitable deductions than otherwise), but this (if some are of dubious validity) may be exactly the behavior that is socially optimal. But, under the current system, savvy potential evaders make a guess about the DIF (and other audit triggers), and game their reports accordingly. It is not obvious (to me, at least) that complete secrecy is always the best strategy, and I know of no formal proof of this.

4.5 Fine-tuning Penalties and Rewards

Putting aside the severity of punishment, we can also consider other dimensions of penalties. Blank (2014) and Paramonova (2015a, b) discuss "collateral tax sanctions" such as revoking from tax evaders drivers' licenses, professional licenses, or passports from tax evaders. Finland famously uses (and has since 1921) income-dependent sanctions for transgressions such as speeding, shoplifting, and securities laws, and in 2002 assessed a $103,000 fine on a Nokia executive for driving his motorcycle 45 miles per hour in a 30mph zone. Sweden, Denmark, Germany, Austria, France, and Switzerland also have some sliding-scale fines. We should think hard about nonstandard penalties.

4.6 Getting the Money

Although public finance textbooks pooh-pooh its importance, the remittance system can be of first-order importance in efficiently enforcing and administering a tax system. Getting the money from what Logue and Slemrod (2009) call the "low-cost remitters" matters. This lesson has been recognized most clearly in the system of employer withholding most countries use for income and payroll taxes: it is cheaper to deal with collecting the tax liability from a small number of organizations with relatively efficient bookkeeping done for non-tax reasons. As mentioned earlier, we now have evidence from diesel taxes that shifting the remittance responsibility can affect the volume of tax evasion.

Note that some of the information-reporting initiatives discussed in this paper also shift the remittance pattern. The São Paulo system of involving final consumers in the VAT offers rewards to those who participate; in essence, the value of the corroborative information comes with a negative remittance from consumers, which must ultimately be offset by larger remittance elsewhere in the VAT chain, in other taxes, or lower expenditures. The dual landlord-tenant remittance system of the Italian TASI spreads the remittance responsibility and thereby generates corroborative information. The primary tax difference between classifying, say, Uber drivers as employees or as independent contractors is that only in the former case would Uber be responsible for withholding (i.e., remitting) an approximation of the income tax liability the driving produces. The policy message is that, for tax compliance reasons, the borders between efficient and inefficient remittance responsibility need to be defended.

Another aspect of getting the money is collection of undisputed taxpayer debts to the tax authority. After all, the deterrence model focuses on the perceived probability that an evading taxpayer will be penalized, which includes ultimately having to pay up. The field experiments recently done suggest that frequent contact, shaming, and face-to-face contact can accelerate payments. The IRS is to be commended for its participation in field experiments to help determine optimal collection strategy. This is an area where more creative efforts might be rewarded; for example, several states publish the names of the biggest debtors, and believe it helps with payments.

4.7 Informal Economy

A nontrivial fraction of tax evasion in the United States is tied to the informal economy, although that fraction is probably lower than in most other countries. Because other countries have a bigger informal economy problem than the United States (and have different standards about permissible government intrusion), some enforcement strategies have been tried elsewhere already. I discuss, next, some that I find intriguing.

As of 2012, it is illegal in Norway to purchase cleaning services from companies not approved by the labor inspectorate. In many European countries (e.g., Sweden, Poland, Belgium, Bulgaria, Denmark, Greece, Italy, and Hungary) certified cash registers have been used. Since 2010 in Sweden, businesses selling for cash (including debit cards) must have a certified cash register that includes a special black box that only can be accessed by the tax authority; this is in part to counter the use of zappers, software installed on electronic cash registers or other electronic point of sales that allows users to erase recorded transactions. Retailers can use this to skim large amounts of cash and can operate the technology even remotely. Detroit, Michigan was the site of a particularly astounding case where owners of a restaurant zapped $20 million and transferred the funds to Hezbollah.[18] Since 2008 in Sweden, for home renovation and domestic services, consumers can apply for a scheme where they pay the supplier for materials but only half of the labor portion of the fee. The company performing the work then applies to the tax authority for the other half, thus revealing to the tax authority their existence and some of their taxable income and VAT base. New rules introduced in 2015 require the service provider to provide even more information to receive payment for non-labor items. Denmark since 2011 has a regime where consumers can deduct 15 percent of the costs of home maintenance and services if a report of the expenses are sent digitally to the tax authority, in part designed to make declared domestic services cheaper than their shadow economy counterparts.[19]

4.8 Discouraging Cash and Encouraging Engagement with the Financial Sector

Some types of tax evasion are facilitated by transacting in cash; see Morse et al. (2009). In response, some governments have introduced a ceiling for cash transactions—DKK 10,000 in Denmark, €1,000 in Italy, €5,000 in Belgium, and €1,500 in Greece.[20] Others have required POS terminals in, for example, taxis. Although it has been suggested that cash be directly taxed, this has not been widely implemented.[21] There was a tax on cash withdrawals in India from 2005 to 2009, designed primarily as an audit trigger.[22] Alternatively, one could consider providing incentives to use cards. Argentina offers a 5 percent VAT discount on debit card transactions and a 3 percent discount on credit-card purchases. South Korea offers a lump-sum refund if card usage exceeds 20 percent of individual gross income for credit cards and 25 percent for debit cards.[23] Either a tax on cash or a subsidy to the use

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[18] These policies are discussed in greater detail in Williams (2014, pp. 101-103). Zappers and appropriate policy responses are discussed by Ainsworth (e.g., 2010).

[19] Williams (2014, p. 160).

[20] See Williams (2014, p. 103).

[21] See Benshalom (2012).

[22] See Tax Administration Reform Commission (2014).

[23] See Williams (2014, p. 104)

of electronic payment could be justified as a Pigouvian tax/subsidy to address the marginal social cost of difficult-to-monitor-for-tax-purposes transactions. Note that the United States has recently gone in the opposite direction, due to the District Court ruling that allowed stores to charge purchasers a surcharge of up to 4 percent for using a credit card. [24] It is, however, wrong to think that electronization of payments always facilitates tax enforcement. A case in point is electronic cash and cryptocurrencies, such as Bitcoin. According to its press clippings, cryptocurrency is about privacy and resistance to oversight, but it also becomes difficult to enforce certain taxation and financial regulations when online transactions cannot be tracked.[25] The 1099-K initiative discussed earlier also has this disadvantage, cracking down on noncompliance of credit-card sales while leaving cash sales untouched.

Under one of the two plans discussed in the report of the President's Advisory Panel on Federal Tax Reform (2005, p. 128), the Simplified Income Tax Plan, small and medium-sized businesses would have to use designated business bank accounts into which they would deposit all receipts and from which they would make business expenditures. Businesses would be prohibited from making personal expenditures out of, or from commingling personal and business funds in, these segregated business bank accounts. To improve compliance, banks would be required to provide small businesses with an annual summary of account inflows and outflows that would be reported directly to the IRS by the financial institution maintaining the account. Needless to say, this was not adopted, and probably wisely because of its substantial intrusion into the financial affairs of firm owners. Its other compliance suggestion was adopted, the one requiring that issuers of debit and credit cards report to businesses and the IRS payments for credit and debit card purchases of their cardholders; this is the Form 1099-K discussed earlier.

4.9 Process

The IRS is now fully on board with electronic filing, as a way to process returns at lower cost. About 65 percent of all returns processed by the IRS in 2014 were filed electronically; 2 percent of these electronic returns were free-filers and nearly 50 percent were filed by paid tax preparers. It could do more. Two options stand out. The first is the system known alternatively as prefilled or pre-populated returns, already used to some extent in at least 26 countries, and piloted in California. It provides, at no cost to taxpayers upon filing, the information the government already has access to through information returns. It has been attacked as an unwarranted intrusion into the private tax preparation software business; on these arguments, see Holtzblatt (2007) and Bankman (2008). Indirectly it would help compliance if it freed up IRS resources to devote to enforcement, and if it provided taxpayers with a warm glow that ignited their intrinsic motivation to comply (don't hold your breath on that).

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[24] Note that most credit cards now offer purchasers rewards related to usage. These rewards could come in-kind, such as airline miles or hotel stays, or in "cash back" of as much as 2 percent on all purchases or up to 6 percent on selected purchases. These rewards programs offset to some degree any surcharge for credit-card use, and it is notable that the reward percentage is often higher for purchases at gas stations, where cash discounts abound. In-kind rewards for cash payments extend to Ann Arbor, MI, where my favorite take-out Chinese restaurant offers a free eggroll with a cash payment.

[25] See Marian (2013).

Its direct effect on compliance is a priori unclear, and empirical evidence is scarce. One exception is Katakorpi and Laamanen (2013), who estimated the effect on the behavior of taxpayers utilizing data from a policy experiment in Finland in the 1990s under which a proportion of taxpayers received a prefilled income tax return, whereas other taxpayers had to file a full return. They concluded that receiving a prefilled income tax return led to a significant *reduction* in the number of individuals claiming deductions. Although which return one received did not affect the actual chance of evasion being detected, the authors argue that considerations related to tax evasion might be in play if the reform affected individuals' perceived probability of detection: individuals receiving the pre-filled form realized that the tax authorities had information on, for example, their earnings, and may have become worried that the authorities also had information on other items that were not printed on the form. If this is the mechanism behind the results, it would imply that in the new system, some individuals who would otherwise have claimed some deductions to which they were not entitled did not do so upon receiving a prefilled return.

Another option, promoted by Ventry (2011), would involve a centralized database maintained by the federal government. This database would contain most of the information required to file a tax return such as wage information, common deductions, and taxes paid. Taxpayers, professional preparers, and authorities could all access this shared source of information to file taxes. Some filers would still need to input information like charitable deductions. For most taxpayers, however, the "data retrieval system" would considerably simplify the process. They would no longer have to gather the information required from disparate sources. The United Kingdom has taken a leading role in implementing similar online accounts. For example, about 5 million small and medium-sized businesses are slated to manage their tax affairs through a personalized homepage, allowing them to register, file, and remit what they owe for several taxes and see their liabilities for these taxes.

The IRS could also take advantage of improved information technology by offering a "smart" tax return. Bankman et al. (forthcoming) discuss three ways that a smart return could improve compliance. The first involves changing the wording on existing returns to increase the psychological cost of evasion and increase the perceived expectation of detection by, for example, placing the attestation of honesty to the top of the form. The second builds appeals to morality in the return itself through the use of a short phrase containing a "self-relevant" noun, such as "cheater," as in "Please don't be a cheater." Research suggests that this approach might affect behavior more than the standard letter-based appeal to conscience wording such as "the entire community suffers" from evasion or referring to the "compliant majority." The third uses online "conversational agents" to ask adaptive questions. Adaptive questions incorporate information known about the taxpayer, including information from answers to previous questions. Adaptive questioning is commonly used in e-commerce because it is more efficient. In the tax context, it would allow the IRS to ask more focused questions, which should reduce evasion and audit costs. It could also benefit taxpayers by reducing filing time and eliminating the risk of subsequent audit. Adaptive questioning that is part of a data-driven system allows for continuous experimentation and real-time modification of algorithms to incorporate the results of that experimentation.

5. An Excerpt from the State of the Union Address of 2017

"My tax system proposals do not end with bringing the income tax rate structure in line with our values and eliminating unfair and inefficient loopholes. The fairness of the tax system and its impact on economic growth also depend on how well the laws are enforced. Whatever the top tax rate is, it does not contribute to progressivity if high-income people park their money in foreign financial accounts and don't report the income, and it does not help the economy if investment is diverted from where it would do the most good."

"Law-abiding Americans should not have to pay the bills left unopened and unpaid by those who do not play by the rules. That goes for most owners of small businesses, whose contribution to the U.S. economy is so important. The thousands of honest housepainters should not have to struggle to compete with others who shirk their tax obligations and can thereby underprice the honest service providers. Complying with the tax laws is an obligation of all citizens."

"The government has an obligation, as well, to make the tax system as simple and efficient as possible while fairly enforcing the laws. Here are some concrete steps we will take. First, the IRS will be allocated a budget that allows it to do its job well, and continue to do it while respecting taxpayers and providing them with the information they need to comply. Modern data analysis techniques will be employed to identify honest taxpayers and leave them be, while bringing to justice those who are not honest. American taxpayers will also benefit by a modernization of the tax-filing process that will save time and money, and will have the opportunity to go to a highly secure, password-protected website that contains the information the government already has; for most, tax filing will require just a click of a button to prepare as well as file their return."

(Standing ovation from both sides of the aisle.)

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