Business Income Underreporting and Public Finance*

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February 13, 2024

ABSTRACT

This paper proposes a new dynamic theory of business taxation that takes into account income underreporting by owners and potential reputational losses if tax evasion is discovered. Taxpayers are assumed to be of two types: those that are always compliant regardless of opportunity and those that cheat if it is economically beneficial to do so. Opportunities arise in self-employment but, in equilibrium, only for business owners that can weather the costs of an audit, which include fines for past taxes owed and losses in business brand. The theory is used to predict the aggregate and distributional impacts of increased enforcement efforts and then to run policy counterfactuals. In order to assess quantitative impacts, a baseline model is parameterized to be in line with data from the U.S. national accounts and National Research Program (NRP) random audits. The main policy experiments compare the impacts of increased public spending financed either by increased taxation on business incomes or increased enforcement efforts aimed at their owners. Higher enforcement leads to a larger declines in entrepreneurship, less investment in business and financial assets, and lower average business ages. However, changes in business incomes are roughly equal in the two experiments because of selection: higher enforcement drives out owners that are unproductive.

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1 Introduction

Despite the many efforts to improve third-party reporting and shrink the tax gap, estimates of underreported business incomes in the United States remain high, especially for pass-through entities. Using the most recent data from IRS filings and audit compilations, national accountants at the BEA estimate that 34 percent of pass-through income—roughly 700 billion dollars in 2018—was not reported in tax filings.[1] This paper considers the central problem of financing government spending taking these high levels of tax evasion into account. Specifically, we study the impacts of raising additional revenues in the current United States in two ways: with higher business tax rates and with higher enforcement rates of business owners.[2]

To do this, we propose a new theory of business taxation that takes into account income underreporting by business owners and potential loss of reputation if tax evasion is discovered. At its core, it is a theory of dynamic occupational choice, in which individuals can choose to be paid employees and work for someone else or to be self-employed and run their own business. We introduce a central role for the tax authority that can fully monitor wage payments to employees through third-party reporting but cannot observe all receipts and expenses of business owners without audit. We assume that only a fraction of individuals would evade taxation if given the opportunity, but those that would have an obvious advantage in running a business. Whether they choose entrepreneurship however depends on their productivity in paid- versus self-employment and the ultimate tax consequences.

Two key features of the theory make the tax evasion decision dynamic. First, we assume that owners invest in their business's reputation, brands, and customer bases—what we call *sweat capital*—and would lose part or all of the accumulated capital if any tax evasion were revealed. Both state and federal tax authorities publicize details of tax evasion cases, regardless of the income of the individual or the size of the business. Second, we assume that the tax authority can look back at past filings and assess fines on the accumulated stock of unreported income—what we call *back taxes*—which implies an additional motive for precautionary savings in financial assets available to pay future fines if cheating is later detected. In the United States, statutory limits are six years for significant unreported incomes and indefinite for fraudulent filings.

Critical to our modeling choices and the quantification of impacts of enforcement efforts are data from IRS compliance measurement programs. The Taxpayer Compliance Measurement Program (TCMP) conducted in-person, line-by-line audits of returns for a nationally representative random sample of taxpayers over the period 1962–1988—most frequently samples of individuals but, in some years, samples of corporations and partnerships as well. The successor program, the National

[1] Here, we categorize pass-throughs as S corporations, partnerships, and sole proprietorships. If we include C corporations, the BEA estimate for underreported income is 1.1 trillion in 2018 dollars.

[2] In 2022, the U.S. Congress increased funding for IRS enforcement as part of the Inflation Reduction Act.

Research Program, which was established in 2000, has continued the auditing of randomly sampled taxpayers, although the NRP now makes use of third-party information and correspondence when verifying the accuracy of certain lines on the tax form. (For full details, see Internal Revenue Manual (IRM) 4.22.1.4.) The two measurement programs provide estimates of the tax gap—which is the difference between what the IRS estimates to be the true tax liability and the amount received in a timely manner—along with estimates of amounts of underreported incomes (or overstated expenses), amounts of underpayments due to insufficient withholding or late payments, and amounts due from individuals that did not file a tax.

Data from both measurement programs show that business income underreporting accounts for most of the tax gap, which is why this feature of noncompliance is our central focus. Increased third-party reporting of credit card transactions (through Form 1099-K) has curtailed some underreporting, but there are still many businesses with large cash receipts and business that are subject to little information reporting. Even with third-party reporting, owners have opportunities to treat personal consumption expenditures as business expenses. For example, many business owners deduct car and truck expenses, travel, meals, entertainment, and home expenses, which are close substitutes with personal consumption. The IRS random audits are also useful for theory development as certain patterns are emerging from the empirical studies of NRP. For example, data on audits show that while a majority of owners misreport business incomes, underreported incomes and taxes are highly concentrated. Few owners account for most underreporting. Data on audits also show significant underreporting for taxpayers with low or negative incomes.

Other useful data are informed surveys of business owners conducted by the Taxpayer Advocate Service (TAS) of the IRS. We refer to these surveys as *informed* because TAS uses an IRS computer-generated score for each respondent to sort them into low- or high-compliance groups.[3] Of particular interest are the nonpecuniary motives for compliance that would help account for the fact that many of the randomly-sampled business owners cheat little, despite low informational requirements and low audit rates. Survey questions are intended to elicit views on economic deterrence, social norms, trust in government and the tax system, the complexity of complying, and the influence of tax preparers or others in one's social network. (See Luttmer and Singhal (2014) for additional evidence.) Importantly, there are significant differences in responses of those in the low- and high-compliance groups. Owners in the high-compliance group have greater trust in the government and IRS and are more motivated by moral obligations. The differing attitues are motivation for our assumption that some taxpayers are compliant regardless of opportunity.

We parameterize our model using the information from the IRS data and U.S. national accounts and compute the dynamic general equilibrium for this baseline economy. Simulations of the model

[3]TAS uses the Discriminant Index Function (DIF) score, which is the IRS's estimate of the likelihood that an audit would result in an adjustment.

are used to predict the impacts of higher enforcement efforts on two types of business owners: those that have been tax compliant and those that have not. We also construct distributional statistics, ranking owners by the extent of their underreporting and again by a measure of the size of their business. Finally, we run two counterfactuals and compare the results to the model's U.S. baseline. The first counterfactual raises the tax rate on businesses from 40 percent to 47 percent. The second counterfactual raises the probability of tax audit from 2 percent to 5 percent—which is enough to generate the same level of additional revenues. Simulations and counterfactuals reveal clear patterns from the model. Higher enforcement efforts lead to a larger decline in entrepreneurship, less investment in business and financial assets, and lower average business ages. However, changes in business incomes are roughly equal in the two counterfactual experiments because of selection: higher enforcement drives out owners that are unproductive. In effect, we are comparing an economy with businesses that have low capital and high productivity to another with businesses that have high capital and low productivity.

Our work is related to a large and growing literature in public finance focused on tax evasion. Most theories of tax evasion follow the influential work of Allingham and Sandmo (1972), who model the decision to cheat as a static portfolio choice of risk averse taxpayers: each period, taxpayers decide how much of their income to put into the safe asset—and properly included on tax filings—and how much is in the risky asset that faces a potential penalty if an audit occurs. (See also Sandmo (2005) and Slemrod (2019).) Over time, the Allingham and Sandmo (1972) framework has been extended and the idea of modeling tax evasion as a portfolio choice has been introduced into richer heterogeneous-agent models. DiNola, Kocharkov, Scholl, and Tkhir (2021) introduce the standard features of Allingham and Sandmo (1972) into a model of financially-constrained entrepreneurs, for example, as in Quadrini (2000)—along with a fixed cost for underreporting income and penalties that depend on the stock of capital owned by the firm. They use the model to study aggregate outcomes and steady-state welfare when comparing their U.S. baseline to a world with perfect tax enforcement. Fernandez-Bastidas (2023) uses a similar framework to DiNola et al. (2021) to study the impacts of more progressive taxation—although includes a disutility cost of cheating instead of a fixed cost and focuses on the distributional impacts of the policy change.

2 Data

In this section, we summarize lessons from U.S. data to motivate our theory and parameterizations. The main sources of data are IRS programs to assess the extent of tax noncompliance, namely, the National Research Program (NRP), and the Tax Compliance Measurement Program (TCMP).[4]

[4]Throughout this section, we will note whether we are reporting on adjusted or unadjusted data from these programs. In some reporting, the IRS adjusts raw data to include estimates of undetected underreported income, which is found by applying a generalized version of the "detection controlled estimation" (DCE) method developed

Table 1: National Research Program Summary Statistics

Statistic[b]	Amounts by NRP Tax Year[a] 2001	2006	2008	2011	2014	2017	2020	2021
Net tax gap	477	563	475	499	538	575	625	693
Enforced payments	90	124	69	76	85	84	73	70
Gross tax gap	567	686	544	575	623	657	697	763
% Underreporting	82.6	83.6	84.5	79.7	80.2	80.9	79.9	78.8
Underpayment	9.6	10.2	8.5	11.9	11.9	11.6	11.5	9.9
Nonfiling	7.0	6.2	7.0	8.4	7.9	7.5	8.7	11.2

[a] NRP tax years indicate the initial years for each program. Data listed under 2008, 2011, 2014, and 2017 are summaries of programs covering tax years 2008–2010, 2011–2013, 2014–2016, 2017–2019, respectively. Data for 2020 and 2021 are projections.

[b] Tax gaps and enforced payments are reported in billions of 2023 dollars. The gross tax gap is the difference between the true tax liability and the amount paid on time, averaged over the tax years listed in the table. The net tax gap is the gross tax gap reduced by the amount of enforced and other late payments that will eventually be paid. The DCE method is used to adjust the audit data to account for undetected noncompliance. Shares of the gross tax gap for underreporting, underpayment, and nonfiling are shown in the last rows of the table. Source data are available in IRS Publications 5364 and 5365.

Additionally, we will choose parameters so that the national income and product accounts (NIPA) for the model are aligned with those of the United States.

2.1 Underreporting Accounts for Most of the Tax Gap

Since 1979, the IRS has been producing statistics for the *tax gap*, which summarizes taxpayer noncompliance. Two measures are usually reported: the gross and net tax gap. The gross gap is the difference between total taxes owed and total taxes paid voluntarily. The net gap is the difference between total taxes owed and taxes paid after receipt of payments that are late or detected through subsequent audits. The data underlying these estimates come from two programs: the Taxpayer Compliance Measurement Program (TCMP) and the National Research Program (NRP). Both programs use random samples of individual and corporate returns.

The TCMP data are derived from in-person audits that took place between 1962 and 1988. This program was suspended in 1988 because of complaints that these audits were too burdensome and replaced by the NRP, which is still operative today. Table 1 shows the net and gross tax gaps across NRP tax years, including projections for 2020 and 2021. The gap estimates and enforced

by Feinstein (1990). The basic idea is to find multipliers that can scale up the NRP audit adjustments recommended by all examiners to the level of adjustments recommended by the most experienced examiners— who presumably detect the most cheating—controlling for observable characteristics of the taxpayers. For more details, see Erard and Feinstein (2011).

Table 2: Sources of the NRP Underreporting Tax Gap

	Shares by NRP Tax Years[a]							
Sources[b]	2001	2006	2008	2011	2014	2017	2020	2021
Business	62	65	60	55	55	55	53	55
Individuals	38	32	32	31	33	33	33	34
Corporations	11	18	11	11	9	9	8	9
Self-employment tax	14	15	17	13	13	13	12	13
Non-business	38	35	40	45	45	45	47	45
Wages and salaries	4	3	1	3	2	2	2	2
Other	34	32	39	43	43	44	45	43

[a] NRP tax years indicate the initial years for each program. Data listed under 2008, 2011, 2014, and 2017 are summaries of programs covering tax years 2008–2010, 2011–2013, 2014–2016, 2017–2019, respectively.

[b] Sources list the entities and income categories that comprise the underreporting gap. The data in columns are shares attributable to each source by the NRP tax year.

payments are reported in billions of 2023 dollars. These data include taxes owed by all taxpayers—both business and non-business. The table shows that over the 20 year period, both the net and gross tax gaps have mostly trended upward, peaking in tax year 2021. To give it a macroeconomic perspective, the gross tax gap was 3 percent of GDP and 28 percent of federal income tax receipts in 2021.

There are three components that make up the tax gap: underreporting, underpayment, and nonfiling. Underreporting is an understatement of the tax liability that occurs because the taxpayer either underreports incomes or overstates deductions and credits. Underpayment is a failure to pay taxes when they are due. Finally, nonfiling is a failure to file a return. The last three rows of Table 1 show the shares of the gross tax gap arising from these three sources. We see that underreporting accounts for most of the gap. Earlier data from TMCP also show that underreporting of taxes is the largest component of the gap. For example, in tax year 1987, underreporting of individual and small corporate income accounted for 70 percent of the tax gap. (See Internal Revenue Service (1988).)

2.2 Business Incomes Account for Most Underreporting

The underreporting tax gap is typically attributed to four sources: individual income tax, corporation income tax, employment tax, and estate tax. For our purposes, the more relevant decomposition is business versus non-business since business income is the main source of underreporting.

In Table 2, we report this decomposition by constructing the shares attributable to each source

Table 3: Underreported Tax Gap Shares by Information Reporting

Extent of Reporting[b]	Shares by NRP Tax Year[a]							
	2001	2006	2008	2011	2014	2017	2020	2021
Substantial	11	11	11	13	12	12	12	11
Some	28	31	17	22	23	24	25	32
Little	61	58	72	66	66	64	62	57

[a] NRP tax years indicate the initial years for each program. Data listed under 2008, 2011, 2014, and 2017 are summaries of programs covering tax years 2008–2010, 2011–2013, 2014–2016, 2017–2019, respectively. Data after 2016 are projections.

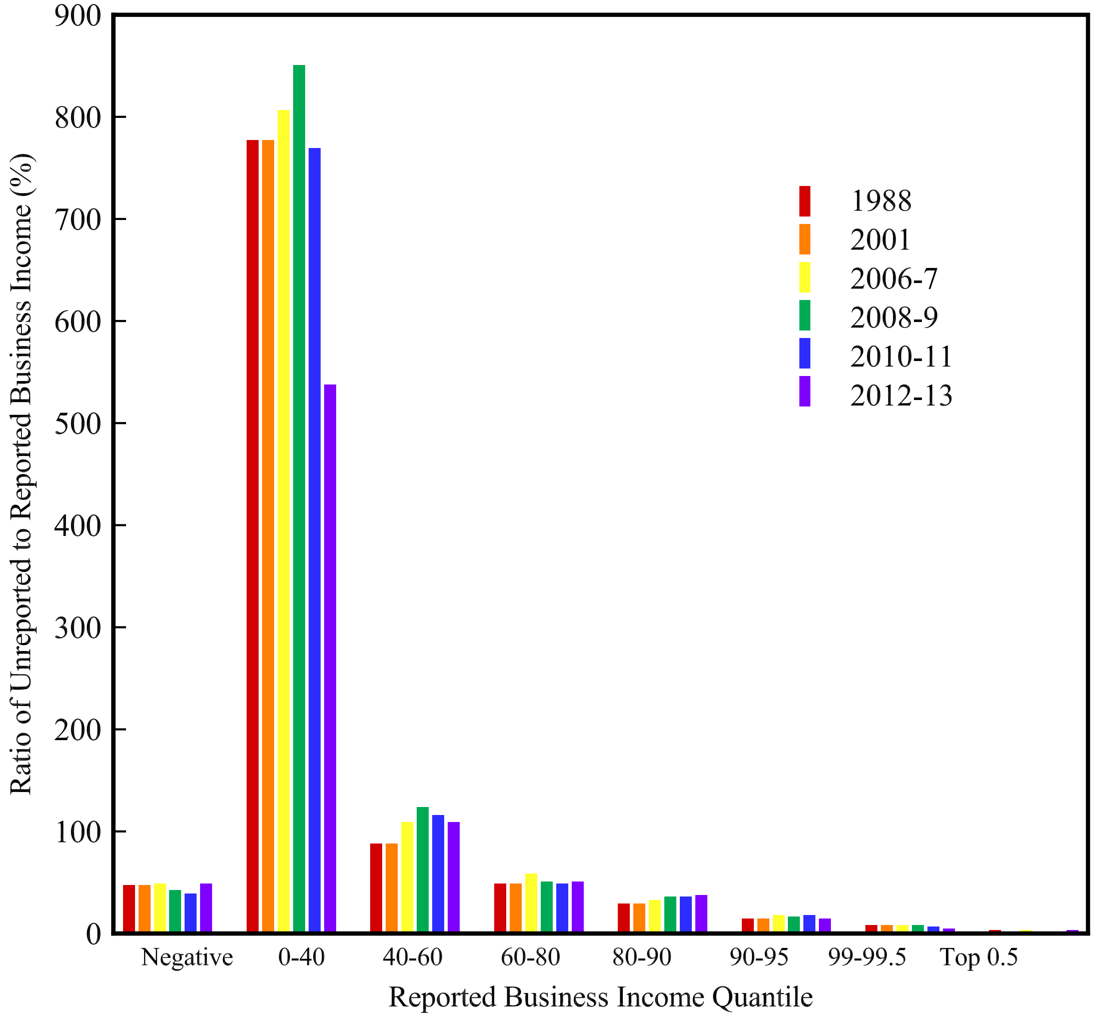
[b] The rows are shares of individual income taxes with different reporting requirements. Wages, salaries, pensions, annuities, unemployment compensation, dividend income, interest income, State income tax refunds, and taxable Social Security benefits are subject to *substantial* third-party reporting. Incomes from partnerships, S corporations, capital gains, and alimony are subject to *some* informational reporting. Incomes from nonfarm proprietorships, rents, royalties, farms, and other sources are subject to *little* to no informational reporting.

in all NRP tax years. The business underreporting by individuals is done by pass-through business owners and sole proprietors that file Schedule C Form 1040. These business owners are responsible for roughly one-third of the underreporting in most years. The business underreporting by corporations is done by both C corporations—both large and small—that pay corporate income tax at the entity level. Corporations are responsible for roughly 10 percent, with 2006 being an outlier at 18 percent. The business underreporting through employment tax is the self-employment tax of taxpayers filing Form Schedule SE. This source has accounted for roughly 15 percent through time. Overall, the business underreporting has fallen in the range of one-half to two-thirds of all underreporting in all NRP tax years. The remainder is lumped into non-business, which is primarily attributable to income categories other than wages and salaries. These other categories include gambling winnings, capital gains and distributions, pensions, interest, and dividends.

2.3 Most Business Income Subject to Little Information Reporting

The fact that business incomes account for most underreporting is in large part because most owners are subject to little informational reporting. In Table 3, we report shares of the individual income tax underreporting attributed to three sources of income: income subject to *substantial* reporting, for example, third-party filings and withholding for paid employees; income subject to *some* reporting, for example, Schedule K-1 forms filed by partners and S corporation owners with their share of business distributions; and income subject to *little* to no reporting, for example, incomes of most sole proprietors. The latter two categories are the relevant ones for business

Figure 1: Underreporting to Reporting Ratios for Business,
TCMP Tax Year 1988, NRP Tax Year 2001–2013



Notes. Source of data is IRS administrative data reported in Auten and Langetieg (2023), Figure 3B. No DCE adjustments have been made.

owners and they account for most of the gap. They account for almost 90 percent of the individual underreporting gap.

What these results tell us is that business owners have ample opportunities for noncompliance. We turn next to data that highlight the extent of noncompliance across the distribution of business incomes.

2.4 Most Owners Underreport Business Incomes

In Figure 1, we show the rates of underreporting by business income quantile for the TMCP 1988 and NRP tax years 2001–2013. (See Auten and Langetieg (2023) for complete details.) The business owners included in these data file individual income tax Form 1040 with Schedule C (sole proprietors), Schedule E (rent and royalties, farm rent, partnerships and S corporations), or Schedule F (farms). The underreporting rate is calculated as the ratio of underreported business income to reported business income, which is then multiplied by 100.

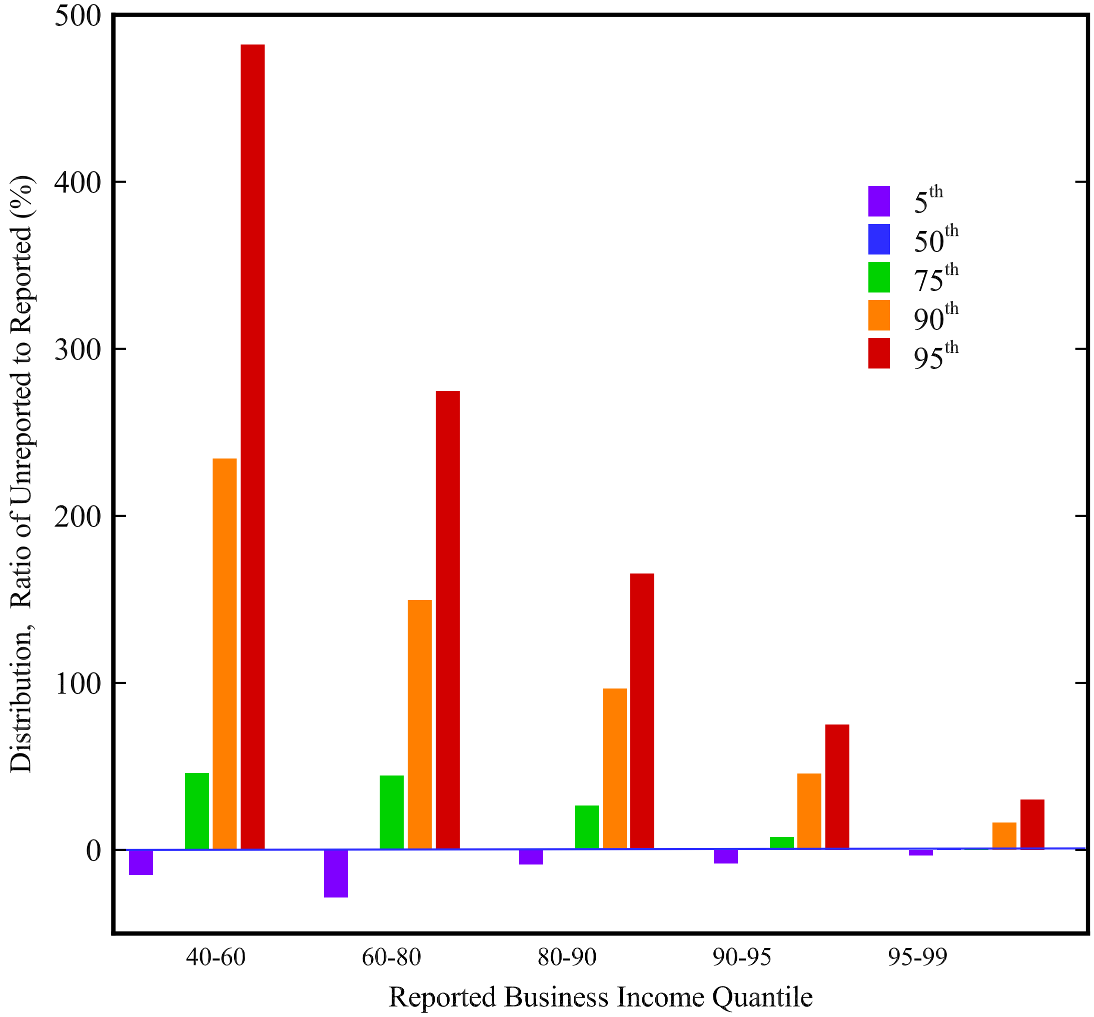
There are several noteworthy features of the data plotted in Figure 1. First, there is significant underreporting even for those with losses. If shown separately, we would see that the the reported losses are roughly twice as large as the true losses. When shown as a ratio, we see that the underreporting rate is close to 50 percent for most of the program years. Second, the owners in the range of 0 to 40 percentile are clearly an outlier—in part because the denominator of the ratio can be low. For the data shown here, returns with less than \$500 of business income was omitted, but there are enough cases with income above \$500 with so much underreporting that the rates are close to 800 percent. Third, the distribution above the 40th percentile still shows significant underreporting, which declines with income. For owners in the 40th to 60th percentiles, the underreporting ratio is roughly 100 percent when averaged across years. For owners in the 60th to 80th percentiles, the underreporting ratio is about 50 percent. The ratio continues to fall from 30 percent in the 80-90th bracket down to below 5 percent for the top 0.5 percent of reported incomes.

As further evidence of widespread underreporting, the General Accounting Office (GAO) used unadjusted NRP data for tax year 2001 and analyzed returns of sole proprietors that file Schedule C with their Form 1040 tax return. (See General Accounting Office (2007) for complete details.) The GAO estimated that at least 61 percent of owners in their study underreported their net business income. Many of these proprietors would be in the lower percentiles of Figure 1, which includes all business owners. For example, the GAO reports that two-thirds of the proprietors had net incomes less than 25,000 dollars, which is equal to 32,500 in 2023 dollars. But, it is the lower percentiles where the ratios are highest and that is why the sole proprietors are of particular interest for tax compliance studies.

2.5 Few Owners Account for Most Underreporting

While cheating is widespread, random audits reveal that a small proportion of owners account for most of the understated taxes. To see this, consider the TCMP and NRP samples of business owners filing either Schedule C, E, or F. Here, to avoid issues with incomes that are close to zero or negative, we consider only taxpayers ranked 40th and above by reported incomes (as shown in Figure 1). We can break them into groups and, For each subgroup by reported income percentile—for example the 40–60, the 80–90, and so on—we can rank them in terms of their ratios of underreported to reported incomes. For example, suppose that we take all taxpayers between the 40th to 60th percentile in reported income. We can further rank the taxpayers in this group by their ratios of underreported

Figure 2: Distribution of Underreporting Ratios for Business, Averaged over NRP Tax Years 2006–2013

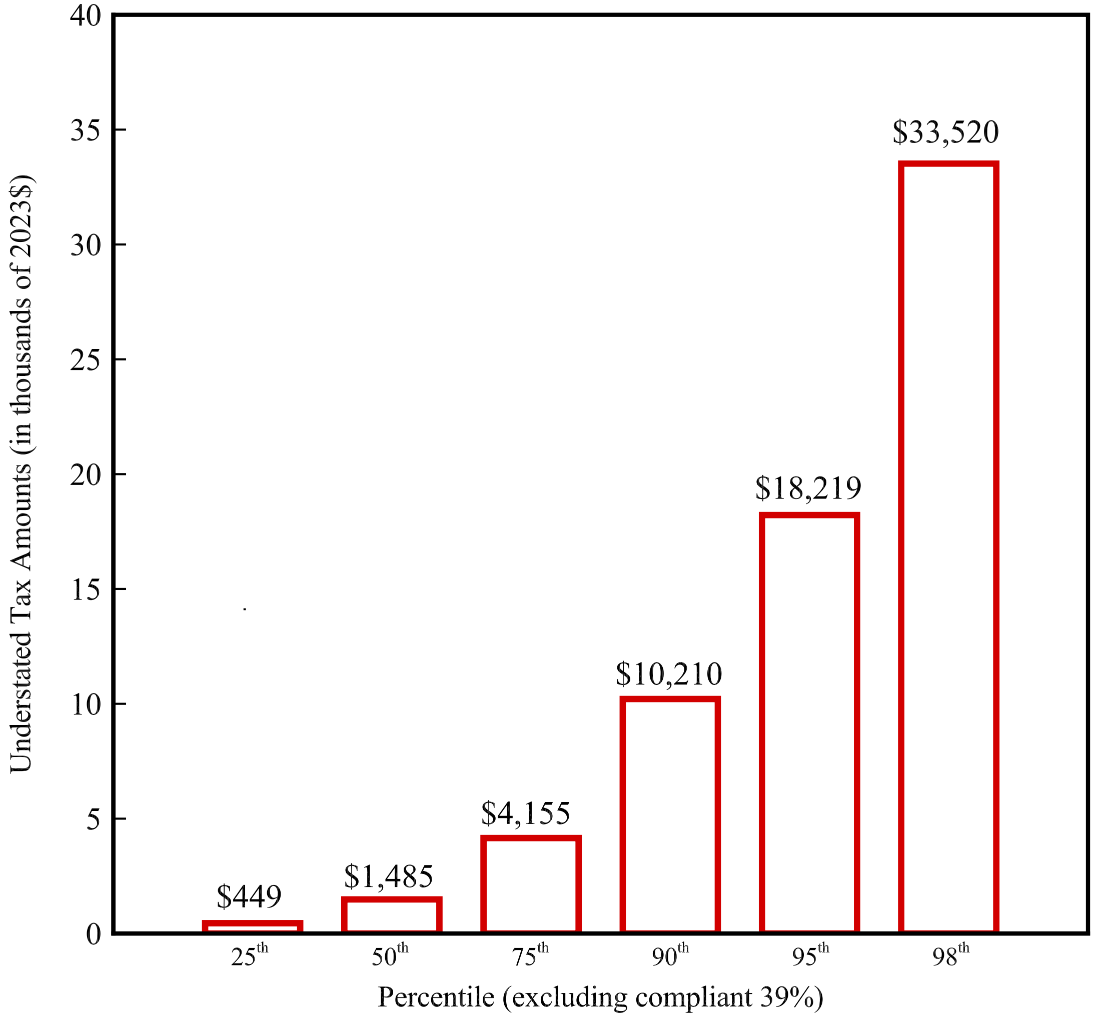


Notes. Source of data is IRS administrative data reported in Auten and Langetieg (2023), Figure 3C. No DCE adjustments have been made.

to reported incomes. In Figure 2, we show the results of this second ranking. In this case, we report the distributional statistics for the underreporting ratios of the subgroups at the 5th, 50th, 75th, 90th, and 95th percentiles. Here, as before, these disaggregated data are not DCE-adjusted.

There are several noteworthy features of Figure 2 First, the 50th percentile is barely visible across subgroups. To emphasize this fact, we drew the x-axis with the same blue as the 50th percentile. The import of this result is that half of the distribution has zero or negative underreporting, where the latter is possible if the taxpayers (likely accidentally) overreported incomes. Second, most of the distribution is above the 90th percentile regardless of which reported-income subgroup we analyze. Third, as before, we see an overall decline in the underreporting ratios with

Figure 3: Understated Tax Amounts for Form 1040 with Schedule C,
NRP Tax Year 2001



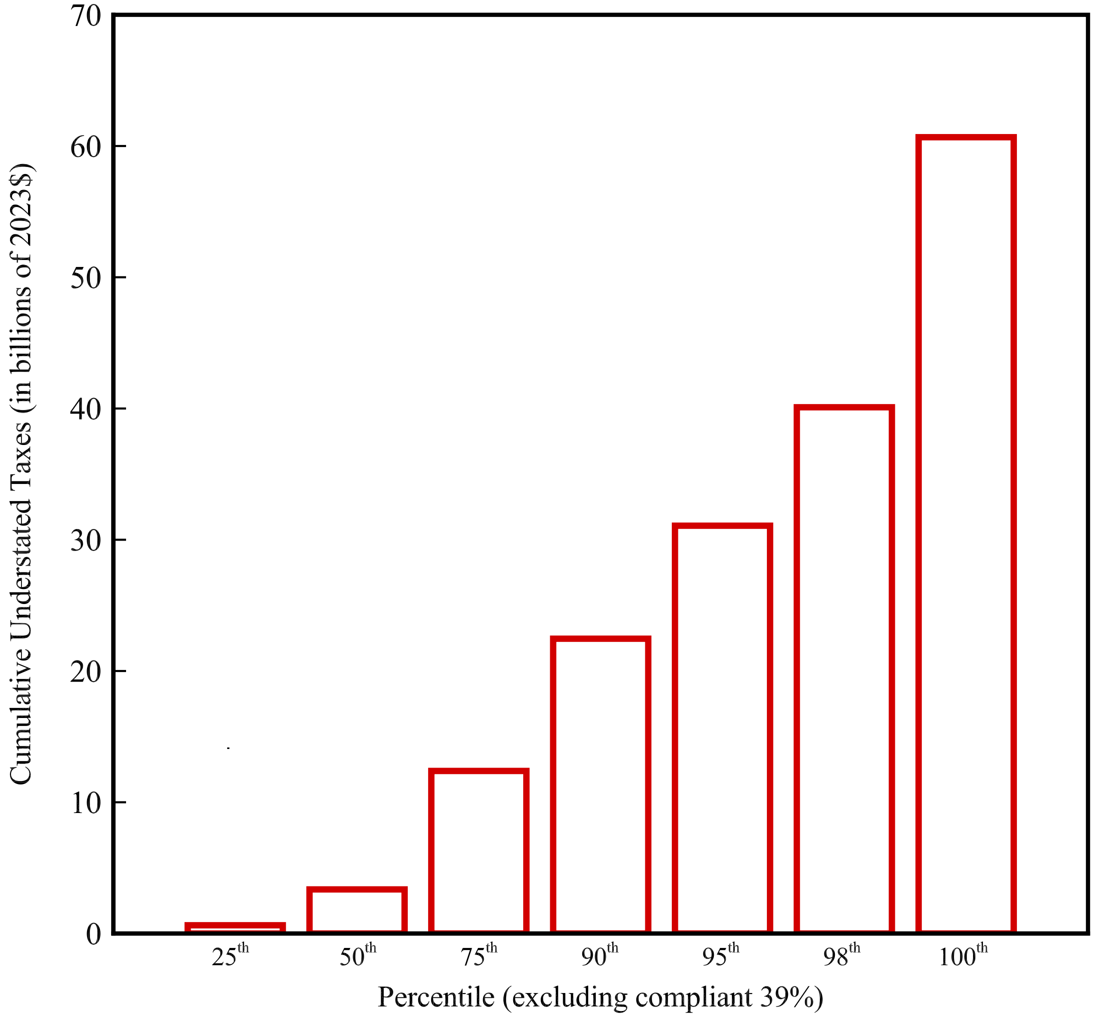
Notes. Source of data is IRS administrative data reported in General Accounting Office (2007) Figure 4, with amounts inflated to 2023 dollars. No DCE adjustments have been made.

reported incomes, but now we see this at all ranks of the distribution.

The GAO study of sole proprietors in the 2001 NRP provide further evidence of concentrated underreporting. Figure 3 shows the distribution of understated tax payments in 2023 dollars. Note that the figure only includes the 61 percent of randomly selected returns with understatement and audit amounts shown have not been DCE adjusted. At the 25th percentile, the amount of understated tax is less than $500 in 2023 dollars. Even at the 50th percentile, the amounts are still less than $1,500. Amounts reach over $10,000 by the 90th percentile.

Without any DCE adjustments made to the NRP data, the total understated amount is equal to 60.7 billion in 2023 dollars. If the taxes understated across the distribution are cumulated, as

Figure 4: Cumulative Understated Amounts for Form 1040 with Schedule C, NRP Tax Year 2001



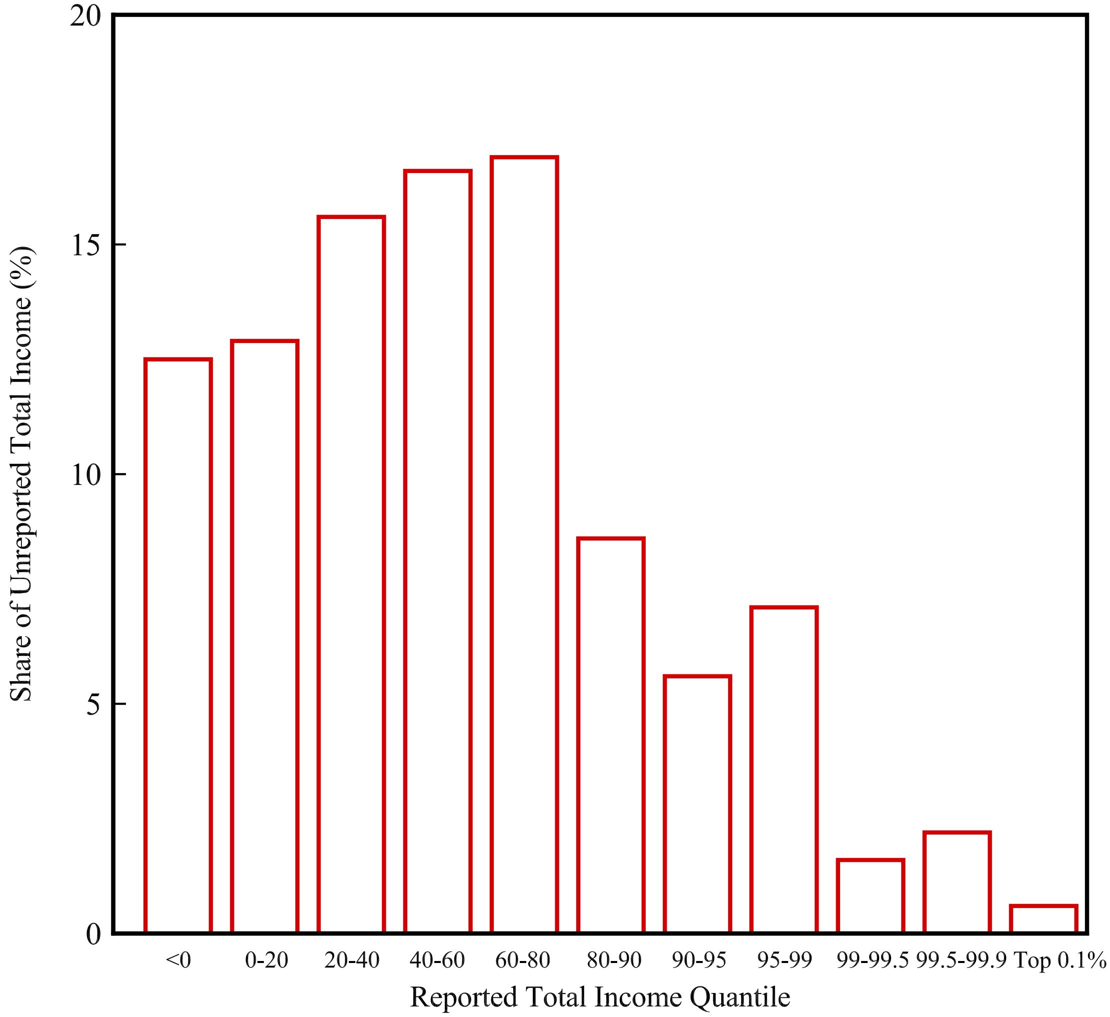
Notes. Source of data is IRS administrative data reported in General Accounting Office (2007) Figure 5, with amounts inflated to 2023 dollars. No DCE adjustments have been made.

shown in Figure 4, then we again see the high concentration of tax evasion. At the 90th percentile, the cumulated total tax is only 22 billion, which means that two-thirds of the understated tax is owed by the top 10 percent of those when ranked by understatements.

2.6 Lowest Shares of Unreported Incomes in Top Income Groups

Although few taxpayers account for most underreporting, data based on the TCMP and NRP show that the lowest shares of unreported income are attributable to the top income groups. In Figure 5, we plot the shares of unreported incomes—again without any DCE adjustment—for all taxpayers

Figure 5: Shares of Unreported Total Income,
Averages for Tax Years 1988–2013



Notes. Source of data is IRS administrative data reported in Auten and Langetieg (2023), Figure 1C. No DCE adjustments have been made.

across the reported total income distribution.[5]

If, alternatively, we had ranked taxpayers by their corrected (audit plus reported) income or by their positive incomes only, the main takeaway does not change: the top income groups still have the lowest shares. These alternative income measures primarily change the estimates for the lowest incomes because of the fact that misreporting is concentrated for taxpayers with low incomes and losses. On the other hand, if taxpayers are ranked by estimates of "true" AGI with detected income added back and DCE adjustments—which is the case in the studeies of Johns and

[5]These statistics are only available publicly for total incomes, which is an IRS gross income measure before deductions and allowances are made to get their "bottom line" adjusted gross income (AGI) measure.

Slemrod (2010) and DeBacker, Heim, Tran, and Yuskavage (2020)—then shares for the top incomes do increase. For example, using the NRP data for tax years 2006–2014 and ranking taxpayers by an audit-corrected measure of AGI, DeBacker et al. (2020) estimate that the share of unreported income for the top 1 percent in AGI before any DCE adjustment is 15 percent—significantly higher than the 4.4 percent share of reported total income shown in Figure 5. With the DCE adjustment, the share is 28 percent. As Auten and Langetieg (2023) point out, how to distribute undetected incomes—especially losses in business—is still being debated, but what is most relevant for research in noncompliance is overwhelming evidence that underreporting occurs across the distribution, not just at the top.

2.7 Surveyed Owners Report Nonpecuniary Motives for Compliance

The fact that few taxpayers account for most tax underreporting has been a central puzzle of research on tax compliance. Given that rates of audit are low—less than 2 percent for most taxpayers—and there is little informational reporting required for certain types of income, one might expect greater noncompliance by more of the population with opportunities to cheat.

Surveys conducted by the Taxpayer Advocate Service (TAS) of the IRS offer some insights into this puzzle. In 2013, TAS reported results of telephone surveys of sole proprietors for two samples: a nationally representative one (with a 56 percent response rate) and another in selected communities (with a 54 percent response rate). In both surveys, taxpayers were asked questions intended to elicit attitudes about government policy, the IRS, and compliance. Prior to the calls, TAS had gathered information about past compliance of all respondents (through DIF scores) and could therefore compare answers across taxpayers who were more or less likely to be compliant. Having this information ex ante is useful because it can potentially uncover other reasons for taxpayer compliance besides the obvious one that high perceived penalties outweigh gains from cheating. Tax compliance might instead stem from nonpecuiary motives. For examples, differences in compliance across taxpayers could stem from their differing views on whether the government tax system is fair and benefits all citizens. They could stem from differences in taxpayers' sense of moral obligation. They could stem from differences in beliefs about the likelihood that others pay their taxes.

According to the TAS findings and conclusions, the surveys do reveal differing attitudes of the low- and high-compliance groups. From the national survey, TAS concluded that "the high-compliance group expressed more trust in government and the IRS" when compared to the low-compliance group. From the community survey, TAS concluded that "the high-compliance community respondents were motivated by morals and deterrence" whereas those in the low-compliance group were "suspicious of the tax system and its fairness." In modeling the taxpayer, we can use the fact that there are measurable differences in attitudes across taxpayers that correlate with their behaviors.

3 Theory

In this section, we describe an economy inhabited by individuals that choose paid- or self-employment taking factor prices and government tax policy and regulatory system as given. These individuals have preferences for goods produced by private firms owned and directly managed by self-employed business owners and goods produced by larger public firms that are indirectly owned by shareholders who hire managers. Individuals save in financial assets and, in the case of business owners, invest in business assets such as customer bases and brands. In equilibrium, prices, employee wages, and interest rates are such that markets for goods, labor, and assets clear.

In order to study tax policy and compliance, we incorporate several key features motivated by the IRS data described in Section 2. First, we allow for underreporting incomes—and hence taxes—to the tax authority by business owners. As noted earlier, underreported taxes account for most of the tax gap and underreported incomes are mostly attributable to business owners, given the limited information reporting required. Second, we allow the tax authority in the model, as in the data, to detect past cheating and collect back taxes and fines. IRS examiners apply periods of limitations for auditing income tax returns. The statute of limitations is 6 years if there is unreported income that exceeds 25 percent of gross income, and it is indefinite if a fraudulent return is filed. Third, we allow for loss of reputation and business brand if the owner is audited and found to have cheated. In the extreme, their sweat capital stock becomes worthless. In actual cases, this is possible because state and federal authorities publicize information about the tax evasion. Finally, we allow for two permanent types of individuals: those who are *always* compliant regardless of their opportunities to misreport and those who are *potentially* compliant and would underreport income if given an opportunity. As noted earlier, many business owners face little third-party informational reporting and thus have opportunities to evade taxes, but not all of them do. Thus, we want to allow for nonpecuniary motives to be compliant.

3.1 Individuals

We start with the optimization problems of individuals in the economy. Every period, individuals choose to be a worker or a business owner. Let $s = [a, \kappa, d, z, \epsilon]$ be the vector of state variables in a particular period, where a is the stock of financial assets, κ is the stock of sweat capital, d is the stock of back taxes, z is productivity in business, and ϵ is productivity in labor. Let $V^b(s)$ be the value of running a business and let $V^w(s)$ be the value of earning a wage in paid employment with the state vector s. Then, the occupational choice is the solution to

$$V(s) = \max\{V^b(s), V^w(s)\}. \tag{1}$$

We denote the choice vector for potential business owners by x_b with elements as follows: next period financial assets a'; next period sweat capital κ'; next period stock of back taxes d'; consumption of private sector goods c_p; consumption of public sector goods c_c; leisure ℓ; physical capital in production k_p; owner hours in production h_p; owner hours in building the business h_κ; owner expenses in building the business e; consumption that is expensed on the job c^r; and reported taxable net income y_b^r.

The dynamic program solved by an owner is given as follows:

$$V^b(a,\kappa,d,z,\epsilon) = \max\nolimits_{x_b} \{U(c,\ell) + \beta \textstyle\sum_{z',\epsilon'} \text{prob}(z',\epsilon'|z,\epsilon) W(a',\kappa',d',z',\epsilon')\}, \tag{2}$$

where U is the utility function, c is a consumption bundle over c_p and c_c, and $\text{prob}(\cdot|\cdot)$ is the transition matrix for productivity in self- and paid-employment (z,ϵ). Next period's value is a weighted sum of (i) the value of not being audited and (ii) the value of being audited, with weights given by probability $\Pi(d')$:

$$W(a',\kappa',d',z',\epsilon') = (1-\Pi(d'))V(a',\kappa',d',z',\epsilon') + \Pi(d')V(a'-f_a(d'), f_r(\kappa'), 0, z', \epsilon'), \tag{3}$$

where f_a is the fine that must be paid in the event of an audit, f_r is the reputational cost to the business of revealed tax evasion. For example, suppose $f_r(\kappa') = 0$ if d' is over a certain threshold, and $f_r(\kappa') = \kappa'$ otherwise. This would be the case of full reputational loss of the stock of sweat capital κ if sufficient tax evasion is revealed. For owners that are always compliant, we can either replace W with V in (2) or assume that the probability of an audit is 0.

The maximization on the right hand side of (2) is subject to several constraints, which we describe next. The first is the budget constraint:

$$a' \leq [(1+r)a + y_b - T^b(y_b^r) + \chi - (1+\tau_c)(c_c + pc_p)]/(1+\gamma), \tag{4}$$

which is written in per capita terms with γ equal to the economy's growth rate. Assets next period cannot exceed incomes from current financial asset holdings, $(1+r)a$, plus business income, y_b, net of taxes, $T^b(y_b^r)$, that are paid on reported income, y_b^r, plus transfers, χ, with consumption expenditures inclusive of consumption taxes, $(1+\tau_c)(c_c + pc_p)$, subtracted off. The tax rate on consumption is equal to τ_c and the relative price of privately produced consumption is p. Production of the private sector good uses inputs of business sweat capital, κ, owner hours, h_p, and rented capital, k_p. There are two measures of business income: true income denoted as y_b and reported income y_b^r, which is the amount shown on tax filings. The income measures are as follows:

$$y_b = py_p - (r+\delta)k_p - e \tag{5}$$

$$y_b^r = y_b - (1+\tau_c)c^r, \tag{6}$$

where private output is $y_p = zf_p(\kappa, h_p, k_p)$ and c^r is on-the-job consumption inclusive of taxes that is reported with other expenses on the business tax form. Note that this consumption is over and above the expensing done for legitimate business purposes (namely, e). The amount $(1+\tau_c)c^r$ can be thought of as the sum of ineligible expenses and underreported receipts—here, all that matters is the difference between true and reported *net* income.

The maximization problem in (2) is also subject to the following constraint governing the evolution of sweat capital:

$$\kappa' = [(1-\delta_\kappa)\kappa + f_\kappa(h_\kappa, e)]/(1+\gamma), \tag{7}$$

where $f_\kappa(h_\kappa, e)$ is new investment that depends on the owner's time (outside of production activities) and expenses. Importantly, there is reputational content to these assets that can be lost if the owner is caught evading taxes. Here, that shows up as a potential reduction in the stock with $f_r(\kappa) < \kappa$. Time used to build sweat capital, along with time in production and time in leisure, must sum to the allowable time:

$$h_\kappa + h_p + \ell = 1, \tag{8}$$

normalized here to equal 1.

The final constraints are related to back taxes, which affect the probability of being audited and the precautionary saving motive for future fines if caught. We assume that

$$d' = [(1-\delta_d)d + f_d(c^r)]/(1+\gamma), \tag{9}$$

where d is the current balance of back taxes and δ_d is an estimate of taxes that will never be collected, even if the taxpayer is audited. This might include misreported incomes or expenses that are impossible to detect even with audit. They might include tax forgiveness after a certain statutorily prescribed period of time has passed. The term $f_d(c^r)$ is the current unpaid taxes, for example,

$$f_d(c^r) = \tau_b(1+\tau_c)c^r \tag{10}$$

in the case that the tax on business income was proportional with a rate equal to τ_b. Because audits result in fines, we also include a constraint on the stock of financial assets:

$$a' \geq f_a(d'), \tag{11}$$

where $f_a(d')$ is the fine that depends on the accumulated stock of back taxes.

Next, we consider the dynamic programming problem of an individual in paid employment that has state s. Let x_w be the vector of choices for a paid employee that include next period financial assets, a', consumption of private sector goods c_p, consumption of public sector goods c_c, and leisure ℓ. The dynamic program in this case is given by

$$V^w(a,\kappa,d,z,\epsilon) = \max\nolimits_{x_w} \left\{ U(c,\ell) + \beta \sum\nolimits_{z',\epsilon'} \text{prob}(z',\epsilon'|z,\epsilon) W(a',\kappa',d',z',\epsilon') \right\}, \tag{12}$$

where the continuing value is (3) and the same for business owners. The maximization is subject to a constraint on the budget, which is given by

$$a' \leq [(1+r)a + w\epsilon h_w - T^w(w\epsilon h_w) + \chi - (1+\tau_c)(c_c + pc_p)]/(1+\gamma). \tag{13}$$

Assets next period cannot exceed incomes from current financial asset holdings, $(1+r)a$, plus wage income, $w\epsilon h_w$, from working h_w hours at productivity level ϵ net of taxes, $T^w(w\epsilon h_w)$, plus transfers, χ, with consumption expenditures inclusive of consumption taxes, $(1+\tau_c)(c_c+pc_p)$, subtracted off. With the individual's time allocation normalized to 1, leisure ℓ cannot exceed $1-h_w$.

Since individuals switch between paid- and self-employment, the value functions V^w and W in (12) must also depend on the sweat capital stocks, κ, and undetected back taxes, d. We assume that these stocks depreciate, but possibly at a different rate if the individual does not continue in the business. More specifically, we assume that the maximization problem has the following additional constraints:

$$(1+\gamma)\kappa' = (1-\lambda_\kappa)\kappa \tag{14}$$

$$(1+\gamma)d' = (1-\lambda_d)d, \tag{15}$$

where λ_κ is the rate of deterioration of the business brands, reputation, and customer bases when not being used and λ_d is the rate of tax forgiveness on past taxes owed if the owner is no longer with the business.

3.2 Corporations

Next, we turn to the optimization problem of corporations.[6] Corporations use technology F to produce output y_c with inputs of capital, k_c, and labor, n_c:

$$y_c = AF(k_c, n_c), \tag{16}$$

where A is the economy-wide level of total factor productivity. Each period, they choose investment, x_c, and labor, n_c, to maximize firm value for their shareholders, that is,

$$V^c(k_c) = \max_{x_c,n_c}(1-\tau_d)d_c + \tfrac{1+\gamma}{1+r}V^c(k_c'), \tag{17}$$

where d_c is the pre-tax dividend paid to shareholders, which is equal to sales wage payments, investment, and corporate taxes, and x_c is gross investment in corporate capital, which is equal to net investment plus depreciation at rate δ_k:

$$d_c = y_c - wn_c - x_c - \tau_p(y_c - wn_c - \delta_k k_c), \tag{18}$$

$$x_c = (1+\gamma)k_c' - (1-\delta_k)k_c. \tag{19}$$

The tax rates on dividends and profits are given by τ_d and τ_p, respectively.

[6] Here, we have in mind larger C corporations that are more diversified and face less risk than the business owners described above.

3.3 Government

Government finances per capita spending on goods and services, g, transfers, χ, and interest payments on borrowing, b, with a host of taxes and penalties on misreported incomes. More specifically, the following budget constraint must hold each period:

$$
\begin{aligned}
g + \chi + (r - \gamma)b = \tau_c & \int (c_{ci} + pc_{pi})\, di + \\
& + \tau_d(y_c - wn_c - (\gamma + \delta_k)k_c - \tau_p(y_c - wn_c - \delta_k k_c)) \\
& + \tau_p(y_c - wn_c - \delta_k k_c) + \int T^n(w\epsilon_i n_i)\, di \\
& + \int T^b(y_{ri}^b)\, di + \int \mathbf{1}_i f_a(d_i)\, di.
\end{aligned} \tag{20}
$$

3.4 Equilibrium

An equilibrium is a set of individual allocations indexed by by, namely, $\{c_{ci}, c_{pi}, e_i, a_i, n_i, k_{pi}, y_{pi}\}$ and corporate allocations $\{k_c, n_c, y_c, d_c, x_c\}$ plus prices (p, w, r), and government policies that clear both goods markets, the asset market, and the labor market:

$$\int c_{ci}\, di = y_c - \left(\int e_i\, di + (\gamma + \delta_k)(k_c + \int k_{pi}\, di) + g\right) \tag{21}$$

$$\int c_{pi}\, di = \int y_{pi}\, di \tag{22}$$

$$\int a_i\, di = (1 - \tau_d)k_c + \int k_{pi}\, di + b \tag{23}$$

$$\int n_i\, di = n_c, \tag{24}$$

where it is assumed that tangible capital investments, business expenses, and government purchases are corporate sales.

4 Calibration

In this section, we discuss modeling choices, including functional forms for preferences and technologies and parameter values. Our main objective is to have a baseline that is aligned with U.S. national accounts and tax policies.[7]

For preferences, we use a standard isoelastic functional form defined over the consumption bundle c and leisure ℓ:

$$U(c, l) = \frac{(c^{1-\psi}\ell^{\psi})^{1-\sigma} - 1}{1 - \sigma} \tag{25}$$

$$c = (\omega c_c^{\rho} + (1 - \omega)c_p^{\rho})^{\frac{1}{\rho}}. \tag{26}$$

[7]The current version of the model is missing a few features necessary to align the model national accounts with the United States. These features will be added in the next draft.

In order to get consumption spending shares and per capita hours in line with data, we set $\psi = 0.58$, $\sigma = 2$, $\omega = 0.8$, and $\rho = 0.01$. Two additional parameters that affect preferences over time are the discount factor β, which was set equal to 0.98, and the economy-wide growth rate γ, which was set equal to 2 percent.

There are three production technologies with functional forms given by:

$$f_p(\kappa, h_p, k_p) = \kappa^{\phi} k_p^{\alpha} h_p^{\nu} \tag{27}$$

$$f_\kappa(h_\kappa, e) = \zeta(h_\kappa^{\vartheta} e^{1-\vartheta}) \tag{28}$$

$$F(k_c, n_c) = k_c^{\theta} n_c^{1-\theta}. \tag{29}$$

The first function takes as inputs the sweat capital, κ, the rented physical capital, k_p, and hours of the owners, h_p. To ensure that shares of incomes in the model and data are aligned, we set ϕ=0.15, α=0.3, and ν=0.55. The second function takes as inputs hours of the owners h_κ and expenses e. The parameters for this function are set equal to ζ=1 and $\vartheta = 0.4$. The third function is the corporate production technology with capital and labor inputs, k_c and n_c. This technology is Cobb-Douglas with $\theta = 0$ to ensure comparable estimates for corporate shares in the national accounts. Levels of the capital stock inputs depend on depreciation rates, which are set equal to δ_k=0.041, δ_κ=0.058, and λ_κ=0.5.

Next consider parameters for tax policy and administration. Tax rates are chosen to be consistent with U.S. effective rates, which implies that τ_c=0.065, τ_b=0.4, τ_w=0.4, and τ_p=0.36. Similarly, the transfer and debt levels are set so that the model ratios of these variables relative to GDP are aligned with U.S. data. For that, we need χ=0.136 and b=1.3. The government spending g is set residually to ensure budget balance. The functions and parameters summarizing the policies of the tax administrator are set as follows:

$$f_d(c^r) = \tau_b(1 + \tau_c)c^r \tag{30}$$

$$f_a(d) = \bar{p}d \tag{31}$$

$$\Pi(d) = \pi, \tag{32}$$

with $\bar{p} = 4$ and π= 2 percent. We choose $\bar{p}$ in include the owed taxes, the 75 percent penalty plus 1 percent monthly interest payments plus account and lawyer fees. The audit probability is set at $\pi = 2$ percent for the baseline but varied when we do comparative static exercises and counterfactual policy analyses. For the baseline model, we assume cheaters have full reputational loss following an audit and, therefore, set $f_r(\kappa) = 0$ if d is above a threshold (which in our baseline parameterization is 0.01). We assume the fraction of the population that potentially cheats is 20 percent. This choice ensures that the aggregate business misreporting in the model is consistent with imputations for misreporting in the U.S. national accounts. We assume that the depreciation of the accumulated stock of back taxes is 20 percent, both for business owners and paid employees that ran businesses in the past. These depreciation rates are intended to capture statutory limits for auditing past returns.[8]

5 Results

In this section, we discuss two sets of results. The first set includes basic predictions of the model parameterized above with U.S. data and comparative statics as we vary enforcement measures. The second set of results are policy counterfactuals. Here, we are interested in studying alternative means of raising additional government revenues. Of particular interest is a comparison between public finance through higher taxes on business incomes and increased enforcement efforts aimed at business owners.[9]

5.1 Predictions

We start by reporting comparative statics as we vary the probability of audit π from a low of 1 percent to a high of 7 percent. This increase in audting raises revenue collected—taxes plus fines—by roughly 6 percent. In Table 4, we show the predicted changes in key variables for all business owners (upper panel) as well as those that will cheat if benefits outweigh costs (middle panel) and those that are always compliant (lower panel). Not surprisingly, with increased enforcement efforts, the fraction of the population running a business falls. In this case, the fall in the share is roughly linear in the audit rate, reaching -17 percent for $\pi = .07$. At that point, the non-compliant share is lower by 70 percent and the compliant share is up 45 percent. The average age of businesses also falls, although the decline is much faster: even with an increase from $\pi = 1$ to $\pi = 2$ percent, we find the average business age falls 30 percent. At $\pi = 7$ percent, the average business age is nearly in half as compared to the economy with $\pi = 1$ percent. Compositionally, the average non-compliant business age falls 68 percent while the average compliant business age rises 18 percent. To see the differences visually, we plot the distribution of business ages for two cases in Figure 6. The red line marked "non-compliant owners if π=1 percent" is the distribution for the reference case in Table 4. The blue line marked "compliant owners if $\pi = 1$ percent and all owners if $\pi = 7$ percent" shows the distribution for three separate cases that are so close that they can be shown as one line. They are close because an audit probability of 7 percent is sufficiently high to guarantee economic deterrence for virtually all owners.

The fact that an audit probability of 7 percent ensures close to full compliance is also evident in our predictions for the underreporting amounts c^r and stocks of back taxes d shown in Table 4. In the case of all owners, the estimated declines are roughly linearly until full compliance. If we

[8] All estimates of compliance parameters are subject to change with better micro data.

[9] In later versions, we will also consider the transitional dynamics following policy changes.

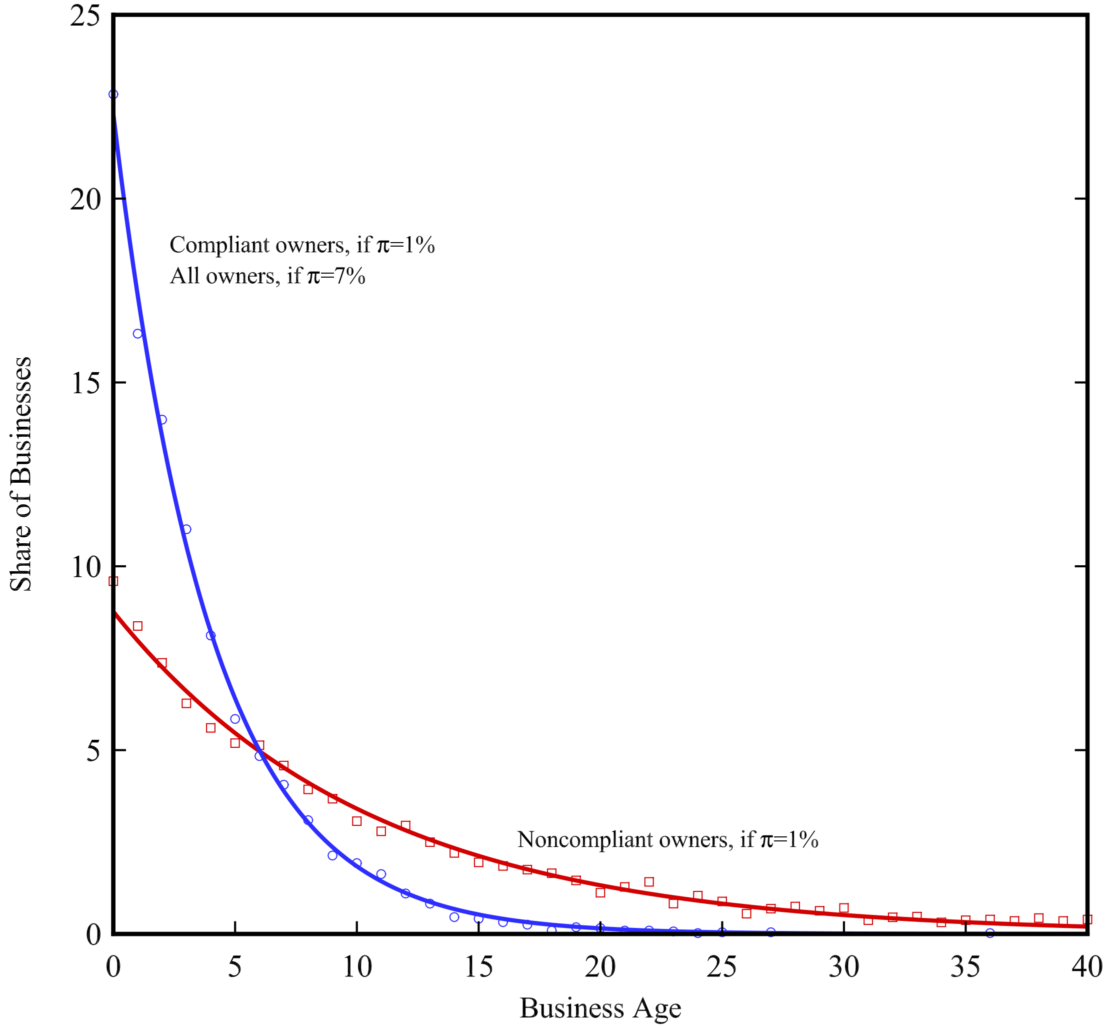
Table 4: Comparative Statics Varying Audit Probabilities

	Audit Probability Changed From 1% to:			
% Change in:[a]	2%	3%	5%	7%
All owners				
Fraction of population	−6	−9	−12	−17
Business age	−30	−42	−49	−49
Underreporting c^r	−11	−26	−58	−99
Back taxes d	−21	−42	−73	−99
Financial assets a	−10	−18	−30	−36
Sweat capital κ	−4	−9	−15	−12
Productivity z	6	9	10	11
True income y_b	6	8	10	11
Non-compliant owners				
Fraction of population	−21	−35	−60	−70
Business age	−33	−50	−64	−68
Underreporting c^r	5	5	−7	−97
Back taxes d	−6	−17	−41	−98
Financial assets a	−4	−9	−29	−57
Sweat capital κ	−9	−14	−37	−31
Productivity z	9	16	25	27
True income y_b	6	7	2	9
Compliant owners				
Fraction of population	11	23	43	45
Business age	5	8	15	18
Financial assets a	5	12	28	39
Sweat capital κ	12	13	21	21
Productivity z	0	0	−1	−2
True income y_b	5	8	11	11

[a] The percent change is taken after taking a conditional average across owners of different types in the simulations.

consider only the non-compliant owners, however, we only see a quantitatively significant change only if audit rates are sufficiently high. In other words, their decision rules have a bang-bang pattern: these owners underreport as much as possible to lower reported incomes to zero, holding back only if they have insufficient assets to pay future fines. Their need for precautionary savings to pay fines is also evident in the predictions for changes in financial asset holdings. Increasing the audit probability results in an overall decrease in average financial assets for business owners, which

Figure 6: Distribution of Owners by Age of Business
Model with Audit Probability of 1% and 7%



Notes. Source of data is simulations of the model with $\pi = .01$ and $\pi = .07$. The distribution over business ages is computed for the two economies and the two types of owners (always compliant and not always compliant). Because they are indistinguishable, we plot the results for the compliant in the $\pi = 1$ economy and for both types in the $\pi = 7$ economy together as one line.

is driven primarily by less need for precautionary holdings for the non-compliant. Going from an audit probability of 1 to 7 percent, we find the percent change in average financial asset holdings to be −57 percent for the non-compliant and 39 percent for the compliant.

Increased enforcement efforts also impact production in critical ways. Business owners that are non-compliant are typically less productive. They are more likely to choose business than their compliant peers because of the economic gain from tax cheating. As long as they have sufficient financial asset holdings and audit rates are low, they can avoid paying taxes, can live off of their assets, and can pay fines if ever they need to. With increased enforcement, the tax cheaters

Table 5: Distributional Statistics by Extent of Underreporting
Baseline Model with $\pi = 2\%$

% Deviations Relative to Sample Averages:[a]	% of Business Income Underreported: None	Less than 80%	Between 80 & 90%	Between 90 & 99%	Greater than 99%
Business age	−37	−18	19	4	67
Underreporting c^r	−100	194	299	309	108
Back taxes d	−99	73	207	158	138
Financial assets a	−40	−63	−30	−4	79
Sweat capital κ	−21	63	59	51	23
Productivity z	7	11	14	13	−16
True income y_b	−10	111	107	93	−7
Shares of owners (%)	59	2	2	4	33

[a] The percent deviations are based on simulations of the baseline model. For each group g of business owners, averages are computed. The statistic reported is the percent deviation of these group averages relative to the sample average: $100(\sum_{i \in g} x_i / [s_g \sum_i x_i] - 1)$, where s_g is the share of owners. If the average for a group is the same as the average for the full sample, the percent deviation is 0. Groups are listed in the table columns.

decline in numbers, business ages shrink, and with greater churn, less sweat capital is accumulated. Furthermore, the greater are the reputational costs of being caught, the lower are their incentives for building these business assets for any given audit probability. In Table 4, the prediction for the decline in κ is 12 percent overall and 31 percent in the case of non-compliant owners. The flip-side of this is the average productivity levels: with greater enforcement there is a selection effect as the non-productive, non-compliant owners find it economically better to do paid employment. In these comparative static exercises, we find higher true business income because we are not holding g fixed across these economies. More is produced in the economy with $\pi = 7$ percent than the economy with $\pi = 1$ percent.

Next, we take the baseline economy—with π equal to 2 percent—and analyze the distribution of owners by first sorting them on the extent of their underreporting and then sorting them on a measure of size. Table 5 reports results for the distribution after ranking business owners by the extent of their underreporting. Businesses are put into five categories: those that do not underreport; those that do underreport but are ranked under the 80th percentile of underreporters; those between the 80th and 90th percentiles; those between the 90th and 99th percentiles; and those above the 99th. Since we have many businesses that are able to achieve zero reported profits,

Table 6: Distributional Statistics by Business Receipts
Baseline Model with $\pi = 2\%$

% Deviations Relative to Sample Averages:[a]	Quintiles of Business Output				
	(1)	(2)	(3)	(4)	(5)
Business age	−21	6	−21	14	21
Underreporting c^r	−99	−58	−42	40	160
Back taxes d	−39	8	−48	−25	103
Financial assets a	19	12	−1	−6	−23
Sweat capital κ	−57	−13	−15	36	49
Productivity z	−21	−17	10	14	14
True income y_b	−113	−68	5	72	104
Share underreporting (%)	32	47	26	36	57

[a] The percent deviations are based on simulations of the baseline model. For each group g of business owners, averages are computed. The statistic reported is the percent deviation of these group averages relative to the sample average: $100(\sum_{i \in g} x_i/[s_g \sum_i x_i] - 1)$, where s_g is the share of owners. If the average for a group is the same as the average for the full sample, the percent deviation is 0. Groups are listed in the table columns.

y_b^r, we define the underreporting rate as $100(y_b - y_b^r)/y_b$ to avoid infinite rates.[10] The percent deviations that are reported in the table are relative to sample averages, and thus 0 means the group average is equal to the sample average. We also report the share of owners in each category in the last row of the table.

There are several noteworthy patterns in Table 5. Starting with the percent deviations, we find owners that are compliant—either by nature or by choice—are on average younger, have less financial wealth, less business wealth, lower income, but are 7 percent more productive than the average owner. At the other extreme are the top underreporters, who are able to push their taxable business incomes close to zero. They are older, have more financial wealth, more business wealth, but are 16 percent less productive than the average owner. The underreporters in the middle of the distribution actually do more per capita underreporting—with c^r and d deviations that are much higher than those at the top—in large part because they are more productive and earn more. They fall in the middle of this distribution because they do not have enough financial assets to weather an audit. That fact tempers their noncompliance. From the last row of the table, we see that underreporrting is concentrated in the model, although there are too many owners with taxable income at zero when compared to the data.

[10] Recall that the underreporting rates from the TCMP and NRP studies are usually defined as $100(y_b - y_b^r)/y_b^r$.

Table 7: Policy Counterfactuals: Enforcement versus Taxation

% Changes in:[a]	Economy Comparisons More Audits π =5% vs 2%	 Higher Tax Rate τ_b=47% vs 40%	 More Audits vs Higher Tax Rate
Number of owners	−7	−4	−3
Noncompliant	−50	12	−55
Compliant	29	−18	56
Business age	−28	16	−38
Underreporting c^r	−52	18	−60
Back taxes d	−66	44	−76
Financial assets a	−22	14	−32
Sweat capital κ	−11	6	−16
Productivity z	6	−3	9
True income y_b	4	4	0

[a] Means of variables listed in the rows of the table are computed for a cross-section of business owners after simulating three different economies: the baseline economy with an audit probability of 2% and two alternative economies that raise the same additional revenue relative to this baseline. In the first alternative, revenue is raised through increased enforcement, and in the second, revenue is raised with higher tax rates on business income. The percent changes in means reported in the three columns are calculated as the changes in the high-enforcement economy when compared to the baseline, the high-tax economy when compared to the baseline, and the high enforcement economy when compared to the high-tax economy, respectively.

Table 6 repeats the exercise but uses business receipts in quintiles when ranking owners. As before, we report the percent deviations relative to the average. The last row in this case is the share of owners in each quintile that underreport income. Interestingly, as in the data, there is underreporting across the size distribution. This can be seen in the rows for c^r, d, and owner shares. Variables related to production, such as sweat capital, productivity, and true income vary predictably with receipts. However, financial assets are negatively correlated with receipts, which is consistent with the fact that the tax evaders, who have larger asset holdings, are not the most productive and would not have the highest business receipts.

5.2 Counterfactuals

Starting with our baseline economy matched to the United States (with $\pi = 2$ percent and τ_b= 40 percent), we now compare two policy reforms intended to raise the same additional public funds, first by raising the audit probability π and second by raising tax rate on business income τ_b.

The results of these reforms are shown in Table 7. The first column of the table reports the percent changes compared with the baseline economy after raising π to 5 percent. The second column reports the percent changes compared with the baseline economy after raising τ_b to 47 percent. The last column reports the percent changes comparing the case with higher π to the case with higher τ_b. Both reforms raise revenues by 3 percent relative to the baseline level.

What Table 7 makes clear is how different the post-reform economies are in many ways despite the fact that the change in business sector income is the same. Both reforms yield an increase in true business income by 4 percent relative to the baseline economy, but the source of the increase is completely different. First, note that there is a 50 percent decline in the number of non-compliant owners with higher audit rates as opposed to a 12 percent increase with higher tax rates. These changes are not completely offset by changes in the number of compliant owners and thus we do find a drop in entrepreneurship in both cases—7 percent with higher enforcement and a 4 percent with higher taxation. The average business age is 28 percent lower in the economy with more auditing, implying more churn relative to the baseline, and 16 percent higher in the economy with more business taxation.

The changes in the composition of owners is accompanied by changes in investment and production. With higher enforcement efforts, underreporting is down 52 percent, back taxes are down 66 percent, and owners need for precautionary savings is down: financial assets fall by 22 percent. On the other hand, if audit rates remain low and business tax rates are increased, we see the opposite because non-compliant owners are incentivized to cheat more: underreporting rises by 18 percent, the stock of back taxes rises by 44 percent and financial asset holdings rise by 14 percent. Differences in the two reforms are also apparent in production patterns. As we saw earlier with the comparative statics exercises, higher enforcement drives out unproductive owners, but more audits means more churn and less accumulation of sweat capital—reputation, brands, customers, and so on. Relative to the baseline, in the economy with more auditing, sweat capital is lower by 11 percent and productivity is higher by 6 percent. If additional revenue is raised through taxation, we find the reverse: intangible capital is higher by 6 percent and productivity is lower by 3 percent with the entry of non-compliant and unproductive owners.

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