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THE DISTRIBUTION OF INCOME TAX NONCOMPLIANCE

Andrew Johns and Joel Slemrod

This paper uses newly available data from the IRS to assess the distributional consequences of U.S. federal income tax noncompliance for the tax year 2001. We find that, when taxpayers are arrayed by their estimated "true" income, defined as reported income adjusted for underreporting, the ratio of aggregate misreported income to true income generally increases with income, although it peaks among taxpayers with adjusted gross income in the 99.0 to 99.5 percentile. In sharp contrast, the ratio of underreported tax to true tax is highest for lower-income taxpayers.

Keywords: tax evasion, tax gap, income distribution

JEL Codes: D31, D63, H26

I. MOTIVATION AND INTRODUCTION

In this paper we use the newly available data from the IRS's most recent comprehensive study of individual income tax noncompliance, the National Research Program, to assess the distributional consequences of income tax noncompliance in the U.S. federal income tax for the tax year 2001. We find that, when taxpayers are arrayed by their estimated "true" income, defined as reported income adjusted for the underreporting estimated by the IRS tax gap methodology, the ratio of aggregate misreported income to true income generally increases with income, although it peaks among taxpayers with adjusted gross income in the 99.0 to 99.5 percentile. In sharp contrast, the ratio of underreported tax to true tax is highest for the lowest-income taxpayers. This contrast in results reflects the fact that a given percentage reduction in taxable income corresponds to a particularly high percentage reduction in tax liability for taxpayers with taxable income just above the taxpaying threshold. Much of the distributional pattern of noncompliance is associated with the fact that on average high-income taxpayers receive their income in forms that have higher noncompliance rates. But this is not the whole story because similar, although not identical, patterns apply to misreporting per-

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centages of given income sources. The inequality of true adjusted gross income (AGI), as measured by the Gini coefficient, is slightly below that of reported AGI, while the inequality of true AGI minus reported income tax is slightly higher than that of reported AGI minus reported income tax.

II. DATA SOURCE AND METHODOLOGY

The estimates in this paper are based on data from the National Research Program (NRP) Individual Income Tax Reporting Compliance Study for the 2001 tax year, supplemented with IRS-calculated estimates of unreported income that examiners were unable to detect.[1] The methodology for measuring the individual income tax underreporting gap has three components: (1) errors detected by examiners during random audits, including over-reporting of deductions, offsets, and credits, (2) adjustments for unreported income that the examiners were unable to detect during those audits, and (3) average marginal tax rates applied to the total estimated underreporting of each type of income and to the over-reporting of offsets to income. Adjustments for undetected income are based on an econometric technique called "detection controlled estimation" (DCE).[2]

For tax year 2001, the NRP selected a stratified random sample of approximately 45,000 returns. Data exclusions, primarily due to data anomalies, resulted in a subset of 36,699 returns that was used for the tax gap analysis.[3] Sample details are shown in Table A1. Each case in the original sample was given a base weight equal to the inverse of the probability of selection. These weights were then adjusted to account for the excluded cases, so that estimates could be projected to the overall population.

During an initial classification stage, case-building materials such as third-party information returns, prior-year returns, and dependent information were collected by NRP and then reviewed by experienced examiners referred to as classifiers. Based on the results of these reviews, some returns were accepted as filed (i.e., were reasonably believed to have no under-reporting) without any examination, while others were assigned to either correspondence or face-to-face audits.[4]

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[1] For details, see U.S. Department of the Treasury (2005a, 2005b, 2005c) and Plumley (2005).

[2] Also included is an estimate of unreported tip income based on typical industry tipping rates, which was allocated proportionally to the amount of tip income actually reported.

[3] An example would be if a taxpayer reported $20,000 of what should be Schedule C income as wage income. Because the type of income may have employment tax consequences, the examiner may increase Schedule C income by $20,000 and decrease wages by $20,000. Line-item compliance estimates generally exclude cases like this example in which the taxpayer enters the income on the wrong line or schedule. Although procedures had been put in place to identify these misclassification errors, initial results showed inconsistencies in how they were handled, and for this reason some returns were excluded from the analysis.

[4] Correspondence audits were limited to returns with at most three compliance issues that could be addressed through documentation requests sent to the taxpayer. Of the 36,699 returns used for this analysis, 84 percent were subject to face-to-face audits, 9 percent were accepted as filed, and 6 percent were subject to correspondence audits. In the remaining (less than 1 percent of) returns, the taxpayer did not respond to the notice, did not show up for the examination, or mail addressed to the taxpayer was returned as undeliverable.

If a return was assigned to be audited, then the classifier identified which issues, or lines on the returns, were mandatory for the examiner to audit. It was at the examiner's discretion whether to extend the examination beyond those classified lines. It was also at the discretion of the examiner to extend the examination to flow-through entities of which the taxpayer was a partner or shareholder. If the examiner did audit the flow-through entity, e.g., a partnership or S corporation, those results are reflected in the tax gap estimates. Although the detection-controlled estimation methodology, discussed below, likely accounts for some portion of flow-through income that was not detected during the examination, it is not known whether it accounts for the majority of underreported flow-through income.[5]

The IRS then applied DCE to those returns subject to audit, in order to adjust for unreported income that examiners were unable to detect.[6] The DCE methodology, developed in Feinstein (1990, 1991, 2004) is based on a joint maximum likelihood estimation of two equations: (1) a noncompliance equation that models the total amount of underreported income, and (2) a detection equation that models the fraction of noncompliance detected by the IRS examiner. The noncompliance equation models underreported income using a censored regression model and assumes a displaced log-normal distribution. The log of the unobserved magnitude of noncompliance, with a displacement parameter, is modeled as a tobit function of a set of return characteristics as well as dummy variables for various ranges of positive income.

The detection equation allows for the possibility that the ability of IRS examiners to detect noncompliance varies systematically across examiners and classifiers. The model estimates the fraction of detected unreported income modeled as a linear combination of a vector of return characteristics that proxy for the complexity of the return (the number of issues examined and the type of audit) as well as characteristics of the examiner such as the examiner's pay scale grade and, for those examiners who perform a sufficient number of audits in the sample, a fixed individual effect.

As Feinstein (1991) acknowledges, estimating the examiner detection rate is fraught with identification problems, as that rate is never actually observed — what is observed is the product of the true noncompliance rate and the detection rate. As Feinstein

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[5] The IRS has recently completed an NRP study of S corporations that filed returns for tax years 2003 and 2004. The results from that study may be used to supplement future individual income tax underreporting gap estimates.

[6] In IRS tax gap studies prior to the tax year 2001, estimates of the amount of income not detected during the random audits consisted of multipliers based on a comparison with tax year 1976 audit results from the Taxpayer Compliance Measurement Program (TCMP), a precursor of the NRP, where examiners did not have use of information reporting (IRP) documents with the income reported on those documents. The results of the comparison showed that, for every $1 detected without the use of IRP documents, another $2.28 went undetected. This resulted in the use of a 3.28 multiplier for prior tax gap estimates, with some variations depending on type of income. Feinstein (1991) reports that aggregate tax gap estimates for tax years 1982 and 1987 based on the DCE methodology are remarkably similar to those based on the previous IRS methodology. For background on detection controlled estimation models, see Feinstein (1990, 1991, 2004) and U.S. Department of the Treasury (1996). The 2001 DCE methodology was developed by Brian Erard and Jonathan Feinstein under contract with the IRS.

(1991, p. 33) puts it, "… a given level of average detected violation may be due to a high frequency of evasion and a low frequency of detection … or to the opposite." An intuition for how the DCE procedure resolves this fundamental identification problem is provided in Feinstein (1991, p. 33) who notes, "… the DCE estimates may be seen as tying down absolute detection rates by finding a set of "best" examiners in the data and assigning them the highest detection rates; all other examiner rates are then determined by comparing their performance to these top examiners."

The DCE analysis was done separately for two groups of returns. A return was allocated to one of the following groups: (1) Returns without reported Schedule C or Schedule F profit or loss, and with reported total positive income (TPI)[7] less than $100,000, or (2) Returns with reported Schedule C or Schedule F profit or loss, or with reported total positive income greater than or equal to $100,000. Within each of these two tax return groups, noncompliance equations were then estimated separately for total income and for "low-visibility" income subject to little or no information reporting, which included farm or nonfarm proprietor income, income from a partnership or S corporation, rental or royalty income, gains or losses reported on Form 4797, and income reported on the Form 1040 "other income" line. "High-visibility" income had at least some systematic information reporting and included wages and tips, interest and dividends, state and local tax refunds, alimony, capital gains, pensions, unemployment compensation, and Social Security income.

The noncompliance equations that resulted from the DCE analysis were used to estimate the amount of total income underreporting (i.e., detected plus undetected) and the amount of low-visibility income underreporting. Unreported high-visibility income was then set to the difference between these two DCE estimates. Each DCE estimate for total underreported income was divided by the amount of underreporting actually detected. This procedure generates four separate "multipliers," one for each type of return and income-visibility category:

Non-business returns with reported TPI < $100,000
    Low-visibility income: 4.158
    High-visibility income: 2.009
Business returns or returns with reported TPI > $100,000
    Low-visibility income: 3.358
    High-visibility income: 2.340.

The DCE multipliers were then used to calculate, on a return-by-return basis, line-item net misreported amounts (NMAs) by multiplying the amount of underreported income detected during the NRP audit by the appropriate one of the four DCE multipliers. The multiplier was applied only to the detected underreporting of a line item if the sample return was selected for face-to-face audit and the examiner detected some underreported income. Note that this technique assumes that detection rates are similar across line items

[7] Total positive income (TPI) is generally the sum of all positive income amounts reported on individual income tax returns, and therefore excludes negative net income amounts.

within each type of return and income-visibility category. The use of the DCE multipliers will understate estimates of undetected income for some taxpayers, and almost certainly will do so for the class of returns subject to correspondence audits and those audited returns where no income underreporting was detected, because no adjustment is made in these cases. Conversely, it may overstate estimates of undetected income for other taxpayers. Note specifically that the use of the multipliers implicitly allocates undetected income in proportion to the amount of income that was detected, within a given income visibility category. To the extent that certain types of low-visibility income are harder to detect than others, the use of the DCE multipliers may also overstate or understate the amount of noncompliance for some income sources.[8]

Note finally that the individual underreporting gap estimates reported here focus only on misreporting on returns filed on a timely basis, and therefore do not take into account all noncompliance by individual taxpayers; the IRS estimates a separate tax gap for individual nonfilers, which includes late-filed returns. Nor do the estimates explicitly account for income derived from illegal activities. If the NRP examiner found income from illegal activities during the audit, that income is included but, as this would have been detected incidentally, it likely represents a very small portion of the whole.

III. NET MISREPORTING

A. Net Misreporting by Income Source

Table 1 presents the aggregate tax gap figures for 2001, by income source, based on the NRP study (U.S. Department of the Treasury, 2006) for the individual income tax and estimates extrapolated from earlier studies for other taxes.[9] The overall gross tax gap estimate is $345 billion, which amounts to 16.3 percent of estimated actual (paid plus unpaid) tax liability.[10] Of the $345 billion estimate, the IRS expects to recover $55 billion through late payments and enforcement actions, resulting in a "net tax gap"— that is the tax not collected — for tax year 2001 of $290 billion, which is 13.7 percent of the tax that should have been paid.

As discussed in Slemrod (2007), about two-thirds of all underreporting of income happens on the individual income tax. For the individual income tax, understated income — as opposed to overstating of exemptions, deductions, adjustments, and credits — accounts for over 80 percent of individual underreporting of tax. Business

[8] The estimates based on the DCE-adjusted NRP subset do not come with standard errors, but we can infer something about the confidence surrounding estimates by looking at Table A1, which shows the number of tax returns, by income class, that comprise the sample.

[9] The second column of Table 1 may refer to the percentage of the corresponding true amount of income, offsets to income, credits, or tax depending on the row of the table.

[10] This percentage is not much different than earlier estimates based on extrapolations from the tax gap studies based on 1988 TCMP data (for example, U.S. Department of the Treasury, 1996). However, taking into account changes in methodology and the uncertainty of the estimating procedures, one cannot conclude that the noncompliance rate has remained steady, as opposed to trending up or down.

Table 1

Components of the 2001 Individual Income Tax Underreporting Gap

	Tax Gap ($billion)	Percentage of the Corresponding True Amount
Gross Tax Gap	345	16.3
Underreporting	285	
Individual Income Tax	197	18
Underreported Nonbusiness Income	56	4
Wages and salaries	10	1
Net capital gains	11	12
Taxable pension annuities, IRA distributions	4	4
Taxable interest and dividends	3	4
Other	28	38
Underreported Business Income	109	43
Nonfarm proprietor income	68	57
Partnership, S corporation, estate and net trust income	22	18
Rent and royalty net income	13	51
Farm net income	6	72
Overreported Offsets to Income	15	4
Deductions	14	5
Exemptions	4	5
Statutory adjustments to income	–3	–21
Overreported Credits	17	26
Employment Tax	54	7
Self-employment tax	39	52*
FICA and unemployment taxes	15	2*
Corporation Income Tax	30	17*
Large (>$10 million assets) corporations	25	14*
Small (<$10 million assets) corporations	5	29*
Estate and Excise Taxes	4	4*
Nonfiling	27	1*
Individual Income Tax	25	2*
Other	2	2*
Underpayment	34	
Individual Income Tax	23	2*
Corporation Income Tax	2	1*
Other	9	1*
Enforced and Other Late Payments	55	3*
Net Tax Gap (tax not collected)	290	13.7*

Source: Slemrod (2007), calculated from U.S. Department of the Treasury (2006).
Note: Only the figures for the individual income tax and the self-employment tax are based on IRS National Research Program results; the rest are IRS extrapolations from earlier tax gap estimates.
* Calculated by the authors.

income, as opposed to wages or investment income, accounts for about two-thirds of the understated individual income. Taxpayers who were required to file an individual tax return, but did not, accounted for slightly less than 10 percent of the gap. While the individual income tax comprises about two-thirds of the estimated underreporting, the corporation income tax makes up slightly more than 10 percent and the employment tax gap makes up about one-fifth of total underreporting.

Perhaps the most striking aspect of the aggregate tax gap estimates is the huge variation in the rate of misreporting as a percentage of true income by type of income (or offset). Only 1 percent of wages and salaries and 4 percent of taxable interest and dividends are misreported, all of which must be reported to the IRS by those who pay them; in addition, wages and salaries are subject to employer withholding. In sharp contrast, self-employment business income, which is not subject to information reports, has a sharply higher estimated net misreporting percentage (NMP): an estimated 57 percent of nonfarm proprietor income is not reported, a total of $68 billion, which by itself accounts for more than a third of the total estimated underreporting for the individual income tax.[11] Over half is attributable to the underreporting of business income, of which nonfarm proprietor income is the largest component.

B. Net Misreporting Percentages by True Income Group

The published information about the 2001 tax gap study shown in Table 1 provides no information about the *distribution* of income tax noncompliance across income groups.[12] To investigate this topic, we analyzed the micro data from the NRP along with the DCE-based multipliers.[13]

The basic results are shown in Table 2, where taxpayers are grouped according to what we call "true income," that is, by percentiles of the adjusted gross income (AGI)

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[11] The numerator of the net misreporting percentage is the sum of all misreporting and includes any over-reporting of income. In order to account for sources of income that can take negative values, the denominator of the net misreporting percentage is defined as the sum of the absolute values of the estimated true amounts.

[12] The one published table that we know of that attempts something similar to our Table 2, in Christian (1994), is based on the results of the Taxpayer Compliance Measurement Program (TCMP), the forerunner of the NRP, for tax year 1988; it is shown in Table A2. First, note that Table A2 presents measures of the voluntary compliance level, defined as reported tax liability divided by corrected tax liability, so it is similar to, although the obverse of, what is reported here in column 2 of Table 2. However, the methodology was significantly different from the one used to create Table 2 and therefore the two tables are not readily comparable. First, the Voluntary Compliance Levels (VCLs) reported in Table A2 are based on the raw TCMP results (i.e., the results were not adjusted for undetected underreported income). Second, and more important, the taxpayers are grouped by reported AGI rather than estimated true AGI. Nonetheless, even with these caveats in mind, the results in Table A2 are somewhat similar to those in column 2 of Table 2. Both tables indicate that the rate of misreported tax declines with income, but the effect is more pronounced in Table A2 because it is arrayed by reported income. This amplifies the effect because, other things equal, those who claim to have low income are on average more noncompliant than those who report that they have high income.

[13] Erard and Ho (2003) analyze the distribution of noncompliance by occupation, based on the tax year 1988 TCMP data.

Table 2

Net Misreporting Percentages by True AGI, Tax Year 2001

True AGI	NMP for AGI	NMP for Tax after Refundable Credits
Bottom 10%	–1	71
10% –20%	4	56
20%–30%	5	38
30%–40%	5	27
40%–50%	6	21
50%–60%	7	20
60%–70%	7	16
70%–80%	8	16
80%–90%	8	14
90%–95%	11	17
95%–99%	18	21
99.0%–99.5%	19	20
Top 0.5%	15	15
Total	11	18

Source: National Research Program data.

that, according to the tax gap methodology, they should have reported. In other words, to calculate true AGI the estimated amount of DCE-adjusted noncompliance due to unreported income was added back to the reported AGI. Grouping taxpayers by reported AGI, rather than true AGI, would paint a misleading picture of the relationship between noncompliance and the true income level as, other things equal, noncompliant taxpayers would appear to have lower income than they really have. It is important to note that Table 2 reports net misreporting percentages by *true* AGI group, where net misreporting percentages are defined as the sum of estimated misreporting divided by the sum of the absolute values of the corresponding true values, be it AGI in the first column and tax after refundable credits in the second column.[14]

The first column of Table 2 shows that the net misreporting percentage rises continually with true income, until it peaks at 19 percent for the estimated true AGI group comprising the top 99.0 to 99.5 percent, whereupon it declines in the highest percentile group. However, the misreporting percentage for the highest true income class, with true income above $2 million, is still above the NMP for any true income group below the 95th percentile. Splitting taxpayers into two groups, above and below $100,000, clearly reveals that the net misreporting percentage of income is much higher for the

[14] Tax after refundable credits as defined in this paper does not include self-employment tax.

higher-income taxpayers: 15.2 percent for those with true income above $100,000, and 7.0 percent for those with true income below $100,000.

Column 2 of Table 2 shows that there is a very different pattern for the net misreporting percentage of tax after refundable credits. It is highest for the low-income groups, and lowest for the highest-income group. The pattern is not monotonic with income. The net misreporting percentage for tax after refundable credits declines with true income from the low-income groups until the 80–90th decile, then increases until the 95–99 percent group, after which it declines again until the highest-income group. The stark difference between column 1 and column 2 of Table 2 in part reflects the graduated, step-function nature of the U.S. income tax rate schedule. To see the implications of the graduated rate structure, consider individuals at different points of the income distribution. For very high-income people, whose income far exceeds the top bracket cutoff, marginal tax rates are only slightly higher than average tax rates, because the benefit of the lower rates, exemptions, etc., becomes vanishingly small. Thus, for a multimillionaire, understating income by 11 percent understates tax liability by about 11 percent.[15] In contrast, consider a married couple filing jointly using the standard deduction with two dependents with $50,000 of AGI. Based on the 2007 tax rate schedule, their tax liability if reporting accurately is $2,922 (implying an average tax rate of 5.84 percent). If, though, they understate their AGI by 10 percent, so that their reported AGI is $45,000, their tax liability is $2,172, reflecting a drop of $750 in tax liability ($5,000 times the marginal tax rate of 15 percent). Thus, an income misreporting percentage of 10 percent corresponds to a tax misreporting percentage of 25.7 percent ($750 divided by $2,922). In the extreme, a taxpayer whose income is just over the taxable income threshold for having positive tax liability can, by understating their income by a small percentage, completely wipe out their tax liability.[16]

C. Aggregate Underreporting by AGI Group

Table 3 shows the fraction of aggregate underreporting of AGI and of tax after refundable credits, by true AGI and reported AGI group. Columns 1 and 3 of the table reveal that, when arrayed by true AGI, the majority of underreporting — 63 percent —

[15] If the understated income is disproportionately in the form of preferentially taxed capital gains, then it could be that understating income by, say, 11 percent, reduces overall tax liability by less than 11 percent.

[16] For a marginal change in taxable income, the ratio of the percentage change in tax liability with respect to a percentage change in taxable income is equal to m/a, where m is the marginal tax rate and a is the average tax rate. With a smooth tax function, m/a is decreasing in taxable income as long as $ma' > m'a$, where a prime denotes a derivative; this need not be true throughout the income distribution even under a generally progressive tax system. The marginal tax rate does not, though, change smoothly in the U.S. tax schedule, but rather jumps discretely across brackets. This results in an infinitely high value of m/a just over the threshold for taxability followed by a gradual decline, and a discrete jump up at the taxable income that corresponds to the next higher marginal tax rate; once within the top bracket, the value of m/a declines asymptotically to one. This pattern can explain why in Table 2 the values in column 2 relative to column 1 are the highest for the lower-income groups and are about equal for the highest-income groups.

Table 3

Fraction of Aggregate AGI Underreporting and Underreporting of Estimated Tax after Refundable Credits, by Estimated True and Reported AGI, Tax Year 2001

AGI	Underreporting of AGI, by Estimated True AGI	Underreporting of AGI, by Reported AGI	Underreporting of Tax after Refundable Credits, by Estimated True AGI	Underreporting of Tax after Refundable Credits, by Reported AGI
Bottom 10%	#	13	1	8
10%–20%	1	8	2	6
20%–30%	1	8	3	8
30%–40%	2	10	3	10
40%–50%	3	9	3	9
50%–60%	5	7	4	7
60%–70%	6	8	5	8
70%–80%	9	8	7	9
80%–90%	12	8	11	9
90%–95%	12	5	10	7
95%–99%	24	10	23	13
99.0%–99.5%	7	2	7	2
Top 0.5%	20	3	21	4
Total	100	100	100	100

** Less than 0.5%.

is associated with taxpayers in the top decile of true AGI, when measured in terms of AGI, and is 61 percent in terms of tax.

Table 3 also shows how misleading it can be to draw conclusions about the distribution of tax noncompliance based on reported AGI. Comparing column 2 to column 1 or comparing column 4 to column 3 shows that using reported income as the grouping concept misleadingly suggests that noncompliance is overwhelmingly a phenomenon of the low and middle-income classes. According to column 2, 63 percent of underreporting is associated with tax returns in the bottom seven deciles. Column 1 reports that the more appropriate percentage is 18. For tax after refundable credits, column 4 misleadingly suggests that 56 percent of underreporting is done by those in the bottom seven deciles, while column 3 reports that a more accurate figure is 21 percent.

D. Net Misreporting by Line Item

The pattern of noncompliance by true income group raises the question of whether high-income taxpayers have generally higher income misreporting percentages because they receive the types of income generally misreported, as Bloomquist (2003) suggests, or whether certain types of income have higher misreporting percentage because they

are received more by high-income people. The analysis of this section suggests that both factors are at play, but that the former predominates.

We first note that high-income taxpayers are much more likely to receive their income in a form that, for reasons to be discussed later, have relatively high average misreporting percentages. We know from IRS Statistics of Income data on reported income that wages and salaries, which are subject to very low misreporting rates, comprise a much higher percentage of AGI for lower-income groups.[17] The mirror image of this is that the high-income groups receive a higher percentage of their income in the form of partnership and Subchapter S business income and, especially, long-term capital gains that have higher overall misreporting rates.[18]

To pursue this issue, we first present in Table 4 misreporting percentages by estimated true AGI group for each of several income sources. Table 4 shows clearly that, within categories of income that are generally subject to relatively high misreporting percentages (the last three columns), the misreporting percentage is higher for the high-income groups. Note, though, that as with the overall misreporting percentage by estimated true income group shown in Table 2, this percentage peaks in a high, but not the highest, income group. This phenomenon is most striking for capital gains, where the net misreporting percentage for the highest income group is just 6 percent.

IV. IMPLICATIONS FOR ESTIMATES OF INCOME DISTRIBUTION AND TAX PROGRESSIVITY

Recognizing the distributional pattern of income tax noncompliance has implications for our understanding of income inequality and the effective progressivity of the income tax system. There are two distinct issues here. First, if estimates of income inequality are based on incomes reported for tax purposes, then misreported taxable incomes will cause errors in the *measurement* of income inequality and the relationship of income to tax liability — i.e., tax progressivity. Second, to the extent that tax noncompliance affects remitted tax liabilities, it affects the *actual* distribution of after-tax income and tax liability, and the actual progressivity of the income tax system.

In this section we see to what extent estimates of each are affected by the DCE-corrected estimates of income tax noncompliance.

A. True versus Apparent Distribution of Adjusted Gross Income

We begin by addressing the effect of noncompliance on the measured distribution of pre-tax income. Table 5 shows the distribution of AGI, as reported and as adjusted for

[17] Source: U.S. Department of Treasury, Internal Revenue Service, Individual Complete Report (Publication 1304), Table 1.4, "All Returns: Sources of Income, Adjustments, and Tax Items, by Size of Adjusted Gross Income, Tax Year 2007," http://www.irs.gov/pub/irs-soi/07in14ar.xls.

[18] See Table 1 of Campbell and Parisi, 2003. Table A3 recalculates the shares of estimated true income based on the NRP estimates of estimated true income, and Table A4 presents the shares of reported income based on the NRP estimates of reported income.

Table 4

Net Misreporting Percentages of Selected Income Sources, by Estimated True AGI, Tax Year 2001

Estimated True AGI	Salaries and Wages	Interest	Dividends	Business (Sch C)	Part., S Corp, Estate & Trust	Capital Gains
Bottom 10%	#	1	1	–12	2	–13
10%–20%	4	3	4	15	*1	–14
20%–30%	2	1	1	38	*3	7
30%–40%	2	3	5	43	8	19
40%–50%	2	2	2	47	6	2
50%–60%	2	3	5	58	20	22
60%–70%	1	2	3	58	7	16
70%–80%	1	3	4	63	11	24
80%–90%	1	7	2	61	8	17
90%–95%	1	2	5	65	19	14
95%–99%	1	3	5	59	22	24
99.0%–99.5%	1	15	5	50	19	20
Top 0.5%	#	2	3	55	19	6
Total	1	4	4	57	18	12

* Estimate based on fewer than 10 observations.
** Less than 0.5 percent.

estimated noncompliance. In each case the income groups are defined according to the concept being measured; for example, true AGI percentages are calculated over all tax returns in the appropriate group, and true AGI percentages are arrayed by estimated true AGI groups. The second column, which displays reported AGI arrayed by reported AGI groups, corresponds to what we would find in the aggregate statistics routinely published by the Statistics of Income Division of the IRS. The first column shows the distribution of estimated true AGI, that is, reported AGI adjusted by the estimated misreporting.

The two columns of Table 5 are not substantially different. To a fairly small degree, the distribution of estimated true AGI is more concentrated among the top five percentiles than is reported AGI — 32.7 percent compared to 32.2 percent. However, the two Lorenz curves intersect, so that one cannot say unambiguously that the distribution of estimated true income is greater than that of reported income.

B. True versus Apparent Distribution of Tax Liabilities

Table 6 shows how the distribution of individual income tax liability changes when the reported figures are adjusted to reflect estimated noncompliance. As in Table 5,

Table 5

Distribution of Estimated True AGI and Reported AGI, Tax Year 2001

AGI	Estimated True AGI	Reported AGI
Bottom 10%	0.3	0.1
10%–20%	1.6	1.6
20%–30%	2.7	2.7
30%–40%	3.9	3.9
40%–50%	5.2	5.2
50%–60%	6.7	6.8
60%–70%	8.8	8.9
70%–80%	11.5	11.7
80%–90%	15.6	16.0
90%–95%	10.9	11.0
95%–99%	14.9	14.4
99.0%–99.5%	3.8	3.7
Top 0.5%	14.0	14.1
Total	100.0	100.0

the second column shows the distribution of reported tax liability when taxpayers are grouped by their reported AGI; this is similar to what could be learned from the published statistics based on tax returns as filed. In this case the distribution of reported tax liability is unambiguously more unequal than the distribution of estimated true tax liability, as the Lorenz curve of the former is always below that of the latter. This is broadly consistent with the results shown in Table 2.

C. Changes in Inequality as Measured by Gini Coefficients

One way to summarize the implications of income tax noncompliance for both measured and actual inequality is by computing Gini coefficients. The Gini coefficient is based on the Lorenz curve, which plots the proportion of the total of some variable, often income, of the population (y-axis) that is cumulatively earned by the bottom x% of the population; it is computed as the ratio of the area that lies between the line of equality (at 45 degrees) and the Lorenz curve, to the total area under the line of equality. We report some relevant calculations in Table 7.

The first column of Table 7 summarizes the impact of income tax misreporting on the Gini coefficient of various concepts of pre-tax and after-tax income in tax year 2001. The first two rows show that inequality of estimated true (pre-tax) AGI, as measured by the Gini coefficient, is actually slightly lower than the inequality of reported AGI: 0.5697 versus 0.5727. The very small change is consistent with the small difference in

Table 6

Distribution of Estimated True Tax Liability and Reported Tax Liability, Tax Year 2001

AGI	Estimated True Tax Liability (After Refundable Credits)	Reported Tax Liability (After Refundable Credits)
Bottom 10%	**	–0.2
10%–20%	–0.3	–0.8
20%–30%	**	–1.0
30%–40%	1.0	0.0
40%–50%	2.4	1.8
50%–60%	3.9	3.7
60%–70%	6.0	5.8
70%–80%	8.6	8.7
80%–90%	13.8	14.1
90%–95%	11.5	11.8
95%–99%	19.9	19.9
99.0%–99.5%	6.5	6.7
Top 0.5%	26.9	29.6
Total	100.0	100.0

** Less than 0.5 percent.

Table 7

Gini Coefficients for Various Income Measures, Tax Years 2001 and 1988

Row #	Income Measure	2001 NRP	1988 TCMP[1]
1.	Reported AGI	0.5727	0.5276
2.	Estimated True AGI	0.5697	0.5252
3.	Reported AGI - Reported Tax Liability	0.5322	0.5024
4.	Estimated True AGI - Reported Tax Liability	0.5372	
5.	Estimated True AGI - Estimated True Tax Liability	0.5322	0.4999

[1]Source: Bishop, Formby, and Lambert (2000, Table 1, Row 13).

the distributions by percentile shown in Table 5. Recall, though, that the two Lorenz curves do not intersect, so that the Gini coefficient is not an unambiguous measure of inequality differences.

The remaining rows of Table 7 correspond to various measures of after-tax income. The third row shows the Gini coefficient of reported income minus reported tax liability.

The reduction in the Gini coefficient between the first and third rows (=0.0405) is the change due to income taxation one would measure based on data that is unadjusted for noncompliance. The fourth row shows the Gini coefficient of estimated true income minus reported tax; this is the appropriate concept of after-tax income assuming that none of the misreported income is detected or ever paid. Not surprisingly, this concept has a higher Gini coefficient than either the third (or fifth) row, because it adds back in unreported income without any accompanying, and inequality-reducing, tax liability.

The difference between the second and fourth rows (=0.0325) repeats that calculation using estimated actual AGI rather than reported AGI, and shows that the change in the Gini coefficient is actually somewhat less than that obtained using unadjusted data.

Comparing the fourth and fifth rows provides information about the distributional consequences of income tax noncompliance, as summarized by Gini coefficients. It indicates that, if all noncompliance were to vanish so that everyone was subject to their estimated true tax liability, then the Gini coefficient would decline by 0.0051. Comparing the fifth row with the third row shows that full reporting (i.e., no noncompliance) would make the Gini coefficient of after-tax income about the same as one would calculate if using unadjusted data for true income and actual tax liability.

The second column of Table 7 shows the tax year 1988 results from Bishop, Formby, and Lambert (2000), who analyze the micro data from the 1979, 1982, 1985, and 1988 TCMP studies to assess the effects of noncompliance and tax evasion on the vertical (and horizontal) distribution of after-tax income and tax burden. They find, as we do for tax year 2001, that including unreported income as measured by the TCMP studies[19] has only a very small (negative) impact on pre-tax income inequality as measured either by the standard Gini coefficient or the extended Gini coefficient developed by Yitzhaki (1983) that can place more or less weight on the lower part of the income distribution. Including both unreported income and additional taxes owed also has a small impact on the Gini coefficient.

A comparison across columns for 2001 and 1988 suggests that income inequality rose significantly over this period; this has been noted in scores of other studies. In addition, if the effect of the tax system on inequality can be measured by the difference between the Gini coefficient for reported income and the Gini coefficient for reported income minus reported (actual) tax, the decline was larger in 2001 (0.04050) than it was in 1988 (0.0252). This suggests that the tax system in 2001 was more successful at reducing what otherwise would be a higher level of pre-tax inequality. Note, though, that a better way to measure the change in the redistributional effect of the income tax system would be to compare the change in the difference between the Gini coefficient of true income and the Gini coefficient of true income minus reported tax, as in the fourth row of Table 7, but Bishop, Formby, and Lambert (2000) do not report the latter statistic.

[19] Bishop, Formby, and Lambert (2000) appear to consider income taxes but not self-employment taxes, the same procedure we employ here. There is no explicit statement about whether they make use of the multiplier that adjusts for undetected income, although their results suggest that they do.

V. CONCLUSIONS

One of the key findings of this paper is that, when taxpayers are arrayed by their estimated "true" income, the ratio of aggregate misreported income to true income generally increases with income. What might explain this pattern of results? Part of the story is that for non-tax reasons higher-income people are more likely to receive income from sources that are more difficult for the tax authority to monitor. A model of rational tax noncompliance, as first outlined by Allingham and Sandmo (1972), suggests that, depending on the relationship of penalties to the amount and nature of noncompliance, more noncompliance would be associated with lower risk aversion,[20] higher marginal tax rates, [21] a lower perceived probability of detection, a lower perceived effect of the level of noncompliance on the perceived probability of detection, and a lower penalty for detected evasion. On average, of course, higher-income taxpayers do face higher marginal tax rates. They also, though, face higher average audit rates.[22] Note also, as stressed in Yitzhaki (1987), that a higher marginal tax rate implies that less income need be understated to achieve a given size gamble in after-tax income.

Microeconometric analysis of the NRP data, along the lines of Clotfelter's (1983) analysis of the 1969 TCMP data, might be insightful, but this kind of exercise is hampered by the lack of extensive demographic information on tax returns, the limited variability of marginal tax rates conditional on income, and extremely limited information on variations in perceived probability of detection (indeed limited to average audit rates across broad classes of income, and the presence of business income). Controlled experiments, for example as reported in Slemrod, Blumenthal, and Christian (2001), have the promise of more compelling identification of the possible determinants of noncompliance, but are rare.[23]

A few caveats must accompany the presentation of our results. The first, and most obvious, is that the NRP estimates of noncompliance are just that — estimates. To the extent that there is systematic error related to true income, the results we present here misrepresent the reality of how noncompliance varies by income group. This is a cause for substantial concern, given the plausible possibility of systematic differences

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[20] More noncompliance relative to income for higher-income returns would be consistent with declining relative risk aversion.

[21] It is, however, important to note the point made by Yitzhaki (1974) that, when the penalty for a given amount of evasion is a fraction of the detected tax evasion, a higher tax rate automatically increases the penalty for a given amount of taxable income understatement. In this case an increase in the tax rate does not change the terms of a tax evasion gamble, and has only an income effect; under usual assumptions about risk aversion, this implies that a tax rate increase would reduce, rather than increase, evasion.

[22] The IRS reports that the audit coverage rate in fiscal year 2008 for returns with adjusted gross income less than $200,000 was less than one percent but rose continuously for higher income groups, reaching 9.77 percent for returns with AGI exceeding $10,000,000 (U.S. Department of the Treasury, Internal Revenue Service, 2009, Table 9b).

[23] See Andreoni, Erard, and Feinstein (1998) or Slemrod and Yitzhaki (2002) for surveys of the empirical literature on tax noncompliance.

in the ability of auditors to detect misreporting by type of income, the plausible possibility that the misreporting of upper-income taxpayers is more sophisticated and thus harder to detect, and the inability of the Detection Controlled Estimation procedure to completely correct for both of these factors. In addition, non-systematic errors would cause an overestimate of the extent to which noncompliance is a phenomenon of truly high-income taxpayers; this is true because an overestimate of noncompliance also overstates true income, while an underestimate does the reverse.

Second, noncompliance has attendant costs that are not measured here.[24] There is the risk involved due to the uncertainty of ultimate remittance and penalty. There are often real costs incurred to identify and implement certain noncompliance strategies, and to camouflage them. Indeed, a model of rational tax noncompliance suggests that, at the margin, the expected utility of tax savings will be exactly offset by the expected utility of costs. Of course, this marginal condition does not imply that there is no private gain from engaging in noncompliance. With assumptions about the nature of these offsetting costs, one can quantify the adjustments needed to calculate the net-of-cost gain. For example, if the marginal cost was linearly increasing in the amount of noncompliance and was equal to zero at zero noncompliance, then the net-of-cost gain would be exactly half of the gross-of-cost gain that we calculate in this paper. If the marginal costs were increasing in the amount of noncompliance, then the net-of-cost gain would exceed half of the gross-of-cost gain. Rather than presenting net-of-cost figures based on arbitrary assumptions about the cost of misreporting function, we present unadjusted figures accompanied by this caveat.

Subject to these caveats and the others mentioned throughout the paper, we tentatively conclude that, when taxpayers are arrayed by their "true" income, the ratio of aggregate misreported income to true income generally increases with income, although it peaks among taxpayers with adjusted gross income between $500,000 to $1,000,000, and is lower than the peak ratio for individuals with income above $1,000,000. In sharp contrast, the ratio of underreported tax to true tax is higher for lower-income taxpayers, reflecting the fact that a given percentage reduction in taxable income corresponds to a particularly high percentage reduction in tax liability for taxpayers with taxable income just above the taxpaying threshold.

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[24] Note also that some of the noncompliance would have been detected in the ordinary course of enforcement, upheld upon appeal and ultimately remitted, perhaps with attendant penalties added.

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APPENDIX

This appendix contains supplementary tables described in the text.

Table A1

Sample Size and Weighted Number of Returns by Level of True AGI Based on TY 2001 Tax Gap Model

True AGI	Number of Returns in Sample	Weighted Number of Returns (Thousands)
Bottom 10%	1,615	12,698
10%–20%	1,758	12,560
20%–30%	2,015	12,562
30%–40%	2,019	12,568
40%–50%	2,661	12,576
50%–60%	3,024	12,574
60%–70%	3,358	12,563
70%–80%	4,010	12,570
80%–90%	4,357	12,569
90%–95%	3,178	6,284
95%–99%	5,055	5,028
99.0%–99.5%	1,589	629
Top 0.5%	2,060	629
Total	36,699	125,808

Table A2

Voluntary Compliance Levels by AGI, 1988

AGI	Voluntary Compliance Level
$0–5K	84.2
5K–10K	78.7
10K–25K	88.8
25K–50K	92.4
50K–100K	93.2
100K–250K	91.3
250K–500K	95.7
>500K	97.1

Note: Voluntary compliance level is reported tax liability divided by corrected tax liability.
Source: Christian (1994), based on 1988 TCMP.

Table A3

Composition of True Income by True AGI Based on TY 2001 Tax Gap Model

True AGI	Salaries and Wages	Interest	Dividends	Business (Sch. C)	Part., S Corp, Estate & Trust	Capital Gains	Other
Bottom 10%	139.2	15.5	8.4	6.5	–32.6	11.5	–48.6
10%–20%	74.8	4.9	1.4	6.0	0.0	0.1	12.8
20%–30%	75.0	4.9	1.4	4.8	0.1	0.6	13.1
30%–40%	77.7	3.2	1.7	4.8	0.5	0.4	11.8
40%–50%	78.7	2.9	1.1	4.5	0.3	0.2	12.2
50%–60%	78.6	2.4	0.8	5.8	0.6	0.5	11.4
60%–70%	77.2	2.4	1.1	5.5	0.6	0.4	12.9
70%–80%	74.6	2.4	1.1	6.7	0.9	0.8	13.5
80%–90%	74.3	2.6	1.3	7.2	1.4	1.3	12.1
90%–95%	69.5	2.0	1.7	10.2	2.6	2.1	11.9
95%–99%	56.9	2.8	2.0	14.7	7.5	4.7	11.3
99.0%–99.5%	48.4	3.1	2.8	12.6	15.2	8.1	9.8
Top 0.5%	34.8	3.8	3.1	6.5	24.4	19.4	8.1
Total	65.8	2.9	1.7	8.1	5.7	4.4	11.3

Table A4

Composition of Reported Income by Reported AGI based on TY 2001 Tax Gap Model

True AGI	Salaries and Wages	Interest	Dividends	Business (Sch. C)	Part., S Corp, Estate & Trust	Capital Gains	Other
Bottom 10%	419.6	50.3	32.0	–1.2	–155.3	40.7	–286.1
10%–20%	75.3	4.7	1.3	9.6	0.0	0.0	9.2
20%–30%	74.4	5.3	1.5	5.9	0.0	0.6	12.3
30%–40%	77.3	3.9	1.9	3.9	0.1	0.4	12.4
40%–50%	83.6	2.6	1.1	3.4	0.4	0.4	8.6
50%–60%	81.4	3.0	0.9	2.6	0.7	0.2	11.3
60%–70%	83.4	2.0	0.9	2.8	0.5	0.2	10.3
70%–80%	79.6	2.8	1.1	2.4	1.0	0.7	12.4
80%–90%	79.9	2.6	1.3	2.7	1.3	0.9	11.2
90%–95%	78.6	2.2	1.6	3.5	1.9	1.7	10.5
95%–99%	69.8	3.1	2.3	6.0	6.2	3.9	8.7
99.0%–99.5%	59.8	3.4	3.1	7.5	13.9	6.6	5.8
Top 0.5%	41.9	4.2	3.6	3.0	23.0	20.7	3.5
Total	72.8	3.1	1.8	3.7	5.1	4.3	9.1