Firm Responses to Book Income Alternative Minimum Taxes *

Jordan Richmond, March 11, 2022

Abstract

Policy-makers have recently suggested implementing book income alternative minimum taxes (AMTs) to ensure that profitable firms face some tax liability. However, research exploring the implications of these policies is scarce. In this paper, I use an event study approach to study firm responses to the AMT book income adjustment in 1987. I find no evidence that firms avoid the tax, and no evidence that firms exhibit significant real production or investment responses. I estimate an elasticity of book income with respect to the net of tax rate of -0.14 with a 95% confidence interval of -0.73 to 0.46. This estimate is substantially lower than previous elasticity estimates because I account for mean reversion. The null results indicate that firms face strong, non-tax incentives to report high book incomes. Applying firm avoidance responses in simulations suggests that modern book income AMT proposals would raise substantial tax revenue.

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"You cannot go to a mill where somebody is making $20,000 a year and attempt to explain to them why a major American corporation can have over $1 billion in profits and pay no taxes." – Senator Bob Packwood on alternative minimum taxes[1]

I Introduction

In 2017, Amazon reported $5.6 billion in profit but paid $0 in taxes (Gardner, 2020). Profitable firms like Amazon can owe small tax bills because the tax code includes deductions and credits meant to incentivize productive economic behavior, and substantial use of these incentives can eliminate all tax liabilities. Over the last forty years, U.S. tax policy-makers have attempted to eliminate the divergence between firms' incomes and tax liabilities by imposing alternative minimum taxes (AMTs). AMTs assign a lower tax rate to a broader tax base that excludes many deductions and credits, implicitly limiting economic incentives in an effort to raise revenue from profitable firms.

In both the United States and OECD talks, recent tax proposals have included an AMT based on *book income*, the income firms report on their financial statements (Li, Watson and Lajoie, 2020). These proposals are appealing because book income provides a broad tax base, suggesting a book income AMT could effectively raise revenue from profitable firms that pay few taxes. However, a book income AMT's capacity to raise revenue may be limited by tax avoidance because firms have substantial discretion to determine their own book incomes (Manzon and Plesko, 2002), and broadening the tax base could lead firms to make inefficient changes to their production and investment policies (Diamond and Mirrlees, 1971).

In this paper, I estimate firm responses to a book income AMT by exploiting variation in the minimum tax rate on book income introduced by the alternative minimum tax book income adjustment in 1987 (AMTBIA87), the only U.S. AMT that has ever incorporated book income into the tax base.[2] I estimate firm responses using an event study framework that compares firms more likely to be subject to the AMT on book income (treatment) to firms less likely to face the tax (control), dividing firms into treatment and control groups based on their average effective tax rates over 1984-1986.

Using Compustat data, I find no evidence that firms avoid AMTBIA87. AMTBIA87

[1]U.S. Senate Finance Committee Hearing. May 3, 1995. "Alternative Minimum Tax".
[2]This policy has also been referred to as the tax on Business Untaxed Reported Profits (BURP).

imposes a 10 percent tax rate on *book tax differences*, the excess of book income over taxable income. To avoid the tax, firms would have to shrink book tax differences by altering revenue or expense items that count differently under the book and tax systems. Therefore, I measure firms' avoidance responses using book tax differences, the tax base, and discretionary accruals, a common proxy for earnings management (Dechow, Sloan and Sweeney, 1995). My preferred point estimates based on the tax base imply that in the first three years after AMTBIA87 the elasticity of book income with respect to the net of tax rate is -0.14 with a 95% confidence interval of -0.73 to 0.46, while in the fourth through sixth years the elasticity of book income is -0.32 with a 95% confidence interval of -0.77 to 0.14. Elasticities based on earnings management responses that highlight accounting-specific manipulation of book income yield similar results.

Previous studies of firm tax base responses to AMTBIA87 find large avoidance responses with book income elasticities ranging from 1.4 to 2.1 (Dhaliwal and Wang, 1992; Manzon, 1992; Dharmapala, 2020). My estimates reject elasticities of this magnitude because I control for mean reversion. In my event study framework, mean reversion impacts estimates of tax base responses to AMTBIA87 because effective tax rates are mechanically and negatively related to book tax differences. Therefore, expected increases in the low, pre-reform effective tax rates of treatment firms lead to book tax difference declines that stem from the treatment definition and do not represent avoidance responses to AMTBIA87. To distinguish between mean reversion and avoidance, I use a placebo-in-time approach that measures mean reversion using event study estimates of tax base responses to treatment definitions in pre-reform years, and identifies avoidance responses as the difference between firm responses to AMTBIA87 and firm responses to the treatment definition in pre-reform years.[3] Failing to correct for mean reversion yields an elasticity estimate of 1.65, directly in line with the previous literature, while using the placebo-in-time approach with alternative specifications, outcome constructions, and across different subsamples consistently yields close to zero elasticities.

The placebo-in-time approach relies on an assumption that the effective tax rate time series process, and its impact on book tax differences, remains stable over time. I provide

[3] Coombs, Dube, Jahnke, Kluender, Naidu and Stepner (2021) use a similar approach to study the impacts of unemployment insurance withdrawal during the COVID19 pandemic.

three pieces of evidence supporting this assumption. First, event study estimates of book tax difference responses to the treatment definition are stable over a period of years spanning 1977-1989. Second, I find that the persistence of effective tax rates remains stable across my sample period. Third, I find that the change in book tax differences associated with a change in effective tax rates remains stable before and after the implementation of AMTBIA87. These three tests suggest that book tax difference responses to the treatment definition do not change around the time AMTBIA87 was implemented.

The lack of avoidance responses to AMTBIA87 cannot be attributed to a lack of tax salience. Placebo-in-time estimates using tax liability as an outcome suggest firms facing AMTBIA87 saw their tax liabilities increase by an average of 0.29% of lagged assets over 1987-1989. This estimate increases to 0.67% of lagged assets when I exclude multinationals and loss firms that could reduce tax liabilities with foreign tax credits and net operating losses, but I still estimate null avoidance responses in this restricted sample. I also provide evidence that the lack of avoidance response is unlikely to be driven by AMT credits, delayed burden from AMTBIA87 due to the difference between firm fiscal years and tax years, or financing constraints.

I use a static, partial equilibrium model to show that avoidance responses to AMTBIA87 are governed by the relative strength of the tax incentive to report lower book income and non-tax incentives to report high book income. Existing research suggests that firms and their managers face strong incentives to report high book incomes (Burgstahler and Dichev, 1997; Graham, Harvey and Rajgopal, 2005; Terry, 2017), to the extent that they are even willing to pay additional taxes to justify reporting fraudulently high earnings (Erickson, Hanlon and Maydew, 2004). The model predicts that we might only observe avoidance responses to AMTBIA87 among firms with weaker non-tax incentives to report high book income. To test this implication of the model, I estimate placebo-in-time specifications of firm avoidance responses restricting to firms with less incentive-based compensation, missing salient earnings thresholds by large margins, and followed by fewer analysts. These estimates are in line with the core prediction of the model, providing suggestive evidence that firms with weaker incentives to report high earnings exhibit larger avoidance responses.

Additional event study estimates show that firms are unlikely to respond to a book income

AMT by modifying their production or investment policies. Using sales, costs of inputs, investment, debt, and employment as outcomes, I fail to reject the null hypothesis of zero response to AMTBIA87 in any year from 1987-1992 for all five outcomes. Complementary instrumental variables analysis suggests that increases in total tax liability stemming from AMTBIA87 have no detectable impact on firm sales, costs of inputs, investment, or debt.

To evaluate the implications of the firm responses that I estimate for contemporary policies, I develop a ten-year revenue score for the book income AMT included in the Biden administration's 2020 tax plan. I estimate that, if firms respond to a modern book income AMT as they did to AMTBIA87, the proposed Biden book income AMT would raise $336 billion over a decade. Using larger elasticity estimates from earlier work on firm responses to AMTBIA87 understates projected revenue by 19%. Close to one-third of the revenue comes from the ten firms facing the largest tax liability increases, which include Hewlett Packard, Berkshire Hathaway and Delta. However, Amazon only faces the 41^{st} largest tax liability increase because foreign tax credits and losses reduce their book income AMT liability. These results suggest that many firms, not just Amazon, have diverging incomes and tax liabilities that would be targeted by a book income AMT, and that narrowing the tax base may leave leeway for profitable firms to mitigate increases in tax liability.

This paper contributes to a substantial literature that uses financial statement or tax data to estimate tax base and earnings management responses to AMTBIA87 (Gramlich, 1991; Dhaliwal and Wang, 1992; Boynton, Dobbins and Plesko, 1992; Manzon, 1992; Wang, 1994; Choi, Gramlich and Thomas, 2001). In contrast to most previous work, I estimate null avoidance responses to AMTBIA87, and show these differences arise from a failure to account accurately for mean reversion. I also build on this previous work by estimating production and investment responses to AMTBIA87.

This paper also contributes to a large body of research that examines the ability of minimum taxes and other government interventions to reduce corporate tax evasion and avoidance (Mosberger, 2016; Alejos, 2018; Almunia and Lopez-Rodriguez, 2018; Lobel, Scot and Zuniga, 2020; Bachas and Soto, 2021) and the welfare impacts of broadening the tax base (Diamond and Mirrlees, 1971; Best, Brockmeyer, Kleven, Spinnewijn and Waseem, 2015). One major contribution of this literature is to show that broad-based taxes can be welfare enhancing if they offset production distortions with increased revenue through reduced evasion or avoidance. The empirical evidence in this paper suggests that under a tax on book income, the tension between firm's desire to report high earnings to investors and report low earnings to minimize tax liability can help limit evasion or avoidance.

The rest of the paper is organized as follows. Section II describes tax policy details. Section III describes the data. Sections IV and V estimate firm tax avoidance and production and investment responses to AMTBIA87. Section VI incorporates estimates of firm tax avoidance into revenue scores of a proposed book income AMT. Section VII concludes.

II Tax Policy Details

Alternative minimum tax liability in the U.S. is calculated as the excess of potential AMT liability over normal tax payments. Potential AMT liability is the AMT rate applied to a broad income base called alternative minimum taxable income (AMTI), defined as taxable income (TI) plus tax preferences and adjustments (TPA) that add deductions and credits back to taxable income. The Tax Reform Act of 1986 (TRA86) set the AMT rate at 20%, and introduced AMTBIA87, which broadened the AMT base with a book income adjustment (BIA) by adding 50% of the difference between $AMTI$ and book income (BI) to the tax base. In equations,

$$\begin{aligned} BIA &= \max\{0.5\Big(BI-(TI+TPA)\Big),0\}, \\ AMT &= \max\Big\{0.2\Big(TI+TPA+BIA\Big)-\tau TI,0\Big\}. \end{aligned} \tag{1}$$

In short, AMTBIA87 imposes a 10% marginal tax rate on book income in excess of $AMTI$ for any firms subject to the AMT.

Congress voted to adopt TRA86 in 1986 so that firms were aware of AMTBIA87 while filing their 1986 financial statements. AMTBIA87 went into effect the next year, in 1987. The window between the 1986 vote and 1987 implementation provided an opportunity for firms to respond to AMTBIA87 through advanced accounting planning.

During the legislative debate over TRA86, Congress considered multiple AMT reforms.

Congress was unsure whether to implement AMTBIA87 or the adjusted current earnings adjustment (ACEA90), which aimed to construct a measure of income as broad as book income using tax principles (Redmond Soneff, 1986). In the final version of TRA86, Congress chose to implement AMTBIA87 from 1987 to 1989 and replace it with ACEA90 in 1990, but also commissioned a Treasury study due before the 1990 switch to explore the impacts of both AMT policies (Redmond Soneff, 1986). While this congressional hedging likely caused some uncertainty about whether AMTBIA87 would be replaced with ACEA90, the policy switch occurred in 1990 as originally specified.

ACEA90 imposed a 20% tax on three-quarters of the difference between a corporation's adjusted current earnings (ACE) and their $AMTI$. In equations,

$$
\begin{aligned}
ACEA &= 0.75\Big(ACE - (TI + TPA)\Big), \\
AMT &= \max\{0.2\Big(TI + TPA + ACEA\Big) - \tau TI, 0\}.
\end{aligned}
\tag{2}
$$

ACE attempted to construct a measure of income as broad as book income using tax principles by eliminating deductions to broaden the $AMTI$ base (Janiga, 1988).[4] Finally, both AMTBIA87 and ACEA90 generated minimum tax credits that could be used to reduce normal tax liability down to minimum tax liability in future years.[5]

After controlling for TPA and assuming ACE is equivalent to book income, both AMTBIA87 and ACEA90 imposed marginal taxes on book tax differences. I summarize variation in the marginal tax rate on book tax differences over time in Figure 1. There was no tax on book tax differences before 1987. From 1987 to 1989, AMTBIA87 imposed a 10% marginal tax rate on book tax differences. Starting in 1990, the replacement of AMTBIA87 with ACEA90 increased the marginal tax rate on book tax differences to 15%.

[4]For example, ACE includes depreciation that is allowed as a deduction for $AMTI$ purposes. ACE also includes forms of income excluded from $AMTI$ like interest on tax-exempt bonds and income on annuity contracts. Janiga (1988) provides additional details.

[5]AMT credits are awarded for income and expense items that cause temporary differences between AMTI and taxable income over time like depreciation, but not exclusion items that cause permanent differences over time like exclusions for small business stock gains.

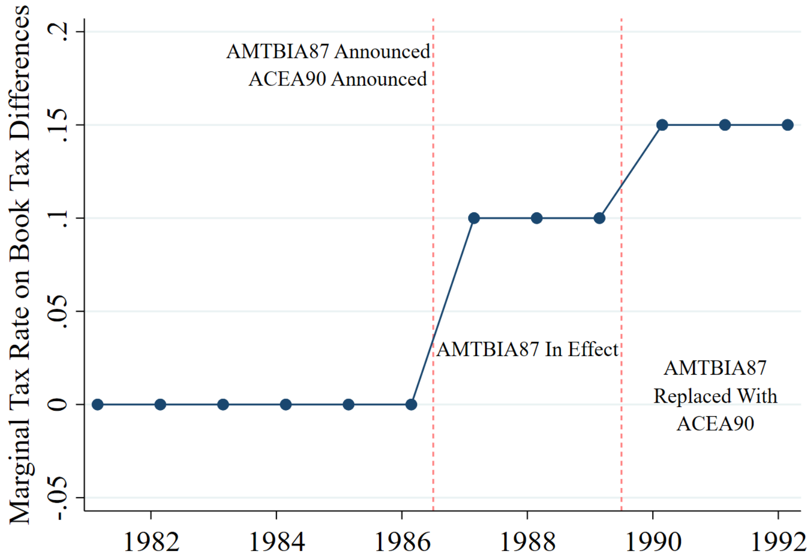


Figure 1: Marginal Tax Rates on Book Tax Differences

Notes: This figure presents the evolution of marginal tax rates on book tax differences due to the alternative minimum tax book income adjustment (AMTBIA87) and the adjusted current earnings adjustment (ACEA90). Tax rates assume proper controls for tax preferences and adjustments, and after 1990 assume adjusted current earnings (ACE) are equivalent to book income.

III Data

To evaluate how firms respond to AMTBIA87, I construct a balanced panel of Compustat firms, restricting to firms with non-missing total accruals and positive, non-missing assets, sales, and pretax income that are incorporated in the United States and appear in the data every year from 1981 to 1992. I end the panel in 1992 because the Omnibus Budget Reconciliation Act of 1993 changed the ACEA90 tax base.[6]

Table 1 provides summary statistics for a 1985 cross section of my sample, with all variables rescaled into 2018 dollars.[7] I winsorize all outcome variables at the 1st and 99th percentile to minimize the role of outliers in the results and scale all outcomes by lagged assets to account for skew in the firm size distribution. Means exceed medians for most variables across the whole sample, reflecting the skewed firm size distribution. The sample

[6]OBRA eliminated the adjusted current earnings depreciation adjustment for property placed in service after 1993, effectively narrowing *ACE* by allowing depreciation deductions.

[7]I inflate to 2018 dollars using the GDP price deflator from NIPA table 1.1.9, "Implicit Price Deflators for Gross Domestic Product" from the BEA.

only includes 11% of all firms in Compustat in 1985, but these firms hold 20% of all assets and take in 28% of all revenues. While these firms are not representative of the economy as a whole, they do represent the large firms targeted by AMTs.

Table 1: Summary Statistics for 1985 Cross Section of Estimation Sample

	Observations	Mean	SD	P10	Median	P90
Lagged Assets	845	2854	5919	52	608	7365
Book Income	845	0.15	0.10	0.06	0.12	0.28
Taxable Income	845	0.11	0.10	0.01	0.09	0.25
Book Tax Differences	845	0.04	0.04	−0.01	0.03	0.08
Discretionary Accruals	845	0.00	0.06	−0.06	0.00	0.07
Sales	845	1.43	1.06	0.43	1.27	2.53
Costs of Goods Sold	845	0.97	0.85	0.23	0.80	1.86
Investment	840	0.23	0.17	0.07	0.19	0.46
Debt	844	0.27	0.10	0.14	0.29	0.39
Depreciation	845	0.05	0.03	0.02	0.04	0.08
Depletion	845	0.01	0.02	0.00	0.00	0.04
Employment	819	12	24	0	3	31

Notes: This table reports summary statistics for a 1985 cross section from the 1981-1992 balanced panel of firms used to estimate firm responses to the alternative minimum tax book income adjustment. Statistics are expressed as a share of lagged assets, except for counts, employment (thousands), investment (capital expenditure per dollar of lagged net property plant and equipment) and lagged assets (millions USD).

The key variable to categorize firms into treatment and control groups is the effective tax rate, because firms with lower effective tax rates are more likely to face AMTBIA87. I measure effective tax rates as tax liability divided by book income. Following Collins and Shackleford (2004), I define tax liability as total income taxes minus deferred income taxes minus other taxes.

To measure firm's tax avoidance responses to AMTBIA87, I focus on book tax differences (BTDs), the tax base, and discretionary accruals, a common proxy for earnings management (Dechow, Sloan and Sweeney, 1995). Book tax differences are measured as the difference between book income and taxable income, where taxable income is measured as tax liability divided by the marginal tax rate. Book income is a broader income measure than taxable income, illustrated by the fact that book tax differences are positive for 85% of firms in 1985.

Book and taxable income differ because tax and GAAP rules for realizing income and expense items differ. These differences can be either temporary or permanent. Temporary

BTDs arise from income and expense items that count for both tax and book incomes, but that are realized at different times, while permanent BTDs arise from income or expense items that count for either tax or book income, but not both.[8] Any firm attempting to avoid AMTBIA87 would have to manipulate income or expense items to shrink either permanent or temporary book tax differences. This type of manipulation could occur via reducing book income or increasing taxable income.

Book tax differences capture tax base responses to AMTBIA87, but include both book and tax responses to the policy. To focus specifically on accounting responses, I use discretionary accruals to proxy for earnings management (e.g. Healy, 1985; Jones, 1991; Boynton, Dobbins and Plesko, 1992; Dechow, Sloan and Sweeney, 1995). Discretionary accruals measure the components of earnings not explained by cash flows and not predicted by economic conditions by residualizing accruals on revenues and capital stocks. Managers have a great deal of discretion to manipulate these earnings (Bergstresser and Philippon, 2006). I closely follow Dechow, Sloan and Sweeney (1995) to construct discretionary accruals, and describe this procedure in Appendix A. The standard deviation of discretionary accruals in the sample is 6% of lagged assets.

The key outcomes to measure production and investment responses are sales, costs of goods sold, investment, debt and employment. I define investment as capital expenditure per dollar of lagged net property plant and equipment (Cummins, Hasset and Hubbard, 1994; Desai and Goolsbee, 2004; Edgerton, 2010; Ohrn, 2018) and debt as total liabilities per dollar of lagged assets (Edgerton, 2010; Ohrn, 2018). Some firms in the sample are missing information required to construct the investment, employment, and debt variables.[9] I use depletion as a control in most regressions and impute missing depletion data with zeros, but results are not sensitive to eliminating this control variable.

I supplement the Compustat data with Execucomp data to explore whether incentive-based compensation mitigates downwards earnings manipulation in response to AMTBIA87

[8]Estimates of temporary book tax differences can be constructed as deferred tax expense divided by the marginal tax rate and estimates of permanent book tax differences can be constructed as the difference between total and temporary book tax differences (Poterba, Rao and Seidman, 2011). Unfortunately, comprehensive data on individual book tax difference components is not available (Raedy, Seidman and Shackelford, 2011).

[9]I linearly interpolate capital expenditures between non-missing firm-year observations to increase coverage of the investment variable, but results are near identical without the interpolation.

because managers with incentive-based compensation face stronger incentives to report high earnings that keep stock prices high. I measure incentive-based compensation using the value of all regular and restricted stock option grants to executives as a fraction of total compensation (stock options, salary, and bonus), summing across all firm managers (Desai and Dharmapala, 2006). The executive compensation data has limited coverage and is only available for 56% of the sample.[10] Among sample firms present in the Execucomp data, the average share of compensation that is incentive-based is 17.7%.

I also supplement the Compustat data with IBES data to explore whether analyst coverage mitigates downwards earnings manipulation in response to AMTBIA87 (Yu, 2008). I measure analyst coverage as the mean number of analysts covering a firm across 1981-1992. Firms in the sample are covered by an average of 3.3 analysts.

IV Tax Avoidance Responses

To study whether firms avoid AMTBIA87 by reducing their book tax differences (BTDs), I use an event study framework to compare the BTD responses of treatment firms with average effective tax rates (ETRs) over 1984-1986 < 23% to control firms with average ETRs ≥ 23%. Averaging ETRs over 3 years captures firms with persistently low ETRs, while the 23% cutoff represents the ETR at which firms are likely to no longer have to pay alternative minimum tax (derived in detail in Appendix B). I estimate

$$Y_{ie} = \sum_{e=-5, e\neq -1}^{6} \Big(\beta_e \cdot Treat_{ie}\Big) + \rho X_{ie} + \delta_e + \gamma_i + \varepsilon_{ie}, \tag{3}$$

where $Treat_i$ is a dummy = 1 if average ETR over years 1984-1986 < 23%, $Treat_{ie}$ is the interaction of $Treat_i$ with event time dummies, and the last year of the treatment definition, in this case 1986, is event time zero. I plot estimates of the event study coefficients in Figure

[10]The executive compensation data also does not begin until 1992, the last year of my panel. Hall and Liebman (1998) document rapidly rising rates of stock-based compensation among the managers of large public companies throughout the 1980s and 1990s, so firms with low stock-based compensation by 1992-1994 seem unlikely to have used it in earlier years, but I cannot rule this out. As one robustness check, I use measures of incentive-based compensation averaging over 1992-1994 and using only 1992 and find similar results.

2, panel (a) in the baseline specification series. These estimates appear to suggest there are large negative BTD responses to AMTBIA87 for treatment relative to control firms.

However, this treatment definition leads to some expected mean reversion because the treatment group is selected to have low ETRs in specific years. In a time series model of the ETR process with mean zero shocks, this treatment assignment will select firms with negative shocks in the years used to split firms into treatment and control groups, suggesting that on average the ETRs of the treatment firms will increase in time periods after treatment assignment independent of any policy change. This increase in ETRs among treatment firms will lead to BTD declines because ETRs are mechanically related to BTDs.[11] Therefore, a key challenge in this empirical set up is to differentiate between BTD responses to AMTBIA87 and BTD changes caused by mean reversion stemming from the treatment definition.

I utilize a placebo-in-time strategy to differentiate between BTD responses to AMTBIA87 and BTD responses caused by mean reversion stemming from the treatment definition. In other words, I compare event study estimates of BTD responses to AMTBIA87 to event study estimates of BTD responses to placebo treatment definitions based on ETRs in earlier years. The earlier year placebos measure the BTD response of treatment relative to control firms in the absence of AMTBIA87, so the difference between BTD responses to the baseline treatment and BTD responses to the earlier placebo treatments captures firm avoidance responses to AMTBIA87 net of mean reversion.

To construct a comparison for the baseline event study, I estimate a stacked event study that averages over BTD responses to placebo treatment definitions in earlier years. To construct the sample for this regression, I take the original data, define $Treat_{id}$ as a dummy $= 1$ if average ETR over three year period $d \in D < 23\%$, and stack copies of the data, one for each alternative treatment definition d. Then, I estimate

$$Y_{ied} = \sum_{e=-5, e\neq -1}^{6} \Big(\eta_e \cdot Treat_{ied} \Big) + \psi Treat_{id} + \rho X_{ied} + \delta_e + \gamma_i + \varepsilon_{ied}, \tag{4}$$

on the stacked data, using a large set of placebo treatments $D = \{(77-79), (78-80), (79-$

[11] Taxable income $\widehat{TI} = \frac{\text{Current Tax Expense}}{\text{Marginal Tax Rate}}$. Book income is reported directly on firms financial statements. Then $BTD = BI - \widehat{TI}$ and $ETR =$ Current Tax Expense$/BI$. Therefore, an increase in current tax expense or a decrease in BI both lead to an increase in ETR and a decrease in BTD.

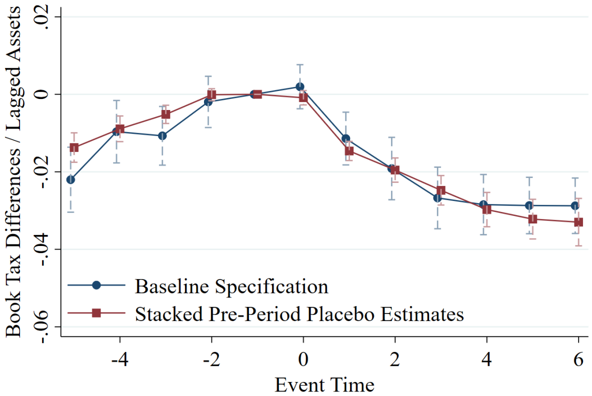
81), (80 − 82), (81 − 83), (82 − 84), (83 − 85)} to ensure estimates are not driven by idiosyncratic year-to-year variation and restricting to years before 1987 to avoid any bias from the implementation of AMTBIA87. The stacked versions of the data with treatment definitions starting in 1980 and earlier are from a balanced Compustat panel spanning 1974-1986 that is constructed in the same way as the baseline panel described in section III.

The estimand of interest is $\beta_e - \eta_e$ (from equations (3) and (4) respectively), the BTD response to AMTBIA87 in excess of average BTD responses to placebo treatment definitions based on years not directly before the implementation of AMTBIA87. All estimates of equations (3) and (4) include depreciation and depletion as controls to flexibly control for TPA that are not part of the AMTBIA87 base.[12] I plot my baseline estimates of β_e alongside estimates of η_e from the stacked event study in Figure 2, panel (a) and the difference $\beta_e - \eta_e$ in panel (b). Estimates from the baseline and placebo series track each other closely, suggesting that the perceived BTD responses in the baseline series are due entirely to mean reversion and do not represent tax avoidance responses to AMTBIA87. In addition, there is no differential BTD avoidance response in 1990, suggesting there is no avoidance response to the increase in the minimum tax rate to 15% implemented by ACEA90.

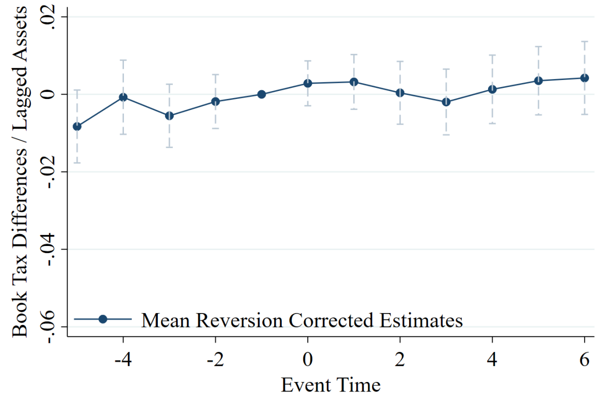
The placebo-in-time approach comparing estimates of equations (3) and (4) relies on an assumption that the time series process of ETRs, and its impact on BTDs, does not change because of the implementation of AMTBIA87.[13] I present three pieces of evidence that support this stationarity assumption. First, the evolution of BTDs for treatment relative to control firms based on ETRs in a wide range of years spanning the late 1970s through early 1990s follow remarkably similar patterns. Figure 2, panel (c) plots estimates of β_e from equation (3) using the balanced panel spanning 1981-1992 and defining treatment based on average ETRs over 1984-1986 in the baseline specification, as well as using the balanced panel spanning 1974-1986 and defining treatment based on average ETRs over earlier sets of years in the alternative series. Each placebo series using earlier years to split firms into

[12] TPA account for an average of 39% of book tax differences across 1987-1989, but 88% of these TPA can be attributed to depreciation and depletion (Gill and Treubert, 1992)

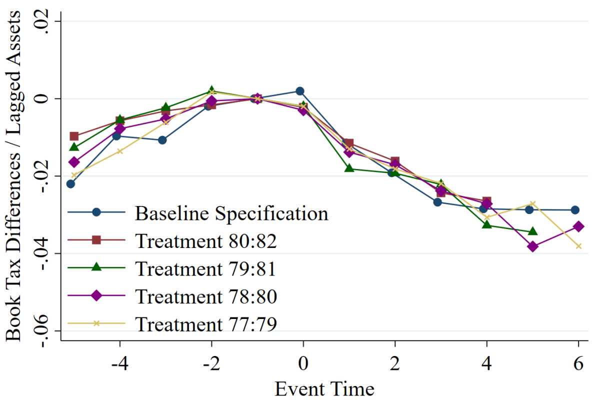
[13] This assumption is similar to the common parallel trends assumption underlying diff-in-diff designs. The key difference is that while diff-in-diff designs assume the outcomes of treatment and control groups would have evolved similarly in the absence of a policy, the placebo-in-time approach hinges on the assumption that the outcome response to treatment definition when the policy is implemented, but in the absence of the policy, would be the same as the outcome response to the treatment definition in pre-reform years.



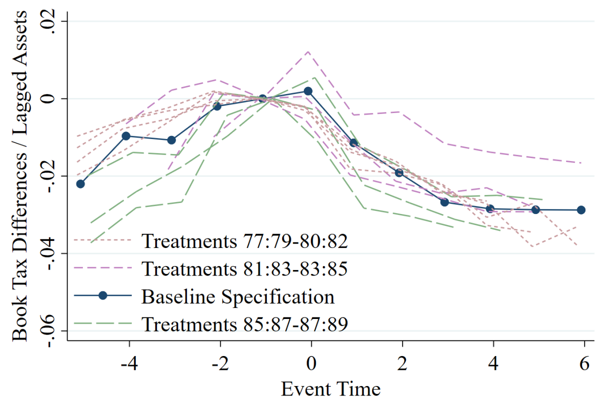
(a) Placebo-in-Time Estimates



(b) Mean Reversion Corrected Estimates



(c) Early Placebos



(d) Pre and Post-Reform Placebos

Figure 2: Placebo-in-Time Estimates

Notes: This figure plots placebo-in-time estimates of tax avoidance responses to AMTBIA87. Panel (a) plots point estimates of β_e from equation (3) splitting the 1981-1992 balanced panel into treatment and control groups based on 1984-1986 ETRs in the baseline specification series, and estimates of η_e from equation (4) splitting data from a 1974-1986 balanced panel and the 1981-1992 balanced panel into treatment and control groups based on ETRs from three year time periods spanning 1977-1985 in the stacked pre-period placebo series. Panel (b) plots estimates of $\beta_e - \eta_e$, the difference between the baseline specification and stacked pre-period placebo series in panel (a). Confidence intervals are constructed from nonparametrically bootstrapped standard errors clustering at the firm level using 300 iterations. Panel (c) plots point estimates of β_e from equation (3) splitting the 1981-1992 balanced panel into treatment and control groups based on 1984-1986 ETRs in the baseline specification series. The earlier series plot β_e estimates using the 1974-1986 balanced panel splitting into treatment and control groups based on earlier years. Panel (d) adds additional estimates of β_e to those in panel (c) using treatment control splits in the pre-reform period and the post-reform period using the 1981-1992 balanced panel.

treatment and control shows the evolution of BTDs in response to the treatment definition in the absence of AMTBIA87 using only pre-reform years. These earlier series track the baseline specification very closely, suggesting the mean reversion of ETRs and its impact on BTDs did not change when AMTBIA87 was implemented.

Figure 2, panel (d) plots additional placebo series splitting into treatment and control based on ETRs in 1981:1983-1983:1985, and 1985:1987-1987:1989. Both new sets of placebo series may not be suitable counterfactuals for the baseline specification because estimates could be biased by the implementation of AMTBIA87. While these series exhibit some variation across treatment definitions, they also closely track the baseline specification, suggesting that the mean reversion of ETRs and its impact on BTDs due to the treatment definition remained remarkably stable through the period before and after the implementation of AMTBIA87. My estimates of equation (4) effectively average over all treatment definitions earlier than the baseline 1984-1986 definition, using only years $\leq$ 1986.

Table 2: Autocovariance Tests

Hypothesis	DoF	Wald Stat
$Cov(ETR_{t+2}, ETR_{t+1}) = Cov(ETR_{t+1}, ETR_t)\ \forall\ t \in [1981, 1990]$	10	0.89
$Cov(ETR_{t+3}, ETR_{t+1}) = Cov(ETR_{t+2}, ETR_t)\ \forall\ t \in [1981, 1989]$	9	1.39
$Cov(ETR_{t+4}, ETR_{t+1}) = Cov(ETR_{t+3}, ETR_t))\ \forall\ t \in [1981, 1988]$	8	1.62

Notes: This table reports Wald statistics and degrees of freedom for tests of the null hypotheses of the equality of the autocovariances of ETRs at time horizons of 1, 2, and 3 years across all firms and years in the baseline panel. ETRs are residualized on depreciation and depletion scaled by lagged assets. Degrees of freedom for each test are the number of restrictions.

Second, statistical tests cannot reject the equality of the autocovariance of ETRs at time lags of one, two and three years across every year spanning 1981-1992. Each null hypothesis and the Wald statistic associated with it is displayed in Table 2.[14] All three tests fail to

[14] To perform statistical tests I construct a vector stacking the full set of variances and autocovariances of ETRs across all years 1981-1992, m. Under i.i.d. sampling and finite fourth moments (Chamberlain, 1982, 1984; Abowd and Card, 1989) this vector will follow a standard normal distribution $\sqrt{N}(\hat{m} - m) \rightarrow \mathcal{N}(0, V)$ and $\hat{V} = \sum_i (m_i - \hat{m})(m_i - \hat{m})'$ will provide a consistent estimate of V. Under these assumptions, I derive a Wald statistic to test that the covariance elements of the moment vector are equal. This test statistic takes

reject the null hypothesis, suggesting the time series process for ETRs remains unchanged around AMTBIA87.

Third, coefficients from distributed lag regressions estimating the relationship between changes in BTDs and changes in ETRs among treatment firms are not different before and after the implementation of AMTBIA87. I create a stacked dataset analogous to the one used for the stacked event study above using treatment definitions $d \in \{(81-83), (82-84), (83-85), (84-86), (85-87), (86-88), (87-89)\}$, restrict to event times between negative one and one, and estimate

$$\begin{aligned} \Delta BTD_{ied} &= \beta_0 \Delta ETR_{ied} + \beta_1 \Delta ETR_{ied} \times Post_{ied} \\ &\quad + \beta_2 \Delta ETR_{ie-1d} + \beta_3 \Delta ETR_{ie-1d} \times Post_{ied} + \phi_d + \delta_e + \varepsilon_{ied}, \end{aligned} \tag{5}$$

where $Post_{ied}$ is an indicator for years after 1986 for firm i in event time e and treatment d. β_0 and β_2 quantify how BTDs change in response to current and lagged ETR changes, while β_1 and β_3 capture whether that impact changes after the implementation of AMTBIA87. Table C.1 displays coefficients from an OLS regression of equation (5).[15] I cannot reject a zero coefficient for the interaction of ETR with the $Post$ dummy, suggesting ETRs have the same impact on BTDs before and after the implementation of AMTBIA87.

Given the robustness of the placebo-in-time approach, I take the baseline and stacked event study estimates and rescale them into an elasticity of book income with respect to the net of tax rate

$$\varepsilon_e^{BI} = \Big(\frac{\beta_e}{\overline{BI}_\beta} - \frac{\eta_e}{\overline{BI}_\eta}\Big) \cdot \frac{1-\tau}{\Delta(1-\tau)_e}, \tag{6}$$

where $\overline{BI}_\beta, \overline{BI}_\eta$ are average book incomes in the pre-period of the samples used to estimate

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the form $W = \sqrt{N}\Big[R\hat{m} - g\Big]'\Big(R\hat{V}R\Big)^{-1}\Big[R\hat{m} - g\Big]$, where R are the test restrictions, g are the proposed values, and $\hat{V}$ is the consistent estimate of the asymptotic distribution of the moment vector. I perform three tests using this procedure, with null hypotheses that each autocovariance of ETRs at a time lag of one, two, or three years is equal for each year between 1981 and 1992.

[15] Table C.1 also displays coefficients from an instrumental variables regression of ΔBTD_{ied} on ΔETR_{ied} following the form of equation (5), but dropping ΔETR_{ie-1d} to maintain the sample and instrumenting for ΔETR_{ied} and $\Delta ETR_{ied} \times Post_{ied}$ with ETR_{ie-2d} and $ETR_{ie-2d} \times Post_{ied}$ to address any potential concerns about serial correlation in ETRs biasing the OLS estimates.

equations (3) and (4) respectively. I nonparametrically bootstrap standard errors to account for sampling uncertainty in the event study and average book income estimates, clustering at the firm level. Figure 3 plots elasticity estimates pooling event time coefficients over $e = 1-3$ and $e = 4-6$ by replacing yearly post-period dummies and their treatment interactions in equations (3) and (4) with dummies for event time $e = 1-3$ and $e = 4-6$ and their treatment interactions. The baseline elasticity estimate over 1987-1989 is -0.14 with a 95% confidence interval from -0.73 to 0.46, rejecting elasticities of the magnitude previously estimated in the literature based off book tax difference responses to AMTBIA87, aggregated in Dharmapala (2020) and represented in the figure by the horizontal dashed black lines.

The elasticity estimates in this paper diverge from previous estimates in the literature because of the mean reversion correction, not because of different controls, treatments groups, samples or measurement of outcomes. The "no mean reversion" series in Figure 3 plots elasticity estimates based on equation (6) without subtracting η_e. These estimates fall within the range of existing estimates in the literature.[16] On the other hand, varying the treatment ETR cutoff to 20% or 26%, subtracting state taxes out of tax expense when constructing BTDs, adding asset tercile time trends (defined in event time negative one), adding 2 digit SIC industry time trends, excluding finance and utility firms, including years after 1986 in the estimate of equation (4), and excluding depreciation and depletion controls all do not materially impact my elasticity estimates.[17]

These robustness checks rule out a number of concerns. The lack of estimate variation when changing the treatment cutoff and measuring taxes differently suggests that measurement error in ETRs does not drive my results. The fact that the elasticity estimates do not change with the inclusion of asset tercile or industry time trends suggests that if other TRA86 policy changes are biasing my results, this bias cannot be driven by industry or

[16]Previous authors were aware of potential mean reversion in similar quasi-experimental set-ups, e.g. the discussion in Dhaliwal and Wang (1992) section 4. However, they adjust for possible mean reversion using only a single placebo year. Given the idiosyncratic year-to-year sampling variation in the evolution of treatment relative to control firm's BTDs displayed in Figure 2, panel (b) I view averaging over a number of placebo series as more appropriate. Even if I selected a single placebo treatment definition the vast majority of available years to choose from would yield close to null elasticity estimates.

[17]To standardize SIC codes within firms I use the mode SIC code within firms across years, breaking ties with the smaller SIC code. I impute two digit SIC codes manually based on financial statement information for firms missing an SIC code in every year.

firm size-specific impacts of those policy changes. The lack of estimate variation when excluding finance and utility firms suggests that rate of return regulation and different profit and reporting incentives faced by these firms do not drive my results. The lack of estimate variation when including post-1986 years in the estimation of equation (4) suggests the elasticity estimates are not sensitive to bias in the placebo-in-time counterfactual potentially introduced by AMTBIA87, nor the specific choice of placebo. The lack of estimate variation when excluding depreciation and depletion controls from regressions suggests adjustments for tax preferences and adjustments are not driving the null estimates and neither is any potential bias introduced by time-varying controls.

Furthermore, I find little heterogeneity in avoidance responses across firm sizes or industries. Appendix Figure C.1, panels (a) and (b) display BTD responses scaled by pre-period standard deviations of the outcome and largely cannot reject the null of zero response across asset terciles or the four industries with the most firms in the sample: manufacturing, trade, transportation, and utilities. Appendix Figure C.2 also shows that placebo-in-time estimates of firm avoidance responses remain similar, especially over 1987-1990 when scaling outcomes by average assets in the pre-reform period rather than lagged assets.

IV.A Explaining the Lack of Avoidance Responses

Why might firms not exhibit large book tax difference responses to AMTBIA87? In this section, I rule out concerns that the tax increase was not salient, that firms could reduce their tax liabilities with foreign tax credits and net operating losses, that firms did not care about AMTBIA87 liabilities because they generated AMT credits, that firms with early fiscal-year ends did not fully face AMTBIA87 in 1987, and that financing constraints push firms to report high earnings even in the presence of the tax.

To confirm the salience of the tax increase, I plot placebo-in-time estimates of firm tax liabilities in Appendix Figure C.3. Panel (a) plots estimates using the whole sample, which suggest that firms facing AMTBIA87 saw their tax liabilities increase modestly by an average of 0.29% of lagged assets over 1987-1989.

Placebo-in-time tax liability estimates and avoidance elasticity estimates excluding multinational and loss firms confirm that tax liability increases were larger for firms that could

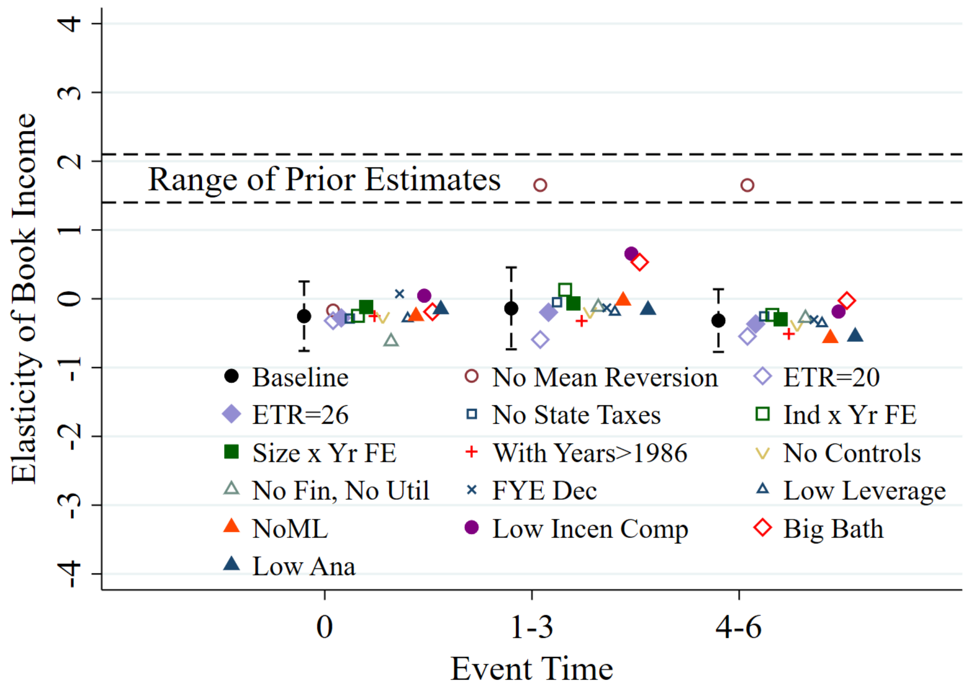


Figure 3: Placebo-in-Time Book Tax Differences Elasticity Estimates

Notes: This figure plots tax avoidance responses to AMTBIA87, scaling estimates of β_e from equation (3) and η_e from equation (4) into elasticities of book income with respect to the net of tax rate following equation (6). Confidence intervals are constructed from nonparametrically bootstrapped standard errors using 300 iterations and clustering at the firm level.

not reduce their AMTBIA87 tax liability with foreign tax credits and net operating loss deductions (Boynton, Dobbins and Plesko, 1992), and that these firms still did not avoid AMTBIA87. Appendix Figure C.3, panel (b) plots tax liability estimates dropping multinationals (firms with non-missing pretax foreign income or foreign tax expense at any event time before zero) and loss firms (firms with positive tax loss carryforwards at event time zero). Among non-multinational, non-loss firms (NoML), tax liability rose by an average of 0.67% of lagged assets over 1987-1989. Furthermore, the "NoML" series in Figure 3 plots elasticity estimates excluding multinational and loss firms. These elasticity estimates are very close to the baseline estimates. This evidence implies that I do not find null elasticities only because firms are reducing AMTBIA87 liability with foreign tax credits and losses, that subsidiary aggregation differences between book and tax systems are not driving my estimates, and that even among firms facing larger tax liability increases there is no avoidance response to AMTBIA87.

To confirm that the absence of tax avoidance cannot be explained by AMTBIA87 liability generating AMT credits that reduce future liabilities, I exploit the fact that firms receive AMT credits for taxes paid on temporary BTDs but not permanent BTDs. If the lack of avoidance was driven by AMT credits, we would expect firms to shrink permanent BTDs that do not generate AMT credits to avoid the tax. However, Appendix Figure C.4 plots placebo-in-time estimates using permanent BTDs and finds permanent BTDs that do not generate AMT credits appear to increase by 0.63% of lagged assets over 1987-1989.

The income firms with early fiscal-year ends reported in 1987 may not have been fully subject to AMTBAI87 because some of it was accrued during the 1986 tax year. To confirm these timing concerns do not drive the lack of avoidance responses, the "FYE Dec" series in Figure 3 plots elasticity estimates restricting to firms with fiscal years ends in December, after the announcement of TRA86 and AMTBIA87. These estimates are very similar to the baseline results, appearing to rule out that the lack of avoidance stems from firms not facing the tax.[18]

Firms with high leverage may face financial constraints and therefore face particularly strong incentives to keep reported earnings high to lower the price of external finance or avoid triggering debt covenant violations (Baker, Stein and Wurgler, 2003; Defond and Jiambalvo, 1994). The low leverage series in Figure 3 plots elasticity estimates restricting to firms with below median leverage. The estimates are very close to the baseline estimates. While leverage is only a rough proxy for financing constraints or potential debt covenant violations, this evidence suggests that financing constraints do not explain the null elasticity estimates.

To rationalize the lack of avoidance responses to AMTBIA87, I specify a static, partial equilibrium model of firm tax evasion and earnings manipulation decisions in the presence of corporate taxes, in which firms face incentives to maximize after-tax profits and stock prices.[19] Firms choose output y with convex costs $c(y)$. Some fraction of firm costs μ_t

[18] Previous studies have found BTD increases in 1986 suggestive of firms shifting BTDs from 1987 into 1986, a result that may also be biased by including firms with different fiscal-year ends. However, I find no increase in BTD in 1986 when restricting to firms with fiscal year-ends in December. If I define treatment and control groups based only on 1986 ETRs I observe a spike in BTDs in 1986, but this spike stems from the treatment definition and is comparable to spikes from placebo treatment definitions based on earlier single years.

[19] For models that consider dynamic earnings misreporting incentives, see Shackleford, Slemrod and Sallee

are deductible for tax purposes so that taxable income is $y - \mu_t c(y)$, and some fraction μ_b are deductible for book purposes so book income is $y - \mu_b c(y)$. Firms can evade or avoid taxes by misreporting tax costs $\hat{c}_t \neq c(y)$ at a convex cost of misreporting $g(\hat{c}_t - c(y))$, and can manipulate book income by misreporting book costs $\hat{c}_b \neq c(y)$ at a convex cost of misreporting $h(\hat{c}_b - c(y))$. Firms seek to maximize after-tax profits subject to misreporting costs while keeping stock prices high. Firm earnings manipulation impacts stock prices via $s(\hat{c}_b - c(y))$ where I assume $s'() < 0$ so that firms want to manipulate their earnings upwards to keep stock prices high. Firms pay taxes $T(y, \hat{c}_t, \hat{c}_b)$ that can depend on reported taxable or book income.

The firm solves

$$\max_{y,\hat{c}_t,\hat{c}_b} \; y - c(y) - T(y, \hat{c}_t, \hat{c}_b) - g(\hat{c}_t - c(y)) - h(\hat{c}_b - c(y)) + s(\hat{c}_b - c(y)). \tag{7}$$

I consider two different tax functions,

$$\text{Tax on Taxable Income: } T(y, \hat{c}_t, \hat{c}_b) = \tau_t(y - \mu_t \hat{c}_t)$$
$$\text{Tax on Book Income: } T(y, \hat{c}_t, \hat{c}_b) = \tau_b(y - \mu_b \hat{c}_b)$$

The first order conditions, which I display in Table 3, determine the level of output, tax evasion and earnings manipulation at the firm optimum. Columns 1 and 2 display how the first order conditions vary with the chosen tax function. Firms choose output to set marginal costs $c'(y)$ equal to $1 - \tau_E \equiv 1 - \tau\frac{1-\mu}{1-\tau\mu}$, the effective net of tax rate that varies with the statutory tax rate and base. A pure profit tax with $\mu = 1$ is therefore production efficient, while tax systems with larger effective tax rates result in production inefficiency. When moving from a tax on taxable income to a tax on book income, firm's marginal benefit of reporting lower book costs changes from $s'()$ to $s'() + \tau_b\mu_b$, as stock benefits from reporting higher earnings are offset by additional taxes.

This stylized model motivates quasi-experimental setups that search for evidence of downward earnings manipulation in response to AMTBIA87 by comparing firms facing AMT-

(2011), Terry, Whited and Zakolyukina (2021) who focus on earnings manipulation impacting firm user cost of capital, and Zakolyukina (2018) who focuses on understanding how frequently firms misreport their earnings.

Table 3: Firm Incentives Under Different Tax Systems

FOC	(1) Book Income	(2) Taxable Income
$c'(y)$	$1-\tau_{E,b}$	$1-\tau_{E,t}$
$g'(\hat{c}_t - c(y))$	0	$\tau_t \mu_t$
$h'(\hat{c}_b - c(y))$	$s'(\hat{c}_b - c_b(y)) + \tau_b \mu_b$	$s'(\hat{c}_b - c_b(y))$

Notes: This table presents first order conditions of the firm problem in equation (7). Column 1 uses the book income tax function. Column 2 uses the taxable income tax function. $\tau_{E,b} \equiv \tau_t \frac{1-\mu_b}{1-\tau_b \mu_b}$, and $\tau_{E,t} \equiv \tau_t \frac{1-\mu_t}{1-\tau_t \mu_t}$.

BIA87 whose marginal cost of over-reporting earnings increases to firms that do not. However, the magnitude of this earnings manipulation response depends on the relative magnitudes of the stock benefit and tax incentives, as well as the shape of the cost misreporting and stock benefit functions. Figure 4 plots an example assuming $h()$ is quadratic and $s()$ is linear to clarify this intuition. Moving from a tax on taxable income to a tax on book income shifts the marginal benefit function from $s'(\hat{c}_b - c(y))$ to $s'(\hat{c}_b - c(y)) + \tau_b \mu_b$, moving optimal earnings misreporting from $\hat{c}_b^* - c(y^*)$ to $\hat{c}_b' - c(y')$. However, the magnitude of this shift will be small if the magnitude of the tax incentive to report lower book income introduced by a tax on book income is small relative to stock incentives to report high book income.

A large literature in finance suggests that firm incentives to report high book incomes are very strong. Graham, Harvey and Rajgopal (2005) survey firm managers and find they fixate on reporting increasing earnings, positive earnings, and earnings that beat analyst targets. Empirical research documents bunching in the firm earnings distribution at these cutoffs (Burgstahler and Dichev, 1997; Terry, 2017). In addition, Erickson, Hanlon and Maydew (2004) find that firms appear willing to pay extra taxes in order to justify reporting fraudulently high earnings.

However, firm incentives to report high book incomes are not universal across firms, suggesting that we should expect to observe larger avoidance responses to AMTBIA87 among firms with weaker incentives to report high earnings. I focus on three types of firms with weaker incentives to report high earnings: firms with less incentive-based compensation (Bergstresser and Philippon, 2006), firms missing earnings targets by large margins, and

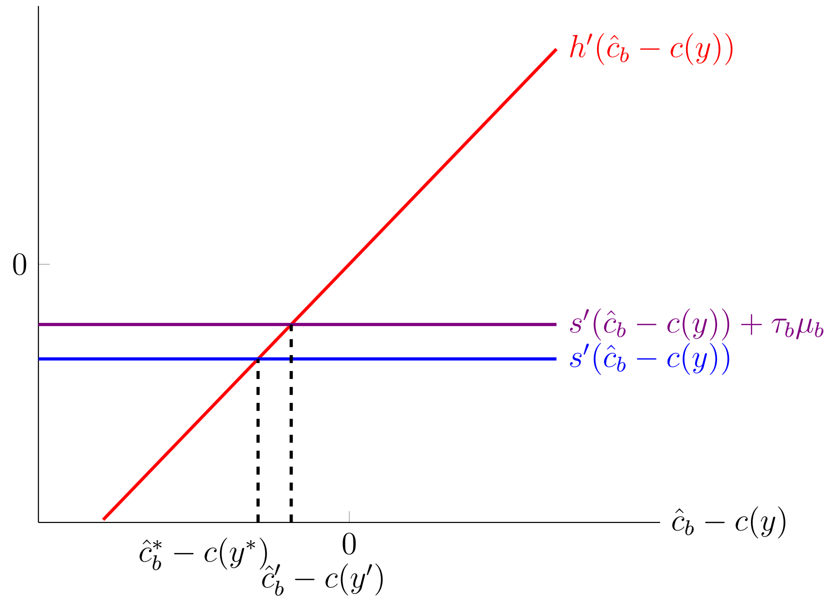


Figure 4: Marginal Firm Decisions

Notes: This figure plots book misreporting cost and stock benefit functions from equation (7) under a tax on taxable income and a tax on book income assuming $h()$ is quadratic and $s()$ is linear. The shift in firm book cost misreporting at the optimum when transitioning from a tax on taxable income to a tax on book income is denoted by $\hat{c}_b^* - c(y^*) - (\hat{c}_b' - c(y'))$, and is determined by the slope of the misreporting cost function $h()$, and the relative strengths of the stock-based incentive to report higher book income $s()$ and the tax incentive to report lower book income $\tau_b \mu_b$.

firms covered by fewer analysts (Yu, 2008).

To focus on firms with less incentive-based compensation, the "Low Incen Comp" series in Figure 3 plots elasticity estimates restricting to firms present in Execucomp, but excluding firms with managers whose compensation is more than 20% incentive-based in 1992 in an attempt to eliminate firms where managers face the strongest incentives to report high earnings. The elasticity point estimate over 1987-1989 for the low incentive-based compensation series is 0.66, suggesting that firms with managers lacking incentives to keep earnings high managed their earnings downwards to avoid AMTBIA87. These results are robust to a variety of cutoff fractions used to determine which firms have low incentive-based compensation, and regardless of whether I measure incentive-based compensation in 1992 or averaging over 1992-1994. I plot elasticity point estimates varying the cutoff fraction and measure of incentive-based compensation in Appendix Figure C.5, panel (c). The lower estimates spanning 1990-1992 may suggest that ACE was not a close analogue to book income.

Firms taking "Big Baths" that are missing earnings benchmarks by large margins also may face weaker incentives to report high book incomes. To focus on these firms, the "Big Bath" series in Figure 3 plots elasticity estimates restricting to firms where the difference between 1987 and 1986 book incomes is less than -0.5% of assets. The elasticity point estimate over 1987-1989 for the big bath series is 0.53, providing suggestive evidence that firms taking big baths shrunk their BTDs to avoid AMTBIA87.

Finally, to focus on firms that are covered by fewer analysts, the "Low Ana" series in Figure 3 plots elasticity estimates restricting to firms with fewer than an average of 3 analysts covering them over 1981-1992. This series provides little support for analyst coverage playing a role in firm responses to AMTBIA87, as the elasticity estimates are close to zero.

Unfortunately, these subsample analyses lack power and the point estimates cannot reject zero. Mechanically, these tests use fewer observations by restricting to only a fraction of the sample. In addition, Execucomp data is only available for 56% of the sample, further limiting the power of the incentive-based compensation test.[20] I plot elasticity estimates with confidence intervals for the baseline series, Execucomp sample, the low incentive-based compensation series, the big bath series, the low analyst coverage series, and the non-multinational non-loss series in Appendix Figure C.5, panel (a). Despite the limited power, these tests provide suggestive evidence that firms with less incentive to report high earnings had larger avoidance responses to AMTBIA87.

IV.B Earnings Management Responses

While I find little evidence that firms reduce the BTD tax base in response to AMTBIA87, firms can reduce BTDs by increasing taxable income or decreasing book income, so it is possible the null estimates presented above represent the combination of a book income decrease and a taxable income decrease.[21] To focus specifically on the accounting manipula-

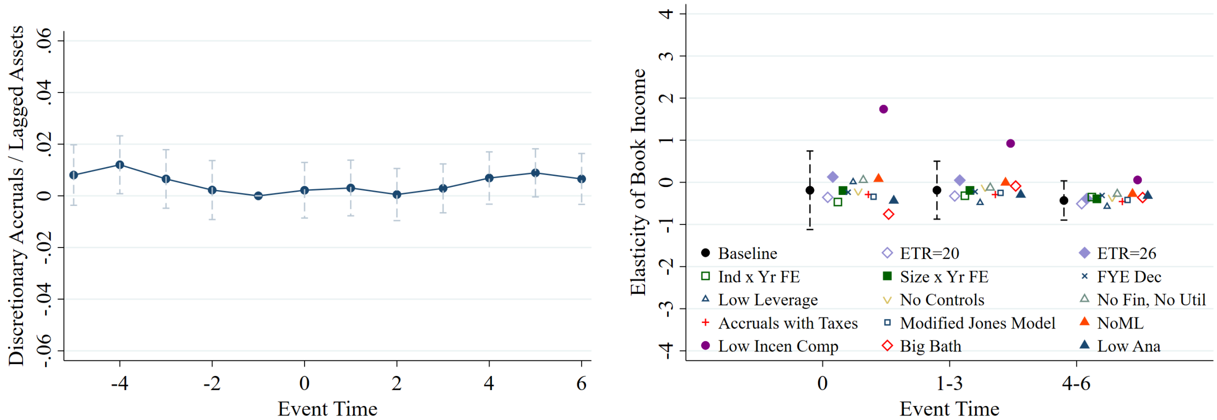
[20]Furthermore, the Execucomp data does not begin until 1992. However, Hall and Liebman (1998) show that levels of incentive-based compensation rose rapidly during the 1980s and 1990s so it seems reasonable to assume firms with low incentive-based compensation in 1992 also had low incentive-based compensation in previous years.

[21]Another potential concern with using BTDs as an outcome is that TRA86 cut the corporate tax rate, providing an incentive to shift taxable income from 1986 into 1987, which would reduce BTDs. However, this would only bias estimates in my event study framework if there is differential shifting of taxable income between treatment and control groups, something I observe no evidence of in Appendix Figure C.3.

tion aspect of firm's potential avoidance behavior, I study how discretionary accruals (DA), a common proxy for earnings management, change in response to AMTBIA87. DAs are not mechanically related to BTDs and therefore should not exhibit mean reversion, suggesting I can use the basic event study framework in equation (3) to estimate DA responses to AMTBIA87. Appendix Figure C.6 plots baseline estimates of equation (3) alongside stacked pre-period placebo estimates of equation (4) using DAs as an outcome and confirms this intuition. When placebo treatments are defined using years before 1984-1986, DA responses for placebo treatment relative to control firms cannot reject zero at every event time.

I plot estimates of β_e from equation (3) in Figure 5, panel (a). In panel (b), I rescale earnings management estimates into elasticities of book income with respect to the net of tax rate using equation (6) without the mean reversion correction. The baseline elasticity estimate over 1987-1989 is -0.19 with a 95% confidence interval from -0.87 to 0.5. These estimates reject downwards earnings management of more than -0.58% of lagged assets, or -0.06% of lagged assets per 1% change in the tax rate. The standard deviation of DA in the entire sample is 6% of lagged assets. Therefore, these estimates reject downwards earnings management with enough precision to rule out earnings manipulation responses to AMTBIA87 that are an order of magnitude smaller than the standard deviation of DAs in the data.

The baseline null elasticity estimates in Figure 5, panel (b) do not change significantly under a similar set of robustness tests as those in Figure 3. Changing the ETR cutoff between treatment and control groups, adding asset tercile or industry time trends, excluding controls, and excluding financial and utility firms does not change these estimates. In addition, the null result holds under different measurement of DAs. The "accruals with taxes" estimates use a DA construction that includes changes in taxes paid in the measurement of total accruals, more closely resembling the definition used in Boynton, Dobbins and Plesko (1992). The "Modified Jones Model" estimates use a DA construction that focuses on changes in credit sales as discussed in Appendix A and outlined in Dechow, Sloan and Sweeney (1995). Furthermore, Appendix Figure C.1, panels (c) and (d) display DA responses scaled by pre-period standard deviations of the outcome and cannot reject the null of zero response across asset terciles or the manufacturing, trade, transportation and utilities industries.



(a) Event Study (b) Elasticity Estimates

Figure 5: Discretionary Accrual Responses

Notes: This figure plots discretionary accrual responses to AMTBIA87. Panel (a) plots estimates of β_e from equation (3) splitting the 1981-1992 balanced panel into treatment and control groups based on 1984-1986 ETRs. Panel (b) scales the β_e estimates in panel (a) into an elasticity of book income with respect to the net of tax rate following equation (6) without the mean reversion correction $\varepsilon_e^{BI} = (\frac{\beta_e}{BI_\beta}) \cdot \frac{1-\tau}{\Delta(1-\tau)_e}$. Confidence intervals are calculated from standard errors clustered at the firm level.

Revisiting the hypotheses from above that some firms may face stronger incentives to manage earnings under AMTBIA87, I also estimate elasticities in Figure 5, panel (b) excluding high leverage firms, firms with fiscal year ends before December, multinationals and firms with losses, firms with high incentive-based compensation, firms without large earnings declines, and firms covered by many analysts. I find little evidence of more downwards earnings management when dropping firms with early fiscal year ends, multinationals and loss firms, high leverage firms, firms not taking big baths, or firms covered by many analysts, but do find some suggestive evidence that firms with low incentive-based compensation manage their earnings downwards. While the low incentive-based compensation estimates have the largest positive magnitudes, none of the estimates can reject zero.

V Production and Investment Responses

AMTBIA87 may impact firm's production and investment behavior by broadening the tax base and curbing deductions meant to incentivize these behaviors. To test whether firms exhibit real production and investment responses to AMTBIA87, I estimate firm sales, costs of goods sold, investment, debt and employment responses to AMTBIA87 using the basic event study framework in equation (3). None of the estimates can reject the null of zero in any of the post-1986 years across all five outcomes, suggesting that firms did not exhibit significant production and investment responses to AMTBIA87. The sales and COGS estimates in panel (a) suggest that firms did not modify their production in response to AMTBIA87 because there are no clear changes in firm revenues or costs of inputs.

Firms also do not appear to make economically meaningful changes to their investment, debt, or employment in response to AMTBIA87. In panel (b), I reject decreases in investment in 1989 of more than -0.48% of lagged assets for every 1% change in the tax rate. In panel (c), I estimate debt responses in 1989 of -0.02% of lagged assets with a 95% confidence interval from -0.24 to 0.2. In panel (d) I estimate log employment responses in 1989 of -0.01 with a 95% confidence from -0.11 to 0.08. These confidence intervals rule out other estimates of firm responses to tax policy changes in the literature by a wide margin. For example, Ohrn (2018) estimates that firms decrease debt by 5.3% of total assets and increase investment by 4.7% for every 1% reduction in the tax rate due to the Domestic Production Activities Deduction, while Zwick and Mahon (2017) estimate that investment increases 2.89% for every 1% decrease in the net of tax rate due to bonus depreciation changes.

To summarize and complement the event study production and investment responses presented in Figure 6, I also estimate the impact of expected total tax liability on outcomes, using expected AMTBIA87 liability as an instrument for total tax liability and estimating

$$Y_{it} = \phi TaxLiab_i + \delta_t + \gamma_s + \varepsilon_{it}, \tag{8}$$

where $TaxLiab_i$ is a firm's expected tax liability based on 1987 policy and 1986 status, Y_{it} are outcomes, δ_t are year fixed effects, and γ_s are industry (SIC2) fixed effects. I instrument for $TaxLiab_i$ with $AMTBIA_i$, a firm's expected AMTBIA87 liability based on 1986 status calculated as 10% of BTD if the firm is in the treatment group and zero otherwise. I estimate this regression over all treatment and control firms, using all data from 1987-1992.

The two stage least squares estimates identify the causal effect of additional tax liability on outcomes under the assumption that expected AMTBIA87 liability impacts outcomes only through changes in tax liability. The instrument is relevant because expected AMTBIA87 liability is mechanically related to expected total tax liability, and unlikely to violate exclusion unless firms respond to AMTBIA87 for reasons unrelated to tax liability changes.[22]

Estimates of the predicted tax liability coefficient ϕ are particularly useful because they can be interpreted as the impact of tax liability on outcomes, but are identified using only variation in expected AMTBIA87 liability, abstracting from other TRA86 changes. In addition, constructing the instrument from BTDs eliminates concerns that event study controls for tax preferences and adjustments do not rid my estimates of bias from mismeasuring the tax base if tax base error is independent across firms.

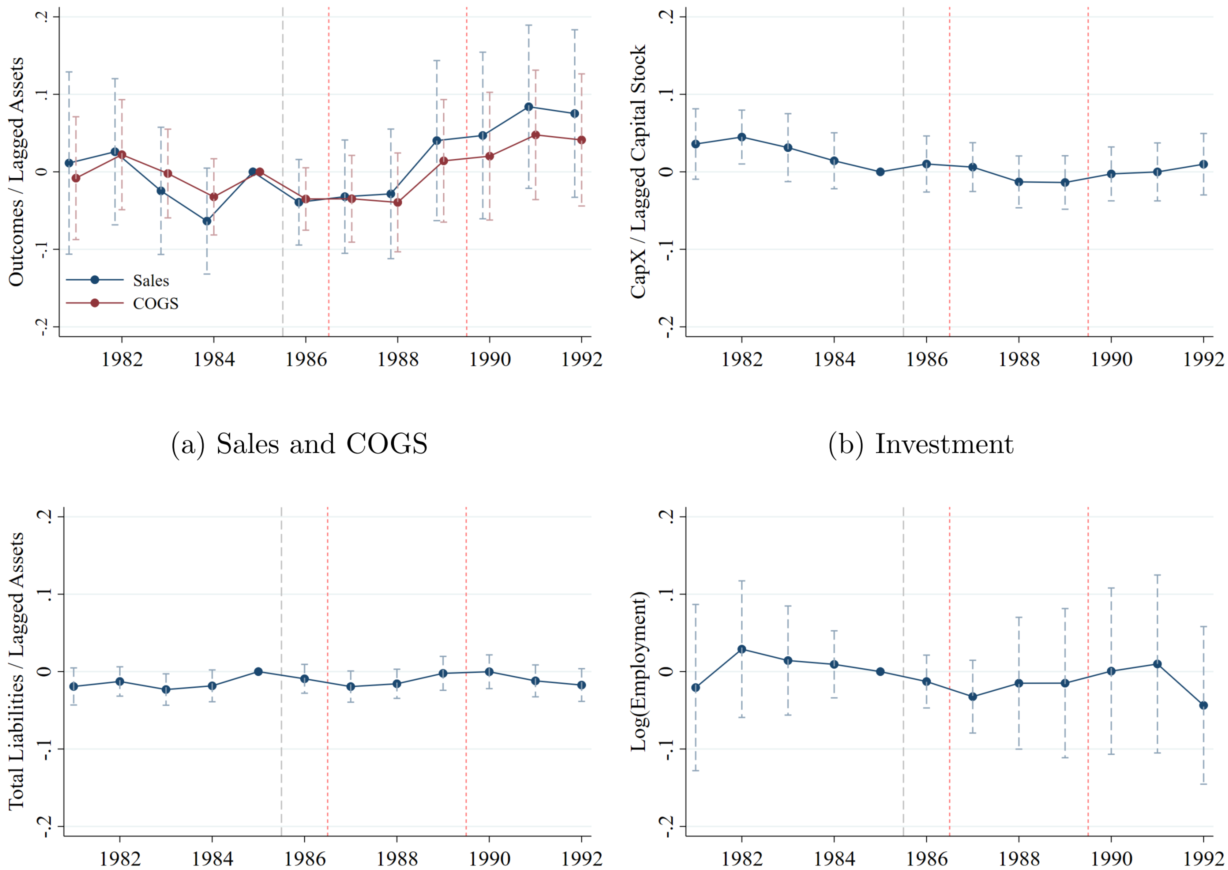
Table 4: Production and Investment Instrumental Variable Estimates

Coefficient	(1) Sales	(2) COGS	(3) Investment	(4) Debt	(5) Employment
Predicted Liability Effect	−0.001	−0.001	−0.000	0.000	0.012
	(0.001)	(0.001)	(0.000)	(0.000)	(0.006)
Observations	3636	3636	3614	3636	3523
Clusters	606	606	603	606	598
F Stat	3.97	3.97	3.79	3.97	3.85
LM Stat	2.83	2.83	2.76	2.83	2.80

Notes: This table reports instrumental variable regression coefficients from equation (8) across five outcome variables: sales, costs of goods sold, investment, debt and employment. The predicted liability effect is the ϕ coefficient on predicted tax liability in equation (8), while the first stage coefficient is the coefficient on the expected AMTBIA87 liability instrument in the first stage. Standard errors are in parentheses and clustered at the firm level. The sample includes all firm-years from 1987-1992 not in the finance and utilities industries.

Table 4 displays instrumental variable regression results using sales, COGS and debt scaled by lagged assets, investment scaled by lagged capital stock, and log employment as outcomes. None of the predicted liability effect coefficients reject the null hypothesis of zero except for employment. The estimates in column 1 suggest that for every \$1 million increase in expected AMT tax liability, sales decrease by 0.1% of lagged assets.

[22]For example, firms might face higher administrative burdens due to AMTBIA87 with significant costs that crowd out investment. However, this seems unlikely because firms already were required to calculate book and taxable income for their taxes and financial statements before TRA86.



(a) Sales and COGS

(b) Investment

(c) Debt

(d) Employment

Figure 6: Real Outcome Responses

Notes: This figure plots real outcome responses to AMTBIA87. Each panel plots estimates of β_e from equation (3), excluding finance and utility firms (SIC codes 4000-4899 and 4900-4999). 95% confidence intervals are constructed from standard errors clustered at the firm level. Panel (a) uses sales and costs of goods sold as outcomes. Panel (b) uses investment as an outcome, defined as capital expenditures per dollar of lagged net PPE. Panel (c) uses debt as an outcome, defined as total liabilities per dollar of lagged assets. Panel (d) uses log employment as an outcome. Full variable definitions are given in section III.

The null production and investment responses to AMTBIA87 that I estimate are consistent with the predictions of the model presented above, where firm output decisions are determined by the effective tax rate (see Table 3). AMTBIA87 applies a low rate to a broader base, leading to a small change in the effective tax rate and small, if any, changes in output.

VI Revenue Scores

To understand the implications of firm tax avoidance responses to AMTBIA87 for contemporary policy, I develop a revenue score of a recent Biden administration proposal to implement a book income AMT. The proposed Biden book income AMT would institute a 15% minimum tax on book income. The minimum tax would only apply to firms with at least $100 million in annual income. In addition, firms calculating minimum tax liability would still be allowed to claim deductions for loss carryforwards and foreign taxes.[23] To score the proposed Biden book income AMT, I simulate the evolution of firm book incomes over a ten-year period in a 2018 cross section of Compustat firms, incorporating possible firm tax avoidance responses to the policy and applying the proposed book income AMT to the simulated data to estimate revenue. I explain the details of my scoring methodology in Appendix C.

This scoring methodology yields a range of estimates that depend on chosen values of the book income elasticity. I construct four scenarios that vary elasticity assumptions to explore how these assumptions impact revenue scores. Scenario 1, in line with the estimates in section IV, assumes zero responses to a book minimum tax. Scenario 2 makes moderate elasticity assumptions close to the upper edge of the confidence intervals of the elasticity estimates in section IV. Scenarios 3 and 4 make higher elasticity assumptions, where the assumptions in scenario 3 are in line with previous estimates of book income elasticities and the assumed elasticities in scenario 4 are even larger.

I summarize the revenue raised by the proposed book income AMT in each simulation scenario in Table 5, panel A. Column 1 displays aggregate revenue scores from each scenario. Column 2 displays the revenue raised by the firms facing the ten largest tax liability increases in each simulation. Columns 3-6 display the revenue raised from firms in the utilities, manufacturing, finance and insurance, and transportation and warehousing sectors respectively. In my preferred Scenario 1, the proposed book income AMT raises $336 billion over a decade. This is simply a mechanical tax calculation. In the more conservative scenario 2, avoidance responses to the proposed Biden book income AMT reduce revenue by 13%. Scenario 3

[23] Historically, when firms have paid an AMT, they have also generated AMT credits which could be used against normal tax liability in future years. I assume the proposal would include AMT credits, and that 30% of AMT revenue is returned to firms via credits.

shows that assuming elasticities in line with previous estimates in the literature reduces estimated revenue by 19%.

Table 5: 10 Year Revenue Scores of the Biden Book Income AMT

Panel A: Baseline Scenarios	(1) Revenue	(2) Top 10	(3) Util	(4) Manf	(5) Fin	(6) Tran
S1: $\varepsilon_t = \{0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0\}$	336	83	81	75	46	36
S2: $\varepsilon_t = \{0.0, 0.5, 0.5, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0\}$	294	76	73	64	40	32
S3: $\varepsilon_t = \{0.5, 0.5, 1.0, 1.0, 1.0, 1.5, 1.5, 1.5, 2.0, 2.0\}$	273	72	68	58	38	30
S4: $\varepsilon_t = \{1.0, 2.0, 3.5, 4.0, 4.5, 5.0, 5.0, 5.0, 5.0, 5.0\}$	167	51	43	32	28	17
Panel B: No FTC Scenarios	Revenue	Top 10	Util	Manf	Fin	Tran
S1: $\varepsilon_t = \{0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0\}$	416	91	82	86	81	39
S2: $\varepsilon_t = \{0.0, 0.5, 0.5, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0\}$	363	83	74	73	71	34
S3: $\varepsilon_t = \{0.5, 0.5, 1.0, 1.0, 1.0, 1.5, 1.5, 1.5, 2.0, 2.0\}$	335	80	69	66	65	31
S4: $\varepsilon_t = \{1.0, 2.0, 3.5, 4.0, 4.5, 5.0, 5.0, 5.0, 5.0, 5.0\}$	197	58	44	34	40	18

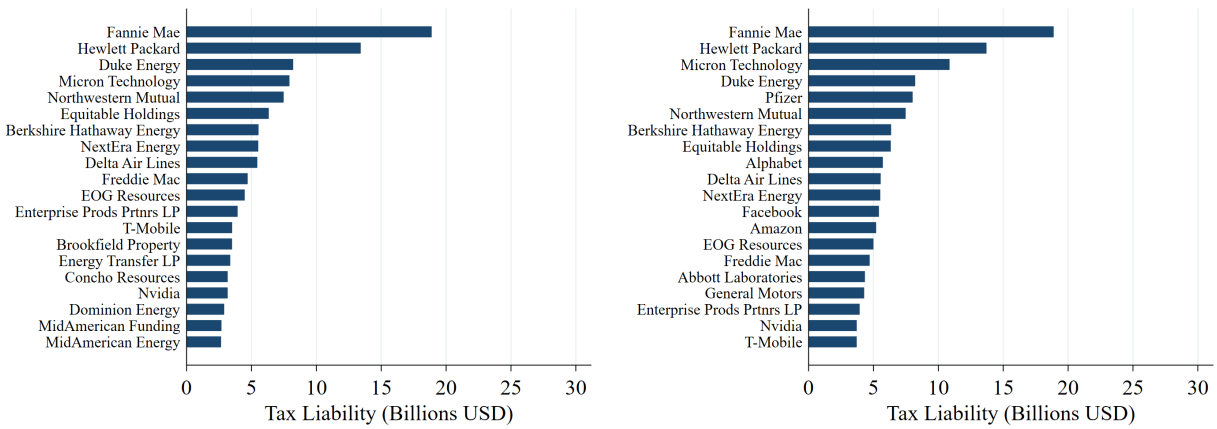
Notes: This table reports ten year revenue scores of the proposed Biden book income AMT across a range of assumptions for ε_t, the elasticity of book income with respect to the net of tax rate at time horizon t. Panel (a) displays revenue estimates for the basic policy described in the text, assuming 30% of AMT liability is recovered via AMT credits. Panel (b) displays revenue estimates for the same policy except that firms are not able to use foreign tax credits to reduce their AMT liabilities. Column 1 displays the total revenue estimate. Column 2 displays the revenue raised from the ten firms contributing the most revenue. Columns 3-6 display the total revenue coming from the four most affected industries across simulations, Utilities (NAICS2=22), Manufacturing (NAICS2=31-33), Finance and Insurance (NAICS2=52) and Transportation and Warehousing (NAICS2=48-49) respectively. Revenue scores are in billions of USD.

Column 2 of Table 5 shows that across scenarios, between 25% to 30% of the revenue raised by the proposed book income AMT comes from the firms with the ten largest tax liability increases due to the policy.[24] Columns 3-6 of Table 5 show that, across revenue simulations, most of the revenue raised by the proposed Biden book income AMT would come from the utilities, manufacturing, finance and insurance and transportation sectors.

Figure 7, panel (a) identifies which firms face the largest tax liability increases from the proposed book income AMT by plotting the tax revenue raised in my preferred simulation from the twenty firms facing the largest changes. The firms facing the very largest tax liability increases include Hewlett Packard, Fannie Mae, Berkshire Hathaway Energy and Delta Airlines.[25] One firm noticeably absent from the top twenty is Amazon.

[24]This share increases in the scenarios incorporating larger avoidance responses to the policy.

[25]Fannie May and Freddie Max are government sponsored enterprises (GSEs). While GSEs are exempt



(a) Biden Book Income AMT (b) Without Foreign Tax Credits

Figure 7: 20 Largest Tax Liability Increases Over a Decade

Notes: This figure plots the tax liability of the firms facing the 20 largest increases in tax liability as a result of the proposed book income AMT in my preferred simulation, Scenario 1. Panel (a) displays tax liability increases for the baseline proposed policy. Panel (b) displays tax liability increases for a modified policy that does not allow firms to use foreign tax credits to reduce minimum tax liability.

Amazon faces a \$1.7 billion increase in tax liability in my preferred ten-year revenue score, the 41$^{\text{st}}$ largest among firms in the sample. Reassuringly, in my simulations the book income AMT does appear to accomplish its stated aim to increase the tax liabilities of profitable firms like Amazon that pay very few taxes. However, the book income AMT captures significantly more revenue from a number of other firms who are either more profitable, pay fewer taxes, or both. Therefore, while criticism that Amazon is highly profitable but pays few taxes is accurate, that criticism can also be levied at many other firms, some of whom are even more extreme examples of diverging profitability and tax liability.[26]

Amazon's tax liability under the proposed book income AMT is mitigated by substantial tax loss carryforwards and foreign tax credits the firm has accumulated. Generally, allowing deductions to substantially narrow a book income AMT base may allow firms to avoid the AMT in the same way they avoid paying taxes under the standard corporate tax system. To explore the type of AMT that would preserve a wider base, I also run revenue simulations

from state and local taxes, they are not exempt from federal taxes.

[26] Amazon's book income is not changed by avoidance assumptions I make in revenue simulations because Amazon would not pay the book income AMT based on their 2018 financial statements. If I applied avoidance estimates to the book income of Amazon, the firm would contribute even less revenue.

for a modified version of the proposed book income AMT that does not allow firms to reduce their minimum tax liability with foreign tax credits.[27] Figure 7, panel (b) plots the twenty largest tax liability increases in response to this modified book income AMT, using my preferred elasticity estimates from Scenario 1. After excluding FTCs, Amazon faces a $5.2 billion increase in tax liability, the 13$^{\text{th}}$ largest among all firms. Table 5, panel B displays aggregate revenue estimates for the simulation without foreign tax credits. This policy would raise $416 billion over a decade with similar levels of revenue concentration among the ten largest contributors and across industries as the proposed policy with a narrow base.

VII Conclusion

In this paper, I estimate firm responses to an AMT on book income. Within an event study framework, placebo-in-time estimates suggest that firms do not manipulate their earnings to avoid AMTBIA87. My avoidance estimates diverge from previous estimates of book income elasticities because I account for mean reversion, not because of different sample construction, variable construction, or controls. I develop a static partial equilibrium model that rationalizes the lack of avoidance responses to AMTBIA87 by showing avoidance depends on the relative magnitudes of tax and non-tax incentives to report high book incomes. Therefore, firms facing weaker incentives to report high earnings should exhibit larger avoidance responses to AMTBIA87. Empirical tests of avoidance among firms with lower incentive-based compensation and firms missing earnings benchmarks provide suggestive evidence that supports this core model prediction. I also find little evidence that AMTBIA87 distorts firm production or investment decisions.

The purpose of AMTs is to bolster public perceptions of tax code fairness by ensuring all firms with substantial income pay taxes. To evaluate the implications of the tax avoidance I estimate in response to AMTBIA87 for contemporary policy, I develop revenue scores of a proposed book income AMT. In my preferred simulation, the book income AMT would raise $336 billion in revenue over a decade. These revenue scores suggest that a book income

[27] This policy would impose double taxation on earnings of foreign subsidiaries if implemented in conjunction with a country-by-country minimum tax, but in the absence of a country-by-country minimum tax would serve as a reasonable backstop in an attempt to capture additional tax revenue from profitable firms.

AMT would raise substantial revenue from firms with high income and low tax liability, but that firms would still have some scope to escape larger tax payments because of deductions and credits allowed in the book income tax base.

The results in this paper suggest that taxes on book income may be non-distortionary and raise substantial revenue because firms face non-tax incentives to report high book incomes. However, if policymakers implement a modern tax on book income, they also need to consider how firm responses may depend on the regulatory environment (Terry, Whited and Zakolyukina, 2021) and the salience of book income versus non-GAAP income measures for investors, firms and managers. Furthermore, a tax on book income may lead to a politicization of the accounting standards setting process (Shaviro, 2020), which could allow special interests to limit the breadth of a book income tax base and continue to allow firms to report high incomes while paying few taxes. Ultimately, we have only incomplete historical evidence to guide the implementation of a tax based on book income, and any implementation of a book income AMT in the future will call for careful evaluation.

References

Abowd, John M., and David Card. 1989. "On the Covariance Structure of Earnings and Hours Changes." *Econometrica*, 57(2): 411–445.

Alejos, Luis. 2018. "Firms' (Mis)-Reporting under a Minimum Tax: Evidence from Guatemalan Corporate Tax Returns." Working Paper.

Almunia, Miguel, and David Lopez-Rodriguez. 2018. "Under the Radar: The Effects of Monitoring Firms on Tax Compliance." *American Economic Journal: Economic Policy*, 10(1): 1–38.

Bachas, Pierre, and Mauricio Soto. 2021. "Corporate Taxation under Weak Enforcement." *American Economic Journal: Economic Policy*, 13(4): 36–71.

Baker, Malcolm, Jeremy C. Stein, and Jeffrey Wurgler. 2003. "When Does the Market Matter? Stock Prices and the Investment of Equity-Dependent Firms." *The Quarterly Journal of Economics*, 118: 969–1005.

Bergstresser, Daniel, and Thomas Philippon. 2006. "CEO incentives and earnings management." *Journal of Financial Economics*, 80: 511–529.

Best, Michael C., Anne Brockmeyer, Henrik J. Kleven, Johannes Spinnewijn, and Mazhar Waseem. 2015. "Production versus Revenue Efficiency with Limited Tax Capacity: Theory and Evidence from Pakistan." *Journal of Political Economy*, 123(6): 1311–1355.

Boynton, Charles E., Paul S. Dobbins, and George A. Plesko. 1992. "Earnings Management and the Corporate Alternative Minimum Tax." *Journal of Accounting Research*, 30: 131–53.

Burgstahler, David, and Ilia Dichev. 1997. "Earnings management to avoid earnings decreases and losses." *Journal of Accounting and Economics*, 24: 99–126.

Chamberlain, Gary. 1982. "Multivariate Regression Models for Panel Data." *Journal of Econometrics*, 18: 5–46.

Chamberlain, Gary. 1984. "Panel Data." In *The Handbook of Economentrics*. Vol. 2, , ed. Zvi Griliches and Michael Intrilligator, Chapter 22. New York: North Holland.

Choi, Won W., Jeffrey D. Gramlich, and Jacob K. Thomas. 2001. "Potential errors in detecting earnings management: Reexamining studies investigating the AMT of 1986." *Contemporary Accounting Research*, 18(4): 571–613.

Collins, Julie H., and Douglas A. Shackleford. 2004. "Do U.S. Multinationals Face Different Tax Burdens than Do Other Companies?" *Tax Policy and the Economy*, 17: 141–68.

Coombs, Kyle, Arindrajit Dube, Calcin Jahnke, Raymond Kluender, Suresh Naidu, and Michael Stepner. 2021. "Early Withdrawal of Pandemic Unemployment Insurance: Effects on Earnings, Employment and Consumption." Working Paper.

Cummins, Jason G., Kevin A. Hasset, and R. Glenn Hubbard. 1994. "A Reconsideration of Investment Behavior Using Tax Reforms as Natural Experiments." *Brookings Papers on Economic Activity*, 24(2): 1–74.

Dechow, Patricia M., Richard G. Sloan, and Amy P. Sweeney. 1995. "Detecting Earnings Management." *The Accounting Review*, 70(2): 193–225.

Defond, Mark L., and James Jiambalvo. 1994. "Debt covenant violation and manipulation of accurals." *Journal of Accounting and Economics*, 17: 145–176.

Desai, Mihir A., and Austan D. Goolsbee. 2004. "Investment, Overhang and Tax Policy." *Brookings Papers on Economic Activity*, 34(2): 285–355.

Desai, Mihir A., and Dhammika Dharmapala. 2006. "Corporate tax avoidance and high-powered incentives." *Journal of Financial Economics*, 79: 145–179.

Dhaliwal, Dan, and Shiing-Wu Wang. 1992. "The effect of book income adjustment in the 1986 alternative minimum tax on corporate financial reporting." *Journal of Accounting and Economics*, 15(1): 7–26.

Dharmapala, Dhammika. 2020. "The Tax Elasticity of Financial Statement Income: Implications for Current Reform Proposals." *National Tax Journal*, 73(4): 27–58.

Diamond, Peter A., and James A. Mirrlees. 1971. "Optimal Taxation and Public Production I: Production Efficiency." *The American Economic Review*, 61(1): 8–27.

Edgerton, Jesse. 2010. "Investment incentives and corporate tax asymmetries." *Journal of Public Economics*, 94(11-12): 936–952.

Erickson, Merle, Michelle Hanlon, and Edward L. Maydew. 2004. "How Much Will Firms Pay for Earnings That Do Not Exist? Evidences of Taxes Paid on Allegedly Fraudulent Earnings." *The Accounting Review*, 79(2): 387–408.

Gardner, Matthew. 2020. "From 0% to 1.2%: Amazon Lauds Its Minuscule Effective Federal Income Tax Rate." *ITEP Just Taxes Blog*.

Gill, Amy, and Patrice Treubert. 1992. "Corporate Alternative Minimum Tax, 1987-1990." Statistics of Income, Internal Revenue Service. Data Release.

Graham, John R., Campbell R. Harvey, and Shiva Rajgopal. 2005. "The economic implications of corporate financial reporting." *Journal of Accounting and Economics*, 40: 3–73.

Gramlich, Jeffrey D. 1991. "The effect of the alternative minimum tax book income adjustment on accrual decisions." *Journal of the American Taxation Association*, 12(1): 36–56.

Hall, Brian J., and Jeffrey B. Liebman. 1998. "Are CEOs Really Paid Like Bureaucrats?" *The Quarterly Journal of Economics*, 113(3): 653–691.

Healy, Paul M. 1985. "The Effect of Bonus Schemes on Accounting Decisions." *Journal of Accounting and Economics*, 7: 85–107.

Hribar, Paul, and Daniel W. Collins. 2002. "Errors in Estimating Accruals: Implication for Empirical Research." *Journal of Accounting Research*, 40: 105–134.

Janiga, John M. 1988. "The Corporate Alternative Minimum Tax: A Critique and Exploration of Alternatives." *Loyola University Chicago Law Journal*, 20(1).

Jones, Jennifer J. 1991. "Earnings management during import relief investigations." *Journal of Accounting Research*, 29(2): 193–228.

Li, Huaqun, Garrett Watson, and Taylor Lajoie. 2020. "Details and Analysis of Former Vice President Biden's Tax Proposals." Tax Foundation.

Lobel, Felipe, Thiago Scot, and Pedro Zuniga. 2020. "Corporate Taxation and Evasion Responses: Evidence from a Minimum Tax in Honduras." Working Paper.

Manzon, Gil, and George A. Plesko. 2002. "The relation between financial and tax reporting measures of income." *Tax Law Review*, 55: 175–214.

Manzon, Gil B. 1992. "Earnings management of firms subject to the alternative minimum tax." *Journal of the American Taxation Association*, 14(2): 88–111.

Mosberger, Palma. 2016. "Accounting versus real production responses among firms to tax incentives: bunching evidence from Hungary." Working Paper.

Ohrn, Eric. 2018. "The Effect of Corporate Taxation on Investment and Financial Policy: Evidence from the DPAD." *American Economic Journal: Economic Policy*, 10(2): 272–301.

Poterba, James M., Nirupama S. Rao, and Jeri K. Seidman. 2011. "Deferred Tax Positions and Incentives for Corporate Behavior Around Corporate Tax Changes." *National Tax Journal*, 64: 27–58.

Raedy, Jana S., Jeri K. Seidman, and Douglas A. Shackelford. 2011. "Is There Information in the Tax Footnote." Working Paper.

Redmond Soneff, Sandra G. 1986. "The Book Income Adjustment in the 1986 Tax Reform Act Corporate Minimum Tax: Has Congress Added Needless Complexity in the Name of Fairness." *SMU Law Review*, 40(5).

Shackleford, Douglas A., Joel Slemrod, and James M. Sallee. 2011. "Financial reporting, tax, and real decisions: toward a unifying framework." *International Tax and Public Finance*, 18: 461–494.

Shaviro, Daniel. 2020. "What Are Minimum Taxes, and Why Might One Favor or Disfavor Them?" Working Paper.

Terry, Stephen J. 2017. "The Macro Impact of Short-Termism." Working Paper.

Terry, Stephen J., Toni M. Whited, and Anastasia A. Zakolyukina. 2021. "Information versus Investment." Working Paper.

Wang, Shiing-Wu. 1994. "The Relationship between Financial Reporting Practices and the 1986 Alternative Minimum Tax." *The Accounting Review*, 69(3): 495–506.

Yu, Fang. 2008. "Analyst Coverage and Earnings Management." *Journal of Financial Economics*, 88: 245–271.

Zakolyukina, Anastasia A. 2018. "How Common Are Intentional GAAP Violations? Estimates from a Dynamic Model." *The Journal of Accounting Research*, 56: 5–44.

Zwick, Eric, and James Mahon. 2017. "Tax Policy and Heterogeneous Investment Behavior." *American Economic Review*, 107(1): 217–248.

A Constructing Discretionary Accruals

Following Dechow, Sloan and Sweeney (1995), I measure total accruals as the change in current assets less change in current liabilities less change in cash plus change in long term debt in current liabilities minus depreciation, all scaled by lagged assets. Total accruals are income for which cash has not yet been exchanged. I then model total accruals as a function of economic conditions (Jones, 1991),

$$\frac{TA_{i,t}}{A_{it-1}} = \sum_{j=1}^{J} \beta_{1j} \frac{1}{A_{it-1}} + \beta_{2j} \frac{\Delta Sales_{it}}{A_{it-1}} + \beta_{3j} \frac{GPPE_{it}}{A_{it-1}} + \psi_j + \varepsilon_{it}, \tag{A.1}$$

where TA_{it} are total accruals and $GPPE_{it}$ is gross property plants and equipment for firm i in 2 digit SIC industry j in year t. I estimate (A.1) using data from 1981-1985 in the period before which there should be any earnings management from AMTBIA87, then predict non-discretionary accruals $\frac{\widehat{NDA_{i,t}}}{A_{it-1}}$ using the regression coefficients over the whole 1981-1992 sample. Discretionary accruals are measured as $\frac{TA_{i,t}}{A_{it-1}} - \frac{\widehat{NDA_{i,t}}}{A_{it-1}}$.

I also explore two alternative measures of discretionary accruals. First, I add changes in taxes payable to the measure of total accruals to more closely match the definition used in Boynton, Dobbins and Plesko (1992). Second, I use a "modified Jones model" as in Dechow, Sloan and Sweeney (1995); Bergstresser and Philippon (2006); Yu (2008), running the regression $\frac{TA_{i,t}}{A_{it-1}} = \beta_1 \frac{1}{A_{it-1}} + \beta_2 \frac{\Delta Sales_{it}}{A_{it-1}} + \beta_3 \frac{GPPE_{it}}{A_{it-1}} + \psi_j + \varepsilon_{it}$ and predicting non-discretionary accruals using $\hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3$ but applying $\hat{\beta}_2$ to $\Delta Sales_{it} - \Delta Receivables_{it}$ instead of $\Delta Sales_{it}$ to focus on changes in credit sales. Neither alternative measure significantly changes results. Hribar and Collins (2002) point out that using these discussed balance sheet approaches to measure accruals may lead to mismeasurement for firms with M&A activities, discontinued operations or significant foreign currency accounts. Unfortunately, I am unable to use the solution proposed in Hribar and Collins (2002) because it relies on statement of cash flow data that does not exist before 1988.

B Relating Effective Tax Rates to AMT Liabilities

I relate effective tax rates to alternative minimum tax book income adjustment (AMTBIA87) payments building on derivations in Dhaliwal and Wang (1992). First, I define the book income adjustment (BIA) and alternative minimum tax payments (AMT) under AMTBIA87, with statutory corporate tax rate τ, taxable income TI, book income BI and tax preferences and adjustments TPA:

$$\begin{aligned} BIA &= 0.5\Big(BI - (TI + TPA)\Big), \\ AMT &= \max\Big\{0.2\Big(TI + TPA + BIA\Big) - \tau TI, 0\Big\}. \end{aligned}$$

Next, I define book tax differences $BTD \equiv BI - TI$. AMTBIA87 is a direct tax on $BTD - TPA$, the portion of book tax differences that are not tax preferences and adjustments. Suppose some fraction f of BTD are TPA, so that $TPA = f(BI - TI)$. Then plugging the expressions for BIA and TPA into AMT, I obtain

$$\frac{AMT}{BI} = \max\{0.1 + 0.1f + \Big[(0.1 - \tau) - 0.1f\Big]\frac{TI}{BI}, 0\}.$$

Furthermore, because $ETR \equiv \tau\frac{TI}{BI}$, I can write

$$\frac{AMT}{BI} = \max\{0.1 + 0.1f - \Big[\frac{\tau - 0.1}{\tau} + \frac{0.1f}{\tau}\Big]ETR, 0\}.$$

Therefore, a firm has positive AMT liability if

$$ETR < \frac{0.1 + 0.1f}{\frac{(\tau - 0.1) + 0.1f}{\tau}}.$$

Now suppose $f = 0$, so that there are no tax preferences and adjustments and AMTBIA87 is a direct tax on BTD. Then a firm faces positive AMT liability if $ETR < 0.2$. In 1987 $\tau = 0.4$, implying that to obtain an ETR of 0.2, a firm must have BI twice as large as TI. In 1986, when $\tau = 0.46$, a firm with BI twice as large as TI has an ETR of 0.23. Therefore, all firms with $ETR < 0.23$ in 1986 are likely to face positive AMT liability from AMTBIA87.

On the other hand, suppose $f = 0.5$, so that half of BTD are tax preferences and adjustments and AMTBIA87 is a direct tax on only half of BTD. Then, a firm has positive AMT liability if $ETR < \frac{0.15}{\frac{(0.4-0.05)}{0.4}} = 0.17$ in 1987. To obtain an ETR of 0.17 in 1987, a firm must have BI 2.33 times as large as TI, while in 1986 a firm must have an ETR of 0.20 to have BI 2.33 times as large as TI.

Aggregate data released by the IRS suggests that the TPA included in BTD are unlikely to lead to spurious results. Gill and Treubert (1992) indicates that, averaging across 1987-1989, $f = 0.39$, and depreciation of property placed in service after 1986 and depletion account for 88% of those tax preferences and adjustments. To be conservative, in my baseline specifications I choose an ETR cutoff of 23% to ensure a high probability that firms in the control group do not face positive tax liability from AMTBIA87, and include time varying controls for depreciation and depletion to eliminate variation in the outcome due to TPA changes. In robustness checks I also find that my results are not sensitive to modifying the ETR cutoff to 20% or 26%.

C Revenue Scoring Methodology

To develop a revenue score of the Biden book income AMT I simulate the evolution of a 2018 cross section of firms' book incomes over the scoring time frame while incorporating avoidance responses to the policy. To select a cross section of firms in 2018, I restrict the Compustat fundamentals annual data to firms with positive, non-missing assets, sales, and pretax income that are incorporated in the U.S. and exist in the data in both 2017 and 2018.[28] I display summary stats for this sample of firms in Table C.2. Relative to the historical sample, firms are significantly larger in 2018 but exhibit the same type of skew with means of most variables exceeding medians by a large amount.

In the 2018 cross section of firms, I construct measures of total tax liability, eligible carryforwards for net operating loss deductions, the tax amount potentially due because of the book income AMT, and new tax due under the book income AMT. I measure applicable tax

[28] I include all firms present in Compustat, including firms with partnership structures like Enterprise Production Partners LP and Energy Transfer LP, which are among the firms displayed in Figure 7.

loss carryforwards as the minimum of Compustat pretax income and tax loss carryforwards. I calculate potential tax due because of the book income AMT as 15% of the difference between Compustat pretax income and applicable tax carryforwards, all less foreign taxes. Finally, I calculate the firm's new tax liability as the maximum of the firm's old tax liability or the potential tax due because of the book income AMT, only applying the AMT if the firm has over $100 million in EBITD.

To ensure my construction of tax status in the Compustat data is consistent with tax data, I compare aggregates of tax variables available in SOI line item reports to aggregate proxies in the Compustat data in Figure C.7 for available years spanning 2008-2015. While there are differences in aggregates in Compustat and the SOI line item reports, the magnitudes reasonably track each other across years.

Building on the 2018 cross section, I construct a panel by simulating ten years forward for each firm, taking into account possible avoidance responses to the proposed Biden book income AMT. To facilitate a direct mapping from the event study estimates of avoidance in section IV into the simulated data, I use CBO's 2018 ten-year GDP forecast as a proxy for book income growth per year for all firms, inflating book income (as well as EBITD and all other tax variables) by the CBO projected growth rate, and calculating book income as the sum of projected book income and a possible avoidance response to the policy.[29] Summing across the new tax liabilities in the first year of the simulation with no behavioral responses yields a one year mechanical tax revenue estimate of $31 billion.

To incorporate firm avoidance responses into the book income projection, I define book income for each firm in the simulation as the sum of projected mechanical book income, and a possible avoidance response to the proposed Biden book income AMT,

$$BI_t = BI_t^{mech} + \varepsilon_t \cdot BI_t^{mech} \cdot \frac{\Delta(1-\tau)}{1-\tau} \cdot \mathbb{1}(T=1), \tag{C.1}$$

[29] To account reasonably for firm losses, I calculate the share of firms with positive losses in 2018 and calculate the ratio of those firm's losses to their pretax income. In each subsequent simulation year I randomly select a fraction of firms that matches the share with positive losses in 2018, and within this sample subtract the fraction of pretax income that was removed via applicable losses in the 2018 calculation. In unreported results, I find that revenue estimates are similar when I instead calculate the observed fraction of tax loss carryforwards over book income in 2018, and reduce projected book income for every firm by that same fraction in each subsequent simulated year.

where BI_t^{mech} is projected book income over the ten-year window applying only CBO GDP forecasts to 2018 book income, ε_t is the elasticity of book income with respect to the net of tax rate over time horizon t that I estimate in section IV, and $\frac{\Delta(1-\tau)}{1-\tau} = \frac{0.85-1}{1} = -0.15$ is the change in the net of tax rate after the introduction of the proposed Biden book income AMT 15% marginal tax on book income.

I capture avoidance responses to the proposed Biden book income AMT with $\varepsilon_t \cdot BI_t^{mech} \cdot \frac{\Delta(1-\tau)}{1-\tau} \cdot \mathbb{1}(T = 1)$. The first terms $\varepsilon_t \cdot BI_t^{mech} \cdot \frac{\Delta(1-\tau)}{1-\tau}$ unwind the elasticity into a change in book income for each firm. $\mathbb{1}(T = 1)$ is an indicator for firms with over \$100 million in EBITD in 2018 that would pay the proposed Biden book income AMT in 2018. This ensures that I only apply avoidance responses in the revenue simulation to a group of firms analogous to the treatment group in the event study analysis in section IV.

After projecting book incomes, I calculate firms additional tax liability as the excess of their projected book income AMT tax liability over their projected tax liability under the normal corporate tax system. Book income AMT liabilities are reduced by foreign tax credits and net operating losses. This methodology calculates a revenue score for the proposed book income AMT holding all other tax policies fixed, though it can be adjusted to incorporate other changes like modifications to the corporate tax rate or treatment of losses and foreign tax credits.

Table C.1: Distributed Lag Regression Estimates

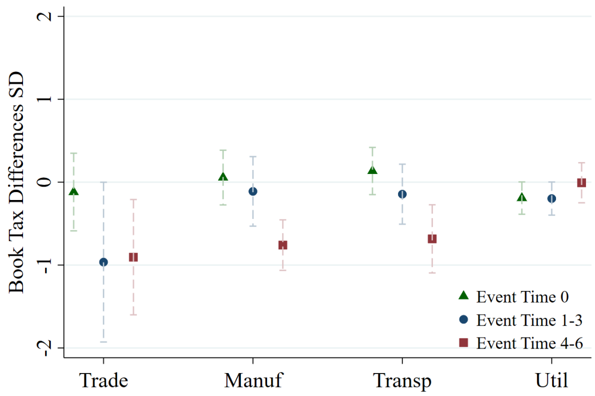
Variable	OLS (1)	IV (2)
ΔETR_t	-0.12	-0.15
	(0.01)	(0.04)
$\Delta ETR_t \times Post$	-0.01	-0.05
	(0.01)	(0.08)
ΔETR_{t-1}	-0.00	
	(0.01)	
$\Delta ETR_{t-1} \times Post$	-0.00	
	(0.01)	
Observations	1261	1261
Clusters	343	343
F Stat		3.16
LM Stat		5.43

Notes: This table reports OLS and instrumental variable regression coefficients from equation (5). The estimation sample is all treatment firms in a stacked data set with treatment definitions based on ETRS in 1981-1983, 1982-1984, 1983-1985, 1984-1986, 1985-1987, 1986-1988 and 1987-1989. The regression restricts to event times negative one through one. Standard errors are in parentheses and clustered at the firm level.

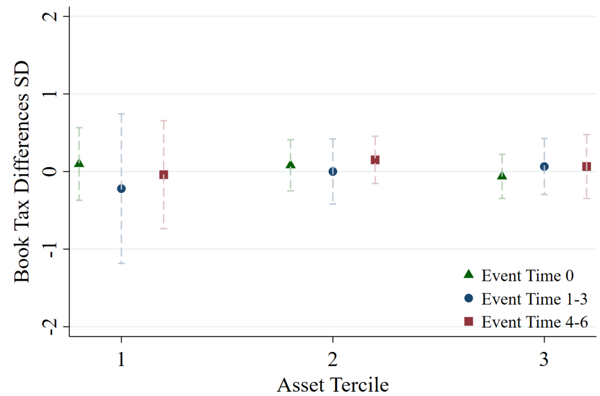
Table C.2: Summary Statistics for Revenue Simulation Sample

	Observations	Mean	P10	Median	P90
Lagged Assets	2689	12255	173	2000	24995
Book Income	2689	0.08	0.01	0.05	0.18
Taxable Income	2689	0.06	0.00	0.02	0.17
Book Tax Differences	2689	0.02	−0.04	0.00	0.08
Sales	2689	0.76	0.05	0.52	1.87
Costs of Goods Sold	2689	0.48	0.01	0.23	1.34
Investment	2436	0.25	0.06	0.18	0.50
Debt	2686	0.69	0.28	0.69	1.03
Depreciation	2689	0.03	0.00	0.02	0.06
Depletion	2689	0.00	0.00	0.00	0.00
Employment	2490	13	0	2	30

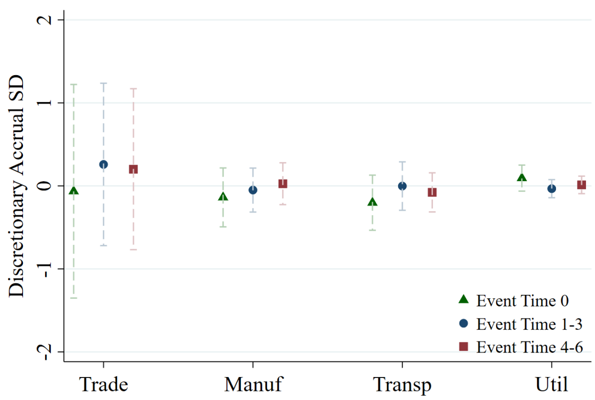
Notes: This table reports summary statistics for the sample of firms used in revenue simulations. Statistics are expressed as a share of lagged assets, except for counts, employment (thousands), investment (capital expenditure per dollar of lagged net property plant and equipment) and lagged assets (millions USD).



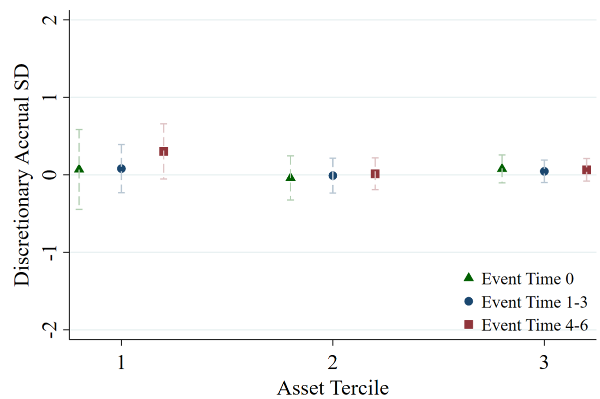
(a) BTD Industry Heterogeneity



(b) BTD Size Heterogeneity



(c) DA Industry Heterogeneity



(d) DA Size Heterogeneity

Figure C.1: Avoidance Response Heterogeneity

Notes: This figure plots tax avoidance responses to AMTBIA87 for industry and size subgroups, scaling each outcome by its standard deviation in the pre-reform period. Panels (a) and (b) use book tax differences scaled by lagged assets as the outcome, estimate β_e and η_e from equations (3) and (4), and plot the difference between these two estimates scaled by the standard deviation of the outcome in the pre-reform period in the baseline panel data set. Confidence intervals are constructed from bootstrapped standard errors clustered at the firm level with 300 iterations. Panel (a) plots estimates separately across industry subgroups, while panel (b) plots estimates separately across 1985 asset tercile subgroups. Panels (c) and (d) display estimates of β_e from equation (3) using discretionary accruals scaled by lagged assets as an outcome, scaling estimates of β_e by the pre-period standard deviation of the outcome. Confidence intervals are constructed from standard errors clustered at the firm level. Panel (c) plots estimates across 1985 asset terciles, and panel (d) plots estimates across industries. Industries include manufacturing (SIC codes 2000-3999), utilities (SIC codes 4900-4999), finance and insurance (SIC codes 4000-4899) and trade (SIC codes 5200-5999).

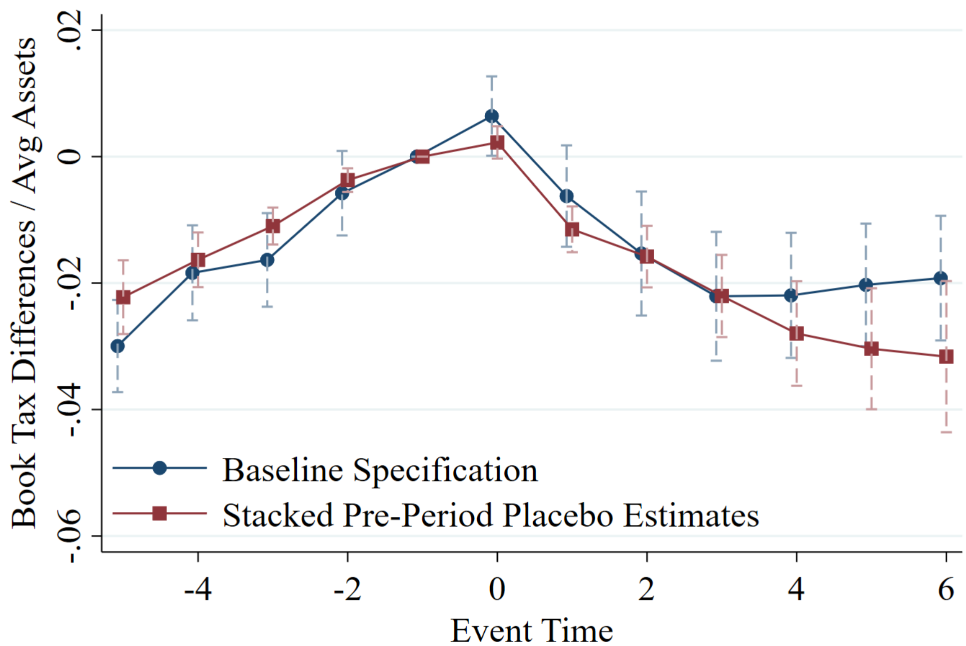
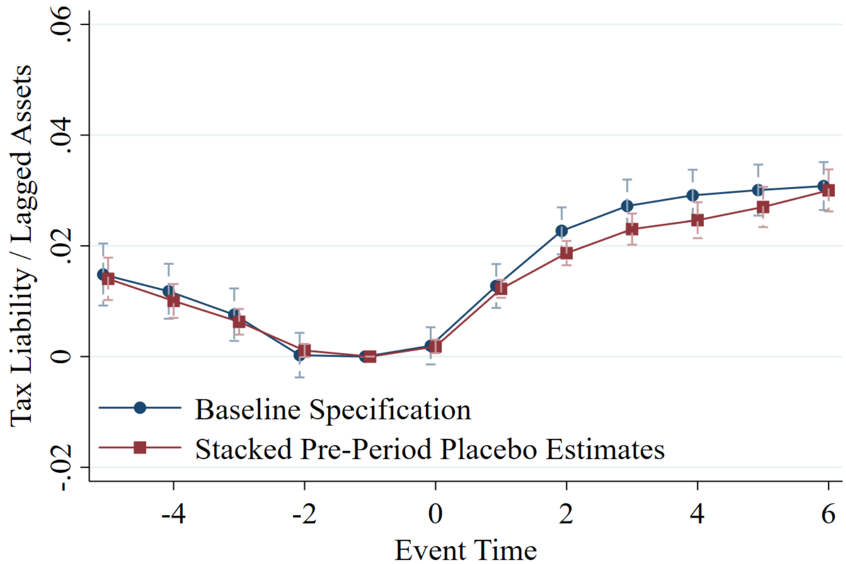
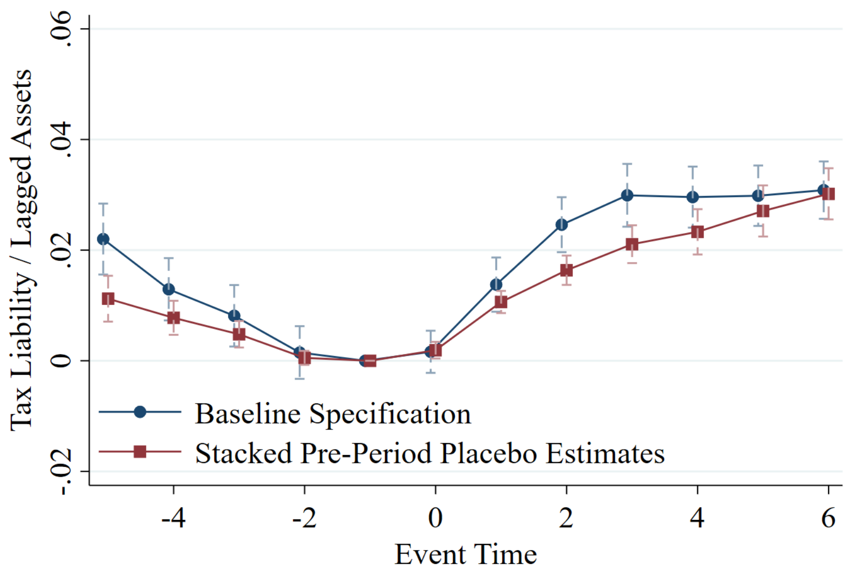


Figure C.2: Placebo-in-Time Book Tax Difference Estimates Scaled by Average Assets

Notes: This figure plots book tax difference responses to AMTBIA87 scaling the outcome by average pre-period assets. The baseline series plots estimates of β_e from equation (3) splitting the 1981-1992 balanced panel into treatment and control groups based on 1984-1986 ETRs in the baseline specification series and estimates of η_e from equation (4) using the stacked data in the pre-period placebo estimate series. Confidence intervals are calculated from standard errors clustered at the firm level. Outcomes are scaled by average assets in the pre-reform period.



(a) Full Sample



(b) No Multinationals or Loss Firms

Figure C.3: Placebo-in-Time Tax Liability Estimates

Notes: This figure plots tax liability responses to AMTBIA87. Panel (a) plots point estimates of β_e from equation (3) splitting the 1981-1992 balanced panel into treatment and control groups based on 1984-1986 ETRs in the baseline specification series and estimates of η_e from equation (4) using the stacked data in the pre-period placebo estimate series. Confidence intervals are calculated from standard errors clustered at the firm level. Panel (b) is identical to panel (a) but excludes all firms that are multinationals (firms with non-missing pretax foreign income or foreign tax expense at any event time before zero) or that have losses (firms with positive tax loss carryforwards at event time zero) from the estimation sample.

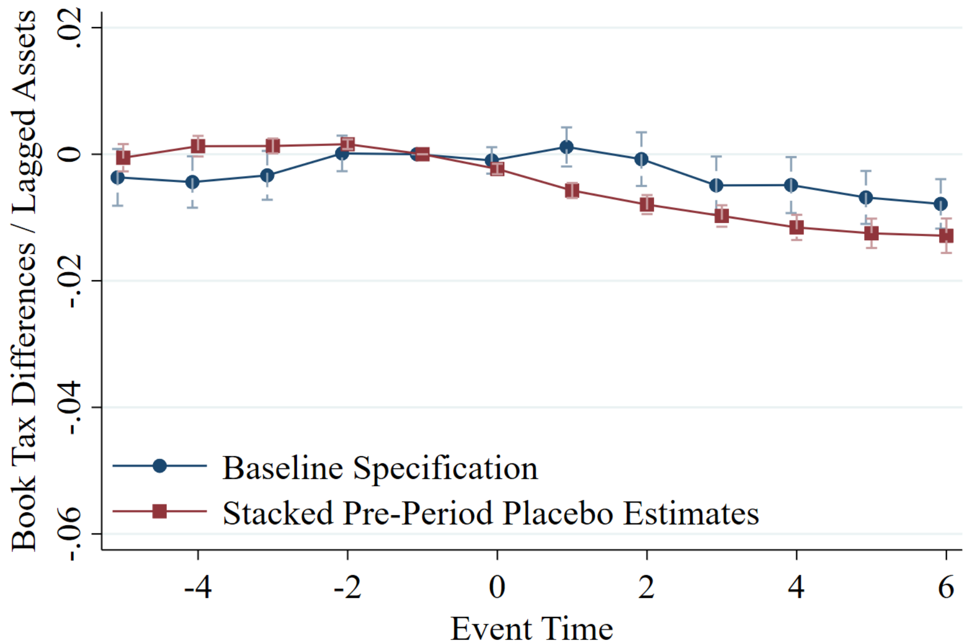
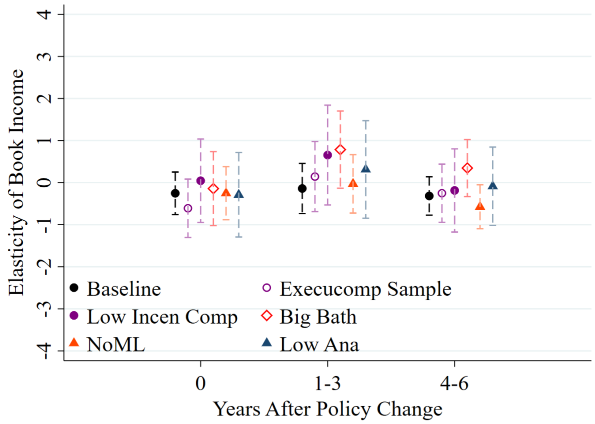
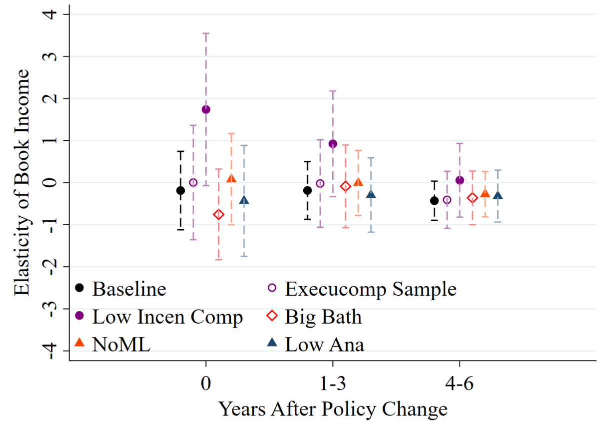


Figure C.4: Placebo-in-Time Permanent Book Tax Difference Estimates

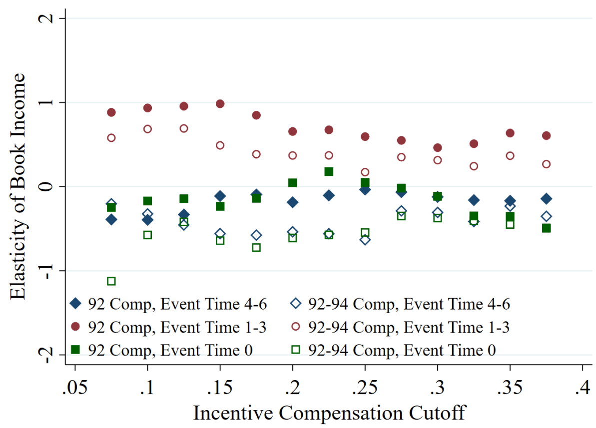
Notes: This figure plots permanent book tax difference responses to AMTBIA87, constructed as book tax differences minus deferred tax assets divided by the statutory tax rate. The baseline specification series plots point estimates of β_e from equation (3) splitting the 1981-1992 balanced panel into treatment and control groups based on 1984-1986 ETRs and the stacked pre-period placebo series plots estimates of η_e from equation (4) using the stacked data. Confidence intervals are calculated from standard errors clustered at the firm level.



(a) BTD Subsample Elasticity Estimates



(b) DA Subsample Elasticity Estimates



(c) BTD Elasticity Estimates By Incentive-Based Compensation Fraction

Figure C.5: Subsample Elasticity Estimates

Notes: This figure plots tax avoidance responses to AMTBIA87 among firm subsamples facing the strongest incentives to avoid the tax. Elasticities in panel (a) are calculated with an identical procedure to the one described in Figure 3, and 95% confidence intervals are constructed from nonparametrically bootstraps standard errors that cluster at the firm level. Elasticities in panel (b) are calculated with an identical procedure to the one described in Figure 5, and 95% confidence intervals are constructed from standard errors clustered at the firm level. Panel (c) plots point estimates of elasticities restricting the sample to firms present in the Execucomp data and with incentive-based compensation below the cutoff on the x-axis. Filled markers plot point estimates using cutoffs based on incentive-based compensation in 1992, while hollow markers plot point estimates using cutoffs based on average incentive-based compensation from 1992-1994.

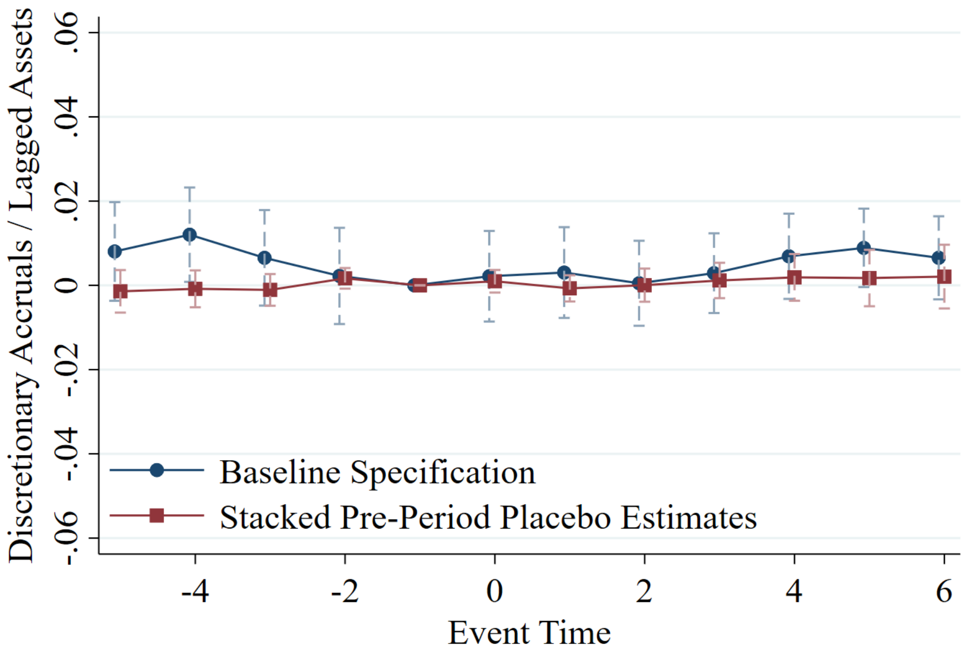


Figure C.6: Discretionary Accrual Mean Reversion

Notes: This figure plots discretionary accrual responses to AMTBIA87. The baseline specification series plots estimates of equation (3), and the stacked pre-period placebo series plots estimates of equation (4). Both series use discretionary accruals scaled by lagged assets as the outcome. Standard errors are clustered at the firm level.

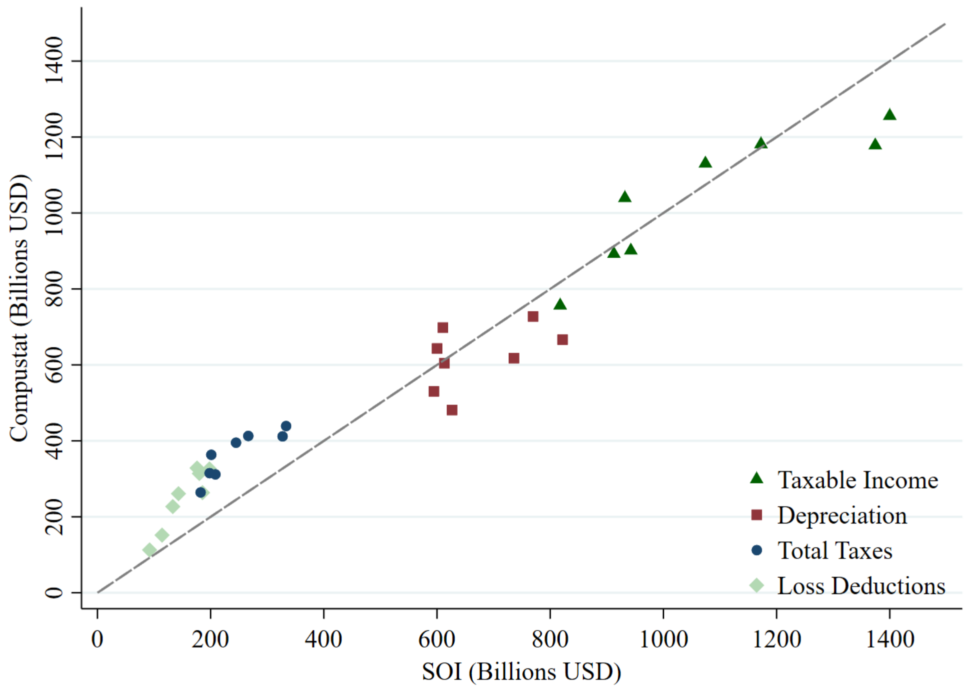


Figure C.7: Comparison of SOI Line Item Estimates to Compustat Aggregates 2008-2015

Notes: This figure compares aggregate sums of taxable income, depreciation, total taxes and net operating loss deductions in Statistics of Income line item reports and Compustat for years 2008 through 2015. The Compustat sample contains all firms with positive, non-missing assets, sales and pretax income that are incorporated in the U.S. in each year. Exact values for depreciation are available from both data sources. I construct a measure of total taxes in Compustat as total income taxes minus deferred income taxes minus other taxes, and my measure of taxable income in Compustat is total taxes divided by the marginal tax rate. To construct a measure of net operating loss deductions in Compustat, I take the minimum of Compustat tax loss carryfowards and pretax income.