Firm Responses to Book Income Alternative Minimum Taxes

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Introduction

- In 2018 Amazon had $10 billion in income, paid 0 taxes
- Deductions and credits mean to incentivize productive economic behavior reduce tax bills, sometimes all the way to 0
- Alternative minimum taxes (AMTs) assign lower rate to broader base excluding many deductions and credits
  - Raise revenue from profitable firms
  - Limit economic incentives
- Renewed interest in using book income as AMT base (Inflation Reduction Act, OECD negotiations for global minimum tax)

Research Question

- How do firms respond to an AMT on book income?
  - How elastic is a book income tax base?
  - Do firms manage their earnings to avoid an AMT on book income?
  - Does an AMT on book income distort production or investment?

This Paper

- Event study exploiting 1987 introduction of AMT book income adjustment (AMTBIA87)
  - Use balanced Compustat panel 1981-1992 ▸ Summ Stats
  - Compare firms with low pre-period effective tax rates (ETRs) facing AMTBIA87 to firms with higher pre-period ETRs that do not
  - Treatment: $ETR < 23\%$, Control: $ETR \geq 23\%$ ▸ Derivation
  - Average ETR over 1984-86 for firms with persistently low ETRs

Findings

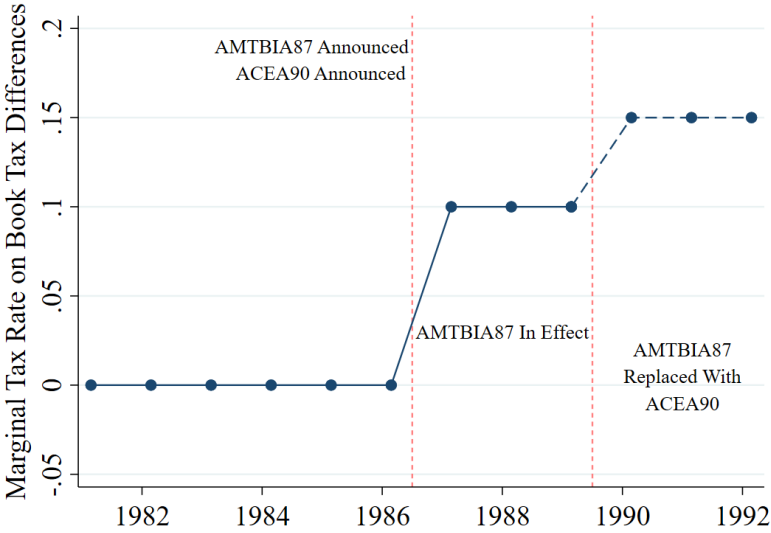
- Book income tax base is not responsive to AMTBIA87, firms do not manage their earnings
  - $\varepsilon^{BI,TB} \in$ [-0.63,0.56] and $\varepsilon^{BI,EM} \in$ [-0.87,0.50] over 3 years
- No evidence of production or investment distortions
  - Investment response per 1% increase in tax rate $\in$ [-0.48%,0.21%]
- Tax increase is salient
  - Tax liabilities increase by 0.29% of lagged assets over 3 years
- Old elasticity estimates reduce revenue scores by roughly 20%

Literature Review

- Firm responses to AMTBIA87 Gramlich 1991, Dhaliwal and Wang 1992, Boynton Dobbins and Plesko 1992, Manzon 1992, Wang 1994, Choi et al. 2001, Dharmapala 2020
  - Zero avoidance responses because I account for mean reversion
- Mitigating incentives in corporate taxation Burgstahler and Dichev 1997, Graham et al. 2005, Desai and Dharmapala 2006, Bergstresser and Phillipon 2006, Yu 2008, Terry 2017, Terry et al. 2021
  - Non-tax incentives to report high book incomes mitigate avoidance responses
- Broad-based taxes, evasion and avoidance Diamond and Mirrlees 1971, Best et al. 2015, Mosberger 2016, Alejos 2018, Almunia and Lopez-Rodriguez 2018, Lobel et al. 2020, Bachas and Soto 2021
  - Taxes on book income can raise revenue while mitigating avoidance

Outline

Minimum Tax Policy Timeline



Book Tax Differences

Permanent BTDs	Book Income	Taxable Income
State & Local Taxes	No	Yes
Tax Exempt Income	Yes	No
Fines	Yes	No
Meals & Entertainment	100%	50%
Interest on Govt Bonds	Yes	No

Temporary BTDs	Book Income	Taxable Income
Depreciation	Straight Line	Accelerated
Mark to Market	Yes	No
Rental Income	Smooth	Year of Contract
Bad Debts	Estimated on Issue	When Realized

▸ Temp BTD Details

Quasi-Experimental Set Up

- Event study where treatment firms have $ETR_{84-86} < 23\%$
- ETR mechanically and negatively related to BTD tax base
- Expect some increase in ETR, and decrease in BTD, for low ETR treatment firms
  - **Key Challenge:** Isolate mean reversion due to treatment definition from tax avoidance responses to AMTBIA87

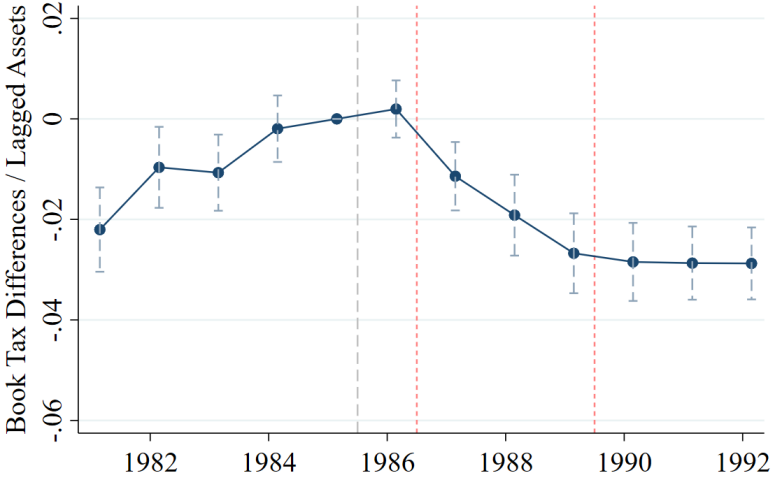
Standard Event Study

- Estimate standard event study

$$Y_{it} = \sum_{\tau=-5, \tau \neq -1}^{6} \left(\beta_\tau \cdot Treat_{i\tau}\right) + \rho X_{it} + \delta_t + \gamma_i + \varepsilon_{it}$$

- $Treat_i = 1$ in post-period if $ETR_{84-86} < 23\%, 0$ otherwise
- $Treat_{i\tau}$ is interaction of $Treat_i$ with event time dummies
- $\tau = 0$ is 1986

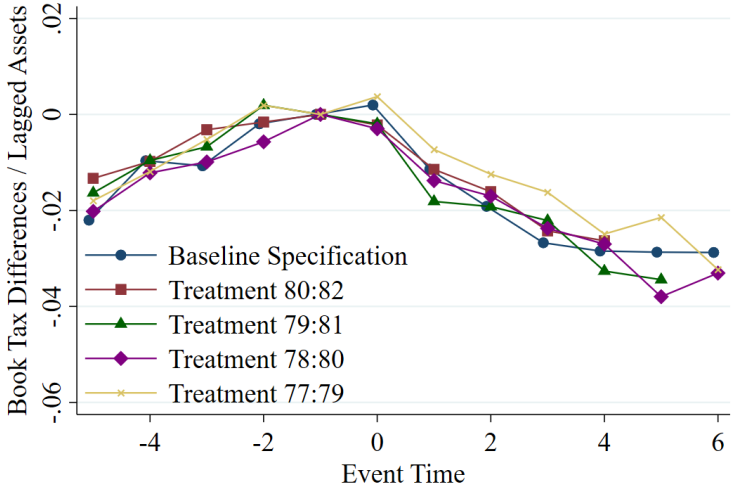
Book Tax Differences Response to Baseline Treatment



Testing for Mean Reversion

- Estimate same event study specification using treatment definitions based on earlier years
  - Use balanced Compustat panel 1974-1986
  - Use treatment definitions based on ETR in 77-79, 78-80, 79-81, 80-82
  - Event time $\tau = 0$ is last year in treatment definition

Book Tax Differences Response to Baseline and Placebo Treatments



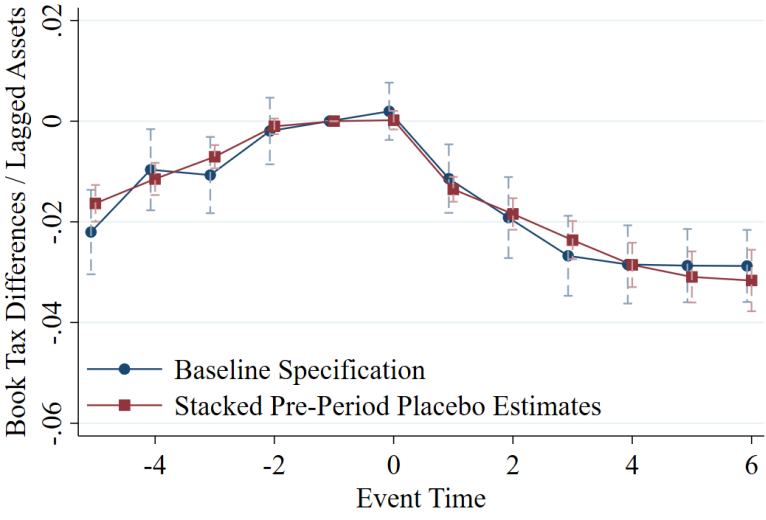
Placebo-In-Time Approach

- Compare BTD response to treatment based on ETR_{84-86} to BTD response based on ETR in earlier years
- Establish counterfactual by averaging over treatment definitions based on ETR in 77-79, 78-80, 79-81, 80-82, 81-83, 82-84, 83-85
  - Event time $\tau = 0$ is last year in treatment definition
  - Append 1 data set for each treatment, estimate stacked event study in pre-reform years

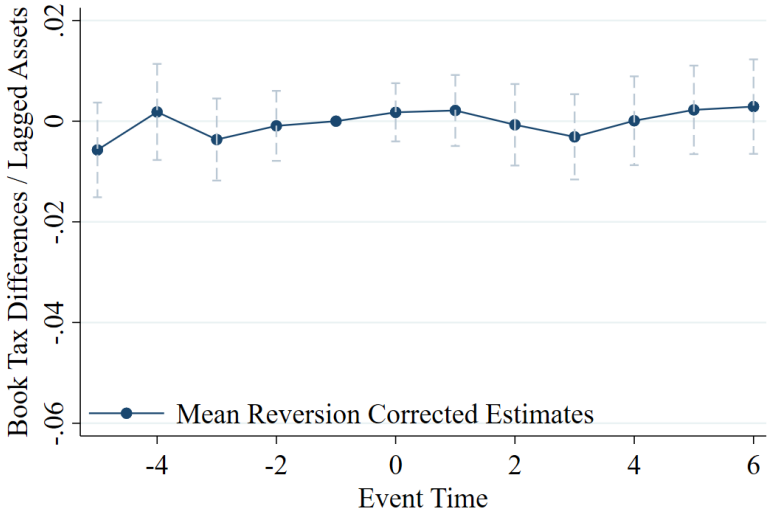
$$Y_{itd} = \sum_{\tau=-5, \tau \neq -1}^{6} \left(\eta_\tau \cdot Treat_{i\tau d}\right) + \psi Treat_{id} + \rho X_{itd} + \delta_t + \gamma_i + \varepsilon_{itd}$$

- BTD response of interest is $\beta_\tau - \eta_\tau$, elasticity is $\left(\frac{\beta_t}{BI_\beta} - \frac{\eta_t}{BI_\eta}\right) \cdot \frac{1-\tau}{\Delta(1-\tau)}$

Book Tax Differences Baseline and Stacked Event Study



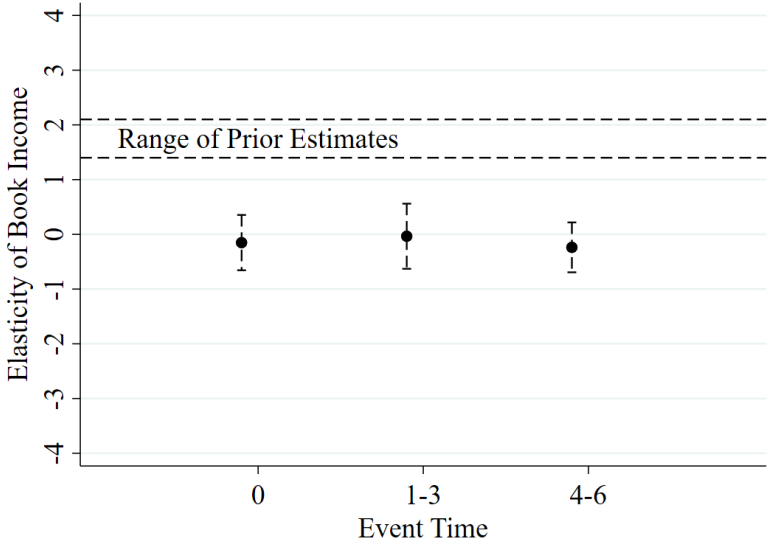
Mean Reversion Corrected Estimates



Validating the Placebo in Time Approach

- Assumption: the time series process of ETR, and its impact on BTD, is stable
  - Show stability of BTD response to placebo treatment definitions over 1977-1989
    - ▸ More Placebo Treatments
  - Specify a time series process for ETR, use minimum distance to estimate the parameters, and simulate mean reversion under parameter deviations
    - ▸ Minimum Distance Simulations
  - Mean, variance and autocovariance moments suggest any bias from changing time series process pushes placebo-in-time estimates towards finding a larger avoidance response
    - ▸ ETR Moments
  - Show relationship between ΔBTD and ΔETR stable before and after AMTBIA87
    - ▸ Distributed Lag Regressions

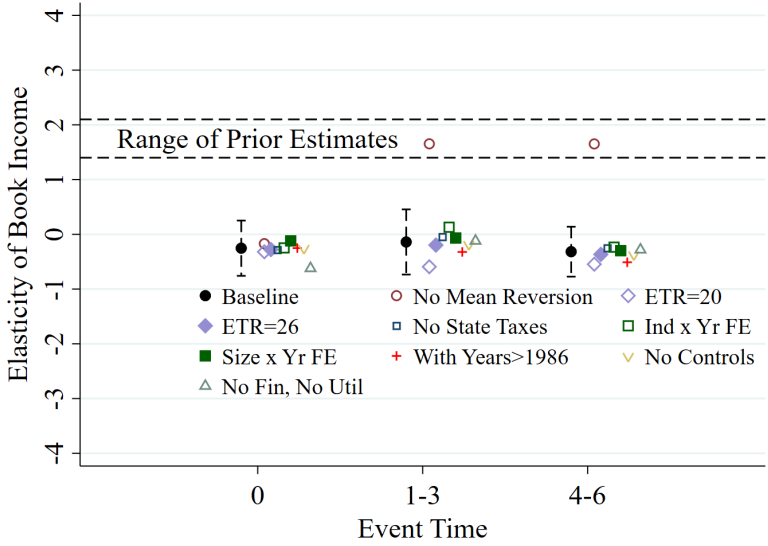
Tax Base Elasticity Estimates



Differences with Previous Point Estimates

- $\varepsilon^{BI,TB} \in$ [-0.63,0.56] over 1987-1989
- Difference with prior estimates explained by mean reversion
- Difference not driven by controls, tax base measurement error, size or industry time trends, choice of placebo, finance or utility firms

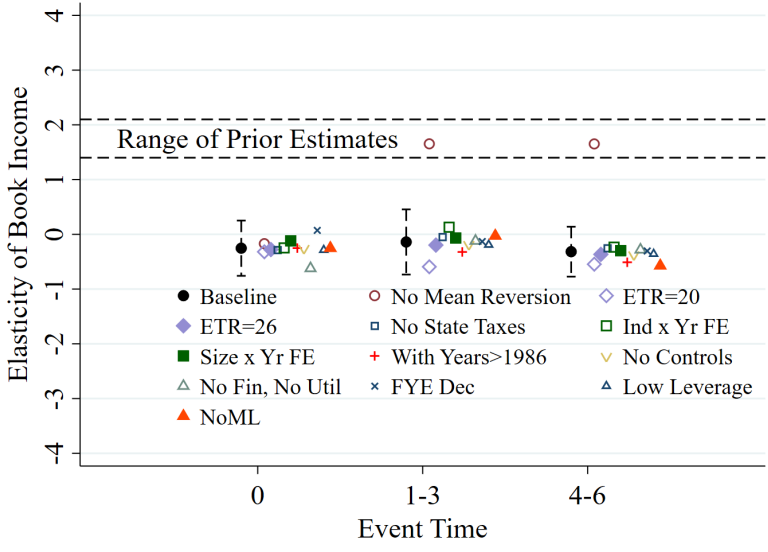
Tax Base Elasticity Estimates



Why are there no avoidance responses to AMTBIA87?

- Tax liability increases by 0.29% of lagged assets ▸ Tax Liab ▸ Tax Liab NoML
- No permanent BTD avoidance ▸ Perm BTD
- Little heterogeneity across industry or firm sizes ▸ BTD Heterogeneity
- No avoidance dropping multinationals and loss firms
- No avoidance restricting to firms with December fiscal year-ends
- No avoidance restricting to low leverage firms

Tax Base Elasticity Estimates



Model of Firm Behavior

- Firms choose output y with convex costs $c(y)$
- Fraction of costs deductible for book and tax purposes (μ_b, μ_t) imply book income $y - \mu_b c(y)$ and taxable income $y - \mu_t c(y)$
- Firms can lie about costs $\hat{c}_t \neq c(y), \hat{c}_b \neq c(y)$, and pay convex penalties for misreporting $g(\hat{c}_t - c(y)), h(\hat{c}_b - c(y))$
- Firms can manipulate stock price $s(\hat{c}_b - c(y))$ with $s'() < 0$

Model of Firm Behavior

- Firm problem taxing taxable income:

$$\max_{y,\hat{c}_t,\hat{c}_b} (1-\tau)y - c(y) + \tau\mu_t\hat{c}_t - g(\hat{c}_t - c(y)) - h(\hat{c}_b - c(y)) + s(\hat{c}_b - c(y))$$

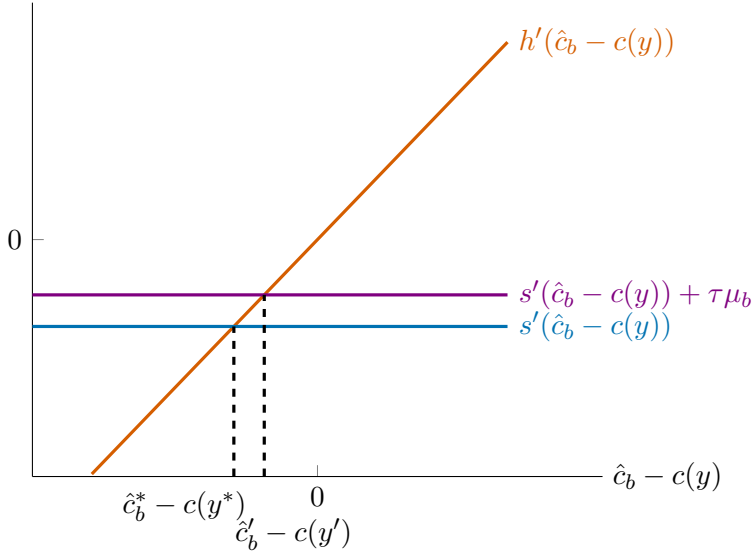
$$g'(\hat{c}_t - c(y)) = \tau\mu_t$$
$$h'(\hat{c}_b - c(y)) = s'(\hat{c}_b - c(y))$$
$$c'(y) = 1 - \tau\frac{1-\mu_t}{1-\tau\mu_t} \equiv 1 - \tau_{E,t}$$

- Firm problem taxing book income:

$$\max_{y,\hat{c}_t,\hat{c}_b} (1-\tau)y - c(y) + \tau\mu_b\hat{c}_b - g(\hat{c}_t - c(y)) - h(\hat{c}_b - c(y)) + s(\hat{c}_b - c(y))$$

$$g'(\hat{c}_t - c(y)) = 0$$
$$h'(\hat{c}_b - c(y)) = s'(\hat{c}_b - c(y)) + \tau\mu_b$$
$$c'(y) = 1 - \tau\frac{1-\mu_b}{1-\tau\mu_b} \equiv 1 - \tau_{E,b}$$

Model of Marginal Firm Behavior



Model Functions

Model Takeaways

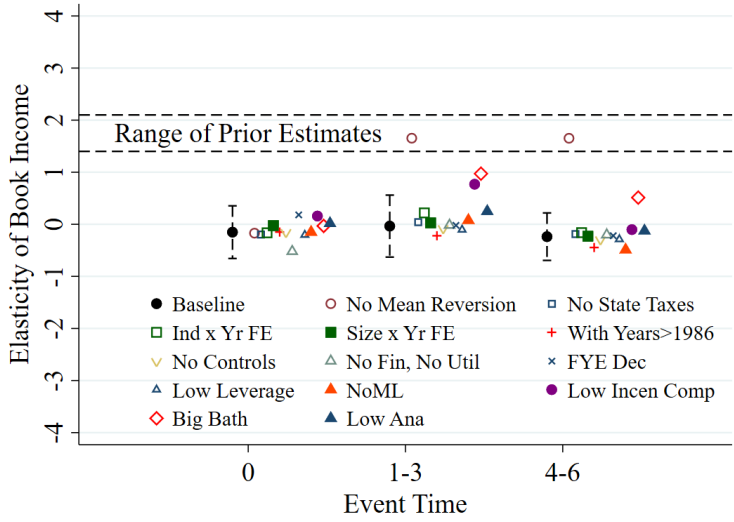
- Large avoidance responses if tax incentive dominates stock incentive
- Large literature suggests stock incentive is strong:
  - Managers focus on reporting high earnings
  - Bunching at past earnings, 0 earnings, and analyst targets
  - Firms willing to pay additional tax on fraudulently high earnings

    Graham et al. 2005, Burgstahler and Dichev 1997, Terry 2017, Erickson et al. 2004
- Suggests we should observe more avoidance among firms with fewer incentives to report high earnings

Firms With Weaker Incentives to Report High Book Income

- Less incentive-based compensation
- Missing past earnings by large margins
- Less analyst coverage

Tax Base Elasticity Estimates

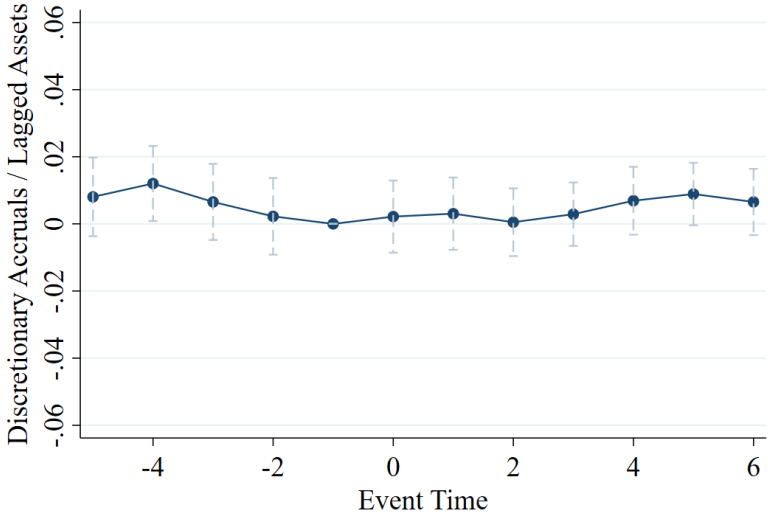


▸ Avoidance CI ▸ Varying Incentive Cutoff

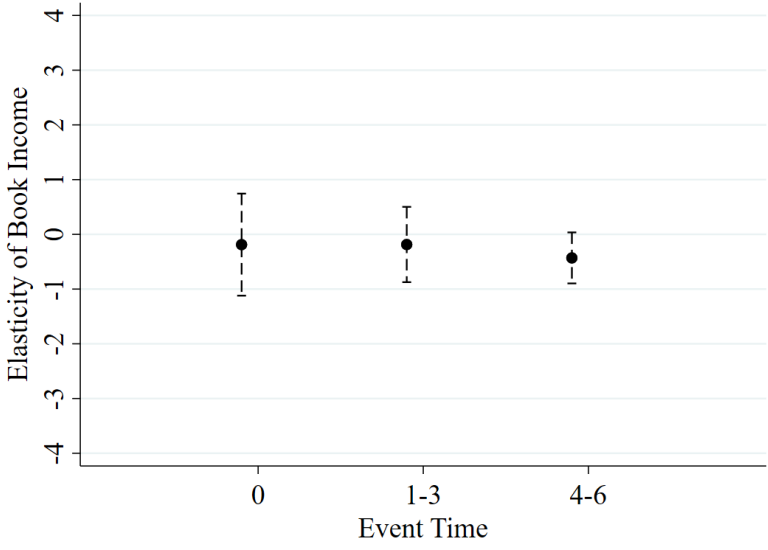
Earnings Management Responses

- BTD shortcomings:
  - Mean reversion
  - Understated for firms paying minimum tax
  - Measure earnings management and tax planning behavior ▸ Single Year Treatment
- Do firms manage their earnings? Use discretionary accruals
  - Accruals: income for which cash has not yet been exchanged
  - Residualize on current economic conditions ▸ Construction
- No mechanical relationship with treatment definition, no measurement issues for firms paying minimum tax ▸ Mean Reversion

Earnings Management Responses



Earnings Management Elasticity Estimates



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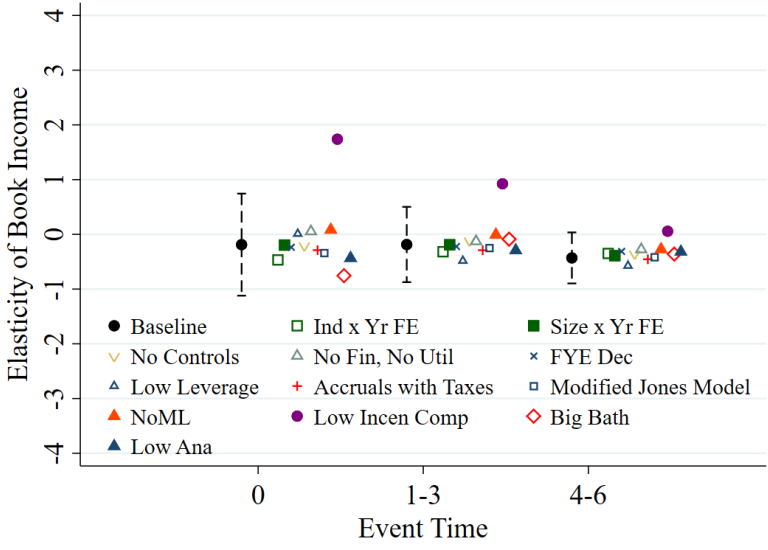
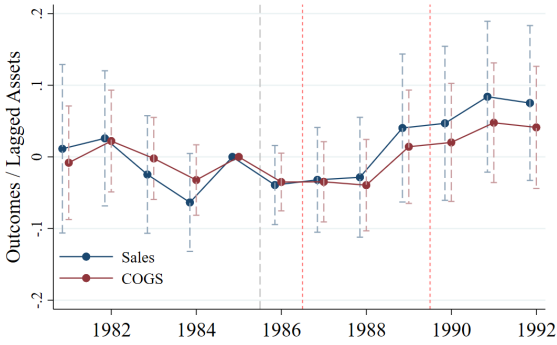


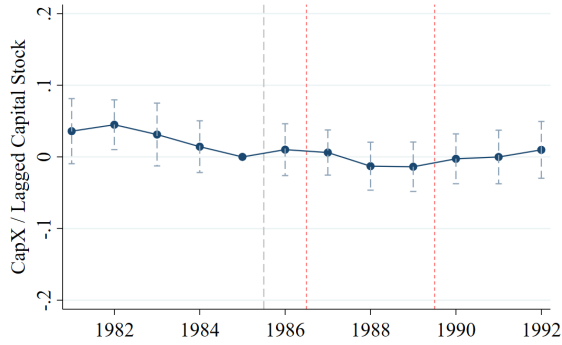
Discretionary Accrual Responses

- Focus specifically on earnings management
- No mean reversion concerns, no taxable income shifting concerns, no measurement error concerns specifically for firms paying minimum tax
- $\varepsilon^{BI,EM} \in$ [-0.87,0.5] over 1987-1989

Production and Investment Responses



(a) Output



(b) Investment

▸ Debt ▸ Employment

Output and Investment Responses

- Reject output declines $> 1\%$ per 1% change in the tax rate
- Reject investment declines $> 0.5\%$ per 1% change in the tax rate
- Consistent with model prediction that small change in effective tax rate τ_E leads to small change in output

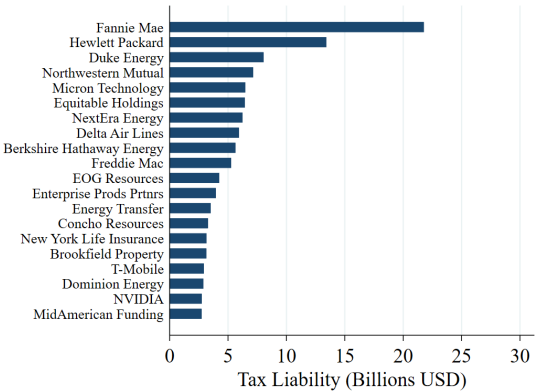
Policy

- Project revenue implications of proposed policy
  - 15% minimum tax on book income for firms with >$100M in income
  - Assume 30% of tax liability recovered via credits
  - Firms can reduce tax liability with foreign tax credits and net operating loss deductions
  - Assume book income elasticities and project revenues over 10 year scoring window Details

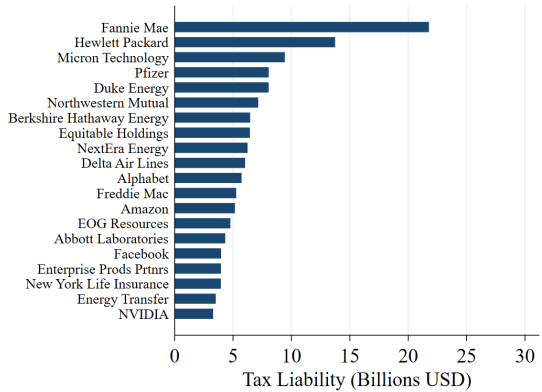
Revenue Scores

Panel A: Baseline Scenarios	(1) Revenue	(2) Top 10	(3) Util	(4) Manf	(5) Fin	(6) Tran
S1: $\varepsilon_t = \{0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0\}$	337	86	82	77	45	37
S2: $\varepsilon_t = \{0.0, 0.5, 0.5, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0\}$	296	78	73	66	40	32
S3: $\varepsilon_t = \{0.5, 0.5, 1.0, 1.0, 1.0, 1.5, 1.5, 1.5, 2.0, 2.0\}$	275	73	69	61	38	30
S4: $\varepsilon_t = \{1.0, 2.0, 3.5, 4.0, 4.5, 5.0, 5.0, 5.0, 5.0, 5.0\}$	169	52	43	32	29	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	93	83	87	82	39
S2: $\varepsilon_t = \{0.0, 0.5, 0.5, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0\}$	362	85	74	74	71	34
S3: $\varepsilon_t = \{0.5, 0.5, 1.0, 1.0, 1.0, 1.5, 1.5, 1.5, 2.0, 2.0\}$	334	80	69	67	65	32
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	43	34	41	18

Largest Firm Liabilities



(a) Biden Book Income AMT



(b) Without Foreign Tax Credits

Revenue Scores

- Lots of firms have divergent book income and tax liabilities
- Breadth of tax base can restrict revenue, firms that pay
- Using prior elasticity estimates reduces revenue by $\approx 20\%$

Conclusion

- Estimate zero book income, earnings management and production/investment responses to AMTBIA87
  - Lower than previous work because I account for mean reversion
  - Non-tax motivations to report high book incomes mitigate avoidance
- Existing revenue scores of proposed book income AMTs underestimate revenues by using larger elasticities
- Is a book income AMT "good policy"?
  - Depends on strength of incentives to report high book income
  - Should the FASB control the tax base? Impact of special interests? Stability of non-tax incentives?

Appendix

Relating ETRs to AMT Liability

$$
\begin{aligned}
BIA &= 0.5(BI - (TI + TPA)) \\
AMT &= \max\{0.2(TI + TPA + BIA) - \tau TI, 0\} \\
\frac{AMT}{BI} &= \max\{0.1 + 0.1f + [(0.1 - \tau) - 0.1f]\frac{TI}{BI}, 0\} \\
\frac{AMT}{BI} &= \max\{0.1 + 0.1f - [\frac{\tau - 0.1}{\tau} + \frac{0.1f}{\tau}]ETR, 0\}
\end{aligned}
$$

So a firm has positive AMT liability if

$$
ETR_{87} < \frac{\tau_{87}(0.1 + 0.1f)}{(\tau_{87} - 0.1) + 0.1f} = 0.2 \implies ETR_{86} < 0.23
$$

▸ Empirical Strategy

Summary Statistics

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	11.62	24.26	0.30	3.11	31.30

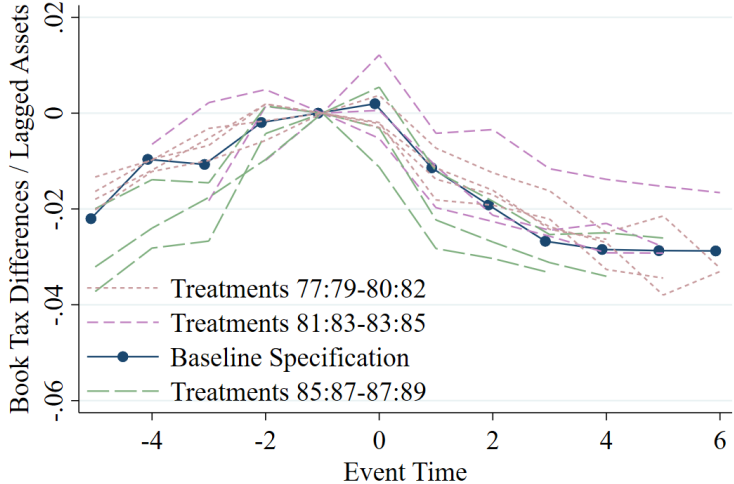
▸ Empirical Strategy

Deferred Tax Expense

- Firms report BI, current tax expense and deferred tax expense on their financial statements
- $BTD = BI - \widehat{TI}$. I estimate $\widehat{TI}$ = current tax expense/τ
- Temporary BTD reclassify tax expense from current to deferred
  - \$100 bonus depreciation in excess of straight line depreciation creates a \$100 BTD and reduces TI by \$100
  - For accounting purposes, the firm should have owed \$100τ in current tax expense based on its current period taxable book income
  - The \$100τ is recorded as deferred tax expense. It will "come due" in some future period when bonus is less than straight line depreciation

▸ BTD

Book Tax Differences Response to Baseline and Placebo Treatments



Placebo Treatments

ETR Time Series Process

$$ETR_{it} = ETR_i + x_{it}\beta + u_{it} + e_{it}$$
$$u_{it} = \alpha u_{it-1} + \varepsilon_{it}, \qquad e_{it} \sim \mathcal{N}(0, \sigma_e^2), \varepsilon_{it} \sim \mathcal{N}(0, \nu_t)$$

- The key parameters are the persistence of shocks α and the variance of shocks ν_t
- If α increases, prior year responses to placebo treatments will overstate mean reversion and placebo-in-time estimates will be biased towards finding smaller avoidance responses
- If ν_t decreases, prior year responses to placebo treatment definitions will overstate mean reversion and placebo-in-time estimates will be biased towards finding smaller avoidance responses

▸ Placebo-in-time Validation

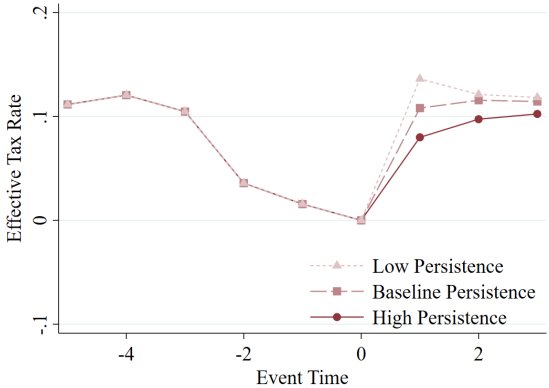
Minimum Distance Estimation

$$\min_{\theta \in \Theta} [\hat{m} - m(\theta)]' [\hat{m} - m(\theta)],$$

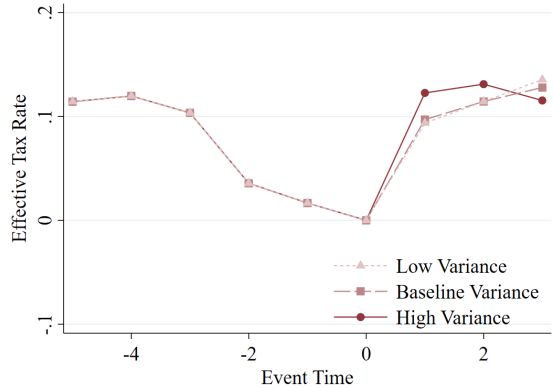
- Estimate $\theta = \{\alpha, \{\nu_t\}_{t=81}^{89}, \sigma_e^2\}$ using minimum distance and data from 1981-1989
- Moment vector m is made of the elements of the ETR covariance matrix
- Estimate $\alpha = 0.224, \{\nu_t\}_{t=81}^{89} \in [0.016, 0.022]$

▸ Placebo-in-time Validation

Mean Reversion Under Varying Parameters



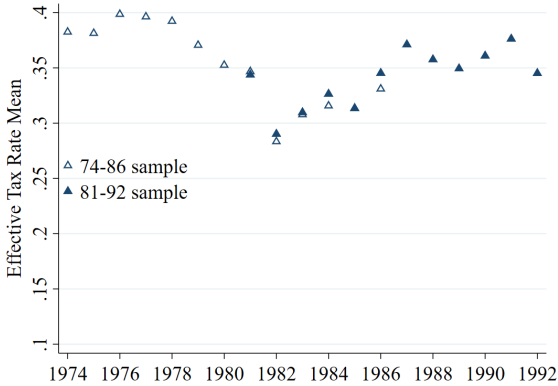
(a) Difference in ETRs Under Different α



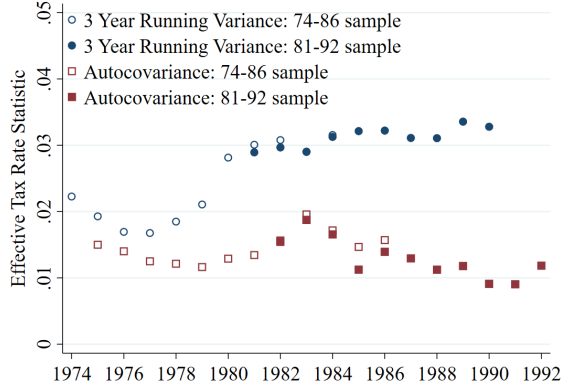
(b) Difference in ETRs Under Different ν

▸ Placebo-in-time Validation

ETR Moments



(a) Effective Tax Rate Means



(b) Effective Tax Rate Variances

▸ Placebo-in-time Validation

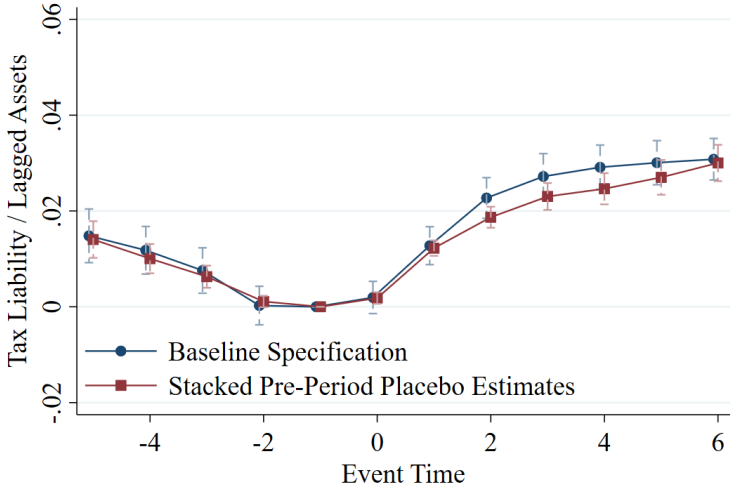
Distributed Lag Regressions

- Does relationship between ETR and BTD change around AMTBIA87?
  - Estimate $\Delta BTD_{it} = \beta_0 \Delta ETR_{it} + \beta_1 \Delta ETR_{it-1} + \Delta \varepsilon_{it}$
  - Coefficients same before and after AMTBIA87, using OLS and IV

▸ Placebo-in-time Validation ▸ Distributed Lag Table

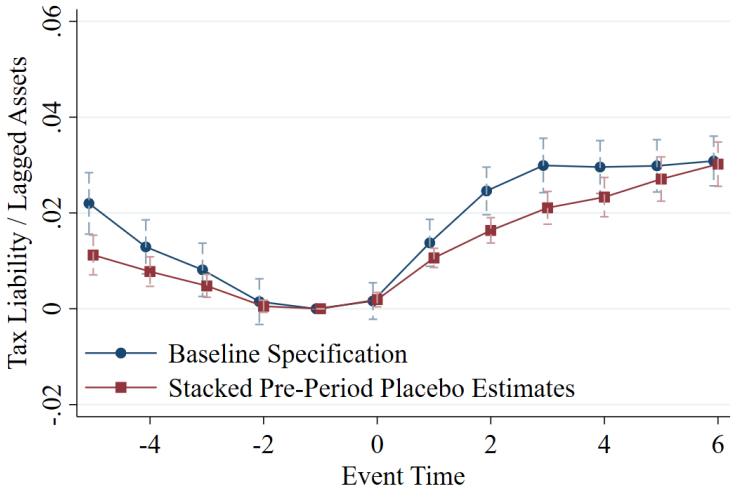
Variable	OLS (1)	IV (2)
ΔETR_t	-0.12	-0.15
	(0.01)	(0.04)
$\Delta ETR_t \times Post$	-0.01	-0.05
	(0.01)	(0.08)
ΔETR_{t-1}	-0.00	
	(0.01)	
$\Delta ETR_{t-1} \times Post$	-0.00	
	(0.01)	
Observations	1261	1261
Clusters	343	343
F Stat		3.16
LM Stat		5.43

Tax Liability Estimates



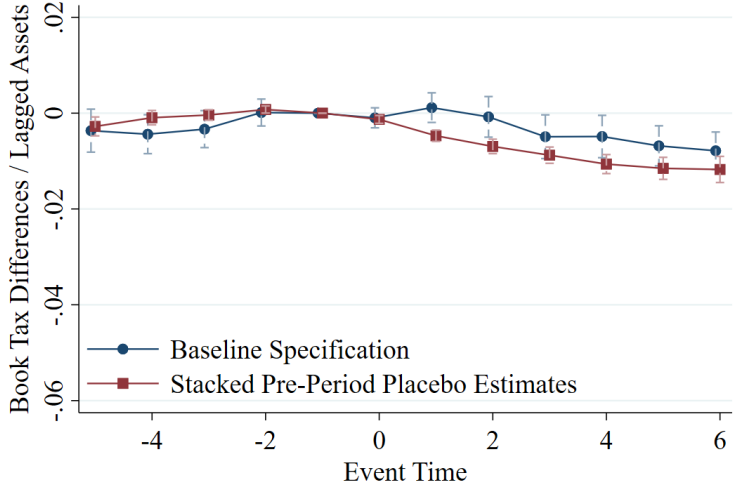
No Avoidance

Tax Liability Estimates: No Multinationals No Losses



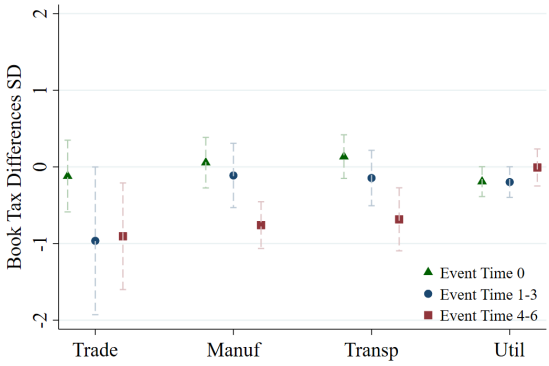
No Avoidance

Permanent Book Tax Difference Responses

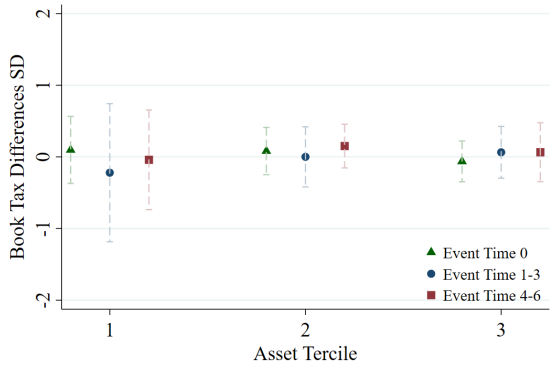


No Avoidance

Book Tax Difference Response Heterogeneity



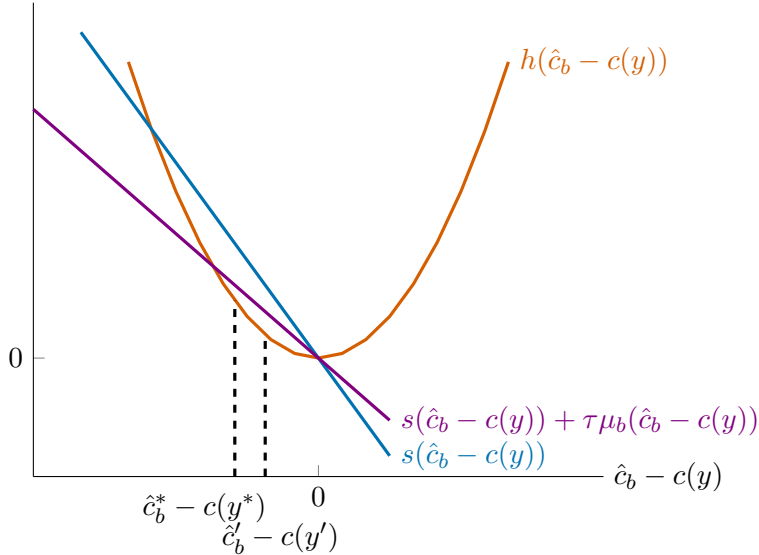
(a) BTD Industry Heterogeneity



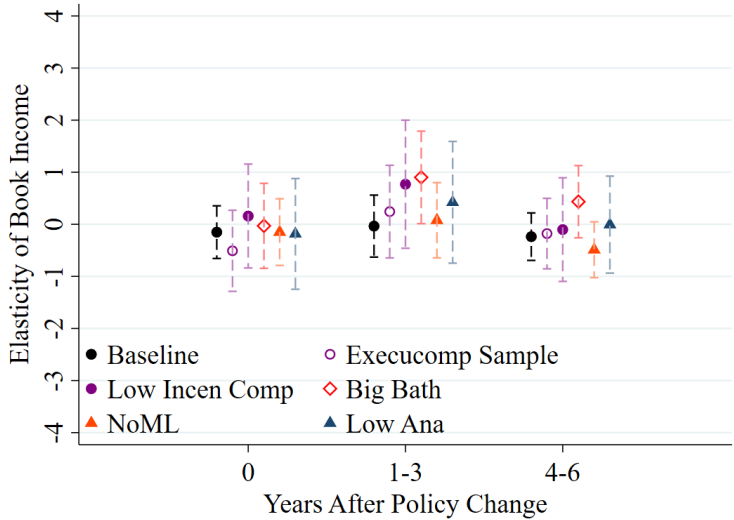
(b) BTD Size Heterogeneity

▸ No Avoidance

Model of Firm Behavior

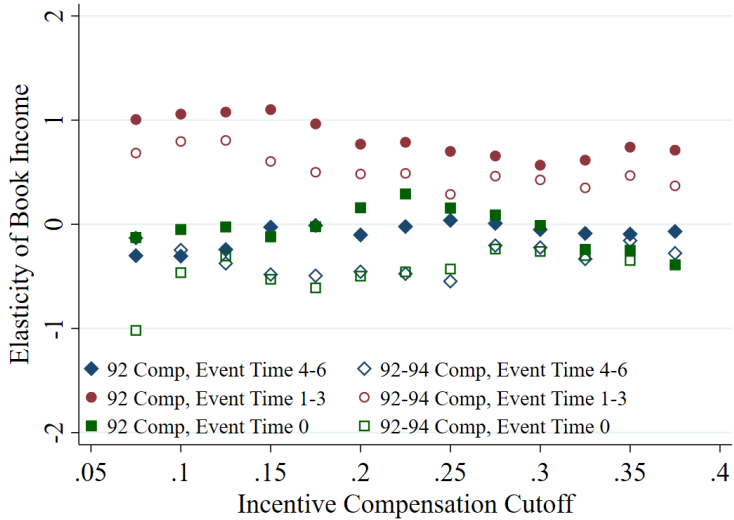


Robustness for Tax Base Elasticity Estimates



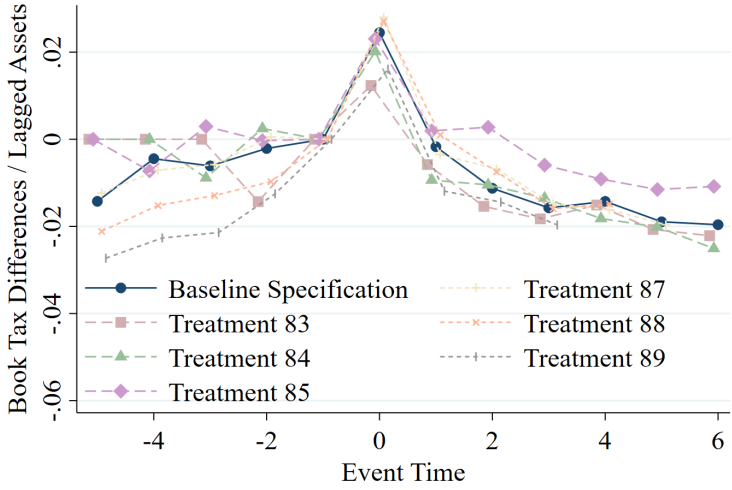
▸ BTD Mean Reversion

Varying Incentive-Based Compensation Cutoffs



▸ BTD Mean Reversion

Single Year Treatment Definition



Earnings Management

Constructing Discretionary Accruals

- Total accruals: $TA_t = \Delta A_t - \Delta Liab_t - \Delta Cash_t + \Delta Taxes_t - Dep_t$
- Discretionary accruals: residual of a regression of total accruals on assets, change in sales and PPE. "Jones (1991) Model"

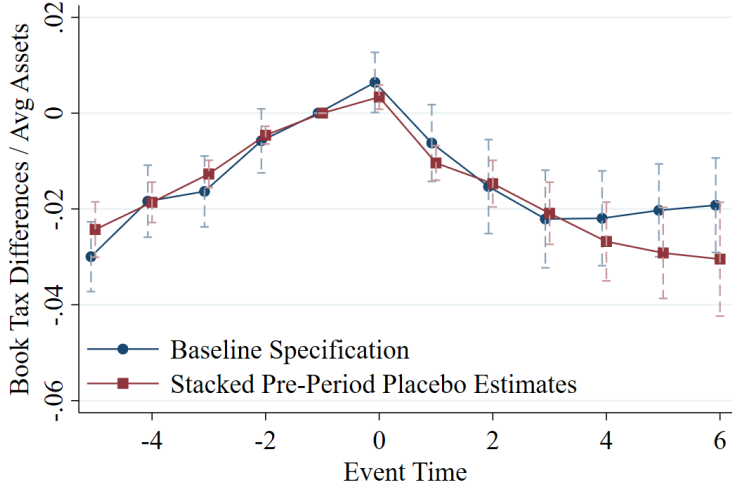
$$\frac{TA_{i,t}}{A_{i,t-1}} = \sum_{j=1}^{J} \beta_{1,j} \frac{1}{A_{i,t-1}} + \beta_{2,j} \Delta \frac{Sales_{i,t}}{A_{i,t-1}} + \beta_{3,j} \frac{PPE_{i,t}}{A_{i,t-1}} + \psi_j + \varepsilon_{i,t}$$

$$DA_{i,t} = TA_{i,t} - \widehat{TA_{i,t}}$$

- Run regression on all firms in pre-period, make predictions across full time series

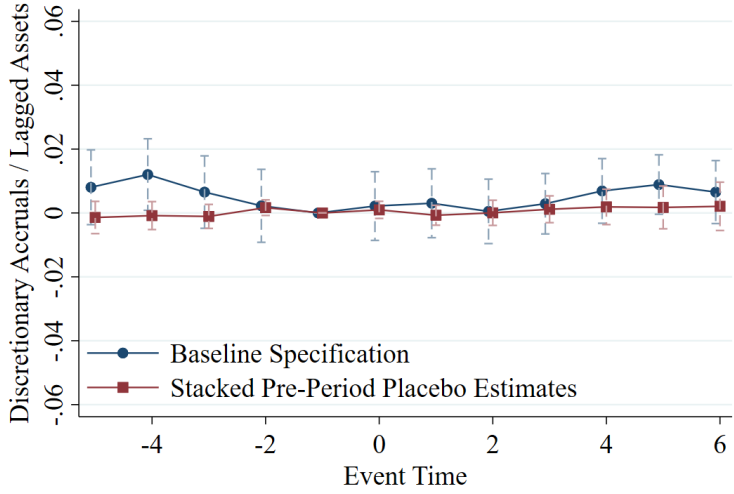
▸ Earnings Management

Book Tax Differences Baseline and Stacked Event Study



Scaled by Lagged Assets

Discretionary Accruals Mean Reversion Test



Earnings Management

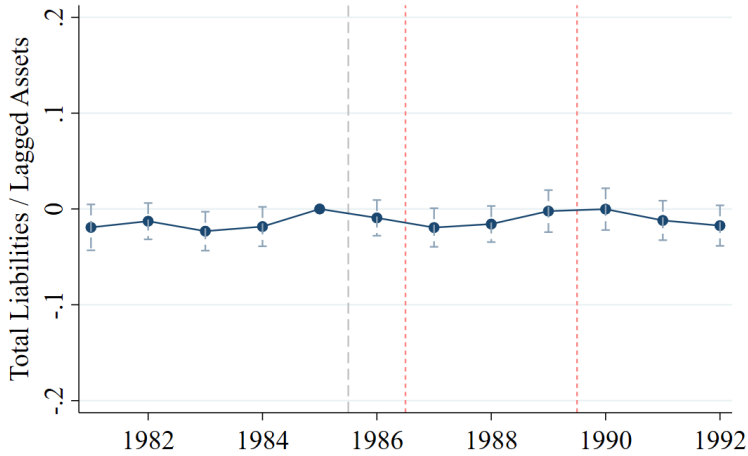
Incentives

- Stylized firm tax liability is $\max\{\tau_t(y - \mu_t\hat{c}_t), \tau_b(y - \mu_b\hat{c}_b)\}$
- Firms pay minimum tax on BI if $\frac{y-\mu_t\hat{c}_t}{y-\mu_b\hat{c}_b} < \frac{\tau_b}{\tau_t}$ (below cutoff)
- Marginal incentives around the minimum tax cutoff:

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

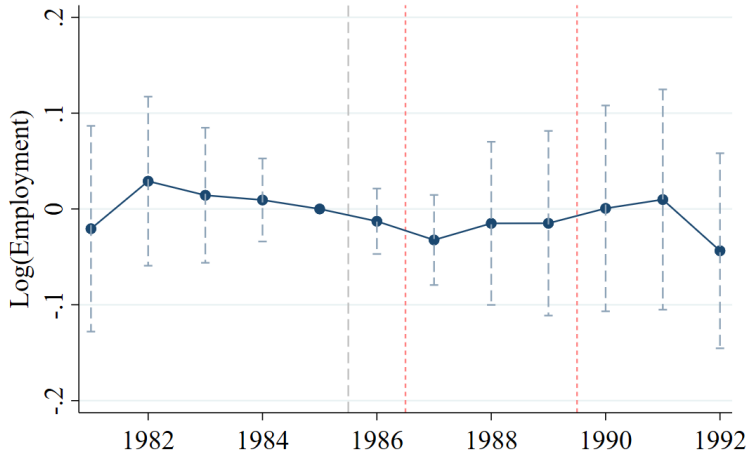
- Book income tax decreases output, decreases tax evasion, brings book avoidance back towards 0

AMTBIA87 Debt Responses



Baseline Investment Results

AMTBIA87 Employment Responses



Baseline Investment Results

Scoring the Proposed Biden Book Income AMT

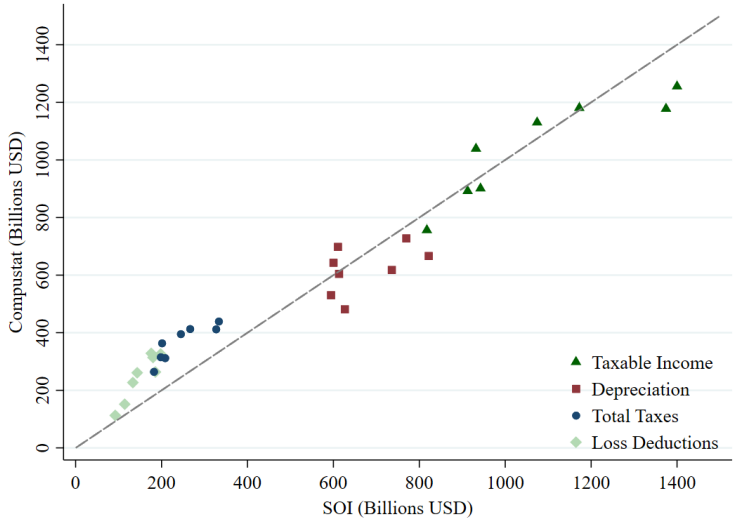
- Use 2018 cross section of Compustat firms with positive, non-missing assets, sales, and pretax income that are incorporated in the U.S. and exist in the data in 2017 and 2018
- Project income and tax variables over 10 year period using CBO GDP forecasts
- Incorporate behavioral response estimates into book income projections for firms facing minimum tax in 2018

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

- Losses: subtract $\overline{TLCF}/\overline{BI}$ every year from a random subset of firms matching fraction of firms with positive losses in 2018. Similar when simply subtracting fraction of tax loss carryforwards over book income in 2018 from every firm in every year

▸ Revenue Score

SOI Compustat Aggregates Comparison



Score