Book Income Responses to Alternative Minimum Taxes

Jordan Richmond

October 26, 2020

Introduction

- Renewed interest in applying alternative minimum tax (AMT) to book income
  - Long-run decline in U.S. corporate tax revenues, increasing inequality
  - In 2018 Amazon had $10 billion in income, paid zero taxes

Introduction

- Renewed interest in applying alternative minimum tax (AMT) to book income
  - Long-run decline in U.S. corporate tax revenues, increasing inequality
  - In 2018 Amazon had $10 billion in income, paid zero taxes
- Policy proposal: Biden's AMT on book income
  - Biden campaign estimate: $400 billion
  - AEI estimate: $94 billion

Introduction

- How will firms respond to an AMT on book income?

Introduction

- How will firms respond to an AMT on book income?
  - Diff-in-Diff exploiting 1987 introduction of AMT book income adjustment (AMTBIA87) using Compustat data
- Use estimated behavioral responses to develop revenue score of the proposed Biden book income AMT
  - Vary assumptions to benchmark against diverging external scores

Preview of Results

- Short-run elasticity of book income with respect to the net-of-tax rate $\varepsilon = 3.70$ over 3 year time horizon, Longer-run elasticity $\varepsilon \approx 3.20$
  - Measures discretionary changes to book income reflecting earnings management and tax sheltering, not investment or production responses
- Biden book income AMT will raise $\$269$ billion over a decade
  - Behavioral responses reduce tax revenue by 38% from $\$434$ to $\$269$B
- Biden campaign estimate close to mechanical revenue calculation, AEI estimate requires assuming behavioral responses $> 4\times$ responses to AMTBIA87

Preview of Results

- Short-run elasticity of book income with respect to the net-of-tax rate $\varepsilon = 3.70$ over 3 year time horizon, Longer-run elasticity $\varepsilon \approx 3.20$
  - Measures discretionary changes to book income reflecting earnings management and tax sheltering, not investment or production responses
- Biden book income AMT will raise $\$269$ billion over a decade
  - Behavioral responses reduce tax revenue by 38% from $\$434$ to $\$269$B
- Biden campaign estimate close to mechanical revenue calculation, AEI estimate requires assuming behavioral responses $> 4\times$ responses to AMTBIA87
- Contribution: Analyze AMTBIA87 with modern empirical methods and use estimates to evaluate contemporary policy

Outline

1. Policy Description
2. Estimating book income responses to AMTs using AMTBIA87
3. Scoring the Biden book income AMT proposal

Definitions

- Alternative Minimum Tax (AMT)
  - Normal corporate tax system allows deductions and credits
  - AMT applies lower tax rate to broader tax base to "ensure that no taxpayer with substantial economic income [can] avoid significant tax liability" (Senate Finance Committee, 1986)

Minimum Tax Policy Timeline

- Book Income (BI) broader than alternative minimum taxable income (AMTI), broader than taxable income (TI)

Minimum Tax Policy Timeline

- Book Income (BI) broader than alternative minimum taxable income (AMTI), broader than taxable income (TI)
- Before 1986, 15% add-on minimum tax on many deductions and credits, referred to as tax preferences and adjustments (TPA)
- TRA86 modernized AMT system, imposed 20% minimum tax on AMTI (AMTI $\equiv$ TI+TPA)
- AMTBIA87 increased AMTI by half difference between BI and AMTI
- TRA86 specifies that AMTBIA87 will be replaced by Adjusted Current Earnings adjustment (ACEA90) in 1990

AMT Book Income Adjustment (AMTBIA87)

$$BIA = 0.5\Big(BI - (TI + TPA)\Big)$$

$$AMT = \max\{0.2\Big(TI + TPA + BIA\Big) - \tau TI, 0\}$$

- Suppose firm has $BI = 400, TPA = 0, TI = 100 \implies$
  $BIA = 0.5(400 - 100) = 150,$
  $AMT = \max\{0.2(100 + 150) - 0.4 \cdot 100, 0\} = 10$

AMT Book Income Adjustment (AMTBIA87)

$$BIA = 0.5\Big(BI - (TI + TPA)\Big)$$

$$AMT = \max\{0.2\Big(TI + TPA + BIA\Big) - \tau TI, 0\}$$

- Suppose firm has $BI = 400, TPA = 0, TI = 100 \implies$
  $BIA = 0.5(400 - 100) = 150,$
  $AMT = \max\{0.2(100 + 150) - 0.4 \cdot 100, 0\} = 10$
- AMTBIA87 essentially imposes 10% marginal tax rate on book tax differences ($BTD = BI - TI$)
- TPA $\approx 39\%$ of BTD, 88% of TPA is depreciation and depletion (Gill and Treubert, 1992)

Adjusted Current Earnings Adjustment (ACEA90)

- AMTBIA87 in effect from 1987-1989
- ACE adjustment (ACEA90) replaces BIA in 1990: imposes 20% tax on 75% of difference between ACE and AMTI
- ACE uses tax principles to try to construct a measure of income as broad as book income

Adjusted Current Earnings Adjustment (ACEA90)

- AMTBIA87 in effect from 1987-1989
- ACE adjustment (ACEA90) replaces BIA in 1990: imposes 20% tax on 75% of difference between ACE and AMTI
- ACE uses tax principles to try to construct a measure of income as broad as book income
  - Increase tax on "broad income" in excess of AMTI by 5%

Adjusted Current Earnings Adjustment (ACEA90)

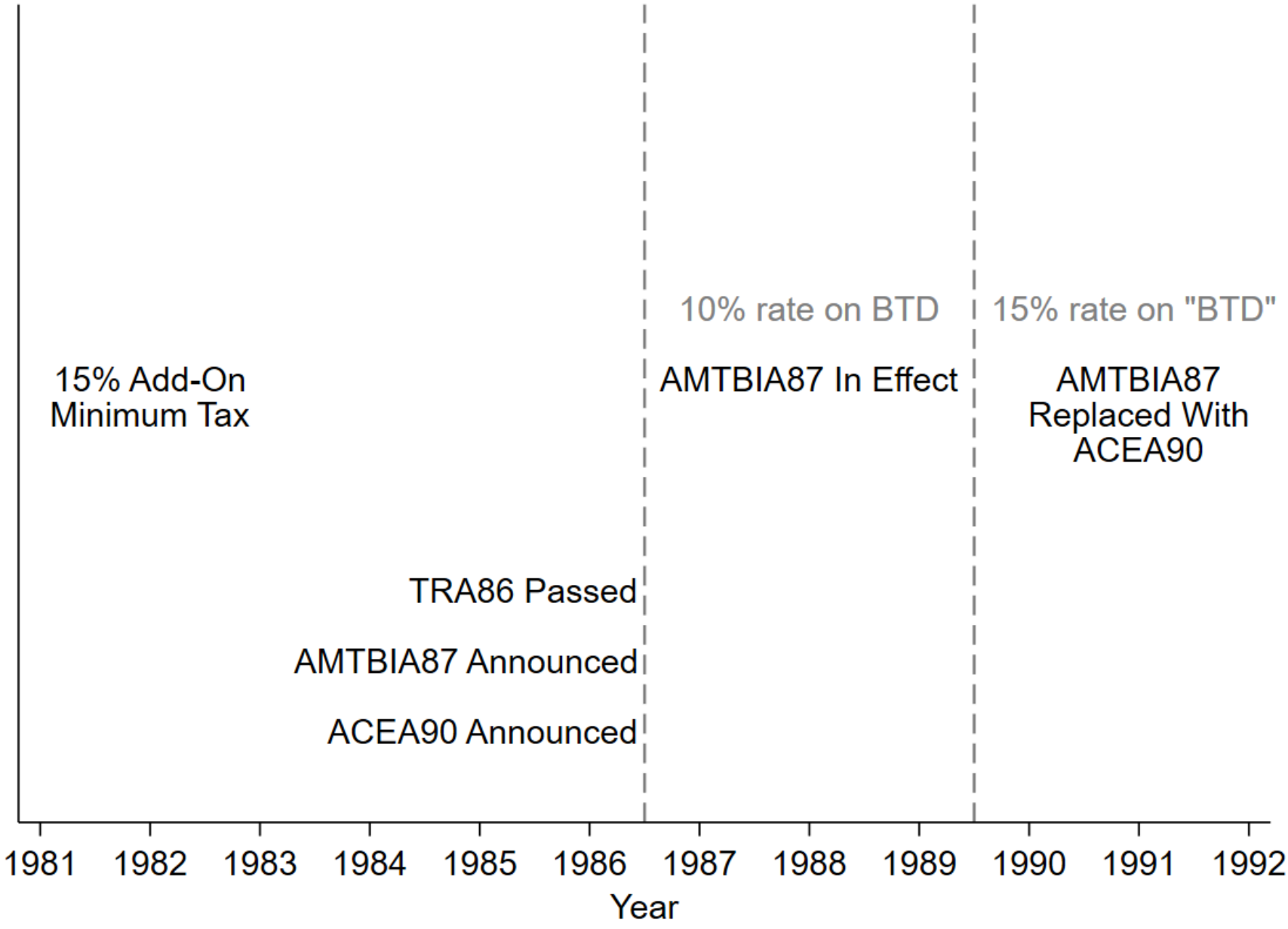
$$BIA = 0.5\Big(BI - (TI + TPA)\Big)$$

$$AMT_{BIA} = \max\{0.2\Big(TI + TPA + BIA\Big) - \tau TI, 0\}$$

$$ACEA = 0.75\Big(ACE - (TI + TPA)\Big)$$

$$AMT_{ACEA} = \max\{0.2\Big(TI + TPA + ACEA\Big) - \tau TI, 0\}$$

Minimum Tax Policy Timeline



Outline

1. Policy Description of AMTBIA87 and ACEA90
2. Estimating book income responses to AMTs using AMTBIA87
3. Scoring the Biden book income AMT proposal

Empirical Strategy

- Difference in Differences comparing firms more likely to face AMTBIA87 (treatment) to firms less likely to face AMTBIA87 (control)
- Treatment: $ETR_{86} < 23\%$, Control: $ETR_{86} \geq 23\%$
  - ETR below which firms must pay AMT ▸ Derivation
- Simulated policy instrument in spirit of Gruber and Saez (2002)

Empirical Strategy

$$BTD_{it} = \sum_{\tau=1981}^{1984} \left(\beta_\tau \cdot Treat_{i\tau}\right) + \sum_{\tau=1986}^{1992} \left(\beta_\tau \cdot Treat_{i\tau}\right) + \beta_1 X_{it} + \beta_2 Treat_i \cdot X_{it} + \delta_t + \gamma_i + \varepsilon_{it}$$

- For firm i in year t, $Treat_i$ is an indicator for $ETR_{86} < .23$, $Treat_{i\tau}$ is interaction of $Treat_i$ and a year indicator, X_{it} are time varying firm-level covariates, δ_t are year fixed effects and γ_i are firm fixed effects

Empirical Strategy

$$BTD_{it} = \sum_{\tau=1981}^{1984} \left(\beta_\tau \cdot Treat_{i\tau}\right) + \sum_{\tau=1986}^{1992} \left(\beta_\tau \cdot Treat_{i\tau}\right) + \beta_1 X_{it} + \beta_2 Treat_i \cdot X_{it} + \delta_t + \gamma_i + \varepsilon_{it}$$

- For firm i in year t, $Treat_i$ is an indicator for $ETR_{86} < .23$, $Treat_{i\tau}$ is interaction of $Treat_i$ and a year indicator, X_{it} are time varying firm-level covariates, δ_t are year fixed effects and γ_i are firm fixed effects
- X_{it}: depreciation, depletion, interest expense, number of employees, assets and sales
- Dependent variable $BTD \equiv BI - TI$ is book tax differences

Outcome Choice

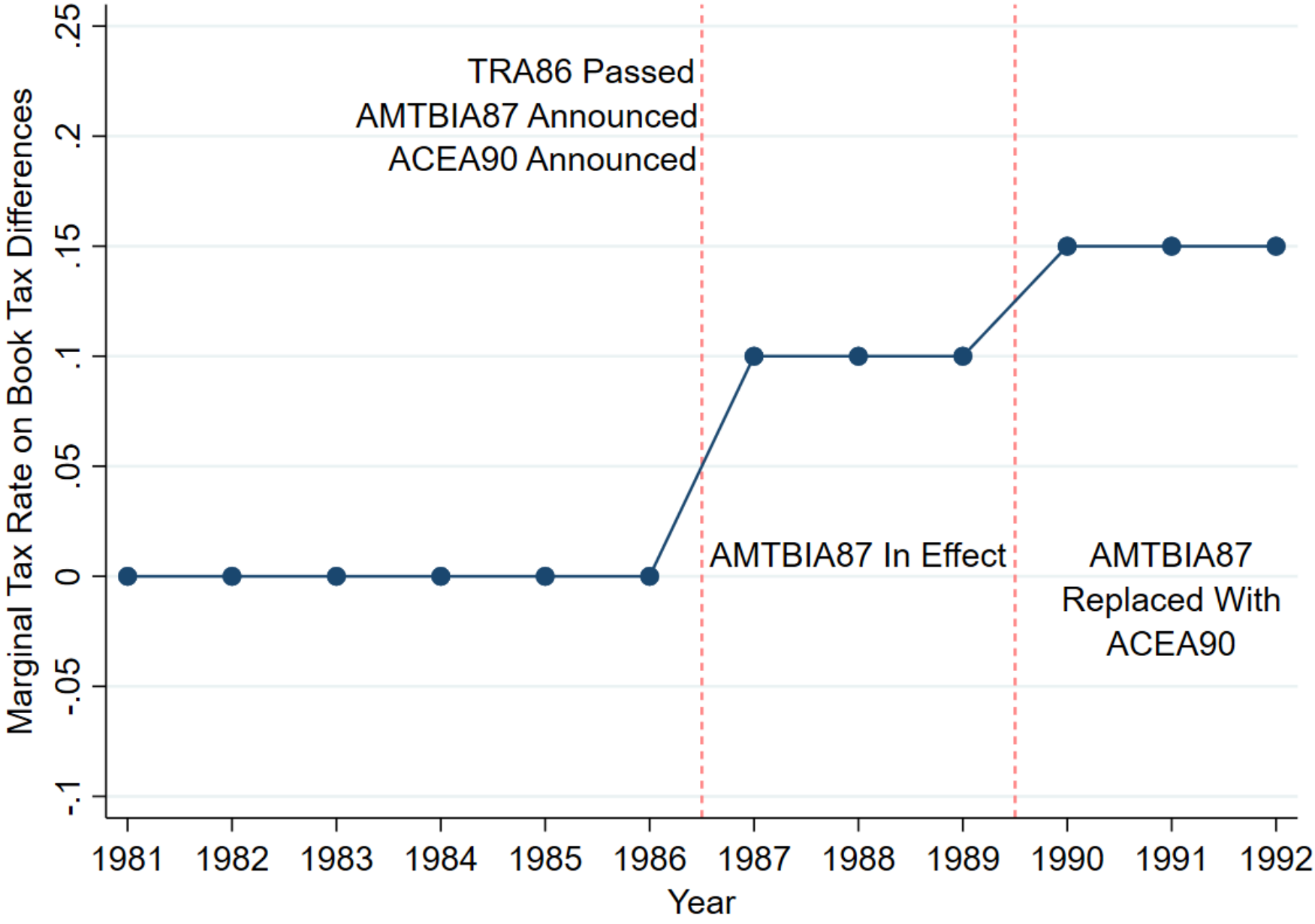
- Choose book tax differences as the outcome. Captures earnings management and tax sheltering responses ▸ Details

  1. Firms have significant discretion to determine book income, so optimizing firms will make discretionary changes before investment or production responses Manzon and Plesko (2002)
  2. Controlling for depreciation and depletion, AMTBIA87 taxes BTD
  3. TRA86 changed tax rate: $\{\tau_{86,87,88}\} = \{0.46, 0.40, 0.34\}$
  4. Tax rate and depreciation changes in TRA86 introduce confounding variation for investment and production responses

Intuition Underlying DiD Estimates

- Tax rate changes and expected responses
- BTD trends in the raw data
- Baseline estimates
  - Linear pre-trend correction

Tax Rate Changes and Expected Responses

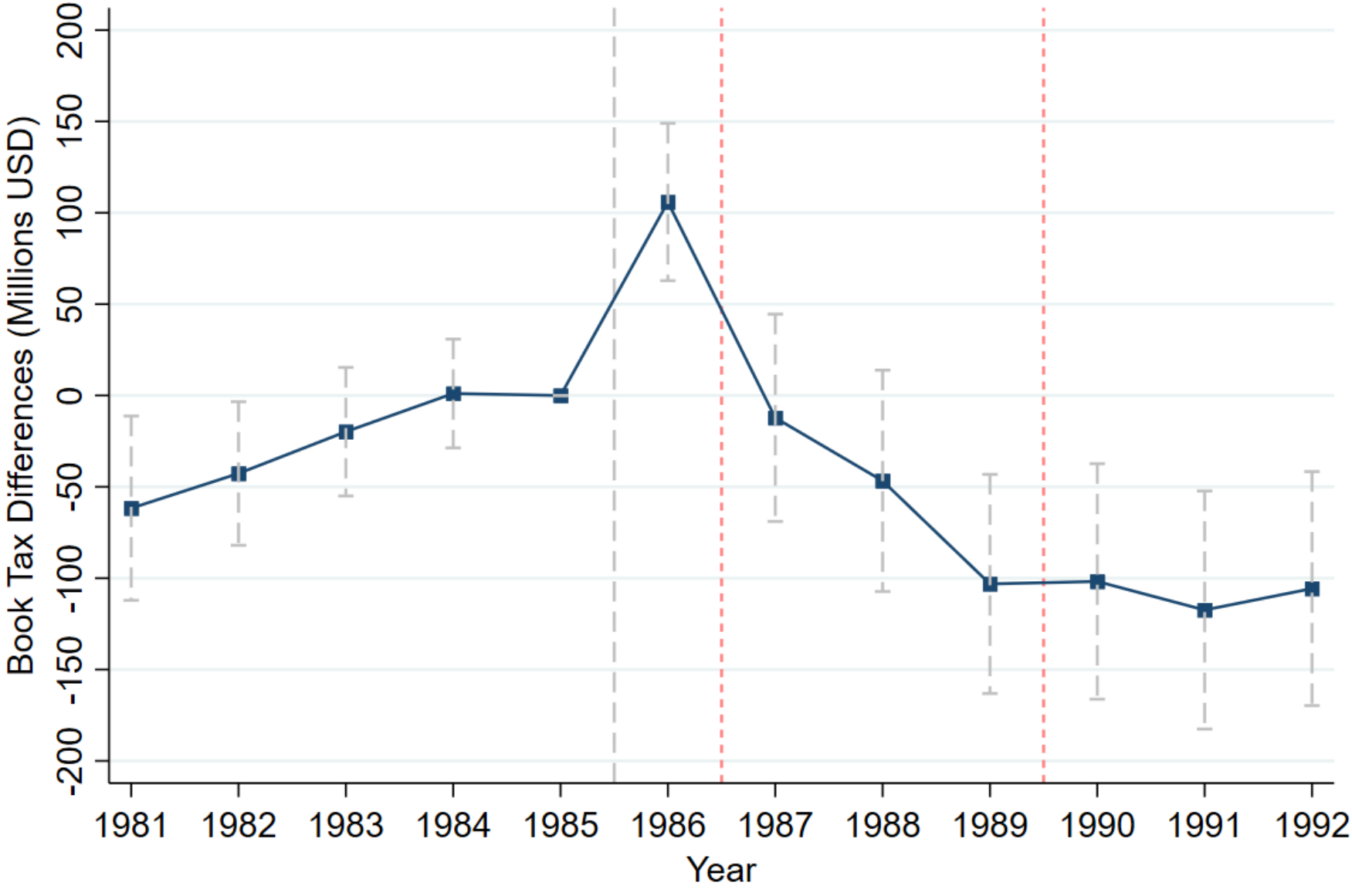


Data

- Compustat fundamentals annual data: Firms that appear in every year from 1981-1992 with positive, non-missing assets, sales and pretax income incorporated in the U.S., with 1986 EBITD $> \$100M$
- 615 firms, 185 treatment firms. Treatment firms have lower average book income but higher average book tax differences in 1985

▸ Table ▸ Raw Means

AMTBIA87 Estimates

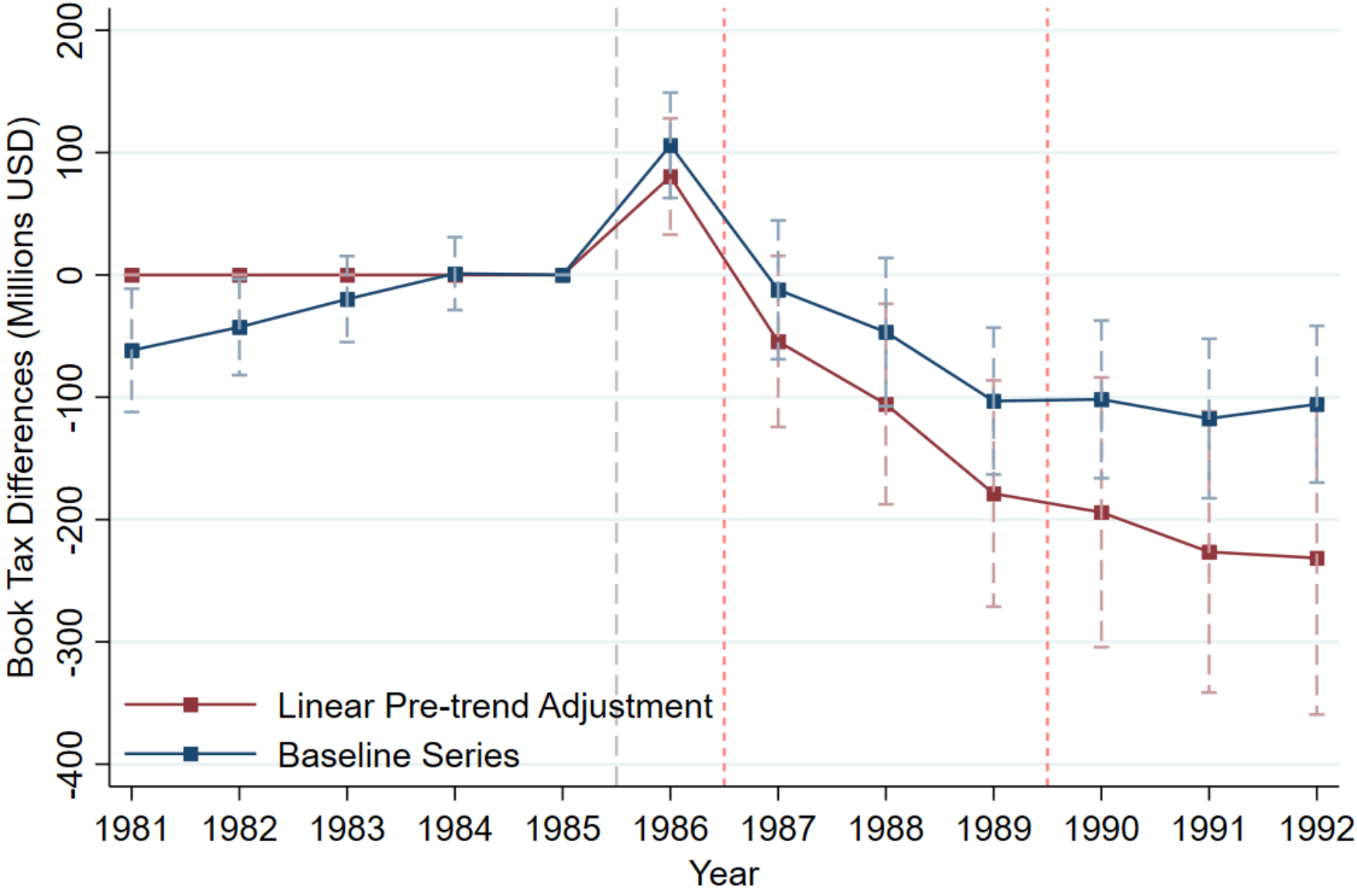


Empirical Strategy: Adjusting for Pre-Trends

$$BTD_{it} = \alpha \cdot Treat_i \cdot t + \sum_{\tau=1986}^{1992} \left(\beta_\tau \cdot Treat_{i\tau}\right) + \beta_1 X_{it} + \beta_2 Treat_i \cdot X_{it} + \delta_t + \gamma_i + \varepsilon_{it}$$

- α captures linear pre-trend between 1981-1985
- Correction valid under assumption that pre-period linear trend would continue in absence of policy

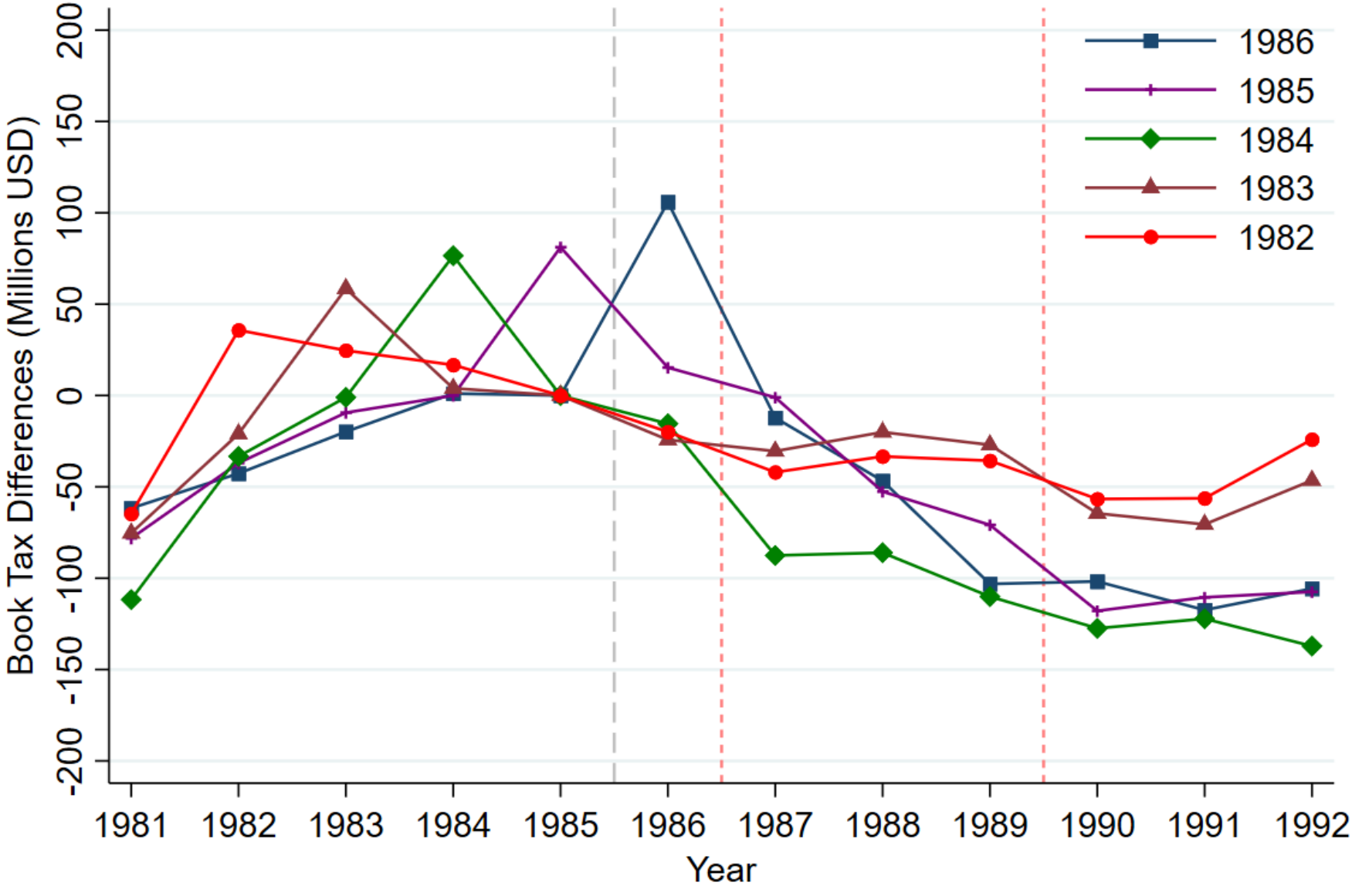
AMTBIA87 Estimates: Linear Pre-Trend Adjustment



Possible Confounders: Lessons from the ETI Literature

1. Mean Reversion
2. Non-AMTBIA87 related changes in book tax differences that vary systematically with ETRs

Mean Reversion



Possible Confounders

1. Mean Reversion
   - Cannot reject null $H_0 : \beta_{86}^{1986} = \beta_{k=0}^{1982-85}$ at 5% level
2. Non-AMTBIA87 related changes in book tax differences that vary systematically with ETRs
   - BTD avoids bias from changes in statutory rate, but TRA86 has many other changes
   - Bias cannot: ▸ Robustness ▸ Robustness w/ Pre-Trends
     - ★ depend explicitly on the ETR cutoff
     - ★ depend on industry specific time trends
     - ★ be specific to utility and financial sectors
     - ★ be specific to firms with fiscal year ends not in December

Elasticities

- Rescale DiD coefficients into elasticities of book income with respect to the net of tax rate
- Capture variation in book income independent from taxable income using estimated change in BTD
- $\varepsilon_t^{BI} = \frac{\Delta BTD_t}{\Delta(1-\tau)_t} \frac{1-\tau}{BI_{85}}$
- Point estimates from preferred specification before and after linear pre-trend adjustment yield

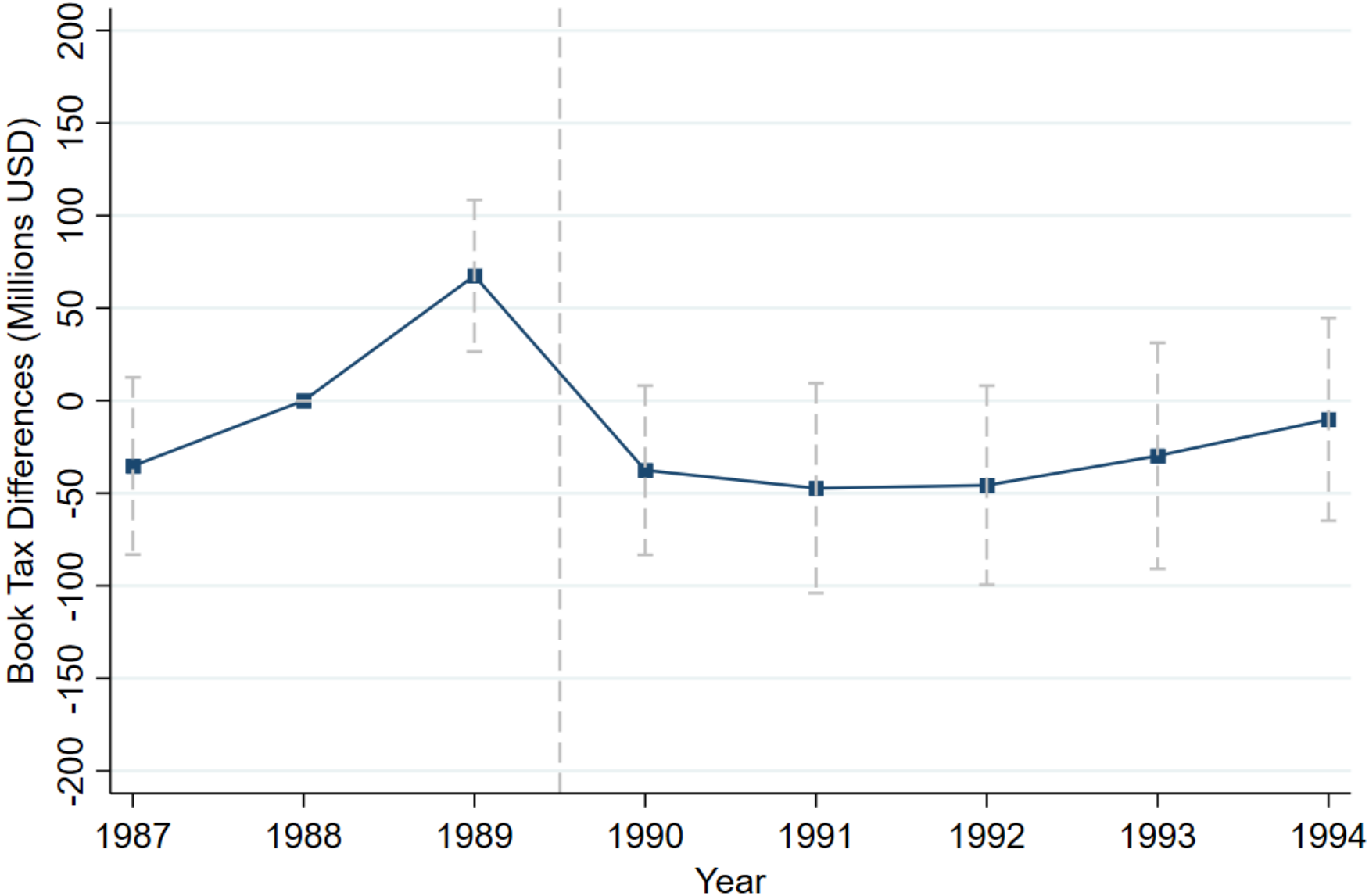
No Adjustment: $\{\varepsilon_t^{BI}\}_{t=1987}^{1992} = \{0.25, 0.97, 2.14, 1.41, 1.62, 1.46\}$

Linear Pre-Trend: $\{\varepsilon_t^{BI}\}_{t=1987}^{1992} = \{1.13, 2.19, 3.70, 2.68, 3.13, 3.20\}$

Elasticities Beyond 3 Year Time Horizon

- Long-run elasticities beyond a 3 year time horizon may conflate firm responses to ACEA90 with responses to AMTBIA87
- Check firm responses with similar DiD: sample of firms present every year from 1986-1994 splitting on 1989 ETRs to measure responses from firms likely to face AMTBIA87 when it is eliminated

Firm Responses to Elimination of AMTBIA87



Elasticities Beyond 3 Year Time Horizon

- Weak negative response to ACEA90 consistent with tax rate increase on same base
- Possible upward bias from pretrend
- Muted response $\implies$ ACEA90 may tax smaller base at higher rate
  - Using 15% rate change could understate true elasticity
  - Can use 10% rate change in elasticity as conservative upper bound

$$\text{LPT: } \{\varepsilon_t^{BI}\}_{t=1987}^{1992} = \{1.13, 2.19, 3.70, 2.68, 3.13, 3.20\}$$

$$\text{LPT, 10\% rate: } \{\varepsilon_t^{BI}\}_{t=1987}^{1992} = \{1.13, 2.19, 3.70, 4.02, 4.69, 4.80\}$$

Firm Heterogeneity

- Estimate DiD by industry, firm size ▸ Manuf + Trans ▸ Util + Fin ▸ Big ▸ Small
- Patterns across industries and firm sizes roughly similar but noisier

Summary of Firm Responses to AMTBIA87

- Estimate short-run book income elasticity $\varepsilon = 3.70$, long-run elasticities appear to stabilize around 3.20
- Firms may exhibit responses to transition from AMTBIA87$\rightarrow$ ACEA90 but tough to distinguish from zero. Use constant 10% tax rate in elasticity calculations as conservative upper bound
- Mean reversion and confounding BTD trends that covary with ETRs unlikely to drive results
- Noisy estimates of firm heterogeneity across industries and firm sizes

Outline

1. Policy Description of AMTBIA87 and ACEA90
2. Estimating book income responses to AMTs using AMTBIA87
3. Scoring the Biden book income AMT proposal

Proposed Biden Book Income AMT

- Policy:
  - 15% minimum tax on book income for firms with >$100M in income
  - Net of net operating losses and foreign tax credits

Proposed Biden Book Income AMT

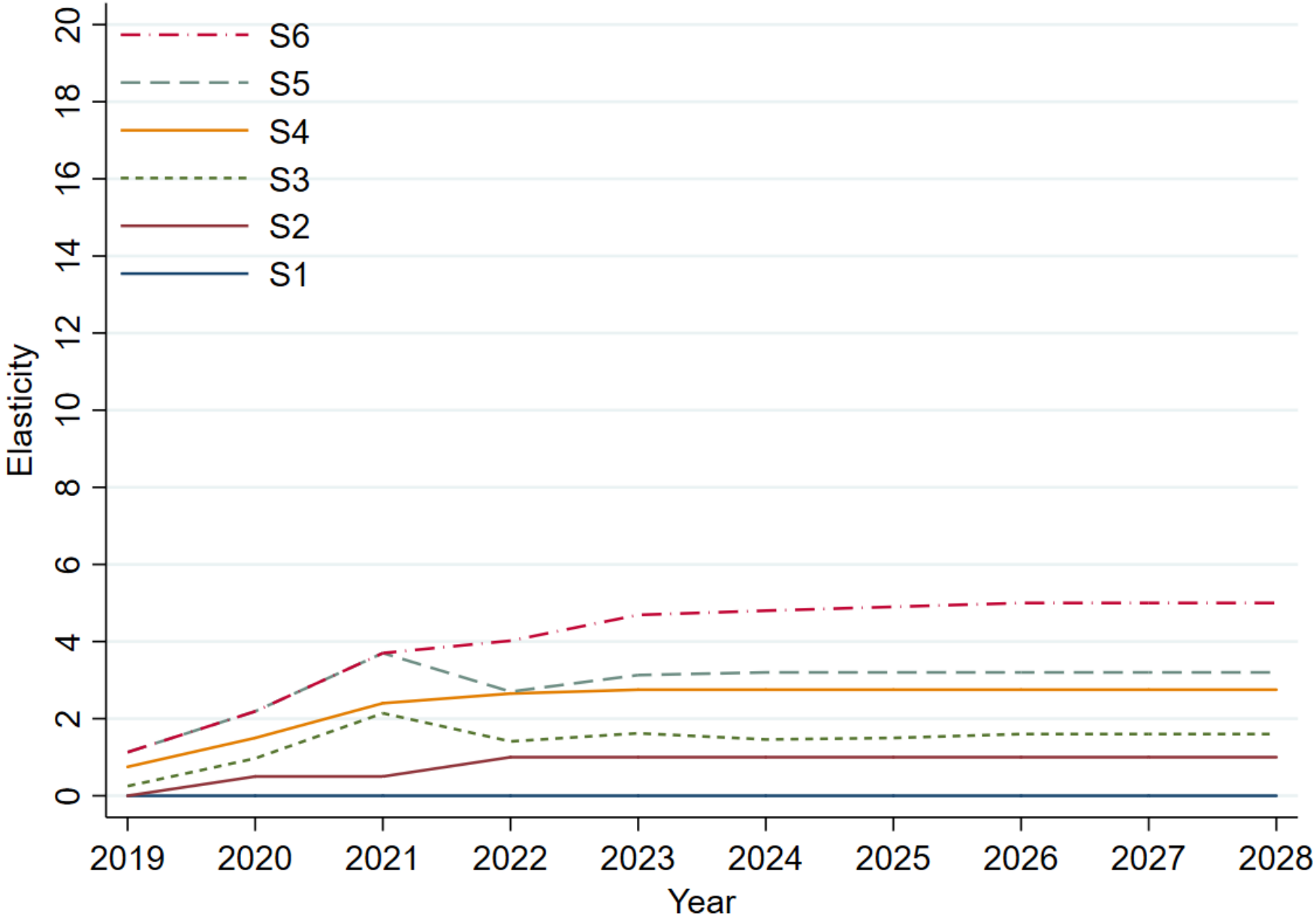
- Policy:
  - 15% minimum tax on book income for firms with >$100M in income
  - Net of net operating losses and foreign tax credits
- Comparison to AMTBIA87:
  - AMTBIA87 imposed tax on BTD, TI taxed via normal AMT system
  - Biden proposal imposes AMT on BI
  - Using AMTBIA87 estimates in score of Biden proposal assumes firms do not have TI responses to Biden book income AMT

Scoring the Proposed Biden Book Income AMT

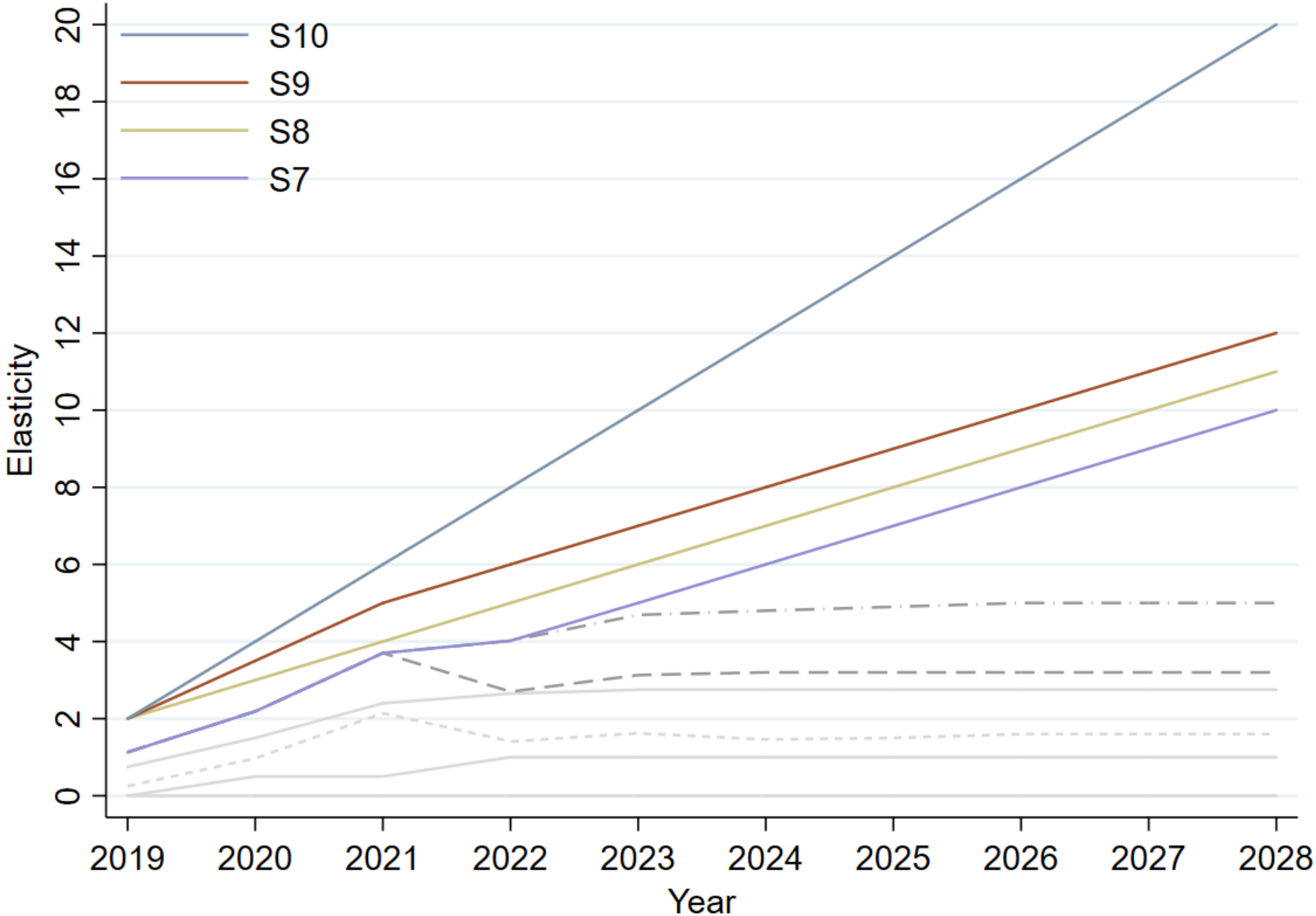
- Use 2018 cross section of Compustat firms present in 2017 and 2018, project income and tax variables over 10 year period using CBO GDP forecasts, incorporate behavioral response estimates into book income projections
- Revenue Scores depend on choice of ε_t

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

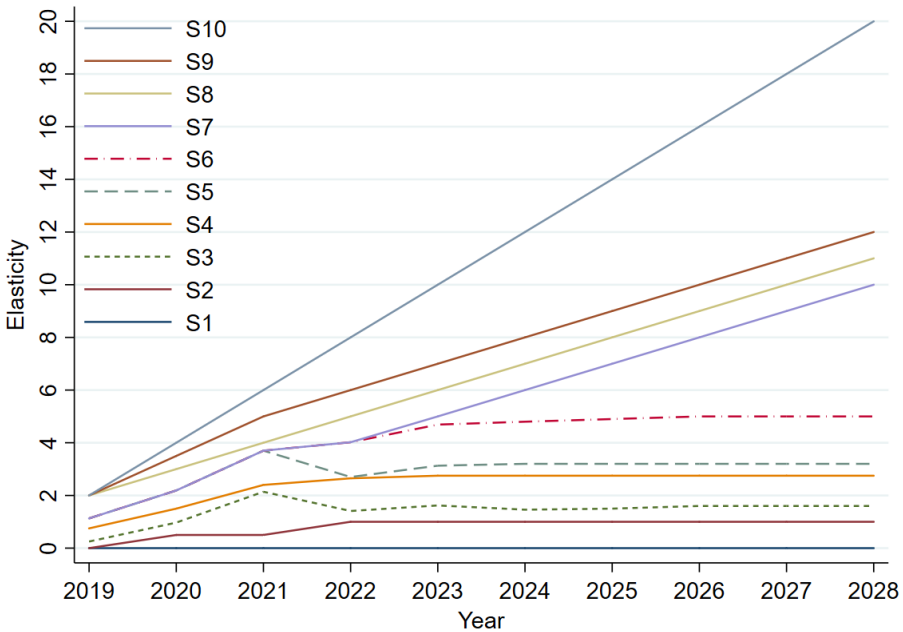
Revenue Score Scenarios



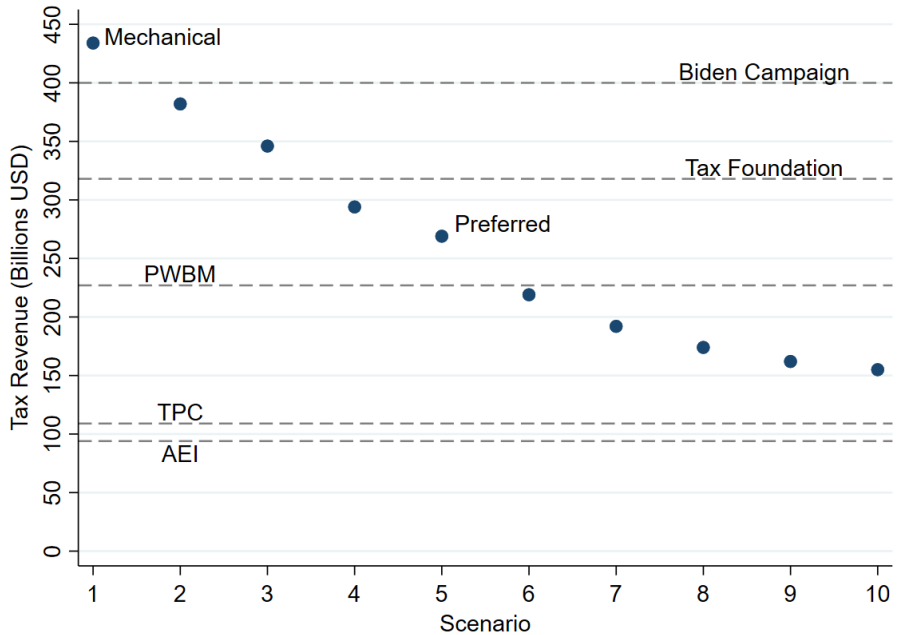
Revenue Score Scenarios



Revenue Score Scenarios



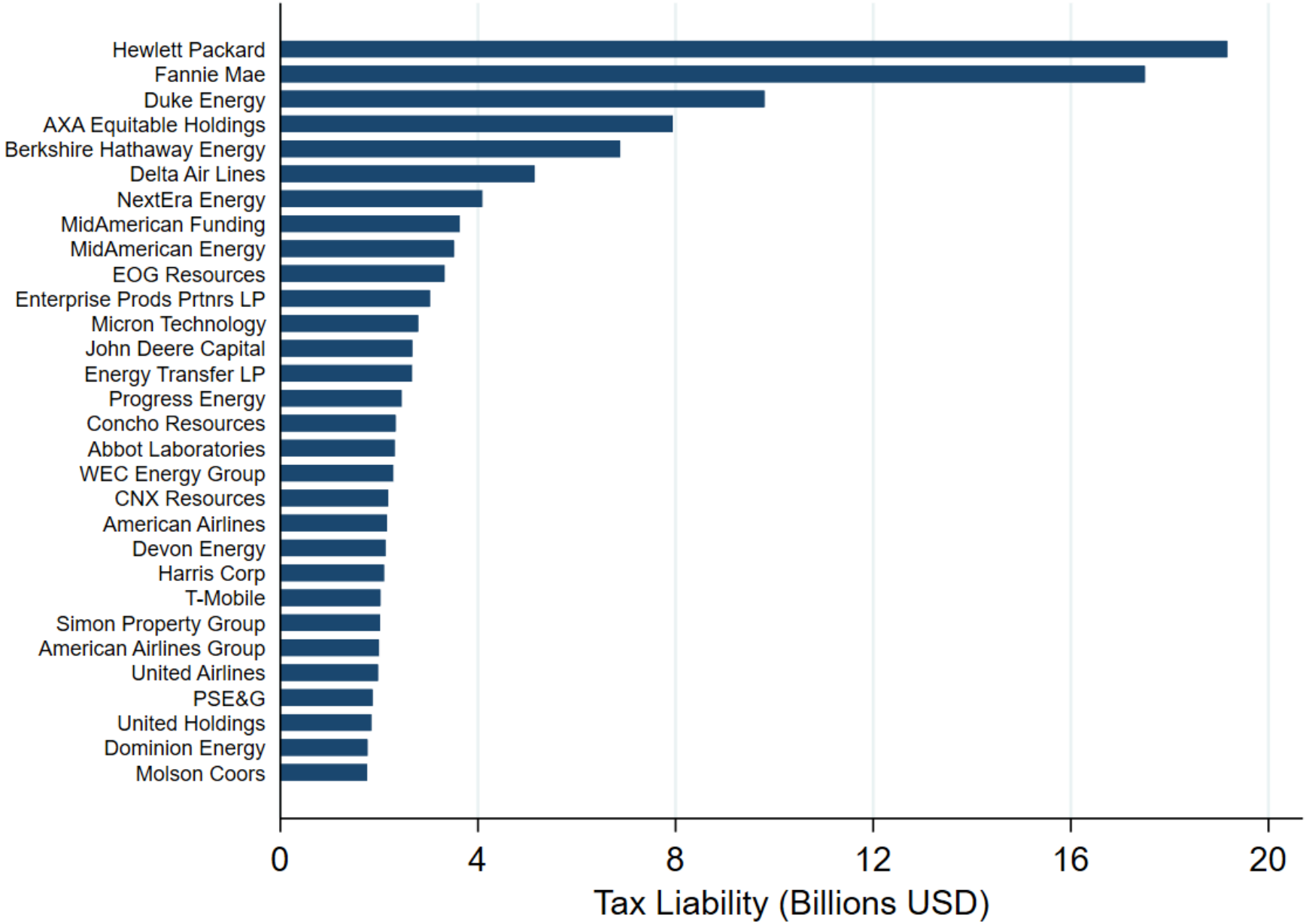
Elasticities



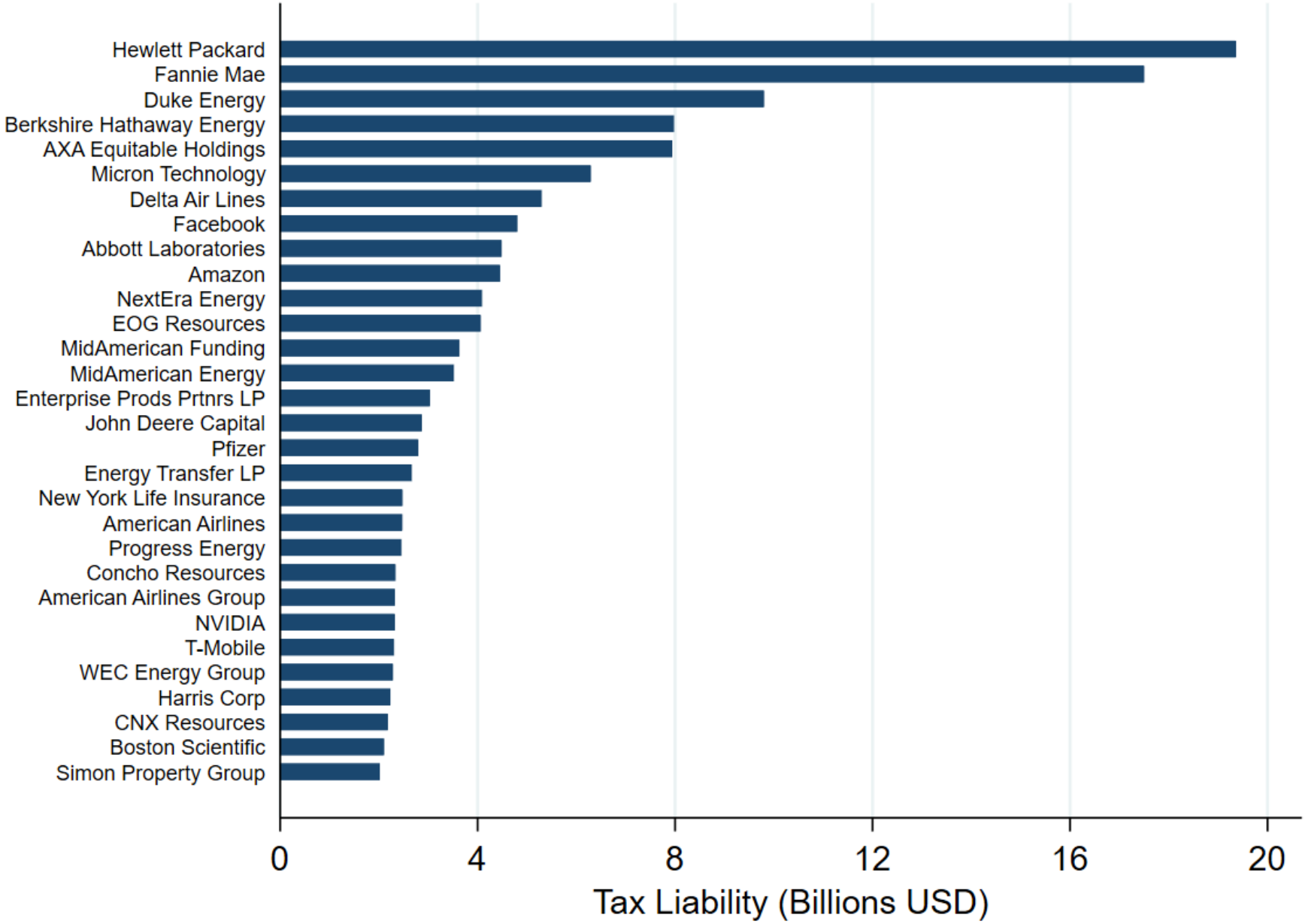
Revenue Estimates

Revenue Simulation Scenarios

Firm Heterogeneity



Firm Heterogeneity



Summary of Revenue Simulation Results

- Preferred Revenue Simulation raises $\$269$ billion over a decade
- To match the Biden campaign estimate, need no behavioral response, to match the AEI estimate, need behavioral response $> 4\times$ observed response to AMTBIA87
- Amazon and many other firms face substantial tax liability increases under baseline policy, Amazon pays more without foreign tax credits
- Most burden falls on utilities, finance and manufacturing firms

▸ Ind Burden

- 30% of revenue from firms facing 10 largest liability increases

Conclusion

- Use AMTBIA87 to estimate $\varepsilon = 3.70$ over 3 year time horizon
- Longer-run elasticity $\varepsilon \approx 3.20$
- Bias from mean reversion or confounding trends unlikely
- Estimated elasticities suggest Biden book income AMT proposal will raise $\$269$ billion in revenue over a decade
  - Think tank and campaign scores require diverging behavioral estimates
  - Utilities, finance, manufacturing sectors face largest liability increases
  - 30% of revenue from top 10 liability firms
  - Amazon tax liability up $\$783$M, 81^{st} largest. Without FTC Amazon tax liability up to $\$4.5$B, 10^{th} largest

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

Income Concepts

- Book Income (BI) broader than taxable income (TI)
- Important differences between BI and TI:
  - Book income includes all majority-owned domestic and foreign subsidiaries
  - Firms have more discretion to modify BI
    - ★ GAAP allows managers to choose different methods of income measurement to proxy for underlying economic value Manzon and Plesko (2002)
    - ★ Temporary Differences: Depreciation, intangible assets, long-term contracts, rental income
    - ★ Permanent Differences: Dividends received, non-qualified stock options, permanently reinvested foreign income, meals and entertainment

▸ Outcome

Estimation Sample 1985 Summary Stats

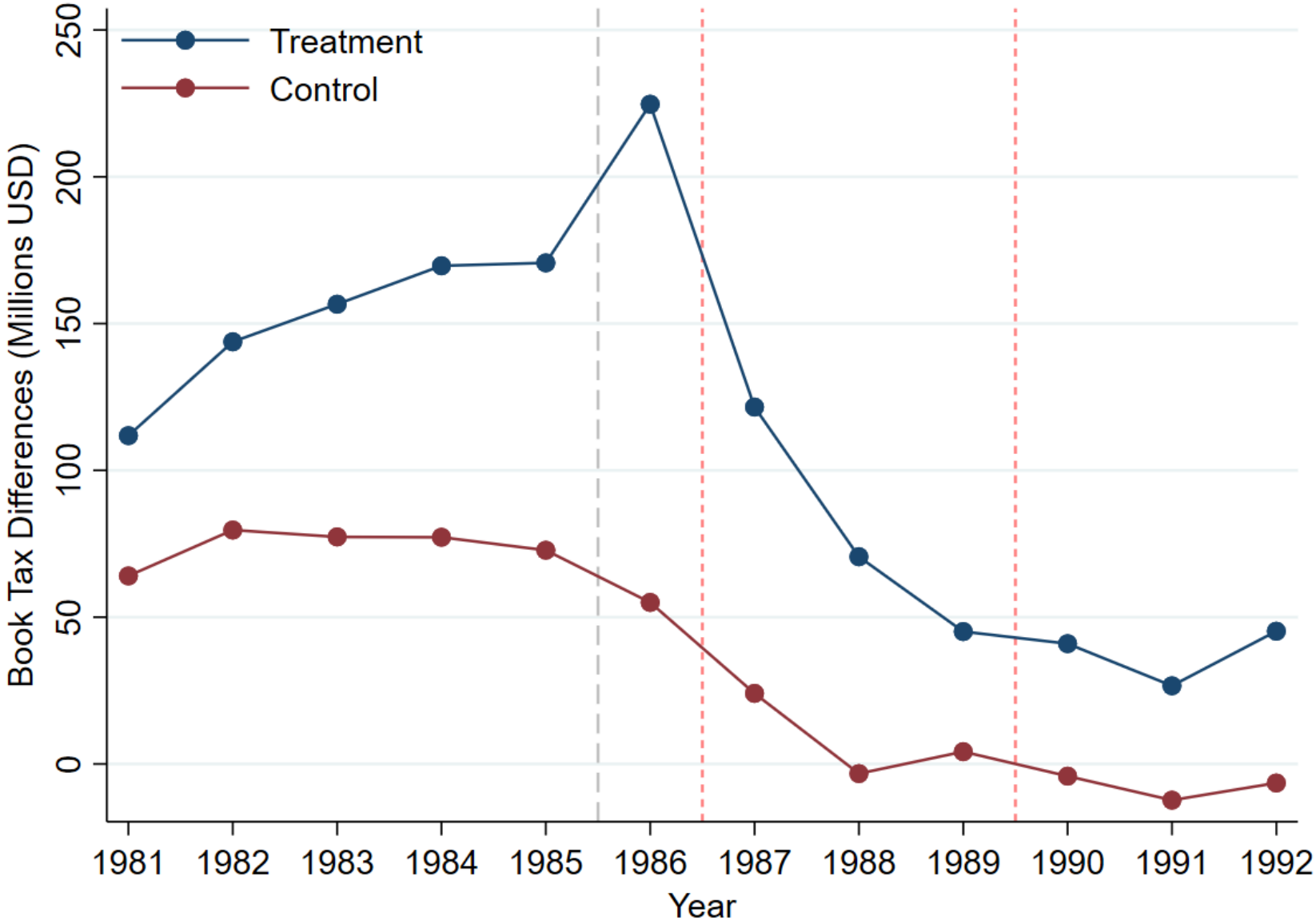
Table B.1: Summary Statistics for 1985 Cross Section of AMT BIA Sample

	(1) N	(2) Mean	(3) Std Dev	(4) Sum	(5) Min	(6) Median	(7) Max
Panel A: Full Sample							
Assets	615	7545	15669	4640098	66	2627	179076
Book Income	615	556	1210	342140	9	228	19801
Taxable Income	615	379	1145	232921	−277	146	15629
Book Tax Difference	615	167	288	102929	−561	69	1173
Total Taxes	615	174	527	107144	−127	67	7189
Depreciation	615	237	620	145903	0	72	8107
Depletion	615	52	139	32166	0	0	1098
Interest	615	215	682	132118	0	51	10352
Panel B: Treatment							
Assets	185	10641	15704	1968510	284	4853	152492
Book Income	185	482	675	89258	9	255	5522
Taxable Income	185	183	451	33840	−277	57	4644
Book Tax Difference	185	265	332	49030	−561	139	1173
Total Taxes	185	84	208	15566	−127	26	2136
Depreciation	185	229	501	42411	0	70	3678
Depletion	185	64	146	11843	0	0	992
Interest	185	278	871	51379	0	74	10352
Panel C: Control							
Assets	430	6213	15482	2671588	66	2257	179076
Book Income	430	588	1377	252883	10	227	19801
Taxable Income	430	463	1329	199081	−72	182	15629
Book Tax Difference	430	125	256	53899	−561	43	1173
Total Taxes	430	213	611	91577	−33	84	7189
Depreciation	430	241	665	103493	0	77	8107
Depletion	430	47	136	20323	0	0	1098
Interest	430	188	581	80740	0	40	7321

Notes: This table reports summary statistics for a 1985 cross section from the sample of firms used to estimate behavioral responses to the alternative minimum tax book income adjustment. Statistics are in millions of USD, expect for counts. Panel A presents statistics from the whole estimation sample, Panel B presents statistics from the baseline treatment sample, and Panel C present statistics from the baseline control sample.

▸ Data

Raw Book Tax Difference Means



▸ Data

Robustness

Table B.3: AMT BIA Difference in Differences Estimates

Coefficient	(1)	(2)	(3)	(4)	(5)	(6)	(7)
β_{86}	115.261	105.921	127.298	131.444	110.952	105.984	107.213
	(21.531)	(21.980)	(26.724)	(35.614)	(25.839)	(23.195)	(20.717)
β_{87}	5.741	−12.197	−11.195	−25.102	2.232	−4.361	−17.856
	(28.822)	(28.947)	(40.241)	(44.940)	(32.086)	(28.709)	(27.029)
β_{88}	−24.922	−46.701	−82.378	−45.215	−30.741	−52.607	−51.618
	(30.623)	(30.907)	(41.477)	(46.122)	(34.529)	(32.527)	(28.890)
β_{89}	−80.571	−103.125	−125.324	−107.913	−93.150	−90.323	−116.826
	(31.139)	(30.600)	(40.955)	(43.529)	(34.417)	(31.951)	(29.646)
β_{90}	−73.508	−101.752	−123.511	−78.380	−93.313	−79.681	−102.442
	(35.485)	(32.885)	(44.326)	(46.302)	(38.790)	(34.982)	(30.871)
β_{91}	−82.411	−117.401	−103.661	−126.585	−110.335	−96.645	−117.360
	(34.312)	(33.242)	(43.072)	(49.870)	(38.102)	(34.537)	(31.814)
β_{92}	−63.072	−105.685	−90.762	−69.161	−107.676	−98.628	−101.539
	(32.769)	(32.680)	(43.829)	(50.814)	(38.923)	(34.864)	(31.428)
Observations	7380	7380	6540	5196	5584	7380	7380
Clusters	615	615	545	433	474	615	615
R^2	0.467	0.537	0.605	0.505	0.547	0.535	0.539
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Ind Trends	No	No	Yes	No	No	No	No
Fin and Util	Yes	Yes	Yes	No	Yes	Yes	Yes
FYE December	No	No	No	No	Yes	No	No
ETR Cutoff	23	23	23	23	23	20	26

▸ Confounders

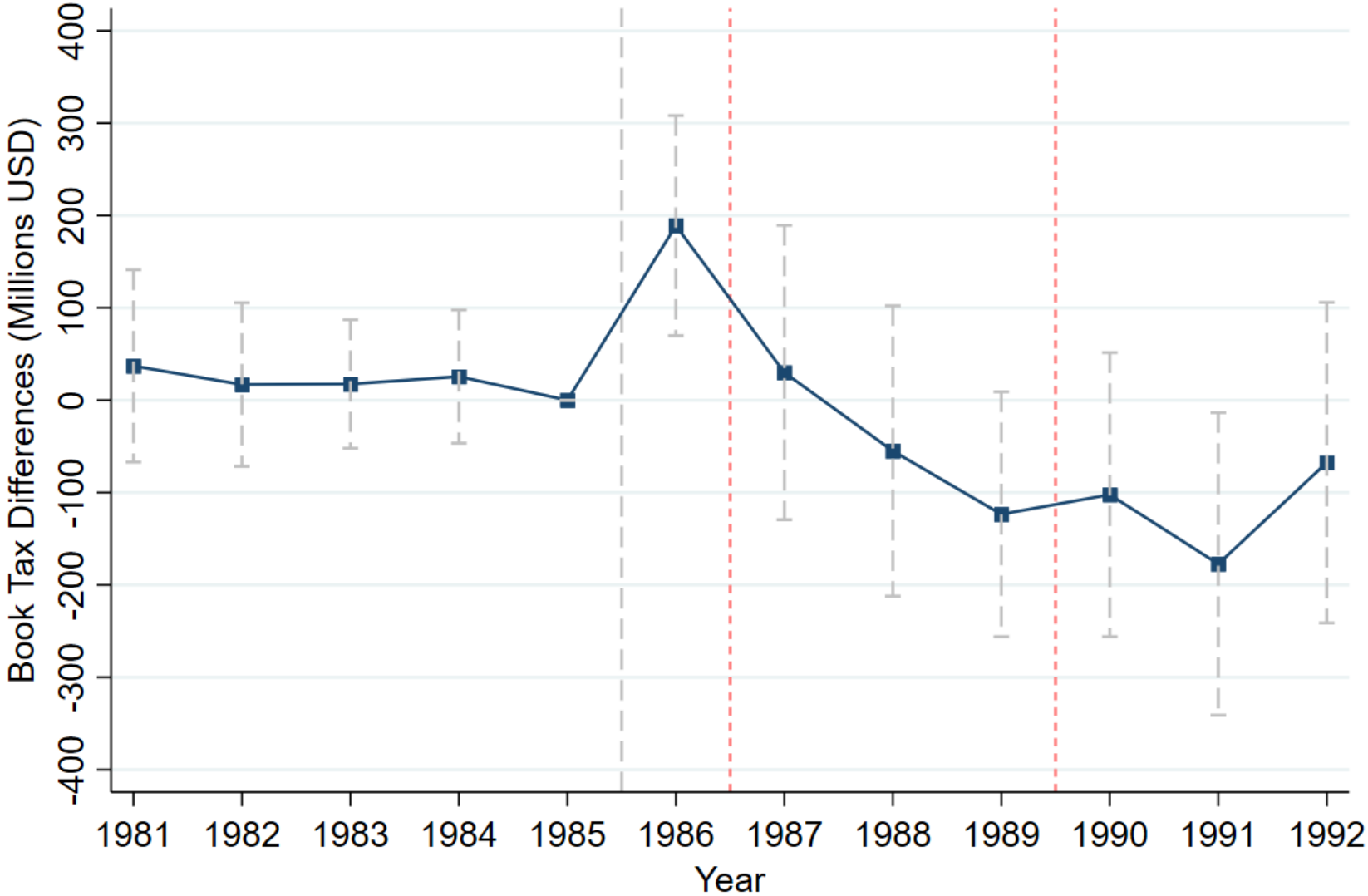
Robustness

Table B.4: AMT BIA Difference in Differences Estimates With Linear Pre-Trend

Coefficient	(1)	(2)	(3)	(4)	(5)	(6)	(7)
β_{86}	89.540	80.416	110.513	112.459	80.392	81.384	84.993
	(24.754)	(24.227)	(28.670)	(37.443)	(28.756)	(25.550)	(22.715)
β_{87}	−40.090	−54.411	−45.171	−51.197	−46.596	−47.572	−58.231
	(36.404)	(35.680)	(48.790)	(54.025)	(39.291)	(35.980)	(33.338)
β_{88}	−90.864	−105.610	−133.547	−78.397	−97.815	−114.415	−110.146
	(41.943)	(41.810)	(56.629)	(58.057)	(47.695)	(43.708)	(39.030)
β_{89}	−166.623	−178.737	−193.684	−148.186	−178.483	−170.730	−193.512
	(47.784)	(47.171)	(64.365)	(64.781)	(53.690)	(48.754)	(44.737)
β_{90}	−179.671	−194.083	−209.060	−125.769	−196.940	−178.708	−197.286
	(59.036)	(56.228)	(77.091)	(72.837)	(65.514)	(59.265)	(52.182)
β_{91}	−208.684	−226.456	−206.393	−181.090	−232.267	−214.302	−230.357
	(58.735)	(58.648)	(79.387)	(78.639)	(68.346)	(60.527)	(55.527)
β_{92}	−209.456	−231.465	−210.678	−130.786	−247.920	−234.917	−232.688
	(66.851)	(65.258)	(88.156)	(86.915)	(76.558)	(69.469)	(61.067)
Observations	7380	7380	6540	5196	5584	7380	7380
Clusters	615	615	545	433	474	615	615
R^2	0.467	0.537	0.605	0.504	0.547	0.535	0.539
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Ind Trends	No	No	Yes	No	No	No	No
Fin and Util	Yes	Yes	Yes	No	Yes	Yes	Yes
FYE December	No	No	No	No	Yes	No	No
ETR Cutoff	23	23	23	23	23	20	26

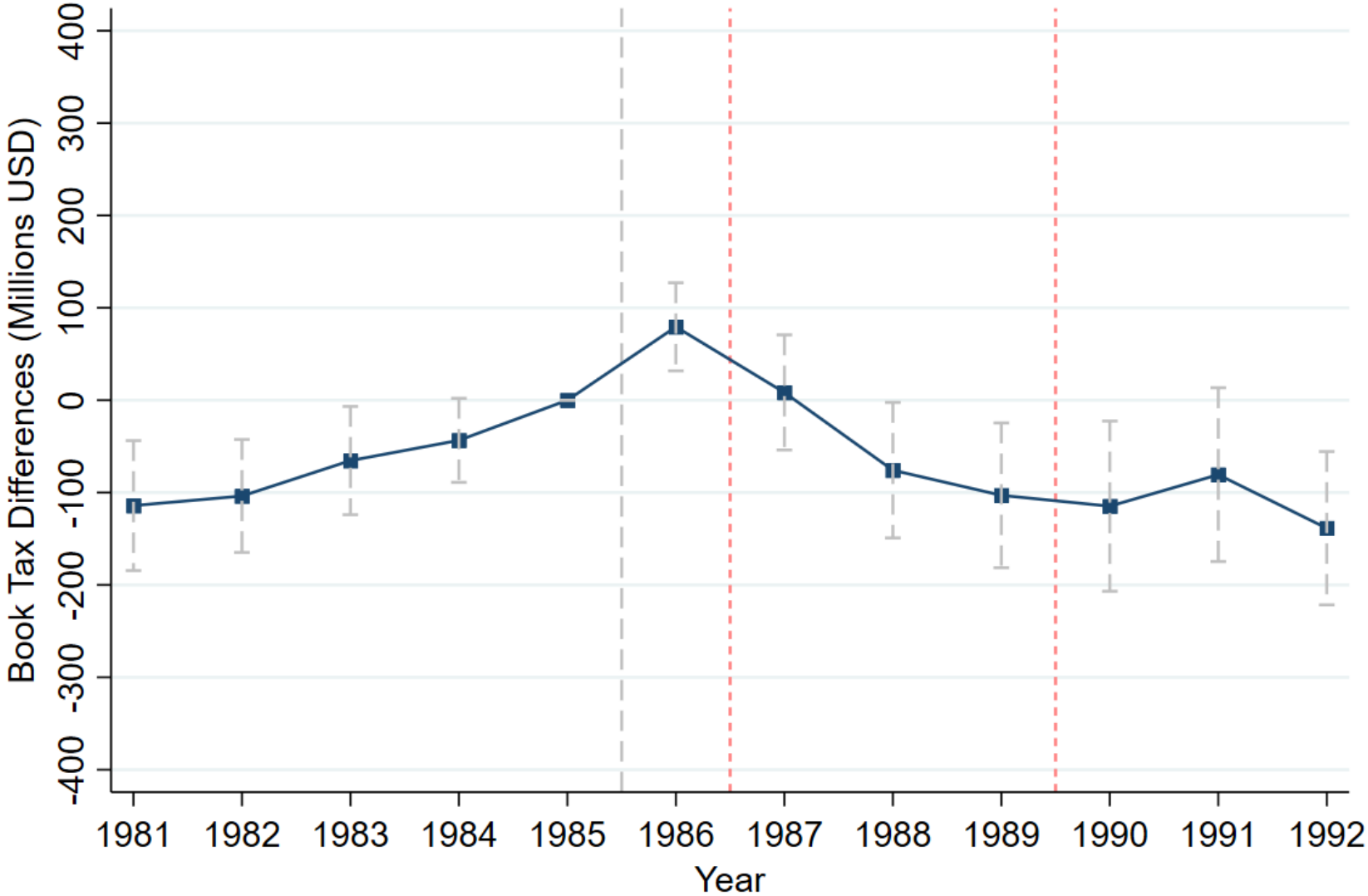
▸ Confounders

Heterogeneous Firm Responses: Manuf and Trans



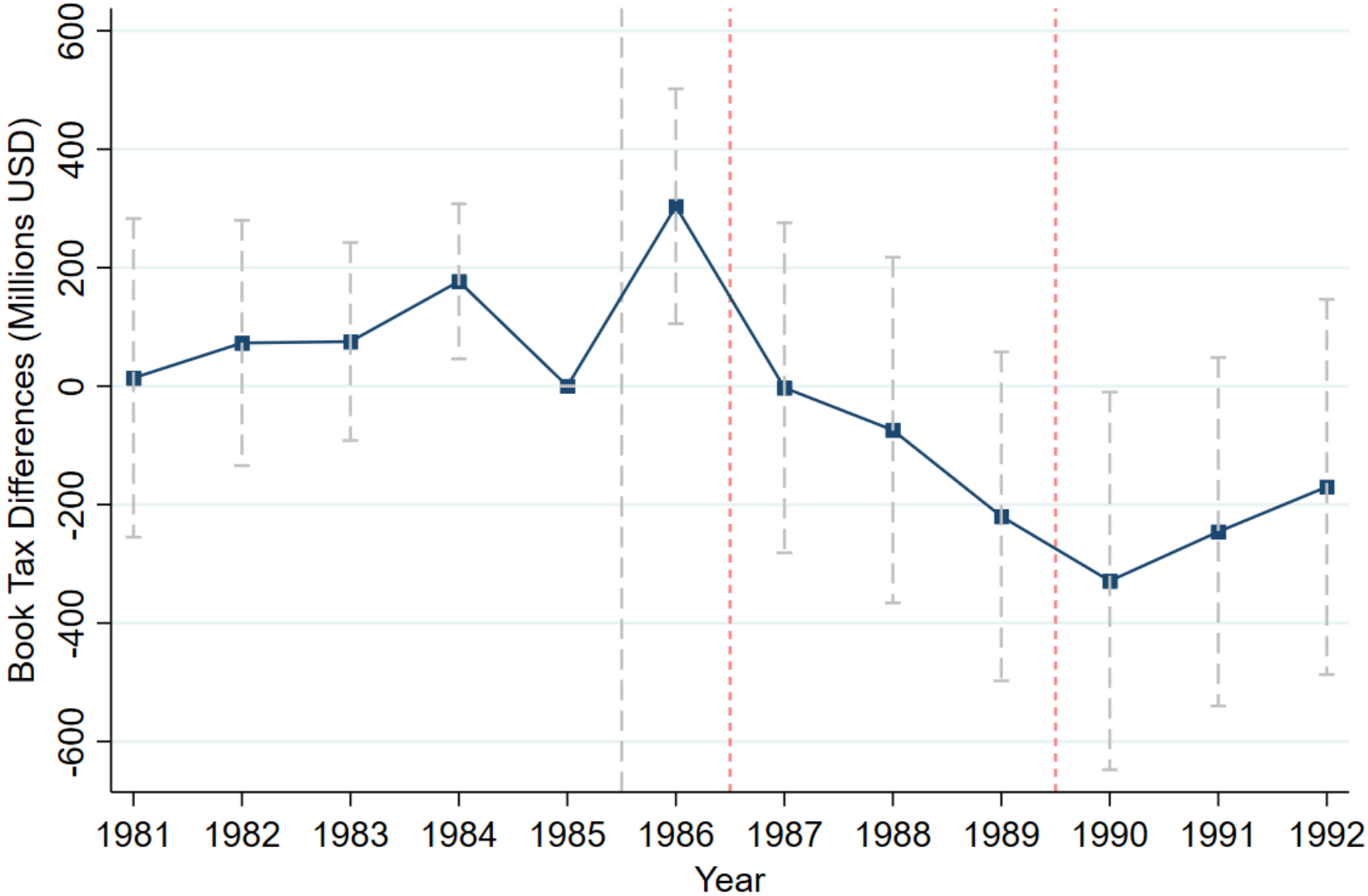
▸ Summary

Heterogeneous Firm Responses: Utilities and Finance



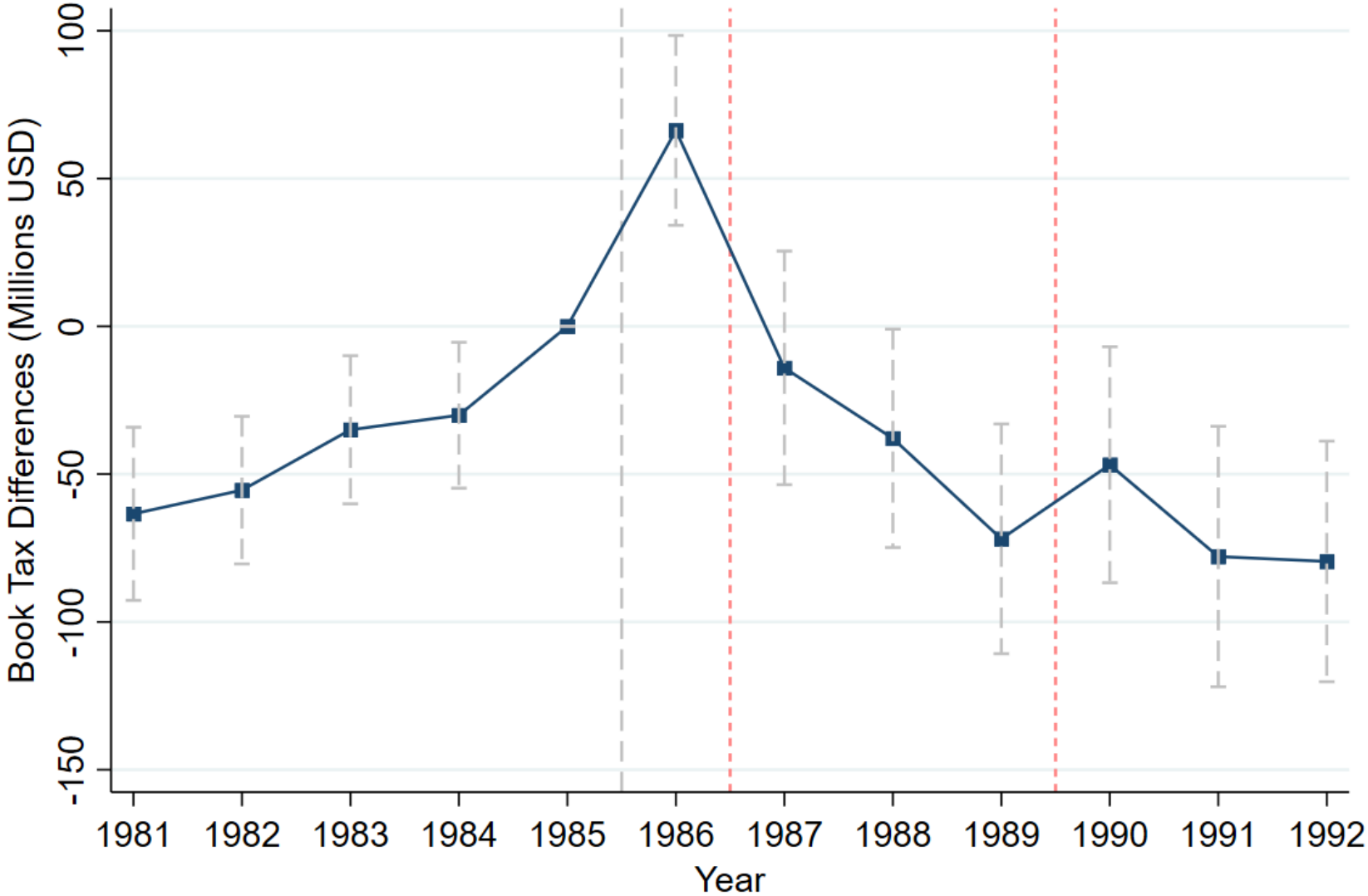
▸ Summary

Heterogeneous Firm Responses: $>$ 1B EBITD



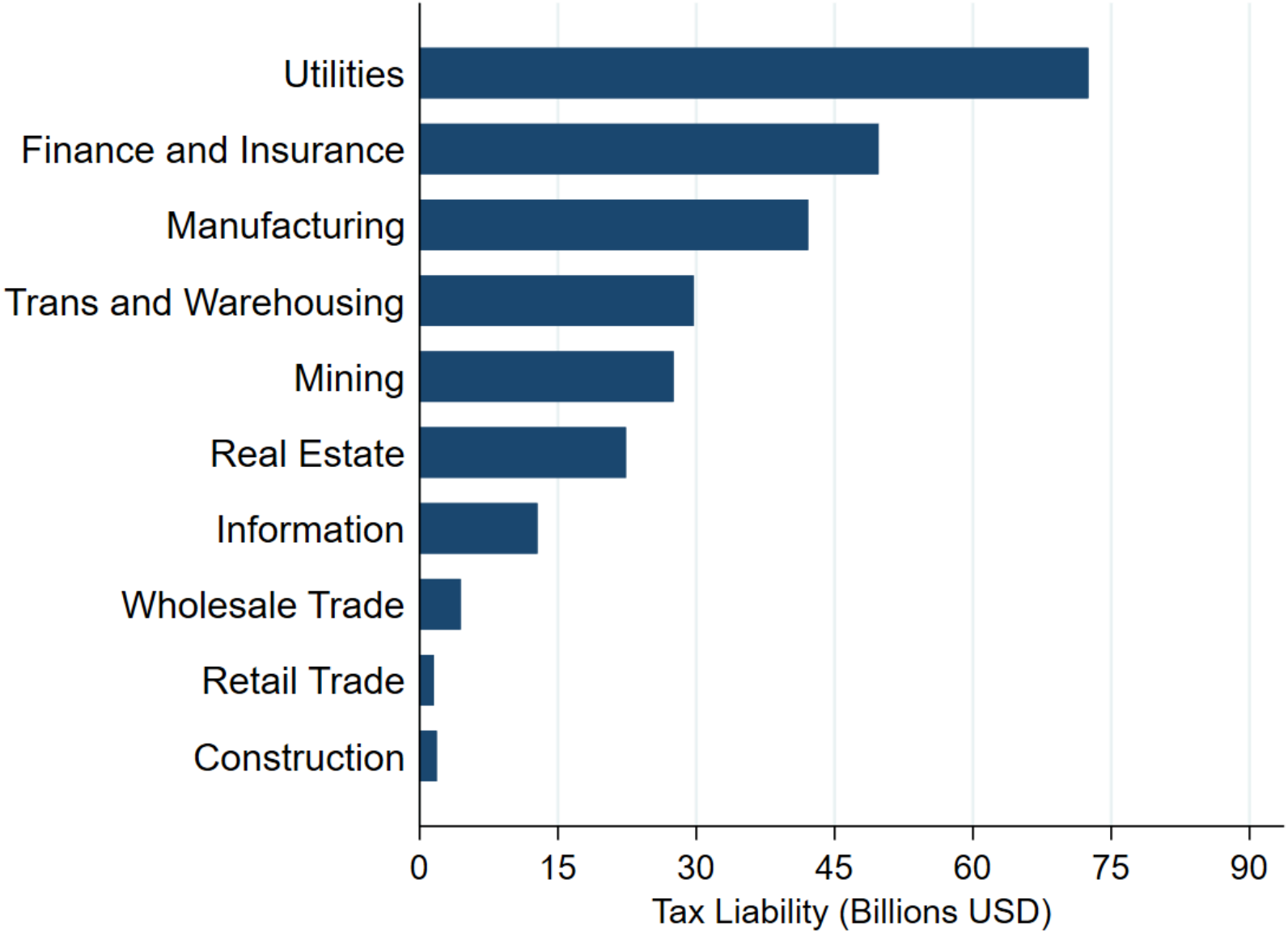
▸ Summary

Heterogeneous Firm Responses: Not $>$ 1B EBITD



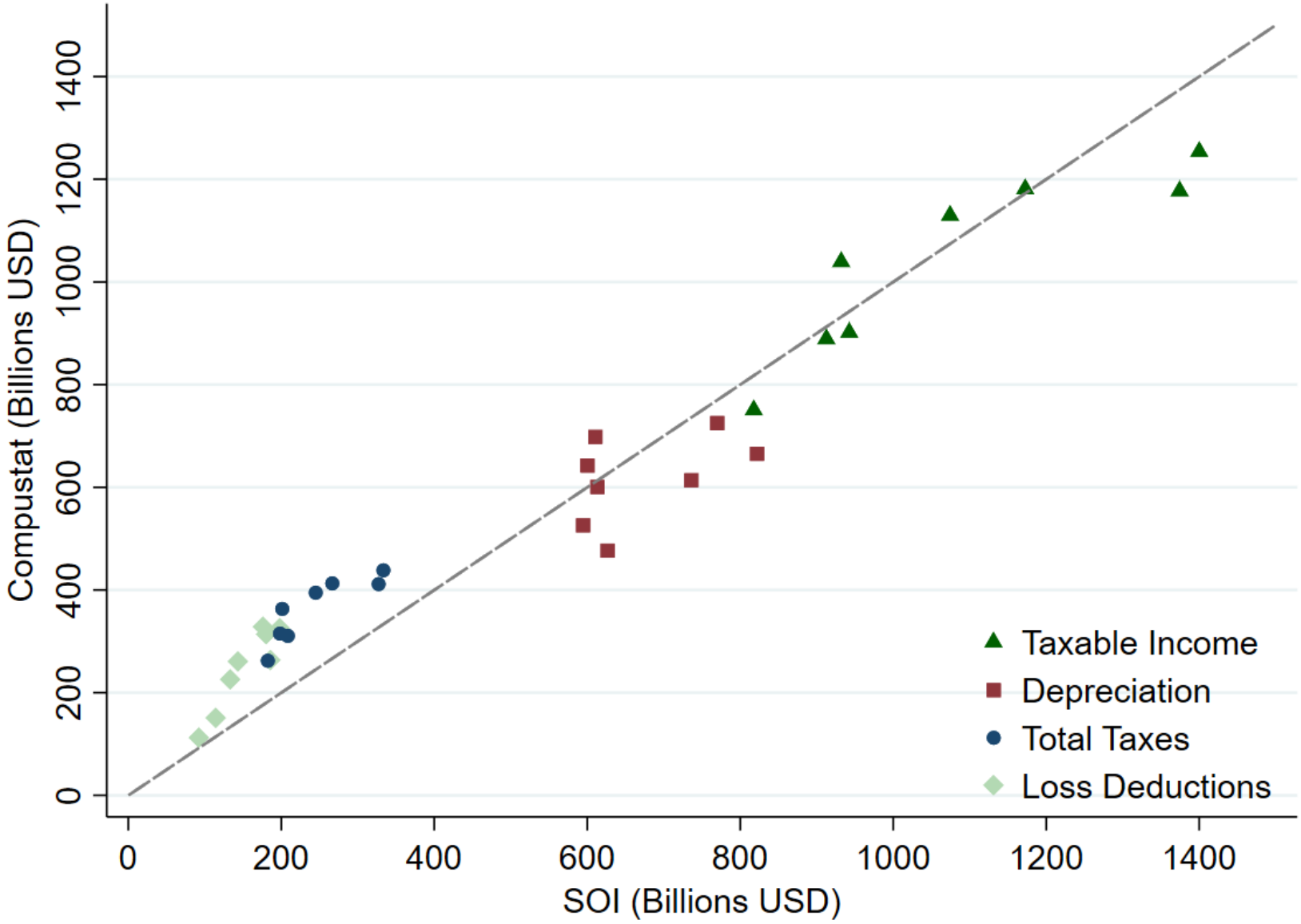
▸ Summary

Firm Heterogeneity



▸ Rev Sim Results

SOI Compustat Aggregates Comparison



▸ Score