Tax Policy and Heterogeneous Investment Behavior
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Online Appendix

For Online Publication

A Legislative Background

This appendix describes legislation affecting the bonus and Section 179 depreciation provisions studied in this paper.

Economic Recovery Tax Act of 1981

The act set the Section 179 allowance at $5,000 and established a timetable for gradually increasing the allowance to $10,000 by 1986. A business taxpayer could claim the investment tax credit only for the portion of an eligible asset's cost that was not expensed.

Depreciation Policies Affected – Section 179

Date Signed – August 13, 1981

Bill Number – H.R. 4242

Deficit Reduction Act of 1984

The act postponed from 1986 to 1990 the scheduled increase in the Section 179 allowance to $10,000. Use of the allowance rose markedly following the repeal of the investment tax credit by the Tax Reform Act of 1986.

Depreciation Policies Affected – Section 179

Date Signed – July 18, 1984

Bill Number – H.R. 4170

Omnibus Budget Reconciliation Act of 1993

The act increased the Section 179 allowance from $10,000 to $17,500, as of January 1, 1993.

Depreciation Policies Affected – Section 179

Date Introduced – May 25, 1993

Date of First Passage Vote – May 27, 1993

Date Signed – August 10, 1993

Bill Number – H.R. 2264

Small Business Job Protection Act of 1996

The act increased the Section 179 allowance and established scheduled annual (with one exception) increases over six years. Specifically, the act raised the maximum allowance to $18,000 in 1997, $18,500 in 1998, $19,000 in 1999, $20,000 in 2000, $24,000 in 2001 and 2002, and $25,000 in 2003 and thereafter.

Depreciation Policies Affected – Section 179

Date Introduced – May 14, 1996

Date of First Passage Vote – May 22, 1996

Date Signed – August 20, 1996

Bill Number – H.R. 3448

Job Creation and Worker Assistance Act of 2002

The act created the first bonus depreciation allowance, equal to 30 percent of the adjusted basis of new qualified property acquired after September 11, 2001, and placed in service no later than December 31, 2004. A one-year extension of the placed-in-service deadline was available for certain property with a MACRS recovery period of 10 or more years and for transportation equipment.

Depreciation Policies Affected – Bonus Depreciation

Date Introduced – October 11, 2001

Date of First Passage Vote – October 24, 2001

Date Signed – March 9, 2002

Bill Number – H.R. 3090

Jobs and Growth Tax Relief Reconciliation Act of 2003

The act (JGTRRA) raised the bonus allowance to 50 percent for qualified property acquired after May 5, 2003, and placed in service before January 1, 2005. The act raised the Section 179 allowance to $100,000 (as of May 6, 2003), set it to stay at that amount in 2004 and 2005, and then reset in 2006 and beyond at its level before JGTRRA ($25,000). JGTRRA also raised the phase out threshold to $400,000 from May 2003 to the end of 2005, indexed the regular allowance and the threshold for inflation in 2004 and 2005, and added off-the-shelf software for business use to the list of depreciable assets eligible for expensing in the same period.

The American Jobs Creation Act of 2004 extended the Section 179 changes made by JGTRRA through the end of 2007. The Tax Increase Prevention and Reconciliation Act of 2005 extended the changes in the allowance under JGTRRA through 2009.

Depreciation Policies Affected – Bonus Depreciation and Section 179

Date Introduced – February 27, 2003

Date of First Passage Vote – May 9, 2003

Date Signed – May 28, 2003

Bill Number – H.R. 2

U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Appropriations Act of 2007

Congress extended the changes in the allowance made by JGTRRA through 2010, raised the maximum allowance to $125,000 and the phaseout threshold to $500,000 for 2007 to 2010, and indexed both amounts for inflation in that period.

Depreciation Policies Affected – Section 179

Date Introduced – May 8, 2007

Date of First Passage Vote – May 10, 2007

Date Signed – May 25, 2007

Bill Number – H.R. 2206

Economic Stimulus Act of 2008

The act provided for 50 percent bonus depreciation. To claim the allowance, a taxpayer had to acquire qualified property after December 31, 2007 and place it in service before January 1, 2009. The previous $125,000 limit on the Section 179 allowance was increased to $250,000, and the $500,000 limit on the total amount of equipment purchased became $800,000.

Depreciation Policies Affected – Bonus Depreciation and Section 179

Date Introduced – January 28, 2008

Date of First Passage Vote – January 29, 2008

Date Signed – February 13, 2008

Bill Number – H.R. 5140

American Recovery and Reinvestment Act of 2009

The act extended the deadlines by one year, to the end of 2009, for the 50 percent bonus depreciation allowance.

Depreciation Policies Affected – Bonus Depreciation

Date Introduced – January 26, 2009

Date of First Passage Vote – January 28, 2009

Date Signed – February 17, 2009

Bill Number – H.R. 1

Small Business Jobs Act of 2010

The act extended the 50 percent bonus depreciation to qualifying property purchased and placed in service during the 2010 tax year. The act increased the amount a business could expense under Section 179 from $250,000 to $500,000 of qualified capital expenditures. These deductions were subject to a phase-out for expenditures exceeding $2,000,000. The provision covered tax years for 2010 and 2011.

Depreciation Policies Affected – Bonus Depreciation and Section 179

Date Introduced – May 13, 2010

Date of First Passage Vote – June 17, 2010

Date Signed – September 27, 2010

Bill Number – H.R. 5297

Tax Relief, Unemployment Compensation Reauthorization, and Job Creation Act of 2010

The bonus depreciation allowance increased to 100 percent for qualified property acquired after September 8, 2010, and placed in service before January 1, 2012. The act also established a 50 percent allowance for property acquired and placed in service in 2012.

Depreciation Policies Affected – Bonus Depreciation

Date Introduced – March 16, 2010

Date Signed – September 27, 2010

Bill Number – H.R. 5297

Table A.1: Section 179 and Bonus Depreciation Policy Changes

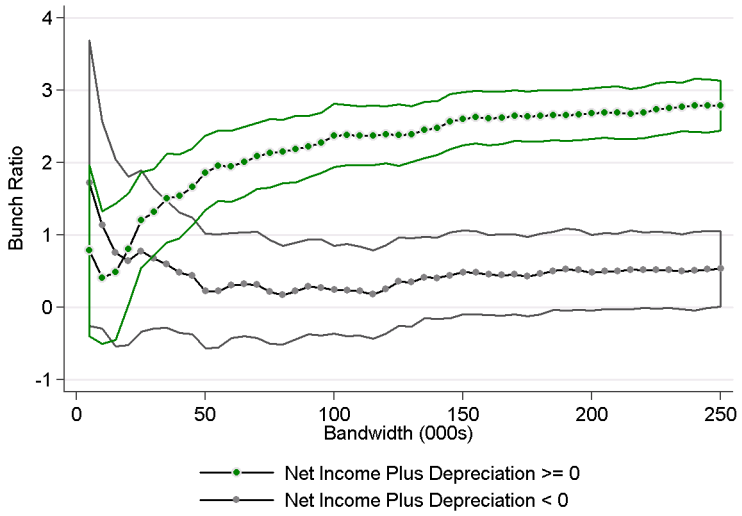
Year	S179 Max Value	S179 Phase-out Region	Bonus
1993-96	$17,500	$200,000-$217,500	
1997	$18,000	$200,000-$218,000	
1998	$18,500	$200,000-$218,500	
1999	$19,000	$200,000-$219,000	
2000	$20,000	$200,000-$220,000	
2001-02	$24,000	$200,000-$224,000	30% Tax years ending after 9/10/01
2003	$100,000	$400,000-$500,000	50% Tax years ending after 5/3/03
2004	$102,000	$410,000-$512,000	50%
2005	$105,000	$420,000-$525,000	
2006	$108,000	$430,000-$538,000	
2007	$125,000	$500,000-$625,000	
2008-09	$250,000	$800,000-$1,050,000	50% Tax years ending after 12/31/07
2010-11	$500,000	$2,000,000-$2,500,000	100% Tax years ending after 9/8/10

a. 2008 was retroactive.

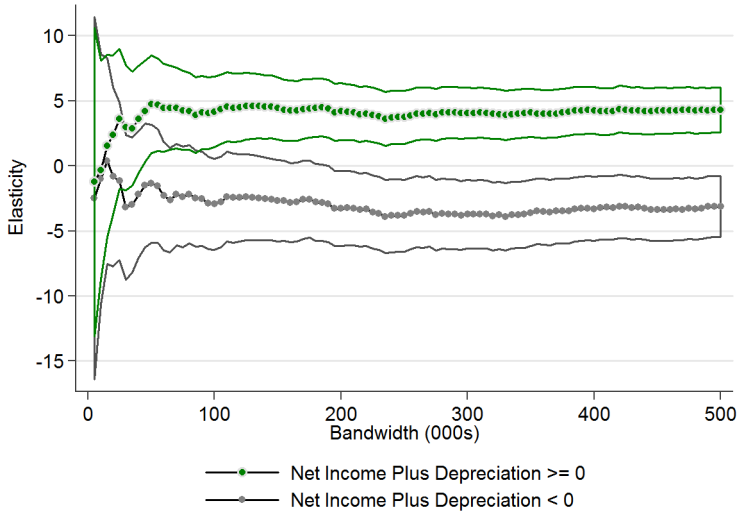
B Supplementary Exhibits

Figure B.1: Investment Behavior and Tax Incentives: Narrow Bandwidth

(a) Bunching with Narrow Bandwidth



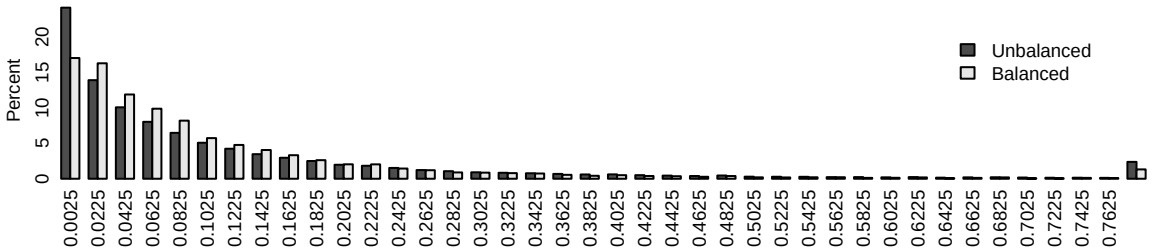
(b) Bonus with Narrow Bandwidth



Notes: These figures replicate the taxable position splits in the bunch and bonus settings, while restricting the sample to within a narrow bandwidth of the tax status threshold. Panel (a) replicates the analysis in panel (a) of Figure 3, which compares bunching behavior for taxable and nontaxable firms. Panel (b) replicates the regression in column (1) of Table 7, which estimates separate coefficients with respect to bonus incentives for taxable and nontaxable firms.

Table B.1: Detailed Investment Statistics (1998-2010)

(a) Investment Rate Distribution



(b) Summary Statistics

Variable	Unbalanced	Balanced
Average investment rate	11.9% (0.20, 3.23, 12.7)	10.4% (0.16, 3.60, 17.6)
Inaction rate	30.2%	23.7%
Spike rate	17.4%	14.4%
Serial correlation of investment rates	0.38	0.40
Aggregate investment rate	7.7%	6.9%
Spike share of aggregate investment	25.1%	24.4%

(c) Summary Statistics over Time and Correlation with Aggregate Investment (Unbalanced)

Variable	1998	1999	2000	2001	2002	2003	2004	2005
Average investment rate (%)	15.1	15.7	13.9	12.1	11.3	12.0	13.0	12.7
Std. dev. investment rate	0.221	0.234	0.213	0.195	0.189	0.205	0.209	0.209
Inaction rate (%)	22.9	21.9	25.7	28.5	28.7	29.3	26.2	27.4
Spike rate (%)	22.9	23.9	21.3	17.9	16.6	16.8	18.8	18.5
Aggregate investment rate (%)	11.7	8.7	8.8	7.5	7.0	6.4	7.2	7.0

	2006	2007	2008	2009	2010	σ	β_{Agg}
Average investment rate (%)	12.8	11.3	10.4	7.1	7.0	0.026	0.74
Std. dev. investment rate	0.208	0.189	0.180	0.140	0.129	0.030	0.64
Inaction rate (%)	28.7	31.2	34.0	41.5	40.5	0.059	-0.68
Spike rate (%)	19.2	15.5	15.5	9.0	9.2	0.045	0.76
Aggregate investment rate (%)	8.3	7.5	7.5	6.3	6.0	0.015	

(d) Investment Rates by Firm Characteristics (Unbalanced)

Sorting Variable	Investment	Inaction	Spike		Investment	Inaction	Spike
Size by Mean Sales Decile (Unweighted)							
$< 0.9M$	11.2% (0.23)	53.8%	16.5%	$[23.1M, 33.5M]$	11.4% (0.17)	17.3%	16.1%
$[0.9M, 3.7M]$	13.0% (0.21)	32.0%	20.2%	$[33.5M, 48.8M]$	10.6% (0.16)	17.4%	13.7%
$[3.7M, 8.7M]$	12.0% (0.19)	23.3%	17.2%	$[48.8M, 77.4M]$	10.5% (0.16)	16.3%	13.3%
$[8.7M, 15.4M]$	11.0% (0.16)	20.3%	15.6%	$[77.4M, 164M]$	10.7% (0.16)	14.8%	13.5%
$[15.4M, 23.1M]$	11.3% (0.18)	19.5%	15.7%	$> 164M$	10.0% (0.14)	14.3%	11.7%
Dividend Payer							
Yes	8.9% (0.14)	20.2%	10.3%				
No	12.0% (0.20)	30.6%	17.6%				

Notes to Table B.1: This exhibit provides detailed investment statistics to enable comparison to past work. The investment rate is bonus eligible investment divided by lagged depreciable assets. All statistics are weighted by sampling weights from SOI. The unbalanced sample includes all firms used in the bonus analysis. The balanced sample includes only those firms in the sample for the entire sample frame. Figure (a) plots investment rate densities with intervals labeled by right end points. Table (b) follows Table 1 of Cooper and Haltiwanger (2006). Inaction is defined by investment below 1%. Spikes are defined by investment above 20%. Aggregate investment is total eligible investment divided by total lagged capital. The spike share of aggregate investment is total eligible investment due to spikes divided by total eligible investment. Table (c) presents these statistics over time for the unbalanced panel. σ is the standard deviation of a statistic over time. β_{Agg} is the correlation of a statistic with the aggregate investment rate. Table (d) presents investment rate statistics for the unbalanced panel with firms sorted by firm characteristics. Standard deviations, skewness, and kurtosis are in parentheses for investment rates. Standard deviations are in parentheses for all other statistics.

Table B.2: Investment Response to Bonus Depreciation for Compustat Firms

	LHS Variable is log(Capital Expenditures)				
	(1)	(2)	(3)	(4)	(5)
	1993-2010	Small Firms	Big Firms	2005-2014	1996-2005
$z_{N,t}$	5.78***	8.18***	1.34	3.93**	7.03***
	(1.07)	(2.09)	(1.08)	(1.23)	(1.71)
Observations	105254	54108	43565	52572	61276
Firms	12747	6355	3731	9205	10487
R^2	0.87	0.69	0.85	0.92	0.89

Notes: This table estimates regressions for firms in Compustat from the baseline intensive margin specification presented in Table 3, where I_{it} is now capital expenditures and $z_{N,t}$ remains the present value of a dollar of eligible investment computed at the four-digit NAICS industry level, taking into account periods of bonus depreciation. Column (1) presents the baseline specification for the time period considered in our main analysis. Column (2) restricts the sample to firms with less than $164M in average sales, defined using mean sales taken over the years 1998 through 2000 and 2005 through 2007. This corresponds to the firms in the 1st through 9th deciles of the bonus analysis sample. Column (3) restricts to firms with average sales above $164M, corresponding to the tenth decile in the bonus analysis sample. Column (4) focuses on the later bonus period and column (5) focuses on the earlier period, using a ten-year window that allows us to compare estimates to placebos from past recessions. All regressions include firm and year fixed effects. Standard errors clustered at the firm level are in parentheses.

Table B.3: Test of Parallel Trends in Previous Recessions

	LHS Variable is log(Capital Expenditures)				
	(1)	(2)	(3)	(4)	(5)
	1985-1994	1975-1984	1968-1977	1964-1973	1955-1964
$z_{N,t}$	1.87	-3.17*	4.24*	-5.45	-10.8
	(1.54)	(1.61)	(1.86)	(3.31)	(6.27)
Observations	42013	24344	13579	8282	2880
Clusters (Firms)	7356	3728	2013	1315	463
R^2	0.88	0.89	0.92	0.91	0.92

Notes: This table estimates regressions from the Compustat sample using the specification presented in Table B.2. Each column corresponds to a placebo test where we have centered the window around the start of a previous recession and applied the bonus schedule from the first round of bonus to the placebo time period. Column (1) covers the recession beginning in 1990, column (2) the "double-dip" recession beginning in 1980, column (3) the recession in 1973, column (4) the recession in 1969, and column (5) the recession in 1960. The recession in 1973 coincided with a reinstatement of the investment tax credit and a shortening of depreciation allowances. All regressions include firm and year fixed effects. Standard errors clustered at the firm level are in parentheses.

Table B.4: Investment Response to Bonus Depreciation using Firm-Level z

	Intensive Margin: LHS Variable is log(Investment)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$z_{i,t}$	2.68***	2.85***	3.99***	1.52***	2.05***	2.61***	2.03***	1.57***
	(0.31)	(0.33)	(0.55)	(0.38)	(0.34)	(0.31)	(0.34)	(0.38)
$CF_{it}/K_{i,t-1}$		0.44***						
		(0.016)						
Observations	734428	579917	513678	220750	585230	721349	721349	721349
Clusters (Firms)	127644	100740	109478	63484	107689	124605	124605	124605
R^2	0.71	0.74	0.73	0.80	0.72	0.71	0.71	0.71
Controls	No	No	No	No	Yes	No	No	No
Industry Trends	No	No	No	No	No	Yes	No	No
2-Digit×Year FEs	No	No	No	No	No	No	Yes	No
4-Digit×Year FEs	No	No	No	No	No	No	No	Yes

Notes: This table estimates regressions from the intensive margin specification presented in Table 3. Instead of measuring policy exposure through industry level $z_{N,t}$, we measure $z_{i,t}$ at the firm level using all observations for each firm to measure the share of investment in each class life. Column (7) adds two-digit NAICS-by-year fixed effects to the intensive margin specification and column (8) adds four-digit NAICS-by-year fixed effects. All regressions include firm and year fixed effects. Standard errors clustered at the firm level are in parentheses (industry level for the extensive margin models).

Table B.5: Substitution Margins and External Finance Robustness

	LHS Variable is ΔRents					
	(1)	(2)	(3)	(4)	(5)	(6)
$z_{N,t}$	0.75**	0.67**	1.21**	0.44	0.92*	0.76*
	(0.26)	(0.26)	(0.41)	(0.37)	(0.36)	(0.33)
Observations	574305	570219	379709	194596	467316	569038
Firms	98443	97678	82703	54069	85715	98117
R^2	0.18	0.17	0.21	0.28	0.19	0.18
	LHS Variable is ΔPayroll					
$z_{N,t}$	1.49***	1.33***	1.71***	1.45***	2.24***	1.60***
	(0.20)	(0.20)	(0.37)	(0.27)	(0.27)	(0.24)
Observations	624918	620767	418841	206077	504078	619038
Firms	102043	101272	86460	55982	88914	101725
R^2	0.23	0.23	0.28	0.35	0.25	0.24
	LHS Variable is ΔDebt					
$z_{N,t}$	1.84***	1.75***	1.57***	2.05***	2.45***	2.03***
	(0.21)	(0.21)	(0.32)	(0.34)	(0.28)	(0.26)
Observations	642546	638486	429681	212865	512856	636814
Firms	103868	103134	88028	57582	90131	103567
R^2	0.20	0.20	0.25	0.30	0.22	0.20
	LHS Variable is Payer?					
$z_{N,t}$	-0.36***	-0.35***	-0.52***	-0.11	-0.36**	-0.41***
	(0.089)	(0.10)	(0.13)	(0.12)	(0.12)	(0.10)
Observations	818576	647617	570772	247804	644212	804128
Firms	128150	104156	110466	66926	108974	125534
R^2	0.68	0.69	0.73	0.76	0.66	0.68
	LHS Variable is log(Investment)					
$z_{N,t}$	4.22***	4.11***	1.54*		5.32***	4.61***
	(0.62)	(0.62)	(0.67)		(0.80)	(0.70)
$z_{N,t-2}$	-0.86	-0.92	0.80		-1.36	-1.88**
	(0.69)	(0.69)	(0.86)		(0.90)	(0.71)
Observations	476734	474755	304605		422437	527539
Firms	84777	84381	70654		76218	88028
R^2	0.76	0.76	0.79		0.99	0.99
Controls	No	No	No	No	Yes	No
Industry Trends	No	No	No	No	No	Yes

Notes: This table estimates regressions of the form in Table 5 using the additional specifications from Table 3. Column (1) reproduces the results from the text using the baseline specification. Column (2) augments the baseline specification with current period cash flow scaled by lagged capital. Column (3) focuses on the early bonus period and column (4) focuses on the later period. Column (5) controls for four-digit industry average Q for public companies and quartics in assets, sales, profit margin, and firm age. Column (6) includes quadratic time trends interacted with two-digit NAICS industry dummies. For the regressions using lagged $z_{N,t-2}$, we do not have data from the policy's post period for the later round of bonus, so we exclude this specification. All regressions include firm and year fixed effects. Standard errors clustered at the firm level are in parentheses.

Table B.6: Tabulation of Firm Characteristics by Size Group (Bonus Sample)

	Discount Rate Markers					Adjustment Predictors			
Sales Bin	Mean Sales	Ever Pay	Lagged Cash	Ever Fail	Taxable	Sales Growth	Age	Spike	Inactive
1	360K	0.344	3.738	0.420	0.633	0.126	19.5	0.144	0.273
2	2.1M	0.391	4.362	0.330	0.762	0.073	19.2	0.130	0.251
3	6.0M	0.273	5.427	0.316	0.771	0.066	20.6	0.152	0.237
4	12.0M	0.240	5.848	0.317	0.786	0.042	22.9	0.151	0.213
5	19.2M	0.251	6.096	0.330	0.805	0.039	24.4	0.143	0.187
6	28.1M	0.244	6.215	0.329	0.829	0.036	25.4	0.141	0.167
7	40.6M	0.265	6.186	0.334	0.829	0.038	26.3	0.142	0.158
8	61.6M	0.262	6.023	0.310	0.841	0.048	25.8	0.142	0.143
9	111M	0.279	5.937	0.305	0.844	0.051	26.1	0.144	0.139
10	1.19B	0.414	5.177	0.319	0.854	0.068	26.3	0.126	0.141

Notes: This table presents means of firm characteristics with firms grouped and ordered by sales bin. Ever Pay is an indicator for whether the firm paid a dividend in any of the three years prior to the first round of bonus depreciation. Lagged Cash is the decile for the residuals from regression of liquid assets on firm characteristics, as described in the text; lower deciles have less liquidity. Ever Fail is an indicator for whether the firm fails at some point during the sample period; failure is defined as disappearance of a corporate EIN from the population of tax filings, which accounts for switches in corporate form, or the filing of an inactive return. Taxable is an indicator for whether a firm is in taxable position prior to depreciation expense. Sales Growth is the average log difference in sales over as many of the previous three years as are available. Age is the number of years since the firm's date of incorporation. Spike is an indicator defined by an investment rate above 20%. Inactive is an indicator defined by an investment rate below 1%.

Table B.7: Heterogeneity by Predictors of Adjustment

	LHS Variable is Log(Eligible Investment)							
	Sales Growth		Age		P(Spike)		P(Inactive)	
	Low	High	Young	Old	Low	High	Low	High
$z_{N,t}$	5.24***	2.27*	3.62***	4.56***	6.53***	4.27**	3.33**	6.22***
	(0.93)	(1.09)	(1.03)	(0.69)	(0.91)	(1.62)	(1.14)	(1.43)
Test	$p = .038$		$p = .435$		$p = .039$		$p = .010$	
Observations	167621	162871	133752	254651	131234	131177	136625	126549
Firms	22659	22653	30503	29525	39723	45391	33434	28504
R^2	0.65	0.70	0.70	0.73	0.82	0.80	0.77	0.57

Notes: This table estimates regressions from the baseline intensive margin specification presented in Table 3. We split the sample based on predictors of adjustment. For the sales growth split, we divide the sample into deciles based on the average log difference in sales over years 1998 through 2000 and 2005 through 2007. Low growth firms fall into the bottom three deciles and high growth firms fall into the top three deciles. For the age split, we divide firms into the top and bottom three deciles based on age over the years 1998 through 2000 and 2005 through 2007, where age is the number of years since the firm's date of incorporation. The P(Spike) and P(Inactive) splits are based on predictive models for adjustment, either a spike defined as an investment rate above 20%, or inaction defined as an investment rate below 1%. The predictions are predicted values based on regressions of an indicator of adjustment on indicators for size group decile, lagged sales growth, lagged dividend payer, indicators for lagged cash decile, and four-digit industry fixed effects. Lagged cash decile is the residual measure of liquidity used in Table 6, which is based on lagged residuals from a regression of liquid assets on a ten piece spline in total assets and fixed effects for four-digit industry, year, and corporate form. The comparison is between the top three and bottom three deciles of these adjustment predictors. All regressions include firm and year fixed effects. Standard errors clustered at the firm level are in parentheses.

Table B.8: Past User Cost Estimates

paper	equation	β_1(SE)	estimation details	data	table / page cite
Cummins, Hassett, and Hubbard (1994)	$\frac{I}{K} = \beta_0 + \beta_1 Q$	0.083(0.006)	first-differences; firm and year FEs; robust SE; all-years	US public firm panel (Compustat), 1953-88	Table 4 (OLS, all years) / p. 28
		0.554(0.165)	first-differences; robust SE; 1962 (major tax reform)	US public firm panel (Compustat), 1953-88	Table 4 (OLS, 1962) / p. 28
		0.198(0.067)	first-differences; robust SE; 1972 (major tax reform)	US public firm panel (Compustat), 1953-88	Table 4 (OLS, 1972) / p. 28
		0.299(0.091)	first-differences; robust SE; 1981 (major tax reform)	US public firm panel (Compustat), 1953-88	Table 4 (OLS, 1981) / p. 28
		0.178(0.083)	first-differences; robust SE; 1986 (major tax reform)	US public firm panel (Compustat), 1953-88	Table 4 (OLS, 1986) / p. 28
Cummins, Hasset, and Hubbard (1996)	$\frac{I}{K} = \beta_0 + \beta_1 Q$	0.647(0.238)	difference observed and forecasted variables; forecasting based on lagged $\frac{I}{K}$, lagged $\frac{CF}{K}$, time-trend, and firm FE; robust SE; AUS 1988	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (AUS 1988, top) / p. 254
		1.626(0.520)	same as above; BEL 1990	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (BEL 1990, top) / p. 254
		0.810(0.216)	same as above; CAN 1988	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (CAN 1988, top) / p. 254

0.867(0.458)	same as above; DNK 1988	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (DNK 1990, top) / p. 254
0.756(0.286)	same as above; FRA 1990	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (FRA 1990, top) / p. 254
0.938(0.242)	same as above; GER 1990	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (GER 1990, top) / p. 254
0.663(0.237)	same as above; ITA 1992	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (ITA 1992, top) / p. 254
0.893(0.219)	same as above; JPN 1989	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (JPN 1989, top) / p. 254
0.423(0.340)	same as above; NLD 1989	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (NLD 1989, top) / p. 254
1.373(0.528)	same as above; NOR 1992	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (NOR 1992, top) / p. 254
1.485(1.378)	same as above; SPN 1989	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (SPN 1989, top) / p. 254
0.641(0.241)	same as above; SWE 1990	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (SWE 1990, top) / p. 254
0.644(0.198)	same as above; UK 1991	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (UK 1991, top) / p. 254

		0.603(0.086)	same as above; USA 1987	Int'l public firm panel (Global Vantage), 1982-92	Table 6 (USA 1987, top) / p. 254
Desai and Goolsbee (2004)	$\frac{I}{K} = \beta_0 + \beta_1 \frac{1-\tau z-ITC}{1-\tau} + \beta_2 \frac{q}{1-\tau} + \beta_2 \frac{CF}{K}$	-0.8895(0.3173)	year and firm FEs; SE clustered at firm-level	U.S. public firm panel (Computstat), 1962-03	Table 8 (baseline) / p. 314
Edgerton (2010)	$\frac{I}{K} = \beta_0 + \beta_1 \frac{1-\tau z-ITC}{1-\tau} + \beta_2 \frac{q}{1-\tau}$	-0.846(0.323)	year and firm FEs; SE clustered at firm-level; includes dummy and interaction for non-taxable firms	US public firm panel (Computstat), 1967-05	Table 3 (2) / p. 945

Table B.9: Comparison of Estimates with House and Shapiro (2008)

	HS (2008) Sample		Bonus Analysis Sample		
	(1)	(2)	(3)	(4)	(5)
	Quarterly	Annualized	Baseline	HS (2008) Zs	Largest Firms
ξ	7.03***	11.7***	20.6***	23.6***	13.1**
	(2.67)	(3.25)	(3.04)	(3.44)	(5.00)
Observations	864	216	592173	592173	74383
Firms			116785	116785	9440
R^2	0.031	0.060	0.73	0.73	0.78

Notes: This table estimates regressions using the bonus analysis sample and the specification from House and Shapiro (2008, hereafter HS) and compares these to the estimates from HS's sample. Column (1) presents the original OLS estimate from Table 4, Panel A, Row 1 in HS. Column (2) presents an estimate from an annualized panel derived from HS's original data. Column (3) presents an estimate using the bonus analysis sample and the original difference-in-differences design, where we have applied equation (21) in HS to transform $z_{N,t}$ to estimate ξ (see HS p. 751). Column (4) repeats this exercise with asset class z_Ts taken from HS. Column (5) repeats the specification in column (3) after restricting the sample to the largest decile of firms based on sales. These regressions focus on the 1993-2006 period studied in HS. Regressions (3) through (5) include firm and year fixed effects. Standard errors for regressions (3) through (5) clustered at the firm level are in parentheses.

C Investment-Weighted Effects of Bonus Depreciation

C.1 Accounting for Heterogeneity in Size and Corporate Form

In this section, we describe our approach for producing an investment-weighted estimate of the effect of bonus depreciation on investment, which accounts for heterogeneous responses by firm size and extrapolates our estimates to the population of firms beyond the scope of our sample. We develop separate estimates for the first and second rounds of bonus (BI and BII, respectively), which differed in average generosity. We proceed in three steps.

1. *Compute an investment-weighted elasticity within our sample.*

   Average firm-level $z_{N,t}$ prior to 2001 is 0.881. The average from 2001 through 2004 is 0.929. The average between 2005 and 2007 is 0.882 and the average from 2008 through 2010 is 0.960. Thus the Δz is 0.048 on average for BI and 0.078 on average for BII.

   The coefficient on $z_{N,t}$ in Table 3 is 3.69.[32] The equal-weighted average effect is thus $3.69 \times \Delta z = .177$, or 17.7%, in BI and 28.8% in BII.

   Investment is concentrated among the largest firms in the firm size distribution, which exhibit lower elasticities than the average firm in our sample. Thus an accurate effect must appropriately account for this heterogeneity. Our approach is to divide the sample into twenty bins based on pre-policy average sales and compute the share of aggregate investment within the sample accounted for by each bin. We reestimate the baseline model separately for each of twenty size groups and compute the weighted average of the elasticities, where a group's respective investment share is taken to be its weight.

   In our sample, the average share of aggregate eligible investment for the top 5 percent of firms is 62%, accounting for SOI sampling weights. The weighted average elasticity is 2.89 or 22% lower than the equal-weighted elasticity. The implied effect of BI is 13.8% and of BII is 22.7%.

   The elasticity for the top group is 2.27. Thus accounting for the bottom 95 percent of firms materially affects our aggregate estimate, which is 27% higher than the elasticity for the top group.

2. *Use the weighted elasticity to generate a prediction within our sample.*

   In terms of aggregate dollars, the average aggregate eligible investment amounts were \$338B in BI and \$384B in BII. We can compute the predicted increase from the baseline model using the average amounts here and the formula $I_{\text{Actual}} = I_{\text{Counterfactual}} \times e^{\beta \Delta z}$, which we can rearrange as $\Delta I = I_{\text{Actual}} \times (1 - e^{-\beta \Delta z})$.

   Using the weighted average elasticity of 2.89 yields a prediction of \$43.8B on average per year in BI and \$77.5B per year in BII.

3. *Use Kitchen and Knittel (2011) data on aggregate investment by corporate form to extrapolate our estimates to investment done outside our sample.*

[32] Note the research design exploits cross-sectional program exposure net of time fixed effects, so the coefficient does not permit measurement of the program's overall general equilibrium effect.

Our aggregate eligible investment amounts do not reflect all eligible investment in the economy. First, we focus on a subsample of all corporations—namely C and S corporations large enough to clear the size threshold based on average eligible investment. Second, a significant amount of eligible investment is undertaken outside the corporate sector, either in partnerships or in sole proprietorships operated by individuals.

We can extrapolate our estimate to these other corporations and corporate forms to produce an estimate across all corporate forms. Since our elasticity is estimated for a different group, this exercise should be interpreted with caution.

Table C.1 presents aggregate investment statistics for bonus analysis sample and for the complete sample in our data. We present these data alongside aggregate investment statistics from Kitchen and Knittel (2011), who combine the corporate sample which is the source of our data with data for partnerships and sole proprietorships. Their aggregates closely match the NIPA aggregates for equipment and software investment. We present aggregates for the years of bonus during which our series and their series overlap.

On average, our sample represents 44% of all eligible investment during these years. Thus we need estimates for the effect of bonus for the remaining 56%. Of this remainder, 22% takes place in corporations outside our sample, 20% takes place in partnerships, and 13% takes place within the sole proprietorship sector.

We divide investment within these other sectors based on whether that investment is likely subject to bonus or instead would qualify for Section 179 expensing in most years. Within the population of corporations outside our sample, 69% is in very large regulated investment and insurance companies or real estate investment trusts and 31% is in small firms mostly covered by Section 179. For partnerships, the statistics from Kitchen and Knittel (2011) reveal that 89% of investment is bonus eligible. For individuals, this number is 41%.

To assign elasticities to these other groups, we must make additional assumptions about their average duration of investment, their taxable positions, and the take-up rate for bonus.

For other non-bonus sample corporations, we assume the 69% in large companies responds with the same elasticity as the top 5 percent in our sample (2.27) and the 31% displays a response of zero. This yields an increase of $12.2B per year in BI and $21.2B per year in BII.

Partnerships include many finance and professional service firms whose activity is relatively short duration, but they also include many real estate partnerships, which buy relatively more long duration equipment. Using the Kitchen and Knittel (2011) data, the composition of eligible and Section 179 investment suggests they are comparable in size to the C and S corporations in our sample. Thus we assume their elasticity equals the 2.89 sample weighted average.

However, Kitchen and Knittel (2011) document considerably lower take-up rates among this sector. This may be for reasons associated with losses or because many partnership owners are tax exempt or foreigners and are therefore less tax-motivated. We use the

relative take-up rate for the partnership sector—equal to 73% of the corporate sector's average take-up rate of 56%—from Kitchen and Knittel (2011) to rescale our estimate.

Then for the bonus eligible amount in the partnership sector, we have an increase of $13.5B in BI and $30.2B in BII, after taking into account the differences in the take-up.

Last for the individuals, we perform a similar exercise for the amount subject to bonus and adjust by the relative take-up rate for individuals—equal to 63% of the corporate sector's average take-up rate. This yields an estimate of $4.1B in BI and $6.1B in BII.

Taking the sum over each component yields a total response per year of $73.6B in BI and $135B in BII. The aggregate average investment amount per year was $781B across all sectors in BI and $936B in BII. Thus relative to the counterfactual prediction without bonus, the implied response is 10.4% in BI and 16.9% in BII.

C.2 Lower Bound on Weighted Effects

The estimates produced in the previous section map the cross-sectional elasticity into a time series predicted effect under the assumption that the mapping is valid. An alternative, which provides a lower bound response, follows from Mian and Sufi (2012) and exploits only the cross-sectional variation induced by the policy to estimate an aggregate response.

The idea is to use the group that receives the smallest shock due to bonus as a counterfactual. We then compute the effect of the policy for other groups relative to this one. By construction any time series effect of the policy shown by the bottom group is set to zero and removed from the effect computed for other groups.

We operationalize this idea by dividing industries into twenty equal-sized bins based on the pre-policy weighted present value of depreciation deductions, z_N, for that industry. During BI, the bottom 5 percent sees a 3.1 cent increase in z while the top group sees a 7.2 cent increase. We subtract the 3.1 cent increase from all other groups and accumulate the investment response for each group. We repeat this exercise for BII, in which the bottom group sees a 6.5 cent increase while the top group sees a 12.4 cent increase.

We use the investment-weighted elasticity from the previous section (2.89) to translate the changes in z to changes in investment for each group. We aggregate these changes in investment and compute the average change for BI and BII.

The results imply an average annual response of $18.1B in BI and $32.1B in BII. Note that if the bottom group also responded to bonus, these estimates would provide a lower bound.[33] Performing a similar exercise as before to extrapolate this bound to the full population of firms yields a response of $30.4B in BI and $55.9B in BII. As a percent of aggregate investment, the BI lower bound is 3.9% and the BII lower bound is 6.0%.

[33]Note also that because we are relying on cross-sectional program exposure net of time fixed effects, we are not estimating the overall general equilibrium effect of the program.

Table C.1: Aggregate Equipment Investment Amounts

(a) Section 179 and Bonus Eligible Basis Sample Comparison ($Bs)

Year	2002	2003	2004	2008	2009
Zwick and Mahon Data					
Bonus analysis sample	345	305	343	427	363
All corporations	508	480	519	631	545
Kitchen and Knittel Data					
All corporations basis	594	592	622	718	607
All entities basis	847	873	921	1130	951

(b) Basis Eligible for Section 179 in Kitchen and Knittel (2011) ($Bs)

Year	2002	2003	2004	2008	2009
C-Corporations	10.7	22.2	22.9	25.8	21.6
S-Corporations	16.1	35.7	36.9	49.8	41.6
Partnerships	7.6	18.3	20.7	33.7	29.7
Individuals	46.6	76.8	80.8	93.7	79.5
Total	81	153	161.3	203	172.4

(c) Basis Eligible for Bonus in Kitchen and Knittel (2011) ($Bs)

Year	2002	2003	2004	2008	2009
C-corporations	498	461	478	550	482
S-corporations	69	73	84	92	62
Partnerships	149	136	145	230	191
Individuals	50	50	53	55	44
Total	766	720	760	927	779

Notes: This table presents aggregate investment amounts for the bonus analysis sample and for other corporate forms from Kitchen and Knittel (2011). The Kitchen and Knittel (2011) sample includes imputations for software purchases, which are necessary to match NIPA aggregates for equipment and software investment. Our investment measure does not include these imputations.