Do State Policies Undermine Federal Investment Incentives? Evidence from Bonus Depreciation

Eric Ohrn[*]

April 2015

Abstract

In 2001 and again in 2008, the US federal government enacted bonus depreciation, an investment stimulus policy that decreased the present value cost of investment by accelerating the write-off of capital purchases from taxable income. During both episodes of bonus, many states adopted the policy, allowing for accelerated deductions of investment spending from both state and federal taxable income. Other states chose to either leave their depreciation polices unaltered or partially adopt the federal policy.

This paper estimates the investment and employment response to state bonus depreciation adoption using variation in state level adoption of the policy and plant level manufacturing data from the Annual Survey of Manufacturers. The analysis suggest that states that fully adopted bonus depreciation at the most common 50% level experienced a 3.2% increase in investment and 2.1% increase in employment relative to those states that did not adopt the policy. The magnitudes of the impact are stable across specifications that address potential selection bias.

Keywords : bonus depreciation, taxation, state and local taxation, investment
JEL Classification : H25; H32; E22, H5, H71

---

[*]`ohrneric@grinnell.edu`. Department of Economics, Grinnell College

1 Introduction

In 2001 and again in 2008, the US federal government enacted bonus depreciation, an investment stimulus policy that decreases the present value cost of investment by accelerating the write-off of capital purchases from taxable income. During both bonus episodes, many states adopted the apolicy, allowing for accelerated deductions of investment spending from both state and federal taxable income. Other states chose to either leave their state depreciation polices unaltered or to only partially adopt the federal policy.

This paper estimates the impact of state level adoption of the federal policy in investment and employment. While the state level adoption of bonus, itself, only decreased the present value cost of investment projects marginally, state adoption may influence investment and employment through other channels. For example, businesses may be more likely to re-optimize their investment strategies to account for the federal policy when the state and federal polices are aligned. Alternatively, businesses may shift activity into adopting states.

Using investment and employment data from the Annual Survey of Manufacturers, the empirical analyses suggest that when federal bonus was set at 50%, states that adopted the policy experienced 3.2% more investment and 2.1% more employment relative to those states that rejected the policy. These estimates are robust to a comprehensive set of time-varying, state-level controls and time-varying, industry level fixed effects. Further analysis suggests that these results are driven mostly by employment and investment disparities between adopting and rejecting states during the first two years that bonus was implemented and the federal policy was at its lowest level – 30%.

If state adoption of bonus is responsible for these strong but short-lived responses, then it seems logical that 1) state adoption of the policy must include benefits to firms beyond a marginal mechanical reduction in investment costs and 2) an aspect of the policy itself or another factor must be responsible for the muting of investment and employment responses after 2002. While there are several potential explanations for the large response, there seems to be a single smoking gun explanation for its short life: another depreciation based federal tax incentive, Section 179, increased its limit from from $200,00 to $400,000 to 2003. Under the enhanced policy, firms could expense (fully deduct) all investment costs up to $400,000. Because 179 is more generous and simpler than bonus, firms may have responded to the federal Section 179 policy regardless its state adoption. Therefore, the federal enhancement of this policy has the potential to obfuscated the impacts of state bonus adoption after 2002.

This analysis is the first to examine the impact of bonus depreciation on employment and is the first to examine any responses to bonus without relying on imprecise industry level estimates of statutory depreciation rates. The results shed new light on the lukewarm national response to bonus depreciation and contribute to the larger policy discussion regarding the interaction of state and federal policies; in particular, whether state-level actions may undermine federal initiatives.

2 Bonus Depreciation

Typically, businesses may deduct newly installed assets from their taxable income according to the Modified Accelerated Cost Recovery System (MACRS) (detailed in IRS Publication 946). MACRS specifies the life and depreciation method for each type of potential investment / asset class. For equipment, lives can be 5, 7, 10, 15 or 20 years and the method is called the "declining balance switching to straight line deduction method."

Table 1 examines the impact of 50% bonus on the cost of a $100 investment that has a 7-year life. MACRS specifies that $25 of the total investment may be deducted in the first year, then $21.43 in the second, etc. With a federal tax rate of 35%, this leads to tax savings of $8.75 in the first year, then $7.50 in the second. Over the course of the 7 year life, all $100 of the investment cost are deducted from taxable income, generating $35 in total in *nominal* tax shields. However, because the entire cost is not deducted from taxable income in the first year, the present value of tax savings associated with the investment are only worth $28.79.[1]

Bonus depreciation allows for an additional percentage of the total cost to be deducted in the first year. In the example, 50% percent bonus depreciation allows 50 additional dollars to be deducted in the first year the investment is made. The remaining $50 of cost is then deducted according to the original 7 year MACRS schedule. With 50% bonus there are now tax savings associated with the investment of $21.88 in the first year, $3.75 in the second year, etc. Thus, bonus depreciation accelerates the deduction of the investment and tax savings. Because firms benefit from the tax savings earlier, the present value of the investment's tax shield increases to $31.89 and the present value cost of the investment decreases by 3.1%.

Bonus depreciation was first enacted in 2001 at a rate of 30%. It was originally intended to be a temporary and counter-cyclical policy. As shown in Figure 1, in 2003, the additional first year deduction was increased to 50%. The bonus was not extended for years 2005, 2006, and 2007, but was reinstated in 2008 at the 50% rate. After 3 years at 50%, the bonus rate was increased to 100% in 2011 (often called expensing). Since 2011, bonus has held steady at 50% but was only enacted retroactively for 2014 in December of that year.

Several papers have examined the impact of federal bonus depreciation. The papers find that bonus, on average, had a lukewarm impact on the investment behavior of publicly traded firms (House and Shapiro (2008)) but was more effective at stimulating investment among smaller businesses (Zwick and Mahon (2014)) and firms that were not influenced by accounting incentives to ignore the policy (Ohrn (2015)). As of yet, however, no research has examined responses to state level adoption of bonus depreciation policy.

---

[1]The $28.79 is a function of the assumed discount rate of 10%. At higher discount rates, the present value of the tax shield will be lower. 10% is used in the example because it is often the rate used in corporate net present value calculations.

Table 1: Example of Federal Tax Impact of 50% Bonus

Year	1	2	3	4	5	6	7	8	Total
MACRS Deduction	25	21.43	15.31	10.93	8.75	8.74	8.75	1.09	100
τ_f x Deduction	8.75	7.50	5.36	3.83	3.06	3.06	3.06	0.38	35
PV(τ_f x Deduction)									28.79
50% Bonus Ded.	62.5	10.72	7.65	5.47	4.37	4.37	4.37	0.545	100
τ_f x Deduction	21.88	3.75	2.68	1.91	1.53	1.53	1.53	0.19	35
PV(τ_f x Deduction)									31.89

Notes: This table calculates the present value of federal tax deductions for a $100 investment under both a traditional 7-year accelerated depreciation regime and under a 50% bonus regime. The federal corporate tax rate is assumed to be 35% and the state corporate tax rate is assumed to be 7.2% - the observed percentage for states that adopted the bonus depreciation policy during years 2001 - 2011. The discount rate is assumed to be 10%.

Figure 1: Bonus Percentage

(a) Bonus Rates

(b) Over Time

For Qualifying Assets Purchased		Bonus
After	Before	
09/10/2001	05/06/2003	30%
05/05/2003	01/01/2005	50%
12/31/2004	01/01/2008	0%
12/31/2007	09/09/2010	50%
09/08/2010	01/01/2010	100%
12/31/2011	01/01/2015	50%
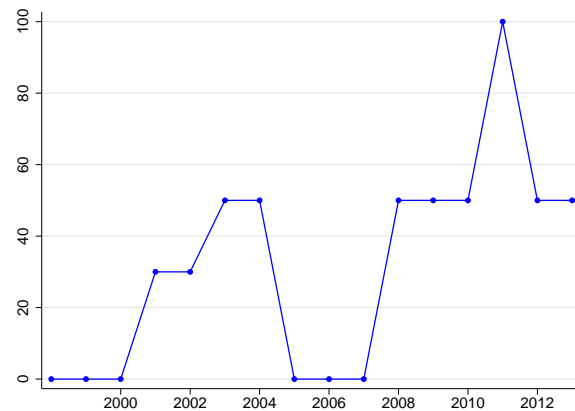
Table 2: Example of State Tax Impact of 50% Bonus

Year	1	2	3	4	5	6	7	8	Total
MACRS Deduction	25	21.43	15.31	10.93	8.75	8.74	8.75	1.09	100
τ_f x Deduction	1.8	1.54	1.10	0.79	0.63	0.63	0.63	0.08	7.2
PV(τ_f x Deduction)									5.92
50% Bonus Ded.	62.5	10.72	7.65	5.47	4.37	4.37	4.37	0.545	100
τ_f x Deduction	4.5	0.77	0.55	0.39	0.32	0.32	0.32	0.04	7.2
PV(τ_f x Deduction)									6.56

Notes: This table calculates the present value of federal and state tax deductions for a $100 investment under both a traditional 7-year accelerated depreciation regime and under a 50% bonus regime. The federal corporate tax rate is assumed to be 35% and the state corporate tax rate is assumed to be 7.2% - the observed percentage for states that adopted the bonus depreciation policy during years 2001 - 2011. The discount rate is assumed to be 10%.

2.1 State Level Bonus Depreciation Adoption

When bonus depreciation was instituted at the federal level, states responded to the policy in one of three ways. First, states could fully adopt the policy (from this point on, these states are referred to as Full Adopters or Adopters). States that chose this option also allowed businesses to deduct the additional bonus percentage of newly purchased assets in the first year from their state taxable income. Second, states could completely ignore or reject bonus depreciation (Full Rejecters, Rejecters). Finally, states could choose to allow for some additional first year write off of new equipment expenditures but not the full federal bonus percentage (Partial Adopters). Several states did not have a corporate income tax during bonus deprecation years and therefore could not respond to the federal policy in any way. State bonus policies are detailed in Appendix A.

State bonus depreciation is inherently less valuable to firms than federal bonus because all state corporate tax rates are significantly lower than the 35% federal rate observed during the bonus episodes. Among Full Adopters, the average state income corporate tax rate was 7.2%. Table 2 shows the impact of 50% bonus depreciation on the present value of tax depreciation allowances when the corporate income tax rate is 7.2%. The 50% bonus decreases the after tax cost of the $100 by by on 0.064% or ¢64. 100% bonus, as was federally adopted in 2011, would decreases the after-tax cost of investment by $1.28.

In a traditional investment model built on a Cobb-Douglas production function in which there are no adjustment costs and the the elasticity of investment to the user cost of capital is -1, (Jorgenson (1963), Hall and Jorgenson (1967)), a 0.064% increase in depreciation tax allowances increases investment by only 1.1%. Thus, these models would predict that investment would increase by

1.1% in full adopting states relative to investment in rejecting states, all else equal. However, there are several reasons one might expect responses to state bonus adoption might be larger than this neoclassical prediction. First, firm level investment is empirically lumpy. Winberry (2015) shows that only a model in which firms have nonconvex costs of adjustment can match both this observed lumpiness and the larger than unity elasticities estimated by Zwick and Mahon (2014). With non-convex or fixed costs of adjustment, firms may choose to re-optimize their capital stock to take advantage of both the state and federal policy only if their state implements the policy; the 0.064% decrease in after-tax investment costs might be just enough to make firms consider the 3% federal incentive.

Additionally, adjustment costs themselves may depend on the interaction of state and federal bonus policy. Additional training could be necessary if accountants are to keep track of both state and federal accelerated depreciation. While these costs may be trivial for large corporation, the costs associated with accounting for depreciation were large enough that they were one of the main impetuses for the adoption of Section 179, a federal tax policy discussed at length in Section 9.

Finally, firms may be able to easily shift business activity from one state to another – especially if they already have plants located in several states. A firm deciding whether to engage in a new investment project in one state versus another should, all else equal, choose to locate in the state that has adopted the bonus policy. Consolidated firm level data would not show these intra-state transmission effects, but elasticities estimated in this paper will because they are based on plant level data (described further in Section 3).
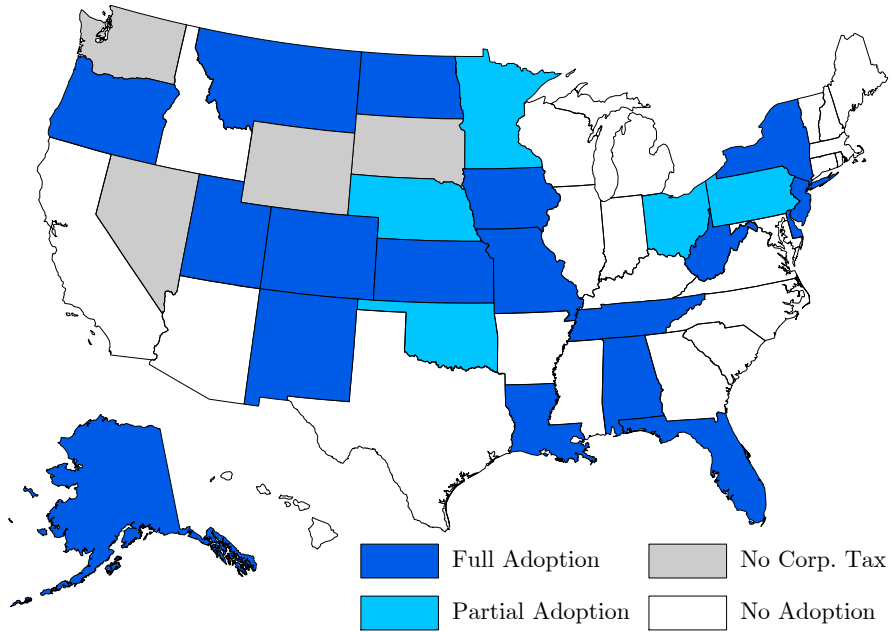
2.2 Mapping Bonus Depreciation Adoption

Figure 2 maps the states the adopted, partially adopted, and rejected the bonus policy in 2001 as well as states that had no corporate income tax rates. In 2001, there were 15 full adopters and 21 rejecters. These states were spread geographically and were represented in the Northeast, South, Midwest, Mountain, and North Western States. During the second bonus episode there were only 10 full adopters and 27 rejecters. The adopters were also not as geographically dispersed across the nation. In both 2001 and 2008, five states partially adopted the policy and four had no corporate income tax rates. Figure 2 demonstrates both cross-sectional variation in 2001 and 2008 (although more in 2001) and within state variation over time in the policy.
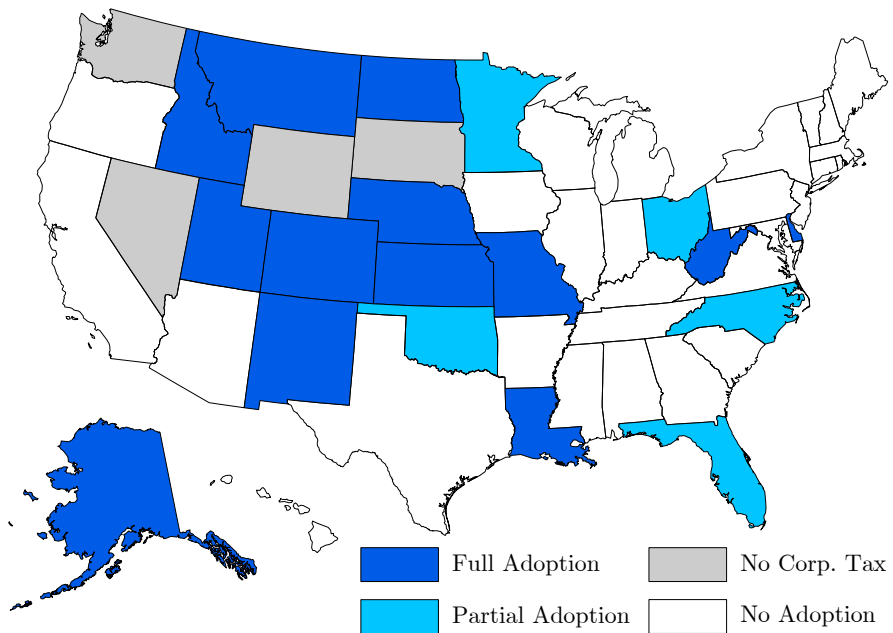
To better visualize the within-state adoption variation, Figure 3 maps the states states that changed their bonus adoption policies at any time during the two bonus episodes. In total, 15 states changed their adoption policies. These policy changing states are geographically dispersed and therefore seem to suggest that regional factors did not influence states' decisions to adapt their adoption policies. Further descriptive analysis of potential factors influencing state adoption is left until Section 3.

Figure 2: State Bonus Depreciation Conformity

(a) Adoption in 2001

Full Adoption   No Corp. Tax

Partial Adoption   No Adoption

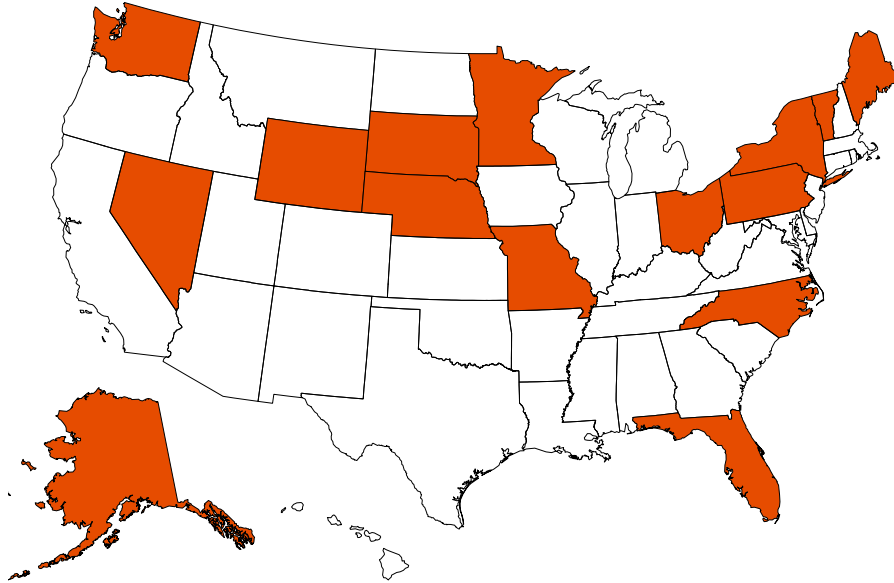### (b) Adoption in 2008

Full Adoption   No Corp. Tax

Partial Adoption   No Adoption

Notes: Figure 2 depicts which states fully adopted the bonus depreciation policy, partially adopted the policy, fully rejected the policy, and did not have a corporate tax in 2001 and 2008.

Figure 3: Bonus Depreciation Policy Changers

Notes: Figure 3 depicts which states changed their adoption of the policy at some point during either bonus episode. In total, 15 states changed thier adoption policy.

3   Data Sources

3.1   Manufacturing Data

Measures of employees and investment come from the The Annual Survey of Manufacturers (ASM) and the Economic Census – both products of the US Census Bureau. The ASM is conducted annually in all years except for years ending in 2 and 7. In those years, employee and investment data are reported in the Economic Census. The ASM provides sample estimates and statistics for all manufacturing establishments with one or more paid employees – which is the entire Economic Census manufacturing census, thus statistics in all year are comparable.

The observational unit in empirical analysis is the 3-digit North American Classification System (NAICS) industry within in each state. There are 21 3-digit NAICS manufacturing industries and 1006 observational units.[2] The investment variable is the log of capital expenditure (in thousands of dollars) and the employment variable is the log of employees for each NAICS x State unit.

---

[2] If each NAICS x State unit was represented there would be 1050 observation. Some industries are either not represented in some states or there are too few establishments to report confidential statistics.

3.2 Federal and State Level Bonus Data

Federal bonus deprecation rates are taken from federal legislation. All legislation containing bonus deprecation are described in Appendix C. The bonus rates over time, as noted previously, are contained in Figure 1. From these rates and dates of implementation / repeal the "Bonus" variables is constructed. Bonus is between 0 (no bonus) and 1 (100% bonus) and varies only over time. If Bonus is set equal to the maximum federal bonus percentage at any time during a given year.

State bonus conformity data is drawn from Lechuga (2014), which described whether states allowed, did not allow, or partially allowed the full federal bonus depreciation in years 2001 through 2013. This data is reproduced in Table 9 and converted to a single "State Takeup" variables which takes on values between 0 and 1. State Takeup is equal to 0 if an observational unit is located in a state that fully rejects the policy in a given year. State takeup is set equal to 1 for states that fully adopted the policy. When bonus is X% adopted, State Takeup is set to X/100.

3.3 Other State Level Data

Other state level data is used to 1) estimate whether there are any systematic differences between states that do and do not adopt bonus deprecation and 2) to control for state level determinants of the investment and employment. From data contained in the Book of States two state finance variables are constructed. The first is the percentage of total state revenue from state corporate income taxes. The second is state budget gap – equal to total state deficit as a fraction of total state revenue. The percentage of democratic state legislators and the political affiliation of the governor are also taken from the Book of States. Finally, the Book of States also provides data on which states had balanced budget amendments in 2001, the year in which bonus was first implemented.

From the Tax Foundation, data on the top marginal corporate income tax rates for each state and each year are constructed. Data on state adoption of Section 179 are also taken from the Tax Foundation. Annual data on data on state population is taken from Census and annual data on Gross State Product is taken from BEA.

3.4 Border Data

If shocks to employment and investment happen at the regional instead of the state level, then estimation strategies may want to focus only on states that share borders. In order to accomplish this, border variables are constructed and included in the analysis as border-group fixed effects. A separate border variables is constructed for each state that partially or fully adopted the policy at anytime during years 2001-2011. The border variables for a given adopter is set equal to one for the adopting states and any states that border it and set to zero for other states.

4 Empirical Strategy

A difference-in-difference (DD) estimation strategy is employed to estimate the impact of state level adoption of bonus depreciation. The DD identifies the impact of the policy impact by comparing the changes in investment and employment by industries located in states that adopted the policy versus changes in investment and employment by industries in states that did not implement the policy. DD estimates are produced by regressing the NAICS by state investment or employment variables on an interaction between the federal bonus rate and a state adoption variable. The baseline DD regression is

$$\ln(\text{capx})_{jst} = \beta_0 + \beta_1 [\text{Bonus}_t \times \text{State Takeup}_{st}] + \sum_{m=2}^{n} [\text{Control}]_s t + \nu_{js} + \sigma_t + \epsilon_{jst} \qquad (1)$$

where j denotes NAICS 3-digit industry, s denotes state, and t denotes time. All regressions also include NAICS by state fixed effects (ν_{js}) and year fixed effects (σ_t) to control for time invariant determinants of industry by state economy wide trends in investment and unemployment. With these fixed effects included, identification of of the β_1/DD parameter is identified only from how investment and employment change in states that adopt bonus versus states that do not adopt bonus.

Because the policy variation is at the state-by-year level, the key identifying assumption is that the policies are independent of other state-by-year shocks. It is hard to believe that this assumption holds given that states may opt into and out of bonus adoption based on a variety of state level characteristics such as financial position, and productivity. To begin to alleviate this concern, a robust set of state-by-year control variables for state politics, productivity, population, and finances can be included in regressions. With these control variables, the identifying assumption is more realistic: state-level adoption of bonus must by independent of state-by-year shocks that are also not correlated with robust set of state-by-year controls. This assumption is explored in greater detail in Section 5, which details potential state level determinants of bonus adoption.

This estimation strategy is sufficiently flexible to eliminate two other potential sources of variation: industry and regionally trends. One concern may be that certain industries are growing faster during the the 2000-2011 time window than others. If faster growing industries were then concentrated in states that adopted the policy, the DD estimate would improperly attribute the policy impact to industry trends. To account for this, NAICS 3-digit industry-by-year fixed effects can be included. When these industry-year fixed effects are included, the DD coefficient is identified by comparing changes in investment and employment from the same industry in states that did and did not implement the policy.

In instead, region trends are the primary concern, then the DD coefficient can be estimated by comparing only bordering states. This is done by including border fixed effects as described in

Section 3.4. Although this procedure limits the number of observational units, because it excludes industries in states that do not have a bordering treatment or control state, the precision of the empirical estimate should be better if region trends drive a good deal of employment and investment variation.

5 Selection Concerns

A primary concern in accurately identifying the effect of state adoption of federal bonus depreciation policy is that states that choose to adopt the policy may be systematically different than those that do not adopt the policy. While these selection concerns can never be fully eliminated, they can be addressed by 1) controlling for other state-by-year observables that may affect investment and employment and by 2) exploring potential determinants of state-level adoption. If there are systematic differences in the types of states that adopt the federal policy, then estimation can be limited in an effort mitigate selection bias by creating more empirically similar treatment and control groups.

5.1 Political Factors

Table 3 explores potential political determinants of state level bonus adoption by presenting the means of three different political variables across three adoption classifications in 2001 and then again in 2008. States the adopted the policy (both fully and in any way) were not statistically different from states that did not adopt the policy in terms of the percentage of the state legislature that were democrats, whether the governor was a democrat, or whether the state had a balanced budget amendment in either 2001 or 2008. Thus, it appears that political factors did not play a factor in the decision to adopt the policy.

5.2 Financial Factors

Table 4 paints a different picture. It seems that financial factors may have influenced states' adoption of bonus deprecation in 2001 and again in 2008. States that adopted the policy in 2001 had a statistically higher tax rate than those that did not. States that partially or fully adopted the policy in 2001 had an average corporate income tax rate of 7.84. States that did not adopt the policy had an average tax rate of 5.67. This difference is statistically significant at the 10% level.

This observed difference would be expected if states were more likely to implement the policy only when it would provide the most tax benefit to their corporate tax base – the state adoption provides a larger decrease in the present value of state tax shields when state tax rates are higher. To account for this selection issue, the analysis can be limited to states with higher corporate income tax rates. This limiting will focus the analysis to states that see higher potential benefit

from the policy and provide more similar treatment and control groups.

During the second bonus episode, adopting states no longer have statistically higher corporate income tax rates. Instead, in 2008, state financial position seems to be a driving factor in state adoption decisions. States that adopt the policy during the second episode are more likely to have a smaller budget gap (budget gap is defined as revenues minus expenditure divided by revenues). Thus, states that were in a tighter financial position in 2008 and could potentially not afford the policy were more likely to not adopt.[3]

5.3 Population and Productivity Factors

As shown in Table 5, population and state productivity as expressed by 1) state population, 2) gross state product (GSP) , and 3) GSP per capita are not different across 2001 adopters. However, states that adopted the policy in 2008 had smaller populations and lower GSP. This selection could be a problem if investment and employment were more stable in smaller and less productive states. In this case, the DD estimate would incorrectly attribute state level volatility to state policy implementation. To combat these issue, analysis can be limited to the first bonus episode when adopting and rejecting states were equally sized and equally productive.

6 Empirical Results

6.1 Baseline Results

Estimated coefficients from Equation 1 are presented in Table 6. Specification (1) through (6) take the log of capital expenditures as the dependent variables whereas specifications (7) through (12) examines the impact of state adoption on the log of employees. When the policy coefficient is multiplied by 100, it can be interpreted as the percentage increase in investment or employment that results from a state fully adopting federal bonus depreciation when the federal bonus rate is 100% (full expensing). Standard errors are clustered at the state and year level. Specification (1) shows that the adoption of 100% bonus at the state level increases capital expenditures by 9.1%. This coefficient may be reinterpreted to say that state adoption of 50% bonus depreciation increases investment by 4.55%.

Specification (2) includes a robust time-varying set of control variables to account for changes in state politics, finances, production and population that could cause increases in investment. When the controls are included, state adoption of 50% bonus increases investment by 4.15%. Specification (3) limits the analysis to the first bonus episode (years prior to 2005) to avoid some of the selection concerns that were identified in Section 5. When only the first episode of bonus is considered,

---

[3]In principle, this could be addressed by limiting analysis to states with budget surpluses in 2008. Unfortunately, very few states had surpluses in 2008. Appendix D estimates the impacts of state adoption during the second bonus episode. In some specifications, analysis is limited to states that had budget surpluses in 2008.

Table 3: Political Determinants of Bonus Adoption

		DETERMINANTS OF 2001 BONUS ADOPTION		
		DEMOCRATIC LEGISLATURE	DEMOCRATIC GOVERNOR	BALANCED BUDGET AMMENDMENT
REJECTER	0	56.37	0.36	0.89
	1	55.52	0.39	0.74
	t	(0.11)	(-0.50)	(1.31)
FULL	0	58.84	0.33	0.75
ADOPTER	1	47.90	0.43	0.93
	t	(1.31)	(-0.62)	(-1.42)
ANY	0	55.52	0.39	0.74
ADOPTER	1	56.37	0.32	0.89
	t	(-0.11)	(0.50)	(-1.31)

		DETERMINANTS OF 2008 BONUS ADOPTION		
		DEMOCRATIC LEGISLATURE	DEMOCRATIC GOVERNOR	BALANCE BUDGET AMMENDMENT
REJECTER	0	59.23	0.53	0.93
	1	55.78	0.57	0.74
	t	(0.44)	(-0.24)	(1.54)
FULL	0	54.99	0.58	0.78
ADOPTER	1	64.10	0.5	0.90
	t	(-1.02)	(0.41)	(-1.87)
ANY	0	55.78	0.57	0.74
ADOPTER	1	56.23	0.53	0.93
	t	(-0.44)	(0.24)	(-1.54)

Notes: Rejecters are those states that allowed for no bonus depreciation in 2001 / 2008. Full Adopters are those states that allowed for the statutory federal level of bonus depreciation in 2001 (at 30%) / in 2008 (at 50%). Any Adopter are those states that allowed for some and potentially full bonus depreciation in 2001 (at 30%) / in 2008 (at 50%). The table presents means for each variable by group. t is the t statistic from the comparison of means. Statistical significance of the t-stat at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. Democratic Legislature is the percentage of the state legislature that is part of the Democratic Party. Democratic Governor is an indicator variables that is equal to 1 when the governor is part of the Democratic Party. Balanced Budget is an indicator equal to 1 if the state had a constitutional balanced budget amendment in place in 2001.

Table 4: Financial Determinants of Bonus Adoption

		DETERMINANTS OF 2001 BONUS ADOPTION		
		CORPORATE TAX RATE	CORPORATE TAX REV %	BUDGET GAP %
REJECTER	0	7.84	6.48	0.44
	1	5.67	4.85	1.97
	t	(2.65)**	(1.25)	(-1.22)
FULL	0	6.07	4.80	1.74
ADOPTER	1	7.64	7.22	0.50
	t	(-1.71)*	(-1.73)*	(0.90)
ANY	0	5.67	4.85	1.97
ADOPTER	1	7.84	6.49	0.44
	t	(-2.65)**	(-1.24)	(1.22)

		DETERMINANTS OF 2008 ADOPTION		
		CORPORATE TAX RATE	CORPORATE TAX REV %	BUDGET GAP %
REJECTER	0	7.37	6.46	-0.6
	1	6.42	6.01	9.6
	t	(1.16)	(0.35)	(-2.47)**
FULL	0	6.54	5.87	9.05
ADOPTER	1	7.40	7.26	-3.05
	t	(-0.91)	(-0.97)	(2.64)**
ANY	0	6.42	6.01	9.64
ADOPTER	1	7.37	6.45	-0.06
	t	(-1.17)	(-0.35)	(2.47)**

Notes: Rejecters are those states that allowed for no bonus depreciation in 2001 / 2008. Full Adopters are those states that allowed for the statutory federal level of bonus depreciation in 2001 (at 30%) / in 2008 (at 50%). Any Adopter are those states that allowed for some and potentially full bonus depreciation in 2001 (at 30%) / in 2008 (at 50%). The table presents means for each variable by group. t is the t statistic from the comparison of means. Statistical significance of the t-stat at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. Corp Tax Rate is the top corporate income tax rate in each state. Corp Tax Rev % is the percentage of total state revenue that comes form the corporate income tax. Budget Gap % is equal to state expenditures minus revenues divided by revenues.

Table 5: Population and Productivity Determinants of Bonus Adoption

		DETERMINANTS OF 2001 BONUS ADOPTION		
		POPULATION (THOUSANDS)	GROSS STATE PRODUCT (10 MILS)	GSP PER CAPITA (THOUSANDS)
REJECTER	0	4,842	1,680	34.92
	1	6,033	2,303	37.85
	t	(-0.65)	(-0.85)	(-0.78)
FULL	0	6,134	2,311	37.41
ADOPTER	1	4,153	1,436	35.04
	t	(1.00)	(1.11)	(0.3992)
ANY	0	6,033	2,303	37.85
ADOPTER	1	4,842	1,680	34.92
	t	(0.65)	(0.85)	(0.78)

		DETERMINANTS OF 2008 ADOPTION		
		POPULATION (THOUSANDS)	GROSS STATE PRODUCT (10 MILS)	GSP PER CAPITA (THOUSANDS)
REJECTER	0	4,616	2,031	47.08
	1	6,700	3,282	47.27
	t	(-1.00)	(-1.14)	(-0.05)
FULL	0	7,065	3,391	46.92
ADOPTER	1	2,117	969	48.40
	t	(2.15)**	(1.99)*	(-0.41)
ANY	0	6,700	3,282	47.27
ADOPTER	1	4,616	2,031	47.08
	t	(1.00)	(1.14)	(0.06)

Rejecters are those states that allowed for no bonus depreciation in 2001 / 2008. Full Adopters are those states that allowed for the statutory federal level of bonus depreciation in 2001 (at 30%) / in 2008 (at 50%). Any Adopter are those states that allowed for some and potentially full bonus depreciation in 2001 (at 30%) / in 2008 (at 50%). The table presents means for each variable by group. t is the t statistic from the comparison of means. Statistical significance of the t-stat at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *.

estimates of the policy impact are larger; state adoption of 50% federal bonus induces 8% more investment. When partially adopting states are excluded from the analysis, as in Specifications (4), (5), and (6), empirical results are nearly identical.

State adoption of bonus depreciation also seems to have a substantial effect on employment. The coefficient on the DD interaction from Specification (1) suggests that state adoption of 50% federal bonus increases employment by 2.6%. When state level controls are included, the implied effect of 50% bonus adoption is 2.1%. This effect is larger but only slightly prior to 2005 (Specification (3)). As was the case with investment, these estimates are robust to the exclusion of partially adopting states.

Two facts are immediately apparent from this baseline analysis. First, the impacts of state level bonus adoption are large and second, they are real. The most standard way to quantify the policy impact is to compute the elasticity of investment with respect to the user cost of capital, $(1-\tau_f z_f-\tau_s z_s)/(1-\tau_f-\tau_s)$ where z is the present value of tax shields available from \$1 of investment and f and s denote federal and state corporate income tax rates and "Z Tax Terms." Using the estimates from Specification (5),[4] the implied elasticity of investment with respect to the user cost of capital is -3.72. This is very large compared estimates cited in Hassett and Hubbard (2002), which summarizes the pre-2002 user cost literature and even larger than the -1.6 elasticity reported by Zwick and Mahon (2014) which is estimated using response to federal bonus depreciation.

If this investment response is due to state bonus adoption, then the magnitude of the response can only be possible if state bonus adoption is impacting plant level investment decisions through channels other than simply decreasing the present value after tax cost of investment by 2%. As summarized in Section 2, there are several ways in which state adoption may be having an outsized impact on investment. First, when there are fixed costs of investment, state bonus policy may gives plants extra incentive to re-optimize their capital stock with regard to both the state and federal policies. If the DD estimates we generated by responses to both state and federal policies (i.e. if plants only responded to the federal policy if states fully adopted) then the implied elasticity of investment with respect to the user cost would be -0.69 – in the middle of the Hassett and Hubbard (2002) range. State level rejection could also undermine the federal incentives and generate these large elasticities if the fixed costs of investment were higher when state and federal policies were not uniform.

This large elasticity could, alternatively, be due to substitution of investment across states. All else equal, corporations should invest in adopting versus rejecting states. In this case as well, the full impact of the federal policy would be felt only in the adopting states as long as firm's ability to substitution across states was sufficiently elastic. This shifting of course does not have to be real. Firms could simply be reporting investment in bonus adopting states. If this were the case, however, the employment response should be negligible.

---

[4]Estimates excluding partial adopters are easier to interpret as states either fully adopt or reject the policy.

Table 6: Baseline Analysis

Dependent Var:	ln Capital Expenditures					
				Excluding Partial Takeup		
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Bonus ×	0.091*	0.083*	0.164**	0.090*	0.080*	0.161**
State Adoption	(0.049)	(0.048)	(0.068)	(0.051)	(0.047)	(0.063)
Year FE	✓	✓	✓	✓	✓	✓
State Controls		✓	✓		✓	✓
Prior to 2005			✓			✓
Adj. R-Square	0.011	-0.001	-0.088	0.002	-0.009	-0.117
State x NAICS Groups	869	866	848	869	866	848
Observations	11,838	10,111	4,787	11,090	9,363	4,382

Dependent Var:	ln Employees					
				Excluding Partial Takeup		
Specification	(7)	(8)	(9)	(10)	(11)	(12)
Bonus ×	0.053*	0.042**	0.051*	0.049	0.039*	0.054*
State Adoption	(0.081)	(0.050)	(0.058)	(0.126)	(0.098)	(0.060)
Year FE	✓	✓	✓	✓	✓	✓
State Controls		✓	✓		✓	✓
Prior to 2005			✓			✓
Adj. R-Square	0.348	0.354	0.134	0.333	0.339	0.099
State x NAICS Groups	878	877	862	878	877	861
Observations	12,307	10,550	4,981	11,543	9,786	4,562

Notes: All specifications present estimates from variants of equation (1). The dependent variable in specifications (1) through (6) is the log of capital expenditures. The dependent variables in specifications (7) through (12) is the log of employees. All specifications include include State x NAICS Fixed Effects. All specifications except (1), (4), (7), and (10) include a robust set of controls to capture changes in state politics, productivity, population, and finances. Specifications (3), (6), (9), and (12) limit the analysis to the first episode of bonus depreciation. Standard errors are two-way clustered by state and year and are reported in parentheses. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *.

Table 7: Investment and Employment Impacts by State Corporate Tax Rates

DEPENDENT VARIABLE:	LN CapX			LN Emp		
STATE CORP TAX RATE	> 0%	> 3%	> 5%	> 0%	> 3%	> 5%
SPECIFICATION	(1)	(2)	(3)	(4)	(5)	(6)
BONUS ×	0.086*	0.087*	0.094**	0.053**	0.053**	0.069**
STATE ADOPTION	(0.050)	(0.050)	(0.047)	(0.026)	(0.026)	(0.031)
YEAR FE	✓	✓	✓	✓	✓	✓
STATE CONTROLS	✓	✓	✓	✓	✓	✓
ADJ. R-SQUARE	-0.009	-0.011	-0.007	0.370	0.364	0.362
STATE X NAICS GROUPS	814	810	749	825	822	759
OBSERVATIONS	8,571	8,379	7,734	8,969	8,772	8,101

Notes: Specifications (1) through (6) present estimates of variants of equation (1) The dependent variables in Specifications (1) through (3) is the log of capital expenditures. The dependent variable in Specifications (4) through (6) is the log of employees. Specifications (1) through (3) and then Specifications (4) through (6) progressively limit the analysis to states in which corporate tax rates are higher. All specifications include year and State x NAICS fixed effects as well as a robust set of controls to capture changes in state politics, productivity, population, and finances. Standard errors are two-way clustered by state and year and are reported in parentheses. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *.

The estimated policy coefficients from Specifications (7) through (12) indicate that the employment response to state adoption of bonus is large and real (not just increases in reported investment). The elasticity of employment with respect to the net of tax rate, $(1 - \tau_f z_f - \tau_s z_s)$, is 1.77 (estimates from Specification (5)). Very little research has investigated the impacts of corporate taxation on employment. As a result, it is hard to place these findings in context. Note, however, that the capital and labor responses seem to be internally consistent as they indicate labor and capital's share of total expenditure are 1/3 and 2/3, the Cobb-Douglas benchmark values.

6.2 Limiting Analysis by State Corporate Income Tax Rates

States with higher corporate income tax rates were more likely to adopt the policy. Therefore, limiting the analysis to states with higher corporate income tax rates (those states that will most benefit form the policy), may increase the similarities of the treatment and control groups in the DD estimation. The potential to limit section bias via this process is even higher if state corporate income tax rates proxy for other unobserved differences between adopting and non-adopting states, such as mobility of capital or production volatility.

Table 7 presents estimates of Equation 1 limited by state corporate income tax rates. Specifications (1), (2), and (3) measure the impact of state bonus adoption on capital expenditures when state corporate tax rates are greater than 0%, greater than 3%, and greater than 5%. As the inclusion threshold increases, the point estimate on the DD coefficient increases (increases are not statistically different from zero.). This analysis suggests that investment in states that had lower tax rates moved more similarly both before and after policy implementation than states that had higher tax rates. One would expect this finding because state adoption should increase investment more in states with higher corporate income tax rates.

Specifications (4), (5), and (6) estimate the policy impact on labor and tell a similar story. As state tax rates increase, the policy has a larger effect on employment. The estimates are also more precise than when there is no corporate income tax exclusion. When states with corporate incomes tax rates greater than 5% adopt 50% bonus depreciation, their employment increases by nearly 3.5%. If the effect of limiting the analysis to states that should be more affected by adoption led to smaller point estimates, there would be cause for concern. However, increasing and more precise DD point estimates suggest that investment and employment effect are driven by state bonus adoption.

7   Robustness Checks

There are two primary concerns that are addressed in this section. The first is that industries that grew (or did not suffer as much) during the 2001 and 2008 recession could be concentrated in adopting states. The second concern is that the empirical strategy thus far has compared the investment and employment of all state industries groups to each other regardless of their geographic location – a particularly troubling strategy if states that adopted the policy were concentrated in regions that grew (or did not suffer as much) during the two episodes of bonus. To address these concerns, first NAICS x Year fixed effects are included in regressions. With NACIS x Year fixed effects, the impact of the policy is identified entirely within 3-digit NAICS industries. Second, border group X year fixed effects are included in regressions. With these border group fixed effects, the identification of the DD parameter is based only on industries within states that share a border.

Table 8(A) presents estimates of Equation 1 when NAICS x Year fixed effects are included. Point estimates of the policy impact are smaller across the board. When the sample is not limited by state corporate income tax rates, state adoption of 100% bonus depreciation no longer has an impact that can be statistically differentiated from zero. However, at higher tax rates, among states in which adoption should have a larger mechanical impact, state adoption of 100% federal bonus increases investment by 6.5% and employment by 4.3%. The lower point estimates suggest that, indeed, industries that fared better during the 2001 and 2008 recession where concentrated, at least to some extent, in adopting states. Therefore, these point estimates are the author's preferred

estimates of the impact of state adoption.

Table 8(B) presents estimates of the impact of state bonus adoption when border-group x year fixed effects are included. As with the previous robustness analysis, when identification of the policy comes only from comparisons of border states, there is no impact of the policy when all states are included. However, when the analysis is limited to states with corporate income tax rates greater than 5%, including border-group x year fixed effects increases estimates of the impact of state adoption on both investment and employment. This seems to suggest that regional trends could be inflating policy estimates in the full sample and deflating policy estimates in the high corporate income states. This result could be generated by regional trends that are more important for low tax states.

8 Visual Evidence of Response to State Bonus Adoption

The empirical analysis has, thus far, shown that state adoption of federal bonus depreciation increases investment and employment among states with higher corporate income tax rates. This result is robust to the inclusion of state level control variables, time-varying industry and border-group fixed effects. Some evidence has also pointed to the fact that adoption of the federal policy during the first episode of bonus depreciation may have had larger investment and employment impacts. To further examine when adoption had the largest impact, we can examine graphical representations of the difference-in-difference empirical approach. These are presented in Figure 4.

Each panel in Figure 4 is constructed by first regressing capital expenditure or employment on state-level controls, and industry and state fixed effects in each year 2000 through 2011 for states that had corporate income tax rates higher than 5%. The residuals from these regressions are then averaged both for industries located in adopting states and industries located in rejecting states.[5] These group-average residuals are then added to mean leveles of investment / employment in years 2000 - 2011. Finally, group means are equalized in the 2000 and 2007 to ease comparison. The result is that in each year the difference between the blue (solid) and black (dotted) line is the unexplained difference in investment behaviors between adopting and non-adopting states.

From panels (A) and (B), there seems to be a large and immediate impact of state bonus depreciation adoption on capital expenditure and employment. The impact is present in 2001 and increases substantially in 2002. However, in 2003, the policy impact immediately disappears. The trends in Panels (A) and (B) confirm the baseline empirical findings but also suggest that largest impact of the policy was in the first two years –those year when the bonus depreciation was at its lowest, 30%. Of course, those years were also when state level rejection of bonus depreciation may have preventing firms from re-optimizing their investment plans to incorporate the federal policy.

---

[5]In Panels (A) and (B), adopting (rejecting) states are defined as those that fully adopted (rejected) the policy during years 2001, 2002, 2003, and 2004. In Panels (C) and (D), adopting (rejecting) states are defined as those that fully adopted (rejected) the policy during years 2008, 2009, 2010, and 2011.

Table 8: Robustness Checks

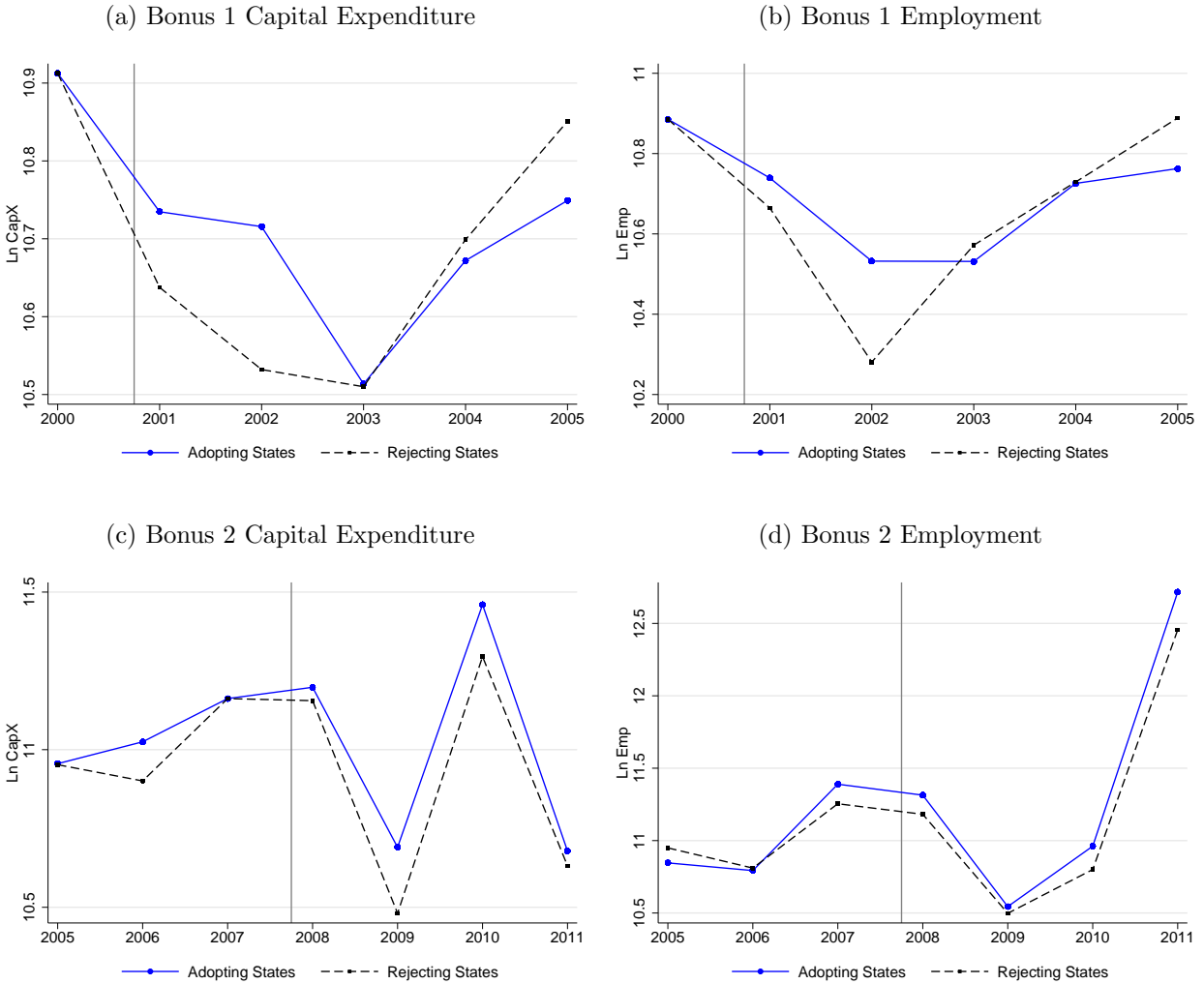(a) Investment and Employment Impacts with NAICS x Year FE

| DEPENDENT VARIABLE: | LN CapX | | | LN Emp | | |
| STATE CORP TAX RATE | | > 0% | > 5% | | > 0% | > 5% |
SPECIFICATION	(1)	(2)	(3)	(4)	(5)	(6)
BONUS ×	0.061	0.064*	0.065*	0.022	0.032*	0.043**
STATE ADOPTION	(0.038)	(0.038)	(0.034)	(0.014)	(0.017)	(0.020)
YEAR FE	✓	✓	✓	✓	✓	✓
STATE CONTROLS	✓	✓	✓	✓	✓	✓
NAICS x YEAR FE	✓	✓	✓	✓	✓	✓
ADJ. R-SQUARE	0.193	0.196	0.195	0.613	0.632	0.637
STATE x NAICS GROUPS	866	814	749	877	825	759
OBSERVATIONS	10,111	9,319	8,419	10,550	9,733	8,802

(b) Investment and Employment Impacts with Border Group x Year FE

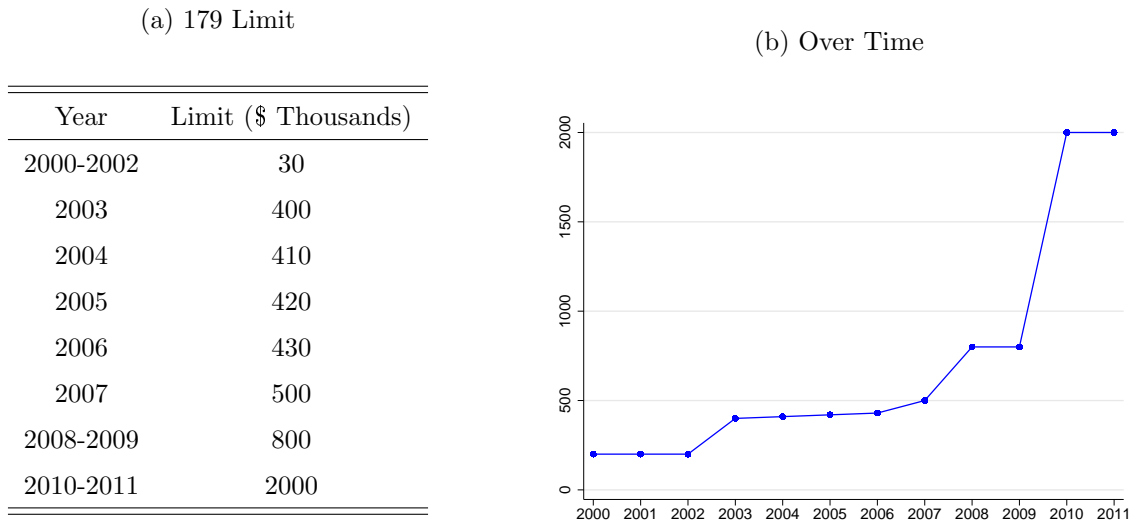| DEPENDENT VARIABLE: | LN CapX | | | LN Emp | | |
| STATE CORP TAX RATE | | > 0% | > 5% | | > 0% | > 5% |
SPECIFICATION	(7)	(8)	(9)	(10)	(11)	(12)
BONUS ×	0.067	0.044	0.122*	0.017	0.044	0.074**
STATE ADOPTION	(0.061)	(0.028)	(0.069)	(0.026)	(0.028)	(0.029)
YEAR FE	✓	✓	✓	✓	✓	✓
STATE CONTROLS	✓	✓	✓	✓	✓	✓
BORDER GROUP x YEAR FE	✓	✓	✓	✓	✓	✓
ADJ. R-SQUARE	0.104	0.454	0.104	0.438	0.454	0.445
STATE x NAICS GROUPS	936	929	802	1,002	929	859
OBSERVATIONS	10,181	9,837	8,472	10,675	9,837	8,902

Notes: Specifications (1) through (12) present estimates of variants of equation (1). Specifications (1) - (6) include NAICS x Year fixed effects. Specifications (7) - (12) include border group x Year fixed effects. Standard errors are reported in parentheses and are clustered by state and year. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *.

Figure 4: Effects of Bonus Adoption

(a) Bonus 1 Capital Expenditure

(b) Bonus 1 Employment

(c) Bonus 2 Capital Expenditure

(d) Bonus 2 Employment

Notes: Figures 4(A) - 4(D) plot the mean Ln Capx and Ln Emp over time for adopting and rejecting states with corporate income tax rates greater than 5% during the first and second episode of bonus depreciation. Adopting states during the first (second) bonus episode are those states that allowed for the full federal statutory bonus during years 2001 - 2004 (2008-2011). Group means are derived through through the following procedure: cross-sectional regression of Ln Capx / Ln Emp on controls forstate politics, productivity, population, and finances as well as state and NAICS FE are run in each year. Residual group means for the adopting and rejecting states are then calculated and added to the mean investment percent for each year. Finally, group means in year 2000 / 2007 are subtracted from all observations and the overall mean investment percentage is added to ease the comparison of trends. All means are count weighted.

Figure 5: Section 179 Limit 2000-2011

(a) 179 Limit

Year	Limit ($ Thousands)
2000-2002	30
2003	400
2004	410
2005	420
2006	430
2007	500
2008-2009	800
2010-2011	2000

(b) Over Time

State adoption in 2008 seems to have less of an impact; investment and employment may receive small boosts but nothing near as significant as the impact that adopting states felt in 2001 and 2002. These results may suggest that indeed, state rejection of federal policy may have undermined its effectiveness when the policy was new. Once the policy was understood by firms and incorporated into investment decisions, state adoption effects seem to have died out. However, the fact that state adoption was very important pre 2003 suggest that perhaps a second federal tax provision, Section 179, which was implemented in 2003, overwhelmed any impacts of state level adoption.

9 Section 179

Section 179 allows firms to immediately expense all investments below a limit (equivalent to 100% bonus below the limit). Prior to 2003, that limit was $200,000. However, in 2003, the section 179 Limit was doubled to $400,000. Figure 5 presents Section 179 limits over time.

179 is more generous than bonus when firms are small and make investments below the limit. Thus, if many firms' investment costs were between $200,000 and $400,000, in 2001 and 2002, then this increase could have forced firms to re-optimize their investment strategies regardless of states' adoption of bonus. As a result, 179 could have potentially swamped out the effects of state bonus deprecation adoption after 2003 and the visual evidence presented in Figure 4, in which strong responses to state bonus adoption in 2001 and 2002 were quickly wiped away when a second federal investment policy was altered. Overall, the introduction of the 179 limit into the analysis suggests that the empirical results presented in this paper were, indeed, driven by depreciation tax policy and not other state trends or selection biases.

23

10   Conclusion

The empirical results presented in this paper suggest that state adoption of bonus deprecation at a 50% bonus rate induce a 3.2% increase in investment and 2.1% increase in employment. These effects are largely driven by state responses in 2001 and 2002, when the bonus policy was new. This large and temporary response presents two questions. First, why was the response so large and second, why was the response short lived. While more work must be done to answer the first question, the temporary nature of the response can be, with some confidence, attributed to the 2003 increase in the Section 179 limit.

References

Hall, Robert E and Dale W Jorgenson, "Tax policy and investment behavior," *The American Economic Review*, 1967, pp. 391–414.

Hassett, Kevin A and R Glenn Hubbard, "Tax policy and business investment," *Handbook of public economics*, 2002, *3*, 1293–1343.

House, Christopher L. and Matthew D. Shapiro, "Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation," *American Economic Review*, 2008, *98*, 737–768.

Jorgenson, Dale W, "Capital theory and investment behavior," *The American Economic Review*, 1963, pp. 247–259.

Lechuga, Jessica, "State Conformite with Federal Bonus Depreciation Rules," 2014.

Ohrn, Eric, "Does Corporate Governance Induce Earnings Management? Evidence from Bonus Depreciaiton and the Fiscal Cliff," 2015.

Winberry, Thomas, "Lumpy Investment, Business Cycles, and Stimulus Policy," 2015.

Zwick, Eric and James Mahon, "Do Financial Frictions Amplify Fiscal Policy? Evidence from Business Investment Stimulus," 2014.

Appendix A   State Bonus Policies

Table 9: Bonus Depreciation State Adoption

State	Bonus Episode 1	Bonus Episode 2	Special
Alabama	Full Adopter	Full Rejecter	
Alaska	Full Adopter	Full Adopter	No Bonus for Oil and Gas Corps
Arizona	Full Rejecter	Full Rejecter	
Arkansas	Full Rejecter	Full Rejecter	
California	Full Rejecter	Full Rejecter	
Colorado	Full Adopter	Full Adopter	
Connecticut	Full Rejecter	Full Rejecter	
Delaware	Full Adopter	Full Adopter	
Florida	Full Adopter but 2003	1/7 Adopter	
Georgia	Full Rejecter	Full Rejecter	
Hawaii	Full Rejecter	Full Rejecter	
Idaho	Full Adopter	Full Rejecter	
Illinois	Full Rejecter	Full Rejecter but for 2011	
Indiana	Full Rejecter	Full Rejecter	
Iowa	Full Adopter but for 2001, 2002	Full Rejecter	
Kansas	Full Adopter	Full Adopter	
Kentucky	Full Rejecter	Full Rejecter	
Louisiana	Full Adopter	Full Adopter	
Maine	2001 Full Adopter 2002 2 Yr Postponed After 2002 5%	Rejecter but 2011, 2012: 10%	
Maryland	Full Rejecter	Full Rejecter	

Notes: Full Rejecters are those states that allowed for no bonus depreciation. Full Adopters are those states that allowed for the statutory federal level of bonus depreciation. Data is taken from "State Conformity with Federal Bonus Depreciation Rules" by Jessica Lechuga, posted on Bloomber BNA. Dark gray rows are states that were full adopters during both bonus episodes. Light gray states are those that fully adopted for a sub sample of years or partially adopted the federal policy.

Table 9A: Bonus Depreciation State Adoption Continued

State	Bonus Episode 1	Bonus Episode 2	Special
Massachusetts	Full Rejecter	Full Rejecter	
Michigan	Full Rejecter	Full Rejecter	
Minnesota	20% Adopter	20% Adopter	
Mississippi	Full Rejecter	Full Rejecter	
Missouri	2001, 2002 Adopter	Full Adopter	
Montana	Full Adopter	Full Adopter	
Nebraska	32% Adopter	Full Adopter	
Nevada			No Corporate Income Tax
New Hampshire	Full Rejecter	Full Rejecter	
New Jersey	Full Rejecter but for 2001	Full Rejecter	
New Mexico	Full Adopter	Full Adopter	
New York	Pre 2003 Full Adopter	Full Rejecter	Bonus Allowed if in Resurgence Zone or New York Liberty Zone
North Carolina	30%Adopter in 2003, 2004	15% Adopter	
North Dakota	Full Adopter	Full Adopter	
Ohio	1/6 Adopter	1/6 Adopter	Corporate Franchise Tax Phased out in 2010
Oklahoma	2001, 2002: 20% Adopter; 2003: Full Adopter	2008, 2009: 20% Adopter; 2010+: Full Adopter	
Oregon	Full Adopter	2009, 2010: Full Adopter but for 2009, 2010	

Notes: Full Rejecters are those states that allowed for no bonus depreciation. Full Adopters are those states that allowed for the statutory federal level of bonus depreciation. Data is taken from "State Conformity with Federal Bonus Depreciation Rules" by Jessica Lechuga, posted on Bloomber BNA. Dark gray rows are states that were full adopters during both bonus episodes. Light gray states are those that fully adopted for a sub sample of years or partially adopted the federal policy.

Table 9B: Bonus Depreciation State Adoption Continued

State	Bonus Episode 1	Bonus Episode 2	Special
Pennsylvania	3/7 Adopter	Full Rejecter but for 2011	
Rhode Island	Full Rejecter	Full Rejecter	
South Carolina	Full Rejecter	Full Rejecter	
South Dakota			No Corporate Income Tax
Tennessee	Full Rejecter but for 2001, 2002	Full Rejecter	
Texas	Full Rejecter	Full Rejecter	
Utah	Full Adopter	Full Adopter	
Vermont	Full Rejecter	Full Rejecter	Allowed for Individuals prior to 2008
Virginia	Full Rejecter	Full Rejecter	Allowed for Qualifying Disaster Property
Washington			No Corporate Income Tax
West Virginia	Full Adopter	Full Adopter	
Wisconsin	Full Rejecter	Full Rejecter	
Wyoming			No Corporate Income Tax

Notes: Full Rejecters are those states that allowed for no bonus depreciation. Full Adopters are those states that allowed for the statutory federal level of bonus depreciation. Data is taken from "State Conformity with Federal Bonus Depreciation Rules" by Jessica Lechuga, posted on Bloomber BNA. Dark gray rows are states that were full adopters during both bonus episodes. Light gray states are those that fully adopted for a sub sample of years or partially adopted the federal policy.

Appendix B   Synthetic Control Visuals

Figure 6: Synthetic Control Visuals

(a) Colorado Capx

(b) Colorado Employment

(c) Oregon Capx

(d) Oregon Employment
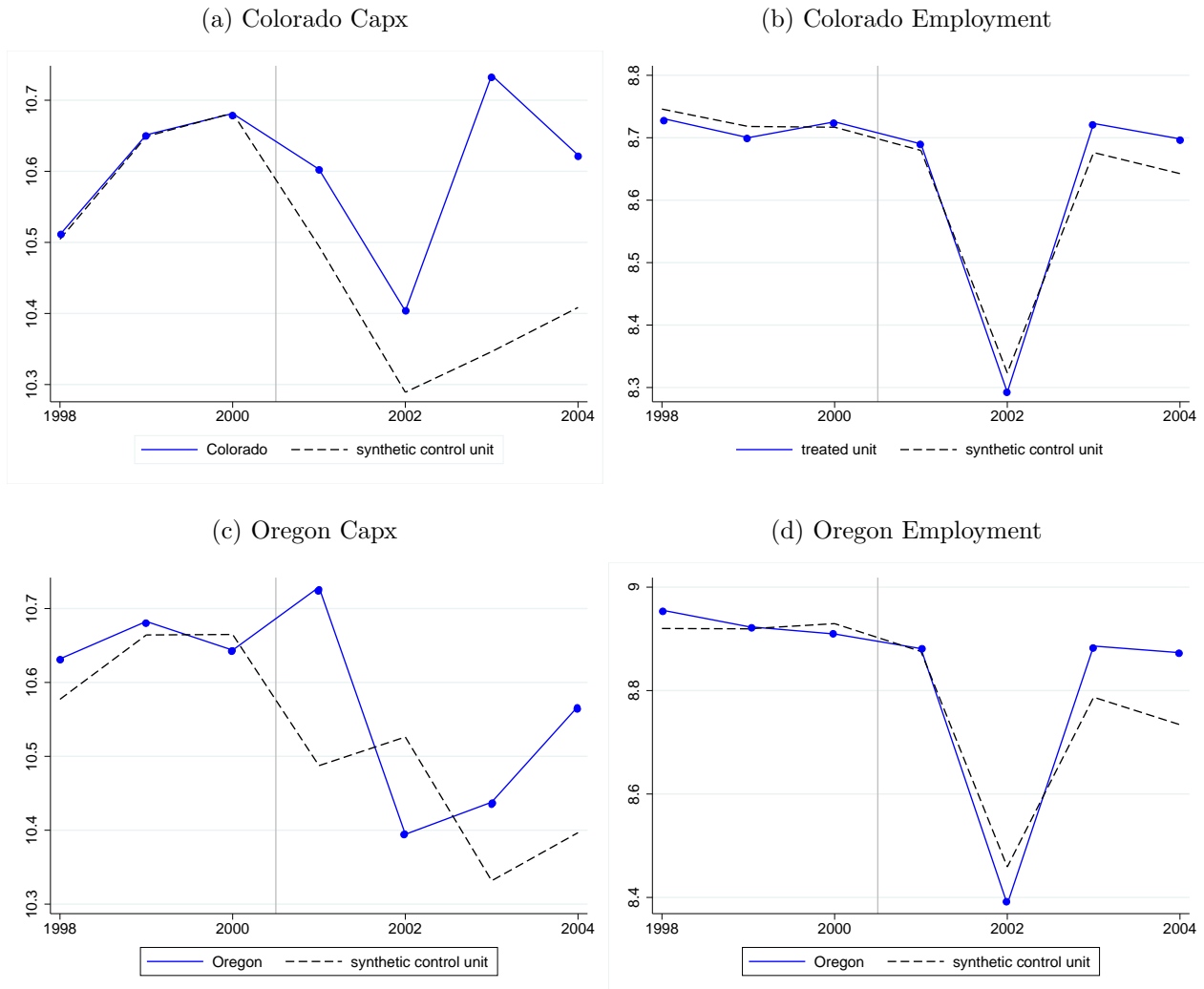
Notes: Figure 6 compares the capital expenditure and employment of Colorado and Oregon against synthetic control units as constructed using techniques pioneered in Abadie, Diamond, and Hainmueller (2010). Synthetic control units are the weighted combination of states that did not allow for bonus depreciation in years 2001 through 2004. Colorado and Oregon are depicted here because they fully adopted bonus deprecation in years 2001 through 2004 and because they are the two states which used the most other states in the construction of their synthetic control units.

Appendix C   Bonus Depreciation Legislation

- The Job Creation and Workers Assistance Act of 2002 enacted 30% bonus depreciation for property placed into service after September 10, 2001.

- The Jobs and Growth Tax Relief Reconciliation Act of 2003 increased the bonus level to 50% for property placed into service after May 5, 2003, and before January 1, 2005.

- Bonus depreciation expired December 31, 2004.

- The Economic Stimulus Act of 2008 reintroduced the bonus depreciation at a 50% rate for capital placed into service after January 1, 2008.

- American Recovery and Reinvestment Act of 2009 extended the bonus at the 50% rate through 2009.

- The Small Business Jobs and Credit Act of 2010 further extended the depreciation at the same rate through 2010. However, SBJCA was not signed into law until September 27, 2010, so for the majority of 2010 businesses may have been under the impression that the bonus depreciation might not be available on new capital expenditure.

- The Tax Relief and Unemployment Insurance Reauthorization and Job Creation Act of 2010 (signed on December 17, 2010) raised the bonus rate to 100% for property placed into service after September 8, 2010, and before January 1, 2012. Property placed into service during 2012 garnered the 50% bonus.

- The American Taxpayer Relief Act of 2012 extended bonus depreciation at a rate of 50% for 2013.

- The Tax Increase Prevention Act of 2014 which was signed into law on December, 2014 retroactively extended bonus through year 2014.

Appendix D Limiting Analysis by State Budget Gaps

Table 10: Impacts and Employment Impacts 2005-2011

DEPENDENT VARIABLE:		LN CapX			LN Emp	
2008 BUDGET GAP		< 0%	< 0%		< 0%	< 0%
STATE CORP TAX RATE			> 0%			> 0%
SPECIFICATION	(1)	(2)	(3)	(4)	(5)	(6)
BONUS ×	0.029	-0.026	-0.059	0.014	0.097***	0.091***
STATE ADOPTION	(0.037)	(0.068)	(0.058)	(0.013)	(0.029)	(0.027)
YEAR FE	✓	✓	✓	✓	✓	✓
STATE CONTROLS	✓	✓	✓	✓	✓	✓
NAICS x YEAR FE	✓	✓	✓	✓	✓	✓
ADJ. R-SQUARE	0.133	0.080	0.075	0.563	0.608	0.587
STATE x NAICS GROUPS	816	160	156	825	160	156
OBSERVATIONS	5,298	1,048	947	5,542	1,079	976

Notes: Specifications (1) through (6) present estimates of variants of equation (1). The dependent variables in Specifications (1) through (3) is the log of capital expenditures. The dependent variable in Specifications (4) through (6) is the log of employees. All specifications focus on are estimated using data from 2005-2011. Specifications (2), (3), (5), and (6) limit the analysis to states which did not have deficits in 2008. Specifications (3) and (6) limit analysis to states with corporate income taxes. All specifications include NAICS x Year and State x NAICS fixed effects as well as a robust set of controls to capture changes in state politics, productivity, population, and finances. Standard errors are two-way clustered by state and year and are reported in parentheses. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *.