The Economic Impact of Connecticut's Corporate Tax Policy Changes: 1995-2012©

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Executive Summary

This study's results suggest that the corporate tax rate reductions, and the credit and exemption programs enacted in the early 1990s have been a mixed and small success for the Connecticut economy, because all programs except the corporate income tax rate reduction generated small job increases and most programs cost the state in terms of public sector hiring forgone. In addition, it is possible that the public goods and services firms need were reduced due to lower state spending that offset the programs' costs. If the state eliminated the 15 existing programs creating 72 jobs or fewer in 2002, it would recapture almost $18 million and forgo 278 new private sector jobs.

The Legislature's Finance, Revenue and Bonding Committee asked the Connecticut Center for Economic Analysis at the University of Connecticut to assess the economic impact of various tax law changes over the past decade as they pertain in particular to corporations and unincorporated businesses. Specifically, they ask: have the corporate income tax rate changes, targeted sales and property tax exemptions, credits and structural (apportionment factor) changes caused firms to remain or expand in Connecticut, or to locate in Connecticut for the first time? How many jobs have been created or saved as a result of these firm activities? Our analysis attempts to answer these questions with three approaches. First, using data supplied by the Department of Revenue Services (DRS), we use the Connecticut economic model (REMI) to assess quantitatively the impact of the tax changes. Second, we interviewed a number of Connecticut business leaders and tax consultants to determine their responses to the tax changes (see Section 2). Lastly, we review relevant literature in Section 3 to explore the theoretical and practical issues of corporate tax law changes on business location and expansion.

The literature illustrates the difficult tradeoff as legislatures consider forgoing revenue that could be used to provide infrastructure and services businesses need to provide incentives for retention and growth. Corporate tax structure and tax incentive programs are competitive issues among the states and Connecticut has done much to improve its business tax environment as the interviews suggest.

The corporate tax rate cuts, credits and exemptions increased capital accumulation and worker productivity relatively more than employment because their targets have been physical and human capital accumulation. Connecticut as a result produced disproportionately more output (GSP) than it created jobs. Connecticut's disproportionate increase in GSP relative to total employment is evident from GSP's 0.517% increase relative to the baseline forecast compared to total employment's increase of 0.199% relative to the baseline in 2002. These investments helped make Connecticut the productivity leader in the United States.

➢ The combination of credits, exemptions and rate cuts creates 10,440 new **private, nonfarm** jobs in 2002.

➢ Because state government spending was lower due to revenue forgone, public sector employment declines by 5,965 jobs in 2002.

➢ Total employment (the sum of the two sectors) increases by 4,475 jobs.

How many of these jobs were saved that otherwise would have been lost is difficult to say, because we are assessing the total change in all jobs created as a result of the rate reduction, credit and exemption programs. Some of the jobs created were retained, some were new due to Connecticut firms' expansion, and some were new due to new firms locating in Connecticut during this period.

Summarizing, were it not for the tax cuts, exemptions and credits, Connecticut would have 4,475 fewer total jobs in 2002.

➢ Connecticut personal income increases $280 million in 2002, $299 million in 2007 and $339 million in 2012.

➢ Gross state product (GSP) increases by $1,036 million in 2002, $1,307 million in 2007, and by $1,588 million in 2012.

Summarizing, were it not for the tax cuts, exemptions and credits, Connecticut would have $1,036 million less GSP and $280 million less personal income and in 2002.

➢ Actual state revenue forgone for all programs in 2002 is more than $430 million.

➤ The 10,440 private sector jobs (forecast to be) created in 2002 add up to the 54,941 private sector job-years created from 1995 through 2002.

➤ We forecast the state to forgo more than $2.425 billion from 1995 through 2002, so that the cost per job created through 2002 is $44,436.

➤ Personal income increases $280 million in 2002 implying that for each dollar the state gave up that year, personal income increases 65 cents.

The general corporate tax rate reductions have the largest impact relative to all credit and exemption programs. For the case of the combined tax cut, exemption and credit programs, in 2002, 57% of the private sector employment impact (5,956 jobs) is due solely to the corporate income tax rate reductions. This result obtains even though in all income years, the total amount of credits and exemptions claimed was significantly greater than the amount forgone in corporate income tax revenue. **The reason is that in the latter case, firms' spending was unrestricted, and we assume firms put their tax savings to their most productive uses. A lower corporate income tax is a competitive issue among the states, and greater business expansion in Connecticut may have resulted from this policy relative to the variety of credits and exemptions policies that primarily benefited firms already in place.**

❖ In terms of private sector jobs created, the Research and Experimental (Incremental) Expenditures Credit generates the next largest number of jobs (1,261) in 2002.

❖ Third is the Property Tax Exemption on manufacturing machinery and equipment that creates 1,106 private sector jobs in 2002.

❖ Fourth is the Insurance Reinvestment credit that creates 633 private sector jobs in 2002.

❖ Fifth is the Fixed Capital credit with 333 jobs that creates in 2002.

❖ The sales tax exemption on data processing services produces the sixth highest private sector job gain (321 jobs) in 2002.

❖ Fifteen of the credit programs create 72 or less jobs each in 2002.

CCEA's individual credit and exemption program results show that in general jobs created in the private sector are sometimes (significantly) offset by job losses (or forgone hiring) in the public sector as a result of forgone state tax revenue. Many of the credit programs generated insignificant new state revenue relative to their cost.

These results suggest that the corporate tax rate reductions, and the credit and exemption programs have been a mixed and small success for the Connecticut economy, because all programs except the corporate tax rate reduction generated small job increases and most programs cost the state in terms public sector hiring forgone. If for example, the state eliminated the 15 existing programs creating 72 jobs or fewer in 2002, it would recapture $17,831,128 and forgo 278 new private sector jobs. Whether these programs stimulated business expansion or relocation, or forestalled employment reductions is difficult to determine, but they did create new private sector economic activity, primarily by increasing capital, and labor productivity, that offset some of their cost. Another issue is that the credit and exemption programs entailed possibly significant transaction costs. Thus, potential benefits were reduced somewhat, as perhaps some firms were deterred from making claims at all. In addition, it is possible that public goods and services firms need were reduced due to lower state spending that offset the programs' costs.

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1995-1999

Section 1:

Introduction

The Legislature's Finance, Revenue and Bonding Committee asked the Connecticut Center for Economic Analysis at the University of Connecticut to assess the economic impact of various tax law changes over the past decade as they pertain in particular to corporations and unincorporated businesses. Specifically, they ask: have the corporate income tax rate changes, targeted sales and property tax exemptions, credits and structural (apportionment factor) changes caused firms to remain or expand in Connecticut, or to locate in Connecticut for the first time? How many jobs were created or saved as a result of these firm activities? Our analysis attempts to answer these questions with three approaches. First, using data supplied by the Department of Revenue Services (DRS), we use the Connecticut economic model (REMI) to assess quantitatively the impact of the tax law changes. Second, we interviewed a number of Connecticut business leaders and tax consultants to determine their responses to the tax changes (see Section 2). Lastly, we review the relevant literature in Section 3 to find out what other states' experiences have been, as well as to explicate the theoretical issues of corporate tax law changes on business location and expansion.

Data availability governed the analysis time frame. DRS provided detailed industry sector data describing tax credits actually claimed for income years 1995, 1996, 1997, 1998, and 1999. We obtained the corporate tax rate changes and corresponding revenues forgone for these years as well. CCEA carried the value of the credits and exemptions in effect in 1999 and corporate tax rate in effect in 2000 unchanged out to 2012 to assess the effects of these stimuli on the Connecticut economy when it would adjust fully to them. OPM provided estimates of the revenue loss due to the insurance reinvestment tax credit from FY 2001 through FY 2011.

We have not accounted for the changes in moving from a three-factor to a single factor (sales only) tax structure during this period, because these specific effects are difficult to determine and no data is yet available. We examine the results of the fiscal stimuli individually and in aggregate allowing us to assess the effects of the tax rate reduction, credit, and exemption programs independently.

The sales and property tax exemptions are independent of profit, while the cases for corporate tax rate reductions and credits require that firms earn profit. We include a section that describes the individual impacts of the corporate tax cut and each credit and exemption program in terms of its cost of private sector job creation, and its cost per dollar returned to the state.

Working Assumptions

Our starting assumption is that firms spent at least what they could recapture as a credit and would have spent something in any case equivalent to the rate of economic growth or their historical spending pattern. In other words, if a firm recognized that it could spend an additional $100,000 on pollution abatement and receive a tax credit for that amount, it would do so. The question is how much *actual* additional spending in the targeted area took place as a result of the credit or exemption, as firms had planned some spending in the targeted areas in any case. If they spent each dollar of the credit claimed on *additional* physical or human capital for example, this is the unitary elasticity assumption. Because we interpret many of the credits and exemptions as relative price reductions of goods or services in the targeted areas, unitary elasticity implies a ten percent price reduction in a good or service induces a ten percent increase in the quantity purchased. However, this may be too optimistic; firms may not spend the full amount of the credit (saving some in retained earnings) and they may not spend it in the area specified by the credit statute.

Empirical research suggests (see the literature review) that the elasticity of economic growth with respect to business tax policy is about -0.2. This means that reducing business taxes by 10% results in a 2% increase in targeted economic activity. This is an

aggregate estimate that we apply at the firm level instead of a dollar for dollar targeted spending pattern implied by unitary elasticity. In addition, we calculate results for an elasticity of -0.5, meaning a 5% increase in targeted economic activity induced by a 10% business tax reduction. We estimate as well the case in which firms spend 100% of their claims in the targeted area for comparison, which is the unitary elasticity assumption (i.e., elasticity = -1.0). We present however, a single case representing our best estimate of firm behavior in which firms spend 20% of the credit or exemption claimed in the targeted area or activity and place the remainder in retained earnings where it flows to its most productive use. ***Absent any rate reductions or tax credits, we assume that firms would spend as they did in the recent past or at the rate of economic (GSP) growth. This pattern is the status quo or baseline REMI forecast.***

Further, we assume that credits resulting in increased employment did so only in the year in which the credits exist. This means that jobs created did not accumulate if the credit continued for more than one year. If, however, the credit towards profits, and in this case the property tax exemption as well, results in increased capital accumulation (buildings or equipment), we assume the increased output made possible from such investment *does* accumulate, because the new capital would continue to be employed even if the credit or exemption ceased. We assume a 5% per year capital depreciation rate. Some credits stimulated further job training and education resulting in greater productivity that we model as reduced production costs.

We model the state's forgone revenue as reduced expenditure, rather than reduced revenue. Our assumption is that one dollar less revenue results in one dollar less government expenditure. This most likely manifested as forgone hiring.

Analysis

For each tax program described below, we calculate results for elasticities of -0.2, -0.5 and -1.0. ***However, we present results only for the -0.2 case only as we believe it represents the most plausible level of firm responsiveness to the fiscal stimuli based on our review of the literature.*** This case produces the greatest private sector impact (change). We evaluate each tax program's impact independently for job creation and return to the state. The Appendix to Section 1 explains the assumptions and modeling strategy for REMI input (changes in public and private spending, employment and cost of capital) for each tax credit program. We describe the sales and property tax exemptions and the corporate income tax cut below.

Property Tax Exemptions

There is a property tax exemption for purchases of manufacturing machinery, certain biotech capital purchases, and for commercial motor vehicles (CGS 12-81 exemption #72) described in Table 1 (source: OFA). We model this by increasing spending in industrial equipment and motor vehicles by 20% of the amount claimed and decreasing state spending by the full amount forgone. The remainder of the exemption claimed reduces the (claiming) firms' cost of capital. This captures the fact that some investment would have occurred in any case and is consistent with our assumption of a conservative response to these stimuli. ***We assume the property tax exemption essentially acts as a price reduction on machinery upgrades and claiming firms buy additional capital goods in the amount of some fraction of the exemption. These new capital goods including physical plant expansion enable claiming firms to produce more output each year for the usable life of the capital. Thus, additions to new output accumulate.*** We use the historical U.S. capital-output ratios for each industry in each year of the study period to estimate new annual output. We assume the state reimbursed the affected towns in full for their loss of property tax revenue.

Table 1: Property Tax Exemptions

Fiscal Year	Number of Firms	Amount Claimed (million $) or Revenue Forgone
2000-2001	4666	$76.1 [$1 mil for motor vehicles]
1999-2000	4575 [19 biotech]	$70.5 [$7.1 biotech]
1998-1999	4472	$68.3
1997-1998	4109	$61.8

Sales Tax Exemption

The sales tax on the purchase of data processing services (CGS 12-412 exemption #74) began its phase-out in FY 97-98 when it moved from 6% to 5% on such purchases. The following fiscal year it moved from 5% to 4%, and in FY 99-00, it moved from 4% to 3%. The state gave up $16 million in the first year, $32 million in the second and $44 million in the third year. This represents approximately a 1% reduction in the price of data processing services each year. The data processing services sector primarily benefited due to increased sales in the amount of $3.2 million in FY 97-98 (20% of $16 million), $6.4 million in FY 98-99, and $8.8 million in FY 99-00. In this calculation, we use our working assumption of a responsiveness (elasticity) of -0.2 (20%) to a relative price change. The difference between what the state gave up in sales tax revenue and the increased sales of data processing services reduced the claiming firms' cost of capital. OFA provided forgone revenue data for this case.

Corporate Income Tax Rate Cut

We calculate the general corporate income tax rate cut by taking the change in the tax rate for a given year relative to the pre-1995 corporate tax rate and model this as an across the board cut in the corporate tax rate that has been equally available to all firms. Table 2 shows corporate tax rates for a sample of years.

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Table 2: Corporate Tax Rate Changes

Income Year	Corporate Tax Rate	Revenue Forgone
1994	11.50%	-
1995	11.25%	$6.6 million
1996	10.75%	$27 million
1997	10.50%	$46 million
1998	9.50%	$80 million
1999	8.50%	$135 million
2000+	7.50%	$175 million

The tax collections in Table 2 reflect the Office of Fiscal Analysis' estimates of corporate tax revenue forgone for income years 1995 through 1999. These estimates work with DRS data and filter out non-policy related corporate tax revenue changes.

Tax Credits

We calculate the economic activity that had to occur in order for firms to claim tax credits and input these implied economic activities (new employment, new output) into the REMI model for the appropriate year. We increase corporate spending on a targeted activity or good by 20% of the amount of the tax credit that firms actually claimed. We assume the remainder of the credits claimed reduced the claiming firms' cost of capital (that is, they went into retained earnings and to their most productive use).

Table 3 illustrates the magnitude of the credits actually claimed by firms in Connecticut in terms of forgone revenue in each year of our analysis.

Table 3: Corporate Tax Credits Claimed

Income Year	Total Credits Claimed
1995	$ 58,339,796
1996	$ 68,661,966
1997	$137,841,540
1998	$113,756,382
1999	$113,293,022
2000+	$113,293,022

The credits claimed and tax revenues forgone in each year reduce the total budget available to the state. In lieu of tax increases, we offset the increased economic activity

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resulting from the corporate rate cuts, credits and exemptions by reducing state government spending by the amount forgone.

Results: Combined Credits, Exemptions and Rate Reductions

We organize this subsection as follows: we present and explain the results of the combined (tax cut, all credit and exemption) programs; subsequently, we present and explain the results of the corporate income tax cut, and each credit and exemption program.

We measure the economic impact of the tax changes, credits and exemptions as the sum of the direct, indirect (business to business activity) and induced (additional rounds of spending from indirect activity) changes in key economic variables relative to a baseline or status quo forecast in which no tax changes, credits or exemptions occur. Therefore, these changes are the not the same as year-to-year changes in the levels of the variables. Table 4 below shows the essential results for the combined (all tax, credit and exemption) programs. We present our most plausible case (the 20% case) of corporate response to the tax programs in place during fiscal or income years 1995, 1996, 1997, 1998, and 1999 for which we have data. This case produces the largest private sector impact. Our time horizon is actually 18 years (1995 through 2012) because we carry 1999 credit and exemption claims then in effect out to 2012. The increased investments in physical and human capital take time to realize increased output, lower prices and increased profitability and competitiveness. During this extended period, we assume the economy fully adjusts to these changes, everything else equal.[1] Everything else equal means that the Connecticut economy undergoes no major unanticipated shocks, or that neighboring states' economies undergo no major unanticipated shocks.

We forecast changes (the impacts) from the baseline in the levels of key economic and fiscal variables for 2002, 2007 and 2012. The impact columns represent results that are

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[1] Our analysis over the long run shows that by maintaining the corporate tax rate change, credits and exemptions for 30 years at their 1999 values, the Connecticut economy adjusts fully in about 12 years to a new long run equilibrium.

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changes from the baseline forecast due to firm activity stimulated by the corporate income tax rate cuts, and the credits and exemptions firms claimed. For the latter two, we increase corporate spending (or employment) on a targeted activity by 20% of the amount of the tax credits or exemptions firms claimed, which, with the additional, cumulative output made possible by these investments (we assume capital depreciates at 5% per year), is the implied economic activity that had to occur by claiming the credit. The remainder of the credit or exemption adds to the claiming firms' retained earnings. This, we assume, leads to firms' unrestricted spending for its most productive uses.

The nature of the stimuli provided by the tax rate cuts, credits and exemptions has been to increase capital accumulation and worker productivity relatively more than employment. The result is Connecticut produced disproportionately more output (GSP) than it created jobs. It is not possible to glean this from comparing Connecticut's GSP per worker with the ratio of the change in GSP to the change in total employment reported in Table 4 below, because these ratios measure different concepts. Connecticut's disproportionate increase in GSP relative to total employment arises from GSP's 0.517% increase relative to the baseline forecast compared to total employment's increase of 0.199% relative to the baseline in 2002.

The combination of credits, exemptions and rate cuts creates 10,440 new **private, nonfarm** jobs in 2002 for the combined case. *Because state government spending is lower due to forgone revenue, public sector employment declines by 5,965 jobs in 2002.* Total employment (the sum of the two sectors) increased slightly by 4,475 jobs. How many of these jobs were saved that otherwise would have been lost is difficult to say, because we are assessing the total change in all jobs as a result of the rate reduction, credit and exemption programs. Some jobs were saved, some were created due to firm expansion, and some were created due to new firms locating in Connecticut during this period. Untangling how many jobs resulted from which cause is not possible because our model cannot determine firm level dynamics. **Summarizing, were it not for the tax cuts, exemptions and credits, Connecticut would have 4,475 fewer jobs in 2002.**

Connecticut personal income increases $280 million, while disposable personal income increases $220 million in 2002. These measures of personal wellbeing increase in 2007 and 2012 to $299 million and $240 million respectively. Gross state product (the value of all goods and services produced in the state in a year on a value added basis) increases by $1,036 million in 2002, $1,307 million in 2007, and by $1,588 million in 2012. **Summarizing again in different words, were it not for the tax cuts, exemptions and credits, Connecticut would have $280 million less personal income and $220 million less disposable income in 2002. In addition, Connecticut would have $1,036 million less GSP in 2002. These numbers reflect the disproportionate increase in output with respect to personal income because the tax programs' stimuli principally increased physical and human capital and therefore output and productivity more than employment.**

State expenditures actually decrease in 2002, 2007 and 2012, in part because the increased private sector economic activity as a result of the various tax changes makes certain publicly provided services (e.g., welfare, day care, job training) less costly to the state. In addition, we assume the state reduces its spending dollar for dollar corresponding to its forgone revenue resulting in, among other things, lower public sector employment of 5,965 jobs in 2002 due to forgone hiring. We calculate a *net* cost of the tax changes for Connecticut as follows (see Table 4): in 2002, the $430.15 million not removed from the economy (at the beginning of the year), modeled as reduced government spending, actually reduces spending by $414.52 million. This means that new economic activity induced $15.63 million in additional state spending. The new economic activity due to the tax cuts, exemptions and credits creates $117.3 million in new tax revenue (the dynamic revenue effect). This amount offsets the $15.63 million in new induced spending plus the initial policy spending reduction (revenue forgone) of $430.15 million. Thus, the state is actually out $328.49 million at year's end; this is the *net* cost of the tax changes in 2002.

We calculate the cost to the state of each job created in a given year by dividing the sum of the *net* cost of the tax changes up to and including that year divided by the sum of the

new jobs created up to and including that year. For the combined case, there are 54,591 jobs (actually job-years) created from 1995 through 2002. We forecast the state to experience a total net cost of the tax changes of $1,949,832,961 from 1995 through 2002, so that the net cost per private sector job created through 2002 is $35,717 per year. The small population increase (7,096 individuals) in 2002 is less than the private sector jobs created in 2002 (10,440 jobs), because private sector job creation in this case increases the labor force participation rate and does not induce much in-migration.

GSP increases $1,036 million in 2002 implying an increase of $3.15 for each dollar of *net* cost of the tax changes in 2002. These ratios are $3.91 and $5.28 in 2007 and 2012 reflecting again the disproportionate improvement of output relative to employment and personal income. Personal income increases $280 million in 2002 implying that for each *net* dollar the state gave up that year, personal income increases 85 cents in 2002; the results are 89 cents for a $299 million increase for 2007, and $1.13 for a $339 million increase for 2012.

These results suggest that the corporate tax rate reductions, credits and exemptions have been a mixed and small success for the Connecticut economy, because private sector job creation and retention is offset by public sector forgone hiring and by public goods and services provision reductions. Thus, the size of the economic changes is quite small in several programs. Whether the tax programs stimulated business expansion or relocation, or forestalled layoffs is difficult to determine, but they did create new private sector economic activity that offset some of their cost. Another issue is that the credits and exemptions programs entailed possibly significant transaction costs. Thus potential benefits were reduced somewhat, as perhaps some firms were deterred from making claims at all.

The subsection following Table 4 and Charts 1 and 2 provides the individual impacts of the corporate tax rate reduction and each credit and exemption program in terms of its new job creation, average cost per job created, and its average cost per dollar of gross revenue returned to the state. Charts 1 and 2 illustrate graphically the changes from the

status quo forecast (one in which there are no rate reductions, credits or exemptions) in the principal economic variables for the combined and tax cut only cases. ***Chart 1 clearly illustrates the dominance of the corporate tax rate reduction relative to the combined case with respect to GS and personal income suggesting that there are offsetting effects by combining the corporate tax rate reduction with the credits and exemptions. These effects are due to the larger revenues forgone for the targeted investments relative to the forgone revenue for the tax cut that led to unrestricted corporate spending for its most productive uses.***

In Table 4, percent changes are not available for variables calculated outside the REMI model in which the baseline is well defined.

Table 4: Essential Results for Key Economic Variables

Economic Impact - Connecticut Corporate Tax Cuts, Credits and Exemptions (20% Case) 1995-2012						
Year	2002		2007		2012	
Economic Variables [Changes from the baseline forecast]	Impact (Absolute Change & Percent)		Impact (Absolute Change & Percent)		Impact (Absolute Change & Percent)	
Private Non-Farm Employment (Jobs)	10,440	0.525%	9,908	0.482%	9,742	0.458%
Public & Farm Employment (Jobs)	-5,965	-2.29%	-5,390	-2.06%	-4,583	-1.75%
Total Employment (Jobs)	4,475	0.199%	4,518	0.195%	5,159	0.216%
Gross State Product (Mil 01$)	$1,036	0.517%	$1,307	0.578%	$1,588	0.626%
Personal Income (Mil 01$)	$280	0.175%	$299	0.168%	$339	0.175%
Fiscal Variables [Changes from the baseline forecast]						
Cost of Tax Changes: Revenue Forgone (Nominal millions $)	($430.15)		($434.75)		($408.25)	
Induced New Spending: Additional Expenditure Required (Mil 01$)	($15.63)		($21.90)		($25.35)	
Dynamic Revenue Effect (Mil 01$)	$117.30	0.568%	$123	0.547%	$133	0.549%
Net Cost of Tax Changes (Mil 01$)	($328.49)		($333.96)		($300.50)	
Selected Cost-Benefit Ratios						
GSP/Net Cost of Tax Changes	$3.15		$3.91		$5.28	
Net Cost of Tax Changes/Private Sector Job Created	$35,717		$34,782		$33,799	
Net Cost of Tax Changes/All Jobs Created	$106,297		$90,785		$80,098	
Personal Income/Net Cost of Tax Changes	$0.85		$0.89		$1.13	

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Chart 1

Key Economic Variables

Legend:
- Personal Income (Mil 01$)
- Gross State Product (Mil 01$)

Y-axis: Millions 2001$

Categories: Combined Case 2002, Corporate Tax Cut 2002, Combined Case 2007, Corporate Tax Cut 2007, Combined Case 2012, Corporate Tax Cut 2012

Values:
- Combined Case 2002: $280, $1,036
- Corporate Tax Cut 2002: $182.10, $601.54
- Combined Case 2007: $299, $1,307
- Corporate Tax Cut 2007: $271.71, $894.02
- Combined Case 2012: $339, $1,588
- Corporate Tax Cut 2012: $314.73, $1,133.63

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Chart 2

Employment Measures

Legend:
- Public & Farm Employment (Jobs)
- Total Employment (Jobs)
- Private Non-Farm Employment (Jobs)

Y-axis: Jobs (12,000; 10,000; 8,000; 6,000; 4,000; 2,000; 0; -2,000; -4,000; -6,000)

X-axis categories:
Combined Case 2002, Corporate Tax Cut 2002, Combined Case 2007, Corporate Tax Cut 2007, Combined Case 2012, Corporate Tax Cut 2012

Data labels:
- Combined Case 2002: 4,475; 10,440; -5,965
- Corporate Tax Cut 2002: 3,653; 5,956; -2,303
- Combined Case 2007: 4,518; 9,908; -5,390
- Corporate Tax Cut 2007: 4,700; 6,609; -1,909
- Combined Case 2012: 5,159; 9,742; -4,583
- Corporate Tax Cut 2012: 5,172; 6,817; -1,645

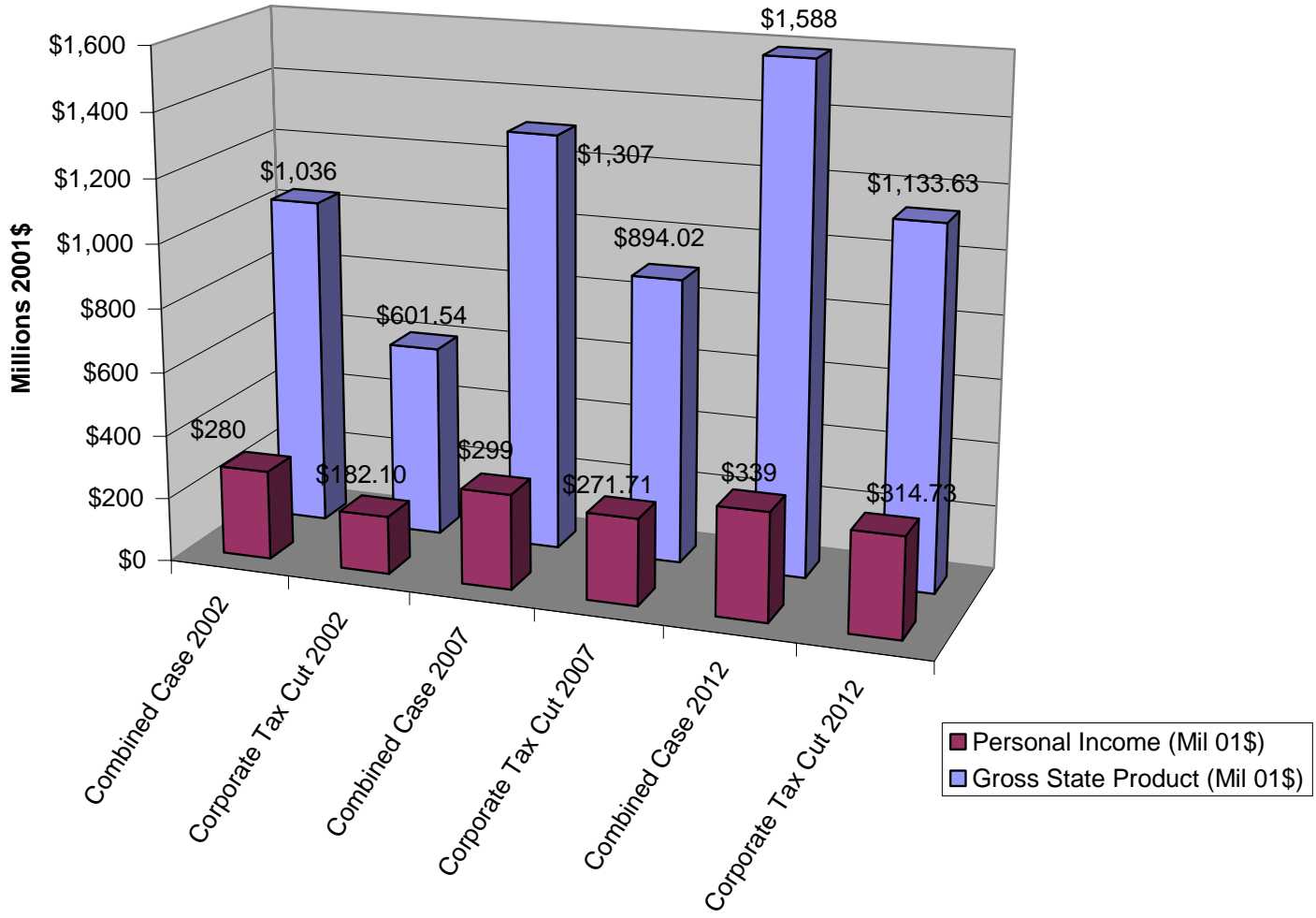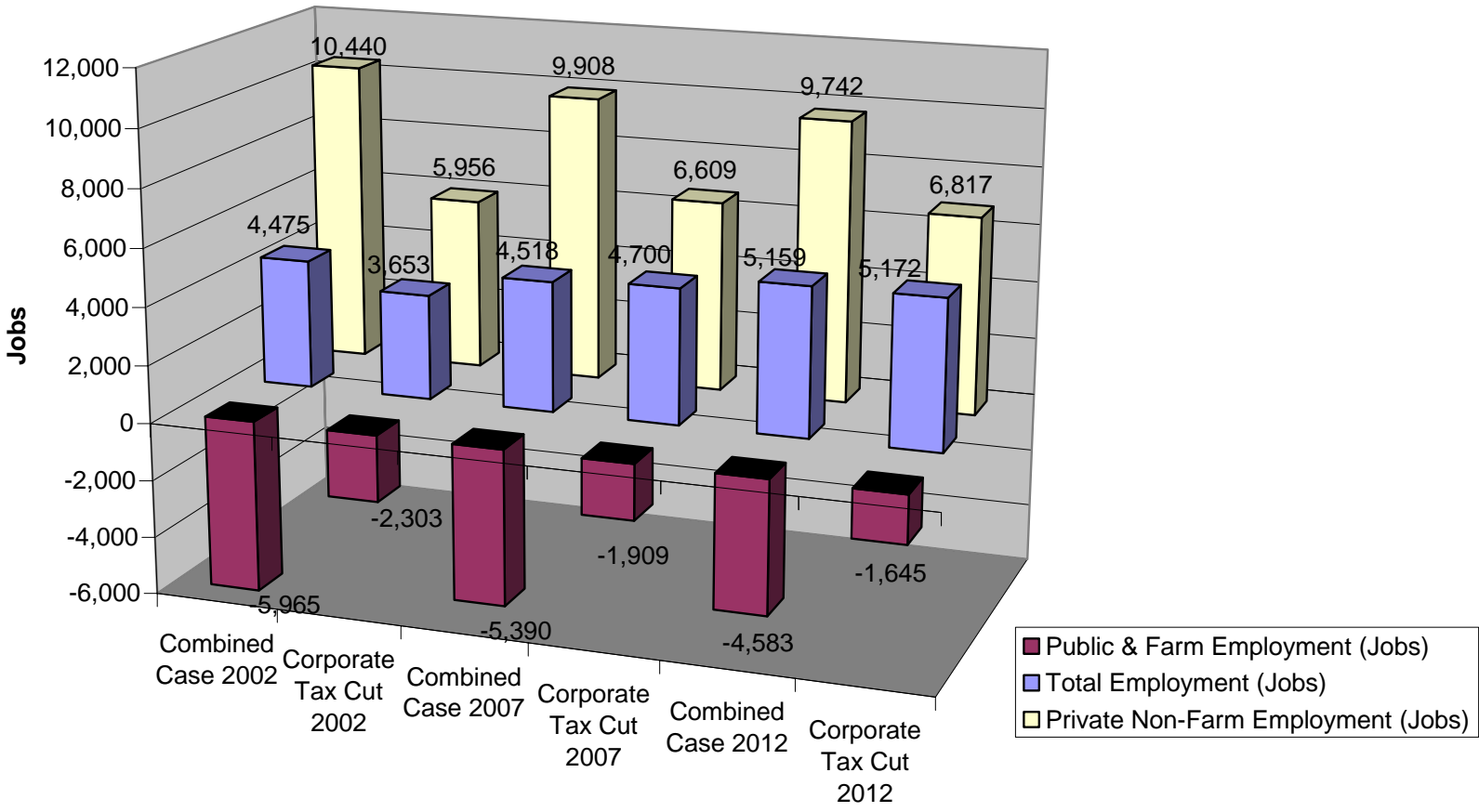## Corporate Tax Rate Reduction and Tax Credit and Exemption Impacts

The general corporate tax cut created 5,956 private sector jobs in 2002, which are 4,484 fewer private sector jobs than the 20% combined case reported above. In the combined case, 57% of the private sector jobs created in all programs resulted exclusively from the corporate income tax reductions. Table 5 reports the macroeconomic effects of the corporate tax rate reductions in the same format as in Table 4. Percent changes are not available for variables calculated outside the REMI model in which the baseline is well defined.

Table 5

General Corporate Tax Cut						
Year	2002		2007		2012	
Economic Variables [Changes from the baseline forecast]	Impact (Absolute Change & Percent)		Impact (Absolute Change & Percent)		Impact (Absolute Change & Percent)	
Private Non-Farm Employment (Jobs)	5,956	0.299%	6,609	0.321%	6,817	0.321%
Public & Farm Employment (Jobs)	-2,303	-0.88%	-1,909	-0.71%	-1,645	-0.61%
Total Employment (Jobs)	3,653	0.162%	4,700	0.202%	5,172	0.216%
Gross State Product (Mil 01$)	$601.54	0.300%	$894.02	0.395%	$1,133.63	0.447%
Personal Income (Mil 01$)	$182.10	0.114%	$271.71	0.153%	$314.73	0.162%
Fiscal Variables [Changes from the baseline forecast]						
Cost of Tax Changes: Revenue Forgone (Nominal millions $)	($175.00)		($175.00)		($175.00)	
Induced New Spending: Additional Expenditure Required (Mil 01$)	($9.25)		($15.34)		($19.39)	
Dynamic Revenue Effect (Mil 01$)	$80.75	0.391%	$98.44	0.439%	$111.20	0.458%
Net Cost of Tax Changes (Mil 01$)	($103.50)		($91.90)		($83.19)	
Selected Cost-Benefit Ratios						
GSP/Net Cost of Tax Changes	$3.44		$5.11		$6.48	
Net Cost of Tax Changes/Private Sector Job Created	$21,407		$17,819		$15,955	
Net Cost of Tax Changes/All Jobs Created	$39,816		$28,869		$24,040	
Personal Income/Net Cost of Tax Changes	$1.04		$1.55		$1.80	

Table 6 below presents the details of each credit program impact in alphabetical order (except for the Property and Sales Tax Exemption programs listed last), as well as the general corporate tax rate reductions. As with the combined cases, we examine results in which corporations spend 20% of the credit claimed on the targeted activity. The remainder adds to their retained earnings and, in effect, reduces their cost of capital that in turn allows the firm to spend these funds in the

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most productive manner. Thus, all of the money claimed flows into the economy, albeit via different paths.

As above, we report the estimated changes from the baseline forecast in 2002, 2007 and 2012 for each program. The baseline reflects the state of the regional economy absent any tax stimuli. Therefore, these changes are the not the same as year-to-year changes in the levels of the variables. The cost per private, nonfarm job created is the sum of the net cost of the tax changes divided by the sum of the changes from the baseline of private, nonfarm jobs created during the sub-periods 1995-2002, 1995-2007, and 1995-2012 inclusive. This means that we look at the total job-years gained or lost over the sub-period relative to the total net cost of the tax program.

Total employment includes the farm, public and private sectors. We report jobs created in the private, nonfarm, and public, farm sectors separately. The results show that in general jobs created in the private sector (if any) are sometimes (significantly) offset by losses (hiring forgone) in the public sector as a result of (net) state tax revenue forgone. Many of the credit programs generated insignificant new state revenue relative to their cost. In terms of the *net* cost per private, nonfarm job created, our results show that these costs vary widely from (positive) $2,227 (Opportunity Certificates in 2002) to more than (negative) $192,180 (sales tax exemption in 2002). Opportunity Certificates generates a positive net cost to Connecticut, while all other programs generate negative net costs to the state as defined above. Opportunity Certificates is an anomalous case because many of the claims (data from DRS) are much less than the $1500 credit per new employee, suggesting that new employment is zero in these cases.

Recalling that the total amounts claimed found their way into the Connecticut economy by different channels in each case (there was some leakage out of state to the extent that capital goods purchased were not made here or that reductions in the cost of capital flowed into dividends paid to out of state stockholders for example), we discovered a trend of declining private sector employment and increasing public sector unemployment for several tax and exemption programs as the fraction of the credits or exemptions claimed rises. This is because the greater amounts captured in firms' retained earnings, the greater the productive use to which firms put these funds. The implication is that for these tax programs, when most of the

credit or exemption claimed flows into retained earnings, it creates the most private sector employment and the least public sector forgone hiring.

The general corporate tax rate reductions create the largest private sector employment gain of 5,956 jobs in 2002, while forgoing 2,303 public sector jobs. In terms of private sector jobs created, the Research and Experimental (Incremental) Expenditures Credit generates the next largest number of jobs (1,261) in 2002. Third is the Property Tax Exemption on manufacturing machinery and equipment that creates 1,106 private sector jobs in 2002. Fourth is the Insurance Reinvestment credit that creates 633 private sector jobs in 2002. Fifth is the Fixed Capital Investment credit with 333 jobs that it creates in 2002. The sales tax exemption credit produces the sixth highest private sector job gain for the reported 20% case (321 jobs) in 2002. The EDP credit creates 293 jobs in 2002, while the Research and Development credit creates 249 jobs in 2002.

The remainder of the credit programs creates 72 or fewer jobs each in 2002. The sales tax exemption had the highest average cost per private sector job created $192,180 in 2002 in all years. Most of the other programs had negative *net* costs per private sector job created with three exceptions of less than $100,000 in 2002. The least and only positive net cost per private sector job created occurred for Opportunity Certificates (an anomalous case) in the benchmark years ($2,227, $1,962, and $1,916). Table 6 presents the details.

We present ranks in Table 6 only for 2002 tax program results as they do not change but by 1 or 2 places for 2007 and 2012, except for the Insurance Reinvestment credit that moves from 4th place in 2002 to 27th in 2007 and 23rd in 2012. This is because revenue forgone as projected by DRS and OPM for this program peaks in 2006 at $44 million up from $8281 in 1999, $11 million in 2000, $15.8 million in 2001, and $21.8 million in 2002. After 2006, revenue forgone declines to $7.4 million in 2010. Private sector job creation for this program peaks in 2003 at 687 new jobs and then declines with the stimulus to -52 new jobs in 2007 and -1 new job in 2012.

Table 6: Individual Tax Credit and Exemption Impacts

Tax Program	Corporate Income Tax Rate Reduction and Individual Tax Credit and Exemption Program Results (20% case)														
	Private NF Employment Change in 2002	RANK Private NF Employment Change in 2002	Public & Farm Employment Change in 2002	Private NF Employment Change in 2007	Public & Farm Employment Change in 2007	Private NF Employment Change in 2012	Public & Farm Employment Change in 2012	NET Cost/Private NF Job in 2002	RANK NET Cost/Private NF Job in 2002	NET Cost/Private NF Job in 2007	NET Cost/Private NF Job in 2012	State Revenue Change per dollar NET cost in 2002	RANK State Revenue Change per dollar NET cost in 2002	State Revenue Change per dollar NET cost in 2007	State Revenue Change per dollar NET cost in 2012
	Jobs		Jobs	Jobs	Jobs	Jobs	Jobs	2001 $		2001 $	2001 $	2001 $		2001 $	2001 $
Corporate Tax Rate Reduction	5,956	1	-2,303	6,609	-1,909	6,817	-1,645	($21,406)	7	($17,818)	($15,955)	($0.57)	23	($0.75)	($0.89)
Air Pollution Abatement	-1	25	0	0	-1	-1	0	($94,803)	21	($91,431)	($134,187)	$0.03	3	$0.10	$0.15
Apprentice Training	8	16	-9	9	-8	8	-8	($82,175)	18	($75,034)	($74,264)	($0.08)	16	($0.10)	($0.10)
Child Day Care Tax Credit	7	17	-4	6	-3	6	-3	($36,176)	10	($38,629)	($39,887)	($0.14)	19	($0.13)	($0.12)
Clean Alternative Fuels	41	11	-2	24	-1	19	-2	($3,444)	2	$1,593	$2,834	($4.30)	27	$10.95	$6.76
Donation of Open Space (begins in 1999)	1	22	-2	2	-1	2	-1	($35,082)	9	($49,593)	($49,847)	($0.05)	12	($0.08)	($0.09)
EDP Property Tax Credit	293	7	-436	256	-404	215	-380	($138,886)	25	($133,752)	($138,022)	$0.01	5	$0.01	$0.02
Employer Assisted Housing	5	18	-8	5	-7	4	-7	($79,623)	16	($90,920)	($101,964)	($0.00)	6	$0.03	$0.05
Employee Training (ceased 1997)	2	21	0	-1	0	-1	0	($65,637)	13	($78,536)	($101,090)	$0.10	2	$0.23	$0.34
EZ Credit for Qualifying Corps.	4	20	-5	4	-5	3	-5	($97,320)	22	($93,911)	($97,132)	$0.02	4	$0.02	$0.03
Fixed Capital Investment (begins in1998)	333	5	-559	330	-520	281	-490	($137,655)	24	($126,403)	($128,851)	($0.07)	15	($0.08)	($0.07)
Housing Program Contribution	27	13	-32	27	-29	25	-27	($64,216)	12	($71,159)	($75,075)	($0.15)	21	($0.13)	($0.13)
Human Capital Investment Credit (begins in 1998)	44	10	-42	39	-40	32	-37	($67,767)	14	($68,704)	($73,438)	($0.16)	22	($0.16)	($0.15)
Insurance Reinvestment Fund Credit	633	4	-303	-52	-372	-1	-8	($12,612)	5	($67,457)	($88,173)	($0.70)	24	($0.09)	($0.05)
Machinery & Equipment Expenditure Credit (begins in 1997)	72	9	-110	62	-103	51	-97	($160,884)	26	($140,451)	($141,688)	($0.03)	10	($0.04)	($0.04)
Manufacturing Facilities in EZ/TIC Tax Credit	18	14	-12	14	-11	12	-11	($58,759)	11	($59,047)	($62,953)	($0.06)	13	($0.06)	($0.06)
Neighborhood Assistance Program Credit	29	12	-34	27	-31	24	-29	($103,980)	23	($103,591)	($106,242)	($0.03)	9	($0.03)	($0.03)
Opportunity Certificate (begins in1997)	16	15	0	16	0	16	0	$2,227	1	$1,962	$1,916	$3.29	1	$4.01	$4.33
Research & Development Credit	249	8	-227	209	-210	176	-198	($81,876)	17	($77,131)	($78,751)	($0.11)	17	($0.11)	($0.11)
Research & Development Credit for Grants to Instituions of Higher Education	5	18	-6	5	-5	5	-5	($69,490)	15	($70,647)	($70,845)	($0.02)	8	($0.02)	($0.03)
Research & Experimental (Incremental) Expenditures Credit	1,261	2	-102	1,029	-83	940	-81	($4,706)	3	($4,772)	($5,234)	($2.11)	26	($2.16)	($2.01)
Small Business Guaranty Fee Tax Credit	1	22	-2	0	0	0	-1	($32,595)	8	($23,557)	($16,477)	($0.12)	18	($0.15)	($0.30)
Traffic Reduction Programs Credit (begins in 1997)	1	22	0	1	-1	0	-1	($14,263)	6	($16,298)	($15,929)	($0.14)	20	($0.22)	($0.24)
Urban & Industrial Site Reinvestment Credit (aka Industrial Waste Treatment) [ceased 1998]	-1	25	1	0	0	-1	0	($88,714)	20	($76,239)	($135,690)	($0.01)	7	($0.01)	$0.01
Worker Education (ceased 1997)	-1	25	0	0	1	-1	0	($8,455)	4	($9,420)	($8,602)	($1.17)	25	($1.27)	($1.51)
Sales Tax Exemption	321	6	-661	359	-614	330	-577	($192,180)	27	($160,404)	($153,283)	($0.04)	11	($0.04)	($0.05)
Property Tax Exemption	1,106	3	-1,127	948	-1,047	788	-988	($84,368)	19	($82,435)	($86,395)	($0.07)	14	($0.08)	($0.07)

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It is clear that the general corporate tax rate reductions have the largest impact relative to all the credit and exemption programs. As mentioned above, in 2002, 57% of the combined, private sector employment impact is due solely to the general corporate tax rate reductions. This result obtains even though in all income years, the total amount of credits and exemptions claimed was significantly greater than the amount forgone in corporate income tax revenue. Part of the reason is that in the latter case, firms' spending was unrestricted, and we assume firms put their tax savings to their most productive uses. A lower nominal corporate income tax rate is a competitive issue among the states, and greater business expansion in Connecticut may have resulted from this policy relative to the variety of credits and exemptions policies that primarily benefited firms already in place.

We observe therefore, that the 26 credit and exemption programs taken individually do not have great impact. With respect to the credit programs, the five largest revenue amounts forgone in income year 2002 are the Fixed Capital ($37,374,387), Electronic Data Processing ($29,296,541), Insurance Reinvestment ($21,900,000), Research and Development ($15,197,525), and the Research and Experimental (Incremental) Expenditures ($13,577,729) credits. The revenue forgone from the property tax exemption for machinery and equipment ($76.1 million) was only slightly less than the sum of the revenue forgone from the top three credit programs in income year 2002. The property tax exemption creates 1,106 new private sector jobs in 2002, while the top three credit programs in terms of revenue forgone creates 1,259 new private sector jobs in 2002. The revenue forgone from the sales tax exemption on data processing services ($44 million) was more than 20% greater than the revenue forgone from the Fixed Capital credit in income year 2002 and creates 11 (3.6%) fewer new private sector jobs in 2002. Three of the credit programs gave up less than $25,000 in income year 2002, while two credit programs ceased operation in 1997 (Worker Education and Employee Training) and Urban and Industrial Site Reinvestment ceased in 1997.

If, for example, the state eliminated the 15 existing programs creating 72 jobs or fewer in 2002, it would recapture almost $18 million and forgo 278 new private sector jobs.

Tax Credit Modeling Assumptions

Air Pollution Abatement

We model this credit as an increase in demand for equipment used for air pollution reduction by the assumed share (20%, 50% and 100%) of the credit claimed. We assume the firm retains the amount of the credit not spent on pollution abatement equipment as earnings that, among other things, reduces its cost of capital. We reduce state government spending each year by the full amount of the credit claimed for pollution abatement equipment.

Apprenticeship in Manufacturing, Plastics and Construction

A credit of up to $4,800 per apprentice reduces the cost of labor to firms in the plastics and construction industries claiming the credit. We calculate the ratio of the total credits claimed to the wage bill of each industry and then used this to reduce the non-wage labor costs of the industries in question. A reduction on labor cost stimulates more hiring and more output. To the extent that the claiming firms did not view all of the credit as a reduction in labor cost, the remainder reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the credit claimed for apprentices in the plastics and construction industries.

Child Day Care

We increase demand for child day care by 20%, 50% and 100% of the amount of the credit claimed. The credit effectively reduces the cost of child care to firms and permits them to purchase or supply more of the service. We assume that child care permits some women to work who otherwise could not. We increase employment in the industry claiming the child care credit by 20%, 50% and 100% of the amount of the credit divided by the average annual cost of child care. This represents the number of added workers needing child care in order to work that firms could employ. The remaining amount of the credit not allocated to child care reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the credit claimed for child day care.

Clean Alternative Fuels

We increase demand for motor vehicles by 20%, 50% and 100% of the amount of the total credits claimed across all industries. The remaining amount of the credit not allocated to clean alternative fuel vehicles reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the credit claimed for clean alternative fuels.

Donation of Open Space Land

This 1999 law allows firms to claim a tax credit equal to 50% of the value of open space land it donates to be permanently preserved open space land. We enter the full value of the land into REMI as an increase in the amenity value of the region. In other words, the donation improves the quality of life in Connecticut by at least the value of the donation. The cost of

capital to the donating industry decreases by the amount of the credit claimed. We reduce state spending by the full amount of the donation of open space land credit claimed.

Electronic Data Processing

Firms could claim a credit equal to 100% of the property tax they paid on electronic data processing equipment. The credit effectively reduces the cost of electronic data processing equipment. We increase demand for computers and other electronic data processing equipment by 20%, 50% and 100% of the sum of the credit claimed across all industries. The remaining amount of the credit not allocated to new computers reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the electronic data processing credit claimed.

Employee Training

We increase demand for higher education by 20%, 50% and 100% of the total amount of the credits claimed. We view the credits as reducing the cost of employee training. Because this represents a reduction in the price of a service, we can expect an increase in the amount of training firms purchase. In addition, the increased training raises labor productivity, at least so that the investment reduces production costs by the amount of the investment in training. The remaining amount of the credit not allocated to employee training reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the employee training credit claimed. This program ceased in 1997.

Employer Assisted Housing

Firms could claim a credit for each dollar they put into a revolving loan fund for new housing for low income workers up to $100,000 per year. We increase investment in new residential capital by 20%, 50% and 100% of the amount of the credits claimed which represent a range of amounts we believe the firms put into the fund beyond what they would have done without the incentive. This represents the additional amount of funds borrowed and used to purchase new housing by low income workers. The remaining amount of the credit not allocated to employer assisted housing was taken as a reduction in the firm's cost of capital. We reduce state government spending was reduced each year by the full amount of the employer assisted housing credit claimed.

Enterprise Zone

Firms incorporated and located in an enterprise zone after January 1, 1997, after meeting certain requirements established by the law, may claim a credit for 100% of their corporate tax liability for 3 years and 50% of their corporate tax liability in years 4 through 10. Because firms had actually to start anew in the zone, we assume 20%, 50% and 100% of the credit firms claimed created new nonresidential capital and purchased new producer durable goods. The remaining amount of the credit not allocated to direct capital spending in the enterprise zone reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the enterprise zone credit claimed.

Fixed Capital

We assume that firms increased their direct investment in producer durable goods by 20%, 50% and 100% of the credits claimed. The remaining amount of the credit not allocated to direct capital spending reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the fixed capital credit claimed.

Grants to Higher Education

Firms could claim a credit for new grants to higher educational institutions for research and development in technology. Under the three scenarios considered, we assume that 20%, 50% and 100% of the credit claimed represented additional grants to higher education from the firms above the normal growth of such grants. We correspondingly increase demand for higher education by these amounts. The remaining amount of the credit not allocated to grants to higher education reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the grants to higher education credit claimed.

Housing Program Contribution Credit

"A tax credit voucher system, which is administered by the Connecticut Housing Finance Authority (CHFA), provides tax credits for cash contributions made by business firms to housing programs sponsored, developed, or managed by non-profit corporations that benefit low and moderate income individuals and families."[2] We increase investment in residential housing by 20% and 50% of the amount of the credits claimed in the REMI model. This represents the assumed amount of additional contributions firms made to the program as a result of the credit. The remaining amount of the credit not allocated to new residential housing reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the housing program contribution credit claimed.

Human Capital

This is a credit for cost incurred by a firm for a variety of human capital investments including employee training, donations to institutions of higher learning, day care facilities construction and child care subsidies. We increased the demand for higher education in Connecticut by 20%, 50% and 100% of the amount of the credits claimed. This represents the added amount we assume firms spent educating workers as a result of the credit. In addition, we assume increased worker productivity reduces firms' production costs by at least the amount invested. These reductions in production costs are cumulative. The remaining amount of the credit not allocated to educational expenditures reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the human capital credit claimed.

Insurance Reinvestment Credit

This law allows firms to claim a credit against funds they invest in an approved Insurance Reinvestment Fund which is a part of the total Insurance Reinvestment Credit law. The credits

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[2] **Informational Publication 2001(17)**, Guide to Connecticut Business Tax Credits, page 33.

are 0% for the first 3 years following the investment, 10% for the years 4 through 7 following the investment and 20% for years 8 through 10 following the investment. We increase firms' investment in nonresidential capital and nondurable producer equipment three years prior to the credit claimed by ten times the credit claimed. Note, the first year of claim for this credit was 1999, the last year of this study. Therefore, the investment for the credit claimed occurred in 1996. We reduce state government spending in 1999 by the full amount of the insurance reinvestment credit claimed.

Industrial Waste (Urban and Industrial Site Reinvestment) Credit

This is a site cleanup program. Construction spending increased by 20%, 50% and 100% of the amount of the credits claimed. This amount represents the added amount we assume firms spent on site cleanup as a result of the credit. The remaining amount of the credit not allocated to site cleanup reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the industrial waste credit claimed. This program ceased in 1997.

Machinery and Equipment Expenditure Credit

"A credit against the Connecticut corporation business tax for expenditures in machinery and equipment is available to corporations that have no more than 800 full-time, permanent employees in Connecticut. The amount of the credit is based upon a percentage of the incremental increase in expenditures for machinery and equipment acquired for and installed in a facility in Connecticut that exceeds the amount spent for such expenditures in the prior income year."[3] Firms' investment in new producer durable goods increased by 20%, 50% and 100% of the amount of the credits claimed which represents the amount of additional firms' spending, we believe, beyond what they would have done without the incentive. We take the remaining amount of the credit not allocated to new nondurable equipment as a general reduction in the firms' cost of capital. We reduce state government spending each year by the full amount of the machinery and equipment expenditure credit claimed.

Manufacturing Facilities

"Tax credits are available against that portion of the Connecticut corporation business tax that is allocable to a manufacturing facility that is constructed, renovated, expanded, or acquired within an Enterprise Zone (or other area having Enterprise Zone level benefits) or in a Targeted Investment Community. A 50% credit is available for manufacturing facilities that are located within a designated Enterprise Zone (or other area having Enterprise Zone level benefits) and that meet certain employment criteria. If the manufacturing facility does not meet these employment criteria or if the facility is located outside the Enterprise Zone (or other area having Enterprise Zone level benefits) but within a Targeted Investment Community, a 25% credit may be available."[4] We entered 20%, 50% and 100% of the new output the firms were able to produce at these facilities into the REMI model. To obtain the new output, we use the U.S. historical capital-output ratio for each industry in each year of the study period. The (fraction of the) credit claimed purchased new capital which, using a specific capital-output ratio implies the incremental output due to the incremental investment. This represents new output that claiming

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[3] **Informational Publication 2001(17)**, Guide to Connecticut Business Tax Credits, page 39.
[4] **Informational Publication 2001(17)**, Guide to Connecticut Business Tax Credits, page 58.

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firms decided to produce in Connecticut, because of the exemption, that they would not have produced otherwise. These additions to output are cumulative. We take the remaining amount of the credit not allocated to inducing new production as a general reduction in the firm's cost of capital. We reduce state government spending each year by the full amount of the manufacturing facilities credit claimed.

Neighborhood Assistance Program

"A credit may be applied against various Connecticut business taxes by a business firm that makes individual cash investments of at least $250 to certain community programs that have received both municipal and state approval. The cash investments must be made in community programs that are proposed and conducted by tax exempt or municipal agencies and must be approved both by the municipality in which programs are conducted and DRS."[5] We assume 20% and 50% of the credit claimed is additional spending by firms on this program beyond the level they would have done without the incentive. We assign half the new spending as new output of nonprofits and half as increased spending of local government. The remaining amount of the credit not allocated to new spending of nonprofits or municipalities reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the neighborhood assistance program credit claimed.

Opportunity Certificate

We increased employment in each of the industries claiming the credit by a number of new employees equal to 20%, 50% and 100% of the credit claimed divided by $1500 (amount permitted per qualifying employee). We further adjusted this figure to reflect a balance between full time and part-time employees. The remaining amount of the credit not allocated to new employees reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the opportunity certificate credit claimed.

Research and Development Expenditures

"A credit may be applied against the Connecticut corporation business tax for research and development expenses incurred in Connecticut."[6] Using the value-added approach to national income accounting and realizing that most research and development costs are labor costs, we treat the research and development expenditures as new output for the industry. The credit represents a reduction in the cost of doing research and development. We assume that firms would use 20%, 50% and 100% of the credit claimed for added research and development; therefore, we increase output (sales) of the industry by the corresponding amount. The remaining amount of the credit not allocated to research and development reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the research and development expenditures credit claimed.

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[5] **Informational Publication 2001(17)**, Guide to Connecticut Business Tax Credits, page 41.
[6] **Informational Publication 2001(17)**, Guide to Connecticut Business Tax Credits, page 47.

Research and Experimental (Incremental) Expenditures

"A credit may be applied against the Connecticut corporation business tax for the incremental increase in research and experimental expenditures conducted in Connecticut."[7] Using the same argument that applies to research and development expenditures, we increase output in the industry by an appropriate amount based on the average credit rate applied to the expenditures. We increase output of the industry claiming the credit by 20%, 50% and 100% of five times the credit claimed. This represents a figure based on an average of the credit rates that firms could claim. The remaining amount of the credit not allocated to research and experimental expenditures reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the research and experimental (incremental) expenditures credit claimed.

SBA Guaranty Fee

"A tax credit is allowed against the Connecticut corporation business tax in an amount equal to the amount paid during the income year by a small business to the federal Small Business Administration as a guaranty fee to obtain guaranteed financing."[8] Effectively, this law reduces the cost of capital to the borrowing firms by the amount of the credit they can claim. Accordingly, in the REMI model, we reduce the cost of capital to the firms making claims on this law by the amount of the credit. Likewise, we reduce state government spending by the amount of the credit claimed for SBA guaranty fees.

Traffic Reduction

"A credit may be applied against the Connecticut corporation business tax by Connecticut corporations that participate in traffic reduction programs that are established under Conn. Gen. Stat. §13b-38p in Connecticut in order to achieve the goals of the federal Clean Air Act. To qualify for the credit, the corporation is required to employ 100 or more employees at a work location located in a severe nonattainment area."[9] We model this credit as an amenity value in REMI as it was not clear where the expenditures associated with this credit were occurring. We improved the quality of life by 20%, 50% and 100% of the amount of the credit claimed in each year. The remaining amount of the credit not allocated to traffic reduction reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the traffic reduction credit claimed.

Worker Education

We increase new employment in the industry by 20%, 50% and 100% of the number of workers covered by the credit. To calculate the number of new workers, we divided the amount of credits claimed by the credit allowed per worker for Work Ed. We further reduced this figure by a wage differential factor between new employees and established employees. We base this adjustment on the idea that the wage of workers equals the value of their marginal product.

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[7] **Informational Publication 2001(17)**, Guide to Connecticut Business Tax Credits, page 51.
[8] **Informational Publication 2001(17)**, Guide to Connecticut Business Tax Credits, page 53.
[9] **Informational Publication 2001(17)**, Guide to Connecticut Business Tax Credits, page 65.

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Therefore, new entrants to the work force are not as productive as established workers. To have simply entered the number of workers implied by the credit would have overstated the amount of new output to society these workers produce. The remaining amount of the credit not allocated to Work Ed reduces the firm's cost of capital. We reduce state government spending each year by the full amount of the Work Ed credit claimed.

Section 1: Appendix 2

The REMI Model

REMI is a dynamic, multi-sector, regional model calibrated specifically for Connecticut by Regional Economic Models of Amherst, Massachusetts. The REMI model includes all of the major inter-industry linkages among 466 private industries aggregated into 49 major industrial sectors. With the addition of farming and three public sectors (state and local government, civilian federal government, and military), there are 53 sectors represented in the model.

The REMI model is based on a nationwide *input-output* (I/O) model that the U.S. Department of Commerce (DoC) developed and continues to maintain. Modern input-output models are largely the result of groundbreaking research by Nobel laureate Wassily Leontief. Such models focus on the inter-relationships between industries, and provide information about how changes in specific variables—whether economic variable such as employment or prices in a certain industry or other variables like population—affect factor markets, intermediate goods production, and final goods production and consumption.

The REMI Connecticut model takes the U.S. I/O "table" results and scales them according to traditional regional relationships and current conditions, allowing the relationships to adapt dynamically at reasonable rates to changing conditions. Some of the salient structural characteristics of the REMI model are:

- Consumption is determined on an industry-by-industry basis, and is based on real disposable income in Keynesian fashion, i.e., with prices fixed in the short run and GDP (Gross Domestic Product) determined solely by aggregate demand.

- The demand for labor, capital, fuel, and intermediate inputs per unit of output depends on relative prices of inputs. Changes in relative prices cause producers to substitute cheaper inputs for relatively more expensive inputs.

- Supply and demand for labor in a sector determine wages weighted by regional differences. The supply of labor depends on the size of the population and the size of the workforce.

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- Migration – which affects population size – depends on real after-tax wages as well as employment opportunities and amenity value in a region relative to other areas.

- Wages and other measures of prices and productivity determine the cost of doing business. Changes in the cost of doing business will affect profits and/or prices in a given industry. When the change in the cost of doing business is specific to a region, it will also affect the share of local and U.S. markets supplied by local firms. Market share and demand determine local output.

- "Imports" and "exports between states are related to relative prices and relative production costs.

- Property income depends only on population and its distribution adjusted for traditional regional differences, *not* on market conditions or building rates relative to business activity.

- Estimates of transfer payments depend on unemployment details of the previous period, and total government expenditures are proportional to population size.

- Federal military and civilian employment is exogenous and maintained at a *fixed* share of the corresponding total U.S. values, unless specifically altered in the analysis.

Because the variables in the REMI model are all related, a change in any one variable affects many others. For example, if wages in a certain sector rise, the relative prices of inputs change and may cause the producer to substitute capital for labor. This changes demand for inputs, which affects employment, wages and other variables in those industries. Changes in employment and wages affect migration and the population level, which in turn affect other employment variables. Such chain-reactions continue throughout the model. Depending on the analysis performed, the nature of the chain of events cascading through the model economy can be as informative for the policymaker as the final aggregate results. Because the model generates such extensive sectoral detail, it is possible for experienced economists in this field to discern the dominant causal linkages involved in the results. Results reported are the total of the direct, indirect and induced effects resulting from the economic activity modeled.

Section 2:

Qualitative Assessment of the Connecticut Business Tax Environment

In addition to the review of the scholarly literature on the impact of business taxes (Section 3 below) and the formal modeling of the specific tax adjustments made in Connecticut, the Legislature's Finance, Revenue and Bonding Committee asked CCEA to provide some qualitative assessment of the behavioral impacts through interviews with tax accountants, tax lawyers, and relevant corporate managers. Consistent with the modeling results, these qualitative assessments argue that the changes in the state tax environment have been broadly positive, either encouraging companies to sustain and expand operations in Connecticut or facilitating the recruitment of new firms to the state. Indeed, there was virtual unanimity among respondents that ten years ago, before the array of changes in the tax environment now under review, tax specialists were uniformly advising clients that, absent a "compelling business strategic objective" for being in Connecticut, firms should locate any new operations out-of-state, and even consider moving some current operations out-of-state. It also meant that specialists rarely if ever advised firms to consider coming to Connecticut. Now, specialists strongly agree that Connecticut provides a highly attractive business tax environment, a state whose elements are largely mutually re-enforcing, generating significant new investments in facilities, machinery, and equipment, as well as providing a framework that for specific sectors is highly competitive with neighboring jurisdictions. Equally important, the changes in the tax environment have a cumulative effect, because firms do not, indeed typically can not, react immediately to changes in the tax structure. Thus Connecticut has been garnering increasing attention as the attractiveness of the tax environment gains awareness and credibility.

Respondents identified five areas in which changes in tax policy have been particularly meaningful. The switch to single-factor apportionment for the corporate profits tax was critical for retention and expansion of business activities in the affected areas. Respondents identified several major employers who would have in all likelihood relocated some or all of their activities if the change had not been made. Perhaps more important, several of these same businesses subsequently decided to expand activities within the state. One respondent declared that there had been "very concrete reactions to single factor apportionment." Especially in financial

services, Connecticut now offers a distinctly superior environment to that in New York, its principal competitor in this sector. Other changes in the tax environment re-enforced the attractiveness of expanding activities in-state. The combination of credits on expenditures for fixed capital, for machinery and equipment, and for research and development were particularly influential. These created a mutually re-enforcing framework within which firms had strong incentives to invest in improved facilities, presumptively enhancing productivity, and making significant investments in R&D to improve both product and process design. One respondent gave the example of a Connecticut manufacturer that has a major facility in-state and another in the Midwest. Until the mid-1990s, that firm made investments in the out-of-state facility. But with the changed tax environment, in the past several years, management has put virtually all new investments into its Connecticut facility, including consolidating some activities here rather than at its other facility. Several respondents emphasized that this mutually re-enforcing quality of the Connecticut tax environment, rather than any single element, has been of special importance in shaping business behavior.

One other change in the tax code seems to have had particular importance: the property tax credit on electronic data processing equipment and the associated progressive reductions in sales tax on data processing services. Data processing is both highly competitive and extraordinarily easy to relocate. The previous Connecticut tax environment put that activity at a significant disadvantage, and firms were clearly committed to moving these activities out-of-state. One respondent characterized the response to the changed environment as "huge."

To emphasize the degree to which tax specialists have changed their estimation of the Connecticut tax environment, one respondent, with two decades of experience in the state, said that now, even when advising foreign firms that have acquired Connecticut-based firms, the advice typically is to expand the activities of that new subsidiary in-state. The same respondent argued that Connecticut has gone from one of the worst business tax environments in the country to one of the strongest, one that to a remarkable degree overcomes the relatively high general cost of doing business in Connecticut.

Clearly, respondents believe that Connecticut has moved from offering an environment in which they could rarely advise firms to expand or to locate—or even sometimes to remain—in the state to one in which Connecticut offers a tax environment that is not just competitive with

but often superior to most relevant jurisdictions. Moreover, they strongly believe that Connecticut has both retained and attracted a significant array of firms in the last half dozen years because of the changed tax environment.

Connecticut has clearly earned both high marks for its current business tax environment and has also enjoyed increasing credibility for its apparent commitment to fostering such an environment. It took time for the changes in the tax law to gain traction with the business community, because on the one hand business typically responds to a changing environment incrementally, in conjunction with decisions about expanding current activities or developing new ones, and because on the other hand it takes time for a change in policy approach to gain credibility. As Connecticut considers the possibility of wide-ranging roll-backs in business tax credits and other structural changes, while not arguing against changing the Connecticut business tax environment, it suggests careful and timely assessment of the long-run implications of various changes in the tax code. Such studies ought to be done before legislation is introduced. This approach bolsters business confidence in a stable, proactive Connecticut tax environment.

Section 3:

The Economic Impact of Corporate Tax Policy Changes:

Literature Review

This review of some relevant literature provides insight into the experiences of states that have changed tax policy as it relates to firms, and explicates some of the theoretical issues of corporate taxation. Fundamentally, the imposition of taxes changes the returns to labor, capital, savings, and affects the quantities of goods and services consumed. Considering their direct impact, increased taxes reduce returns to labor, capital, savings, and reduce consumption, and individuals and firms reduce corresponding productive and consumption activity. Reduced taxes have the opposite effect. Some taxes are essential to provide public goods that the private sector could or would not produce, such as national defense, transportation infrastructure, and education for all people. Researchers have shown that public investment makes private capital more productive (Aschauer 1989, Munnell 1990, 1992), because, among other things, it reduces transaction costs. These public expenditures over time may offset the direct impact of taxes. Taxes also influence behavior by creating incentives or disincentives in specific areas such as pollution abatement, use of clean fuels, job training, and child care. Certain taxes on businesses may be passed along to consumers in some amount depending on their responsiveness to price changes. There are obviously several other costs firms in particular must bear. These include regulatory costs, health insurance costs, environmental compliance costs, unemployment insurance costs, and workmen's compensation costs. In a recent study for example, the Small Business Administration finds that federal regulatory burdens fall disproportionately on small firms (Crain, et al, 2001), and, within that group, the manufacturing sector bears the heaviest burden. Barrow (1998) supports these findings in his survey of the state dependency model. Relatively small firms are tied more closely to the competitive (local) market than relatively larger oligopolistic or monopolistic firms that are more insulated from market volatility. The latter large firms seek and enjoy long term stability and not necessarily competitive advantage as do their smaller counterparts. Because of their ostensibly more secure and stable market segments, larger firms' viability is less likely to be threatened by government-mandated costs. Clearly, studies such as Barrow and Crain et al inform public policy as states work to improve the climate for their core industries.

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Barrow (1998) nicely summarizes the theoretical arguments under girding the role of the state vis-à-vis business. The essential idea is that the state (that is, any jurisdictional political entity) has a vested interest in maintaining a 'healthy' business climate that will maintain and grow its revenues from taxes. Businesses depend on the state to create tax (including mandated costs), spending, and regulatory policies that help them grow. In a democratic society, should the state not produce the desired business climate, Barrow argues, its elected functionaries will be voted out of office, although Williams and Collins (1997) suggest that business in general faces a serious collection action problem in so doing. Williams and Collins (1997) agree in general with the proposition that business has power over public policy, but its strength and mechanisms of operation are not clear.

This interdependency then, in its extreme, produces jurisdictions with low taxes, low employee mandates such as minimum wages, unemployment insurance, workmen's compensation, and family leave; minimal social regulation and environmental protection; right-to-work laws to protect a free labor market, and correspondingly low wages. This neoclassical, laissez-faire view of the economy would promote business expansion in such jurisdictions, while in others where the climate was less favorable, business investment and employment and hence tax revenues would falter in the long run. This model further suffers, as all neoclassical models do, from the assumption that business managers are perfectly rational as they exclusively seek to maximize profit or minimize costs, that they have no uncertainty or ambiguity regarding location decisions, and that they clearly recognize a favorable business climate. Further, the only distinguishing characteristic of different jurisdictions is their mandated costs, not their tax or spending structures. The model ignores workforce quality and availability, transportation and communication infrastructure, and several other elements critical to business success. As a result, indices such as the Grant Thornton index failed to indicate actual, favorable regions because they incorporate only variables to measure neoclassical characteristics as in Barrow's explication of the model.

Barrow (1998) points out that the problem with this formulation is that it neglects the complex reality of business location decision making as has been studied in business colleges. A growing business location analysis and site selection literature suggests that such decisions take many factors into account such as the quality and availability of skilled labor and the transportation and communication infrastructure. This suggests that transaction costs matter greatly in an

imperfectly competitive and 'frictionful' market. Such frictions include search costs and negotiation and enforcement costs among others. Taxes and fees that firms pay to support public infrastructure can be regarded as transaction costs in a general sense, as they are a cost of creating and using markets. One can divide public infrastructure into economic overhead capital and social overhead capital. The former category includes roads, bridges, seaports, airports, waterways, water treatment, and distribution and mass transit. Social overhead capital includes public education at all levels, public health facilities, job training, and public safety facilities. The public sector usually makes these investments as they are too costly, too uncertain for private investors. These investments are often nonrivalrous and nonexclusive, and thus their returns may be below requisites because private firms can not capture all the benefits that accrue through public use. Empirical studies by Aschauer (1989) and Munnell (1990, 1992) among others have confirmed that such public investment positively affects private sector output, investment and productivity.

Firms once located in a region tend to develop networks of appropriate workers, communication, and transportation that become customized to their purposes. They tend to expand in the same location to continue to take advantage of these specialized structures and relationships with local institutions and services that have emerged in their support. Industrial clusters and districts emerge and are self-sustaining given that the business climate does not deteriorate appreciably; otherwise there is relocation to perceived better business climates. Empirical evidence has shown that taxes and fees are not the primary factors influencing location; high quality public infrastructure is quite important. There is confusion about whether such socialized (publicly provided) factors of production are regarded as costs or benefits (investments with a positive return), but the multifarious business climate rankings suggest that taxes and fees are only part of the complex location decision calculus. Adding to the complexity is uncertainty about future changes in policy; governments do not necessarily adopt time consistent policies (Williams and Collins, 1997).

Durbin (2001) reviews recent trends in state corporate income taxes. He finds that nationwide state corporate income tax revenue as a fraction of domestic corporate profits rose from slightly more than 2% in 1959 to more than 12% in 1986. This proportion has declined steadily since 1986 to just less than 6% in 1996. Since then the trend has slowed considerably. The national average tax rate of 11.2% in 1986 declined to 9.1% in 1991 and further to 6.2% in 1996. The

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increase in the 1959-1986 period of tax revenue as a fraction of profits is primarily due to the increase in the number of states imposing corporate income taxes. The decrease is more problematic. Three non-mutually exclusive factors seem to be responsible: measurement errors having to do with the emergence of S corporations; the growth and sophistication of aggressive tax planning; and, actions of state policy makers. S corporation net income is taxed at the shareholder level and resulting income taxes are personal income taxes. The growing share of S corporation income taxes as personal income taxes reduces the effective corporate profits tax rate.

Durbin (2001) cites Professor Richard Pomp who notes that three factors have reduced the corporate income burden: increasing attention by CEOs and CFOs to state tax matters; widespread and increasing use of tax incentives by state legislatures and economic development officials; and, increasingly sophisticated and aggressive tax planning strategies. Two federal tax changes, ERTA (1981) and TRA (1986), stimulated increased corporate attention because they first lowered federal marginal tax rates on corporate net income, which however increased the after-tax cost of state taxes. TRA 86 eliminated or reduced the effectiveness of several loopholes. Whereas previously the firm's main concern was tax compliance, it now focused on minimizing multi-state tax liabilities.

The decade of the 1990s first saw a recession followed by almost ten years of high growth. State budgets suffering deficit in the first years of the decade enjoyed surpluses later. Between 1989 and 1993 corporate income tax increases averaged $493.6 million, while between 1994 and 1999 reductions in such taxes averaged $541.7 million. During this latter period, no enacted annual tax change exceeded 7% of total corporate tax revenues.

Durbin (2001) discusses the tax rate cuts, incentives and structural changes (e.g., three factor to single factor) that many states use to retain and expand existing firms and attract new ones. He cites an analyst who estimates that the increased use of incentives has resulted in the reduction of the contribution of all business taxes from one half of state tax revenue in the 1950s to one quarter in 1990. Mazerov (2001) argues that the move from three factor to single factor corporate tax structure in several states has not improved economic growth, especially as this structure is not uniform across the nation and therefore creates winners and losers. Moreover, the loss in revenue has reduced public investment. Mazerov (2001) cites abundant research that

shows that economic development (e.g., job and firm creation) is not statistically related to low business taxes and that other factors mentioned above are more important.

Durbin (2001) suggests that despite the several reasons for the reduced role of corporate income taxes in state tax structures, the underlying cause is competition among states for increasingly mobile business capital. He cites Oakland and Testa (1995) who do not dispute interstate competition. However, they believe the relative decline in the importance of business taxes and the rise of personal income taxes in relative importance in state budgets is proper given the increasing role that public services play in benefiting individuals directly and firms indirectly. Firms benefit by having a well educated, healthy, and safe workforce. More productive workers earn more and are taxed relatively more heavily than lower productive workers. Thus, ostensibly, states can make up in personal taxes what they forgo in corporate taxes if they spend appropriately on infrastructure. This echoes Barrows' (1998) arguments that there are factors other than taxes that have greater impact on job creation and retention.

Durbin (2001) references Wasylenko (1997) who suggests that state policymakers should maintain a stable business tax climate with low rates and broad bases that can efficiently support the level and types of public services desired by individuals and firms, rather than ad hoc, competitive tax reductions. Durbin points out that other analysts suggest that over-reliance on tax reductions as the preferred means to attract and retain mobile business capital often leads to over dependence on these means. This improper weight on tax-based incentives may lead to sub par provision of public services that actually retards development.

Johnson (1997) acknowledges the argument that a tax cut will lead to economic growth which will in turn lead to a higher quality of life. Although there is some evidence that this statement is true if taxes could be cut without accompanying reductions in public services, studies also show that increases in public services can lead to economic growth. Because tax cuts often come at the expense of public services, it is not clear that the net effect will help a state's economy. Therefore, comparisons of state tax levels that ignore the level of public services needed and demanded by a state's residents provide little useful information to policymakers.

Tannenwald (1996) concedes states are more concerned than ever before about their business tax climate. Over the previous two decades, profound technological and political changes have

enhanced employers' geographic mobility and extended their geographic range, thereby intensifying economic competition both within the United States and throughout the world. This study ranks the business tax climate of 22 states, including the six within New England. It finds only modest differences in business tax climate among most states. Within the region, New Hampshire and Massachusetts have the most attractive business tax climates. The study also estimates the importance of business tax climate in determining where manufacturers invest in plant and equipment. Business tax climate exerts only a small, highly uncertain effect on such investment. Tannenwald (1996) suggests that states may be more likely to stimulate their economies by enhancing public services valued by business.

Carroll and Wasylenko (1994) examine the effect of state and local government fiscal variables on states' employment and personal income growth and find substantial effects during the 1970s. However, when they estimate similar models for the 1980s, the results reveal that the effect of government fiscal variables on subnational growth has waned. The authors pool cross-section and time-series data for the 1967-1988 period to test for the presence of a structural change in the relationship between state and local fiscal behavior and subnational economic growth. Using a switching regression model, they uncover evidence of structural changes between 1976 and 1983. In particular, their results suggest that fiscal variables influenced manufacturing employment in states more significantly during the 1970s than during the 1980s. Moreover, the results indicate that government fiscal variables had little impact on employment changes in non-manufacturing industries in either the 1970s or the 1980s.

Fisher and Peters (1998) investigate the actual value of economic development incentives to firms, and the spatial pattern of incentives, in the twenty-four largest manufacturing states in the United States and in a random sample of 112 cities within those states. They use the hypothetical firm method to measure the value of competitive incentives to typical manufacturing firms and examine the menu of incentives that states and cities offer and the difference those incentives make to a firm's income. The authors consider the effects of taxes and incentives on the spatial distribution of investment returns. They examine the implications of the findings for public policy at the local, state, and national level.

Goss and Phillips (2001) ask: do the returns to business tax incentives differ according to the initial economic conditions of the area providing tax relief? Past research studies have provided

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conflicting answers to this question. Bartik (1997) concluded that rates of return to business tax incentives are likely to be greater for less affluent areas than for wealthier areas offering equivalent incentives. In contrast, Fisher and Peters (1998) determined that tax incentives tend only to offset higher taxes on businesses located in low income areas. This study examines this issue using a unique data set that allows for a fresh look at this issue. Goss and Phillips (2001) find that the returns to subsidized investment are greater in lower unemployment and higher income areas. This suggests that tax incentives reinforce pre-existing economic differences across such areas.

Goss and Phillips (1999) assert a lack of detailed data on state tax incentive programs has limited the assessment of their economic impacts. However, in 1987, the Nebraska legislature, as part of its new business tax incentive initiative, required that the state Department of Revenue collect data on all business tax incentive agreements and report findings yearly. Nebraska's legislative mandate produced a unique data set for assessing the impact of a business tax incentive program. Using this data, the authors evaluate business tax incentives across Nebraska's 93 counties during 1987 to 1995 and conclude that qualifying business investment:

> (a) had a positive and statistically significant impact on economic growth for low-unemployment counties,
>
> (b) had no statistically significant impact on economic growth for high-unemployment counties, and
>
> (c) tended to be undertaken in areas with historically higher investment activity, thus contributing to greater economic performance differences among counties in the state.

Holmes (1998) provides new evidence that state policies play a role in the location of industry. The paper classifies a state as pro-business if it has a right-to-work law and anti-business if it does not. The author finds that, on average, there is a large, abrupt increase in manufacturing activity when one crosses a state border from an anti-business state into a pro-business state.

Mullen and Williams (1994) analyze the impact of state and local tax structures on state economic performance. Specifically, growth rates in Gross State Product over the 1969-1986 period are related to several measures of a state's marginal tax environment in addition to more traditional growth determinants. Mullen and Williams derive estimates of marginal tax rates for individual states and utilized alternately with other tax climate surrogates in explaining variations

in economic growth. They report both output and productivity equations in order to distinguish separate impacts resulting from taxation; the endogeneity problem is also addressed in this fashion. Their findings suggest that, after controlling for overall tax burdens, higher marginal tax rates impede output growth.

Papke (1991) examines the impact of state and local tax differentials on the location of industry using a panel data set of manufacturing firm start-ups. Papke models the number of firm births as a Poisson count process and the estimation technique explicitly accounts for unobserved location or state heterogeneity in the estimation. A second focus of the analysis is the development of an industry- and year-specific series of effective tax rates for each state. After controlling for state and industry effects, the estimates indicate that a high state marginal effective tax rate reduces the number of firm births for half of the industries examined.

Goss and Phillips (1999) evaluate the impact of state and local taxes on economic development by applying meta regression analysis to a survey of the literature by Bartik (1991). The results generally confirm Bartik's conclusion that the effect of taxes is modest across interstate and inter-metro areas but much more pronounced *within* metro areas. Studies neglecting to control for public services and fixed effects will underestimate the tax elasticity. Those measuring growth as aggregate income or investment growth will find lower tax elasticity. Still, most modeling differences encountered across studies do not affect the estimated tax elasticity.

Some of the above papers appeared in the March/April 1997 issue of *The New England Economic Review* that represented the proceedings of a symposium convened by FRB Boston. In addition to the papers presented there, a panel discussed policy implications of state and local development programs and the possible role of the federal government in affecting the costs and benefits of interjurisdictional economic competition. There seems to be general consensus on several broad issues:

1) States and localities have limited influence over business location and expansion because many important determinants are outside jurisdictional control, e.g., labor costs, energy costs, climate, natural resources, and the availability of appropriately skilled labor;

2) Interjurisdictional policy differences are most likely to attract business when they are large and when the competing jurisdictions are otherwise very similar, so that public policy is more effective within regions (metro areas or states) than between them;

3) Public policies designed to stimulate economic development can work at cross-purposes, because tax incentives can reduce public services that firms value, and a relaxed regulatory environment can degrade working conditions and the physical environment. Furthermore policymakers have other goals including an equitable distribution of income and an even-handed treatment of diverse business activities.

4) Empirical work shows great variation in the tax elasticity; however a central tendency is about -0.2 which means that a 10% reduction in taxes would increase economic activity by 2%. Issues plaguing empirical work include measurement errors and confounding causes and effects. There is consensus that both public services and taxes affect economic development however fragile the relationship.

5) Jurisdictional incentives can effectively subsidize labor or capital and therefore influence how firms substitute between them. Therefore policymakers need to be clear on their development goals.

6) The shift away from federal incentives for state and local economic development (devolution) has forced states and localities to make up the difference and therefore to become more competitive, perhaps at the expense of social welfare, as these subnational units notoriously do not evaluate the effectiveness of their programs.

7) For more effective tax and incentive programs, state and local governments should coordinate their efforts and not work at cross-purposes. Goals of each program should be clearly defined, balanced and compatible. Programs should be broad-based and not focused on a few industries; rather, policymakers should direct tax and incentive programs at industrial clusters. They should tailor their programs to the needs of the region and of the times.

There was no consensus on whether interjurisdictional competition is intrinsically good or bad.

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