Ernst & Young Says Permanent Research Credit Could Increase Research Spending

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The R&D Credit: An effective policy for promoting research spending

Prepared for the R&D Credit Coalition

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Executive Summary

This report finds that the research and development (R&D) credit provides significant contributions to the US economy in terms of additional private research spending, employment and wages at both the national and state level.

Innovation and technological advancement are important factors affecting productivity, economic growth and living standards in the United States. R&D provides important spillover effects as innovation in one sector of the economy enhances economic performance throughout the economy. The benefits from R&D to the broader economy may not be fully recognized by individual firms, but are important to the economy's overall performance, thereby providing the policy basis for the R&D credit.

There is a substantial body of economic research that has examined the linkage between the R&D credit and research spending spanning several decades. While estimates vary, this research overwhelmingly concludes that the R&D credit has a significant effect on R&D spending in the United States. These effects would be even larger if the credit was strengthened and made permanent.

This report finds that the R&D credit has a significant impact on private R&D spending:

- The existing credit is estimated to have increased annual private research spending by $10 billion in the short-term and by $22 billion in the long-term (beyond the first several years), substantially higher than the credits roughly $6 billion to $8 billion annual revenue cost.
- Strengthening the credit by increasing the simplified credit from 14% to 20% is estimated to increase annual private research spending by an additional $5 billion in the short-term and an additional $11 billion in the long-term.
- In total, the overall policy -- the existing credit plus strengthening the alternative simplified credit -- is estimated to increase annual private research spending by $15 billion in the short-term and $33 billion in the long-term.

The R&D credit also has significant effects on US wages and employment.

Higher wages:

- In the short-term, wages are estimated to rise by $10 billion from the overall policy, with an additional $7 billion due to the existing credit and $3 billion due to strengthening.
- In the long-term, wages are estimated to rise by $23 billion from the overall policy, with an additional $15 billion due to the existing credit and $8 billion due to its strengthening.

Higher employment:

- Research-orientated employment in the US would be 130,000 higher in the short-term and 300,000 higher in the long-term because of the combination of the existing credit and the strengthening of the alternative simplified credit.

In the increasingly global economy there is increasing competition between countries for additional R&D spending. Based on a 2008 study by the OECD of global R&D tax incentives, the United States ranks 24th among major developed nations offering such a tax incentive.

The R&D Credit: An effective policy for promoting research spending

I. Introduction

The research and experimentation credit, commonly referred to as the R&D credit, provides significant contributions to the US economy. It encourages additional research spending, jobs and wages. By encouraging innovation and technological advancement, the credit adds to the productive capacity of the US economy, increasing economic growth and improving living standards.

The R&D credit, first enacted in 1981, has been in place for three decades. At the same time, it has been largely temporary during this period and extended more than a dozen times, often retroactively although there was a permanent one year gap in the mid-1990s. Despite its temporary nature and the difficulty of businesses to rely on the credit when making R&D spending decisions, numerous studies have found the R&D credit to have significant, positive effects on research spending. Permanent enactment of a strengthened credit would further increase the significant inducement effect already identified in empirical research for promoting private research spending. That is, the incentive effects of the credit would be even larger if the credit were strengthened and made permanent.

Some proposals to reform the business tax system have proposed elimination of the R&D credit along with many other business provisions in order to further lower the corporate tax rate. Based on the results reported by this study, however, the credit provides a powerful incentive for additional research. Moreover, research spending has been found to have important spillover effects for the US economy adding to innovation and technological change, important drivers for productivity growth and job growth.

It is also important to recognize that there is increased global competition for research spending and the positive economic effects it provides to national economies. The United States was one of the first nations to enact a tax incentive for research, but other nations have followed suit. Research credits have now become important policy tools used by countries to attract research activity.[1] Based on a recent OECD study, however, in 2008 the United States ranked 24th among 38 developed nations analyzed in the value of the incentive provided for research.

This study uses the broad results from economic studies analyzing the linkage between the R&D credit and research spending to estimate the impact of the existing credit and its possible enhancement on private research spending and employment. The credit is found to have a significant effect on research spending. Research spending from the overall policy analyzed by this study -- the existing R&D credit plus an increase in the alternative simplified credit rate from 14 percent to 20 percent -- is found to increase research spending by $15 billion in the short-term and $33 billion in the long-term.

Research plays an important role in fostering innovation and productivity and promoting higher living standards.[2] As the Congress and Administration consider ways to reform the tax system and address the nation's long-term fiscal imbalance, the direct effect of the R&D credit on research spending and the indirect effects of this spending on economic performance should be carefully considered.

II. The Policy Rationale for the R&D Credit

Innovation and technological advancement are key determining factors influencing long-run productivity and increases in the standard of living over time. The processes by which new products are developed, existing products improved, production processes refined and new ideas integrated into the economy are all examples of innovation that help advance the pace of technological change and economic growth.

R&D is a key ingredient to innovation and technological advancement as it represents the effects of innovators -- the scientists, engineers and inventors -- who help create and develop new ideas, better products, and less costly and more efficient ways to make products and/or provide services, or otherwise increase the stock of knowledge.

Investment in R&D, however, may be costly from the perspective of a firm and the benefits highly uncertain at times. Firms, while fully cognizant of the potential benefits of R&D, also are aware of the highly uncertain payoffs and they may not fully recognize the benefits R&D provides to the broader economy.

A common rationale for special tax provisions such as the R&D credit is the failure or inability of firms to, on their own, recognize and take into account spillover effects of one activity to others; that is, the notion that an external benefit is not reflected in market decisions or prices. The value of an innovation, such as the development of a new medicine or production process, may have broad benefits to society that go beyond what is reflected in the calculus a business goes through when deciding to engage in the initial research. In the case of R&D, firms acting on their own would base decisions without fully taking into account the societal benefits of R&D. The government can, in effect, nudge the private sector towards a more economically efficient outcome that attempts to take into account the societal benefits of R&D.

Once external or spillover benefits of an activity to the broader economy are identified, it is important to carefully choose policies that will efficiently encourage the underlying activity. In the case of the R&D credit, a key question is to what extent the credit promotes additional research.

III. Framework for Estimating the Impact of the R&D Credit on Research Spending

Estimating the impact of the R&D credit on research spending first requires an understanding of the mechanics of how the credit affects research spending. Generally, only the tax incentive on the last dollar (i.e., at the "margin") of research will matter. The next step is to identify the responsiveness of research spending to changes in its tax

treatment. Fortunately, there are numerous empirical studies over the past several decades that have examined the linkage between research spending and its tax treatment in various ways, using different data and empirical approaches. These studies provide a firm foundation on which to develop an estimate of the responsiveness of research spending to the credit. Finally, the estimates need to account for the ability of firms to switch from one component of the R&D credit to another under a proposal that increases the benefit of one component -- the alternative simplified credit -- but leaves the others components -- the regular credit -- unchanged.

Computation of the credit and its incentive effects

Firms may use one of several different credit formulas whereby a firm can choose between several different methods for calculating its R&D credit (i.e., regular credit -- limited/unlimited and the alternative simplified credit). To estimate the additional R&D that results from the credit or its enhancement, a crucial factor is determining the amount of additional credit that a taxpayer receives for the last dollar of research spending. The credit provided for research spending at the margin is the only portion of the credit that will affect a taxpayer's behavior.

Taxpayers generally use one of two R&D credit formulas: the regular credit[3] or the alternative simplified credit. The regular credit is provided at a rate of 20 percent, while the alternative simplified credit is provided at a rate of 14 percent. There are two different methods for calculating the regular credit. Some taxpayers compare current qualified research expenditures (QRE) to a fixed based percentage calculated based on credit experience and gross receipts from 1984 through 1988 multiplied by average gross receipts during the prior four years (i.e., excess base limitation). Other taxpayers compare current QRE to 50 percent of current year QRE (i.e., 50% limitation). This reduces by one-half the credit taxpayers can actually claim (i.e., an effective 10 percent credit rate).

Thus, for analyzing the additional credit on the last dollar of research it is important to know whether taxpayers are claiming the regular credit or the alternative simplified credit, and, if claiming the regular credit, whether their credit is reduced (i.e., limited).[4] As shown in Table 1, in 2008 about 55 percent of QRE earned the alternative simplified credit, 36 percent earned the regular credit subject to the 50 percent limitation, and the remaining 9 percent earned the regular credit subject to the excess base limitation.

There are also other important considerations. For example, if taxpayers do not have sufficient tax liability to use all of their current credits, the incentive effect will be less as the value of the credits would need to be discounted for when the taxpayer is able to use the credits in the future.

Also, the research spending would generally qualify for a deduction, if not the credit. Thus, the credit net of the deduction may be appropriate for examining its incentive effects.[5]

Table 1. Qualified research expenditures, by credit type, 2008

	Amount ($B)	Percent
Regular credit		
Excess base limitation (unlimited)	$13	9%

50% limitation (limited)	$54	36%
Alternative simplified credit	$84	55%
Total qualified research expenditures	$151	100%

Source: Internal Revenue Service, Statistics of Income, *SOI Tax Stats -- Corporation Research Credit 2008* , 2011, http://www.irs.gov/taxstats/

Economic research on the impact of the R&D credit on research spending

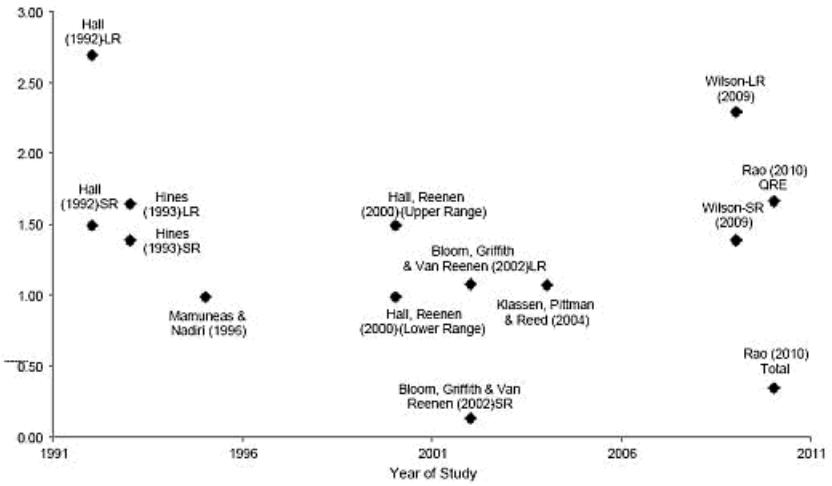
Numerous studies over several decades have examined the linkage between R&D credits and research spending. This research finds that R&D credits have had a profound impact on research spending. Long-run effects are generally found to be significantly larger than in the short-run. A table summarizing the major elements of many of these studies is provided in Appendix A.

The methodology used in many of the studies is summarized here because it provides the basis for estimating the effect of the existing credit and its enhancement on research spending. Most of the studies relate changes in the after-tax cost or "price" of research to research spending controlling for a variety of other factors that may also influence research spending. The price to a firm for conducting one dollar of research is generally given by one minus the credit rate.[6]

Many studies use firm level data (Hall, 1992; Hines, 1993; Rao, 2010; and Gupta, Hwang and Schmidt, 2011), which provides a rich source of data from which to capture the impact of differences in the tax treatment of R&D over time and across firms on research spending. Other studies use aggregated industry data (Mamuneas and Nadiri,1996), country data (Bloom, Griffith, and Van Reenen, 2002), and state-level data (Wilson, 2009). The different approaches allow for different sets of controls to account for non-tax factors that may influence research. Importantly, the studies are also drawing on different credit structures over time, across different firms, across countries, and across states.

Estimates of the responsiveness of research spending to its after-tax cost or price is shown in Figure 1. Responsiveness is measured as the percentage change in research spending for every one percent change in its after-tax cost or price. Two things are striking about these studies. First, there is considerable variability of results. Second, despite this variability, most studies find sizable affects, and long-run effects tend to be considerably larger than short-run effects.

Figure 1. Studies examining the responsiveness of research spending to its after-tax cost or "price"



Note: Values reported by studies indicated the responsiveness of research spending to its after-tax cost or price. For example, a value of 1.0 would indicate that for every 1 percent increase in the after-tax cost or price of research, research spending would fall by 1 percent. See Appendix A for summary of the studies. SR=short-run, LR=long-run. QRE=qualified research expenditures.

Source: Compiled by Ernst & Young LLP.

Based on the studies summarized in Figure 1 and in Appendix A, this report assumes that, in the short-run, for every one percent increase in the price of research, research spending will fall by 0.4 percent. Based on the estimates shown in Figure 1, this estimate could be viewed as somewhat cautious. In the long-run, this study assumes that for every one percent increase in the price of research, research spending will fall by 1 percent.[7]

The variability in the estimated responsiveness of research spending to its tax treatment suggests that consideration should be given to the sensitivity of the estimates for additional research. Consequently, in addition to a central tendency estimate of additional research spending, estimates are also reported assuming a lower bound and upper bound estimate of the responsiveness of research spending to its after-tax cost or price in the long-run of -0.6 and -1.4, respectively.

Methodology for estimating additional research

Separate estimates are developed for the additional research spending due to the existing credit that would arise from an increase in the alternative simplified credit from 14 percent to 20 percent. Short-run effects and long-run effects are estimated for both the existing credit and the enhancement of the alternative simplified credit, as well as sensitivity analysis for the long-run effects as described above.

Existing credit. The additional research spending associated with the existing credit is estimated by calculating the change in the after-tax cost or price of research under current law, compared to if the credit had been eliminated. The estimates of the change in the after-tax cost take into account the fraction of research spending associated with the different components of the R&D credit (i.e., regular credit, alternative simplified credit). The percentage change in the after-tax cost is then multiplied by the estimates of responsiveness in the short-run or long-run. This provides a total measure of the percentage response of research spending to the existing credit, which is then applied to the current level of research spending. Thus, an estimate of the research spending associated with the existing credit is, in effect, developed by analyzing the effect of its repeal.

Enhancement of credit. Estimates for the increase in the alternative simplified credit from 14 percent to 20 percent involve calculating the change in the after-tax cost or price of research under current law and its enhancement. However, with the increase in the alternative simplified credit rate, some firms can be expected to shift from the existing regular credit to what will become a more generous alternative simplified credit. The reshuffling of firms across the different components of the credit is important because the after-tax cost or price varies across the components. For example, firms that shift from the limited regular credit will move from a credit structure that provides a marginal incentive of 10 percent to one that provides a marginal incentive of 20 percent under the enhanced alternative simplified credit. Thus, capturing this reshuffling is crucial to accurately reflect the full inducement effect associated with the higher alternative simplified credit rate.

The reshuffling is captured by modeling the major features of the R&D credit using publicly available data on individual firms' research spending, gross receipts and tax liability over time.

From these data the excess of research over the base amount and other features of the regular credit are modeled. These data are also calibrated to correspond to the 2008 Internal Revenue Service data on QRE associated with the major components of the R&D credit, the most recent year of available data.

Once estimates of how firms reshuffle themselves across the different components of the R&D credit are derived, the change in the-after-tax cost or price can be computed and applied to the estimates of responsiveness of research to its tax treatment in the short-run and long-run developed from the economic research. This estimate of the percentage change in research spending due to the enhancement of the alternative simplified credit is then applied to the current level of tax incentivized research to generate the estimate of additional research spending.

IV. Estimates of Additional Research Spending

As shown in Table 2, the existing R&D credit is estimated to increase annual private research spending by $9.9 billion in the short-run and $22.2 billion in the long-term, as compared to its roughly annual $6 billion to $8 billion cost to the federal government in forgone revenue.[8] Based on estimates of the responsiveness of research spending to its after-tax cost or price at the lower and upper range of what might be considered plausible, the increase in annual private research spending might be as low as $15 billion in the short-term and as high as $35 billion in the long-term.

The increase in the alternative simplified credit from 14 percent to 20 percent is estimated to increase annual private research spending by $5 billion in the short-run and $11 billion in the long-run, with the long-run increase plausibly ranging from $8 billion to $18 billion.

In total, the combined policy is estimated to increase annual private research spending by $15 billion in the short-run, a total increase in private research of 11 percent relative to the $140.9 billion in qualified research spending estimated had the credit been eliminated. In the long-term, the overall policy -- the existing credit and the increase in the alternative simplified credit from 14 percent to 20 percent -- results in a $33 billion increase in annual private research spending, a 22 percent increase as compared to the $129 billion in research spending in the absence of the research credit. In the long-term the plausible range of the increase associated with the overall policy is $23 billion to $53 billion.

Table 2. Additional annual private research spending due to the existing R&D credit and an increase in the

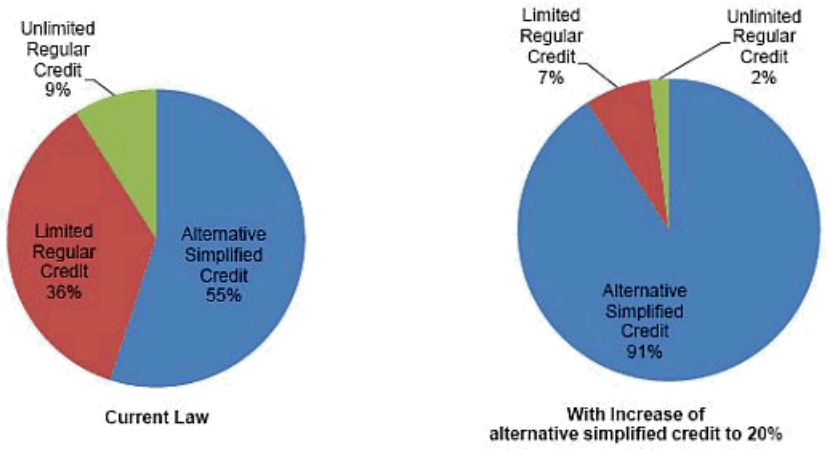
alternative simplified credit rate

	Existing credit	Increase alternative simplified credit from 14% to 20%	Total
		$billions	
Short-run	$10	$5	$15
Long-run:			
Central tendency	$22	$11	$33
Low	$15	$8	$23
High	$35	$18	$53

Source: Ernst & Young LLP.

The effect of the increase in the alternative simplified credit rate from 14 percent to 20 percent on the allocation of qualified research across the different credit formula or type is shown in Figure 2. These estimates indicate that with the alternative simplified credit at a 20 percent rate, the share of QRE associated with the simplified credit rises from 55 percent under current law to 91 percent. The share of QRE associated with the limited regular credit falls from 36 percent to 7 percent, while the unlimited regular credit falls from 9 percent to 2 percent. These estimates suggest a large increase in simplicity would be achieved by this policy because many firms would use the less complex alternative simplified credit instead of the more complex regular credit.

Figure 2. R&D Spending due to R&E tax credit, by credit formula



Source: Ernst & Young LLP.

Additional research spending by type in both the short-term and long-term is shown in Table 3. While total research spending would be $33 billion higher because of the existing research credit and the increase in the alternative simplified credit rate, wages would rise by $23 billion, costs of supplies by $5 billion and contract research by $5 billion. Wages in the short-term would rise by $10 billion, whereby $7 billion in additional wages is associated with the existing credit and $3 billion in wages is associated with its enhancement.

Table 3. Additional annual research spending by type, short-run and long-run impact

	Short-run impact			Long-run impact		
	Existing Credit	Increase in simplified credit from 14% to 20%	Total	Existing Credit	Increase in simplified credit from 14% to 20%	Total
	$ billions					
Total change in QRE	$10	$5	$15	$22	$11	$33
Wages for qualified services	$7	$3	$10	$15	$8	$23
Cost of supplies	$2	$1	$2	$4	$2	$5
Contract research expense	$2	$1	$2	$4	$2	$5

Notes: Totals may not add due to rounding.

Source: Ernst & Young LLP.

In addition to higher wages, the additional private research spending associated with the existing R&D credit and the higher alternative simplified credit rate would also increase US employment. As shown in Table 4, the employment effects are non-trivial. Overall, the US employs roughly 1.5 million individuals in research-orientated jobs.[9] The credit and its enhancement is estimated to increase research-related employment by 140,000 in the short-term and 300,000 in the long-term. That is, research-orientated employment would rise by 25 percent due to the credit as compared to an estimated research-orientated employment level of 1.2 million without any R&D credit.

Table 4. Increase in research-related employment

	Existing Credit	Increase in Simplified Credit from 14% to 20%	Total
	1,000s		
Short-term impact	90	50	140
Long-term impact	200	100	300

Source: Ernst & Young LLP.

The estimates additional research spending associated with the existing R&D credit and increase in the alternative simplified credit are provided in Appendix B.

V. Summary

The R&D credit plays an important role in the US tax system. By providing a significant incentive for additional research spending, it helps to promote additional innovation and technological change, which adds to the productive capacity of the US economy and improves living standards.

Despite the temporary nature of the R&D credit since its inception in 1981, economic studies have generally found that it is effective at promoting additional research spending. Based on this research, this report finds that the existing R&D credit plus the increase in the simplified alternative credit rate to 20 percent would increase annual private research spending by $15 billion in the short-term and $33 billion in the long-term. Making the R&D credit permanent would increase the already powerful incentive effect identified in empirical research for promoting research spending.

Some proposals to reform the business tax system have proposed elimination of the R&D credit along with many other business provisions in order to lower the corporate tax rate. Based on the results reported by this study, however, the credit is found to provide a powerful incentive for additional research. As the Congress and Administration consider ways to reform the tax system and address the nation's long-term fiscal imbalance, the significant effect of the R&D credit on research spending and the spillover effects of this spending on economic performance need to be carefully considered.

Appendix A. Empirical studies estimating the responsiveness of research to the R&E credit

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Authors (Year)

Mansfield (1986)

Empirical Approach

Executives from sampled companies are surveyed to assess the impact of R&E tax credits on their company's R&D spending.

Data/Time Period

Survey data from 205 companies in 1985.

Tax Price/User Cost Elasticity

NA

Credit Benefit-Cost Ratio (Credit Efficiency)

$0.30 to $0.40 of additional R&D spending is induced for every dollar of taxes forgone.

Authors (Year)

Hall (1992)

Empirical Approach

Estimates the effect of after-tax price of R&D, previous R&D spending and sales on current R&D spending.

Data/Time Period

Compustat data comprising of 9167 U.S. manufacturing firms from 1980 through 1991.

Tax Price/User Cost Elasticity

Elasticity for total R&D spending with respect to user cost is -1.5 in the short run and -2.7 in the long run.

Credit Benefit-Cost Ratio (Credit Efficiency)

$2.00 of additional R&D spending is induced for every dollar of taxes forgone.

Authors (Year)

Hines (1993)

Empirical Approach

Estimates the responsiveness of total R&D spending to user costs and sales.

Data/Time Period

Firm level data on 40 manufacturing firms with no merger activity between1984 and 1989.

Tax Price/User Cost Elasticity

Elasticity for total R&D spending with respect to user cost ranges between -1.2 and -1.6.

Credit Benefit-Cost Ratio (Credit Efficiency)

NA

Authors (Year)

Mamuneas and Nadiri (1996)

Empirical Approach

Examined industry-specific effects of R&D tax policies on privately-funded R&D.

Data/Time Period

Industry level data on 15 industries from 1956 through 1988.

Tax Price/User Cost Elasticity

Elasticity for total R&D spending with respect to user cost is -1.0.

Credit Benefit-Cost Ratio (Credit Efficiency)

$0.95 of additional R&D spending is induced for every dollar of taxes forgone.

Authors (Year)

Hall and Reenen (2000)

Empirical Approach

Surveys econometric evidence on the effectiveness of fiscal incentives for R&D.

Data/Time Period

10 studies between 1983 and 1997.

Tax Price/User Cost Elasticity

Elasticity for total R&D spending with respect to user cost ranges between -1.0 and -1.5

Credit Benefit-Cost Ratio (Credit Efficiency)

$1.30 to $2.00 of additional R&D spending is induced for every dollar of taxes forgone.

Authors (Year)

Bloom, Griffith and Van Reenen (2002)

Empirical Approach

Estimates effect of the R&E credit on total R&D through the user cost of capital in nine OECD countries.

Data/Time Period

165 country-year observations between 1979 and 1997.

Tax Price/User Cost Elasticity

Elasticity for total R&D spending with respect to user cost is -0.14 in the short run and -1.09 in the long run.

Credit Benefit-Cost Ratio (Credit Efficiency)

NA

Authors (Year)

Klassen, Pittman and Reed (2004)

Empirical Approach

Examines cost-effectiveness of tax incentives for R&D in terms of dollars of tax revenue forgone.

Data/Time Period

821 firm-years comprising of 287 Canadian firm-years matched with 534 U.S. firm-years from 1991 through 1997.

Tax Price/User Cost Elasticity

Elasticity for total R&D spending with respect to the tax price of -1.08.

Credit Benefit-Cost Ratio (Credit Efficiency)

Canadian credit system induces $1.30 of additional R&D spending per dollar of taxes forgone while the U.S. system induces $2.96.

Authors (Year)

Wilson (2009)

Empirical Approach

Estimates elasticity of in-state R&D with respects to the in-state and out-of-state user costs.

Data/Time Period

State level data for 365 companies by source of funding from 1981-2004.

Tax Price/User Cost Elasticity

- Aggregate cost elasticity (combines in-state with out-of-state effects) for total R&D spending with respect to user cost is 0.17 in the short run and 0.28 in the long run.
- Instate cost elasticity for total R&D with respect to user cost is -1.4 in the short-run and -2.3 in the long-run.

Credit Benefit-Cost Ratio (Credit Efficiency)

NA

Authors (Year)

Rao (2010)

Empirical Approach

Estimates effect of the R&E credit on total and qualified R&D through the user cost of capital.

Data/Time Period

Analyzes R&D using two datasets from 1981 through 1991: a) 1,400 publicly-traded firms (Compustat), and b) 4,500 public/private *firms using confidential IRS tax* return data.

Tax Price/User Cost Elasticity

Short-run elasticity for total R&D spending with respect to user cost is -0.356 and for -1.673 for qualified research expenditures.

Credit Benefit-Cost Ratio (Credit Efficiency)

Ten percent tax subsidy for R&D yields on average between $3.5 million and $10.7 million in additional R&D spending per firm.

Authors (Year)

Gupta, Hwang Schmidt (2011)

Empirical Approach

Examines how the change in the calculation of the base amount of the credit under OBRA 89 impacts the effectiveness of R&E credit.

Data/Time Period

Compustat data comprising 15,804 firm-year observations from 1981 through 1994.

Tax Price/User Cost Elasticity

NA

Credit Benefit-Cost Ratio (Credit Efficiency)

$2.08 of additional R&D spending is induced for every dollar of taxes forgone (Note: Estimated response relates to the change in the definition of the base amount, not the credit rate.)

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Appendix B. State level estimates of additional research, wages and employment.

State level estimates of additional research by state were developed by allocating the estimates for additional research in the short-term and long-term described above using state level data on research spending from the National Science Foundation (NSF) (*National Patterns of R&D Resources 2008*). Associated state level wages were estimated using the relationship between wages and research at the national level. Finally, estimates of additional employment were developed by from an estimate of average wages for research employees and together with the estimates of total wages. These estimates are intended to provide an approximation of the state level estimates based on the NSF data and the nationally-based relationship. The state level estimates will vary according the differences, for example, between average wages for research employment within a particular state as compared to the national average.

Table B-1. Short-run effects of R&D credit on additional R&D spending, wages and employment

Existing Credit	Increase Simplified Credit from 14% to 20%

State	Additional R&D	Wages	Employment	Additional R&D	Wages	Employment
U.S. Total	9,872	6,698	89.4	5,013	3,401	45.4
Alabama	90	61	0.8	46	31	0.4
Alaska	9	6	0.1	4	3	0.0
Arizona	137	93	1.2	70	47	0.6
Arkansas	17	12	0.2	9	6	0.1
California	2,130	1,445	19.3	1,082	734	9.8
Colorado	187	127	1.7	95	65	0.9
Connecticut	281	190	2.5	143	97	1.3
Delaware	44	30	0.4	22	15	0.2
D.C.	106	72	1.0	54	37	0.5
Florida	196	133	1.8	100	68	0.9
Georgia	121	82	1.1	62	42	0.6
Hawaii	16	11	0.1	8	6	0.1
Idaho	31	21	0.3	16	11	0.1
Illinois	392	266	3.5	199	135	1.8
Indiana	164	111	1.5	83	57	0.8
Iowa	52	35	0.5	26	18	0.2
Kansas	47	32	0.4	24	16	0.2
Kentucky	39	26	0.3	20	13	0.2
Louisiana	29	20	0.3	15	10	0.1
Maine	13	9	0.1	7	5	0.1
Maryland	388	263	3.5	197	134	1.8
Massachusetts	674	457	6.1	342	232	3.1
Michigan	478	324	4.3	243	165	2.2
Minnesota	207	140	1.9	105	71	1.0
Mississippi	23	16	0.2	12	8	0.1
Missouri	103	70	0.9	52	35	0.5
Montana	24	16	0.2	12	8	0.1
Nebraska	25	17	0.2	13	9	0.1
Nevada	22	15	0.2	11	8	0.1
New Hampshire	59	40	0.5	30	20	0.3
New Jersey	537	364	4.9	272	185	2.5
New Mexico	155	105	1.4	79	54	0.7
New York	437	297	4.0	222	151	2.0
North Carolina	253	171	2.3	128	87	1.2

North Dakota	9	6	0.1	5	3	0.0
Ohio	276	187	2.5	140	95	1.3
Oklahoma	25	17	0.2	13	9	0.1
Oregon	119	81	1.1	60	41	0.5
Pennsylvania	371	252	3.4	188	128	1.7
Rhode Island	30	20	0.3	15	10	0.1
South Carolina	63	43	0.6	32	22	0.3
South Dakota	7	4	0.1	3	2	0.0
Tennessee	100	68	0.9	51	35	0.5
Texas	490	332	4.4	249	169	2.3
Utah	64	44	0.6	33	22	0.3
Vermont	15	10	0.1	7	5	0.1
Virginia	260	176	2.4	132	90	1.2
Washington	413	280	3.7	210	142	1.9
West Virginia	18	12	0.2	9	6	0.1
Wisconsin	125	85	1.1	63	43	0.6
Wyoming	4	2	0.0	2	1	0.0

[table continued]

	Total		
State	**Additional R&D**	**Wages**	**Employment**
U.S. Total	14,885	10,100	134.8
Alabama	136	92	1.2
Alaska	13	9	0.1
Arizona	207	141	1.9
Arkansas	26	18	0.2
California	3,211	2,179	29.1
Colorado	283	192	2.6
Connecticut	423	287	3.8
Delaware	66	45	0.6
D.C.	160	108	1.4
Florida	296	201	2.7
Georgia	183	124	1.7
Hawaii	24	17	0.2

Idaho	46	31	0.4
Illinois	591	401	5.4
Indiana	247	168	2.2
Iowa	78	53	0.7
Kansas	70	48	0.6
Kentucky	58	39	0.5
Louisiana	44	30	0.4
Maine	20	14	0.2
Maryland	585	397	5.3
Massachusetts	1,016	689	9.2
Michigan	720	489	6.5
Minnesota	312	211	2.8
Mississippi	35	24	0.3
Missouri	155	105	1.4
Montana	36	24	0.3
Nebraska	37	25	0.3
Nevada	33	22	0.3
New Hampshire	89	60	0.8
New Jersey	809	549	7.3
New Mexico	234	159	2.1
New York	660	447	6.0
North Carolina	381	258	3.4
North Dakota	14	9	0.1
Ohio	415	282	3.8
Oklahoma	38	26	0.3
Oregon	179	122	1.6
Pennsylvania	559	379	5.1
Rhode Island	45	30	0.4
South Carolina	95	64	0.9
South Dakota	10	7	0.1
Tennessee	151	103	1.4
Texas	739	501	6.7
Utah	97	66	0.9
Vermont	22	15	0.2
Virginia	392	266	3.5
Washington	623	423	5.6
West Virginia	27	18	0.2
Wisconsin	188	128	1.7

Wyoming	5	4	0.0

Note: Additional R&D and wages in millions of dollars; employment in thousands.

Source: Ernst & Young LLP calculations and National Science Foundation *National Patterns of R&D Resources* 2008.

Table B-2. Long-run Effects of R&D credit on additional R&D spending, wages and employment

	Existing Credit			Increase Simplified Credit from 14% to 20%		
State	**Additional R&D**	**Wages**	**Employment**	**Additional R&D**	**Wages**	**Employment**
U.S. Total	22,212	15,071	201.1	11,280	7,653	102.1
Alabama	203	138	1.8	103	70	0.9
Alaska	19	13	0.2	10	7	0.1
Arizona	309	210	2.8	157	107	1.4
Arkansas	39	26	0.4	20	13	0.2
California	4,792	3,251	43.4	2,433	1,651	22.0
Colorado	422	286	3.8	214	145	1.9
Connecticut	632	428	5.7	321	218	2.9
Delaware	99	67	0.9	50	34	0.5
D.C.	238	162	2.2	121	82	1.1
Florida	442	300	4.0	224	152	2.0
Georgia	273	185	2.5	139	94	1.3
Hawaii	37	25	0.3	19	13	0.2
Idaho	69	47	0.6	35	24	0.3
Illinois	882	599	8.0	448	304	4.1
Indiana	369	251	3.3	188	127	1.7
Iowa	116	79	1.1	59	40	0.5
Kansas	105	71	0.9	53	36	0.5
Kentucky	87	59	0.8	44	30	0.4
Louisiana	66	45	0.6	34	23	0.3
Maine	30	20	0.3	15	10	0.1

Maryland	872	592	7.9	443	301	4.0
Massachusetts	1,516	1,029	13.7	770	522	7.0
Michigan	1,074	729	9.7	546	370	4.9
Minnesota	465	316	4.2	236	160	2.1
Mississippi	52	35	0.5	26	18	0.2
Missouri	232	157	2.1	118	80	1.1
Montana	53	36	0.5	27	18	0.2
Nebraska	56	38	0.5	28	19	0.3
Nevada	49	33	0.4	25	17	0.2
New Hampshire	133	90	1.2	67	46	0.6
New Jersey	1,207	819	10.9	613	416	5.5
New Mexico	350	237	3.2	178	120	1.6
New York	984	668	8.9	500	339	4.5
North Carolina	568	386	5.1	289	196	2.6
North Dakota	20	14	0.2	10	7	0.1
Ohio	620	421	5.6	315	214	2.9
Oklahoma	57	39	0.5	29	20	0.3
Oregon	268	182	2.4	136	92	1.2
Pennsylvania	834	566	7.6	424	287	3.8
Rhode Island	67	45	0.6	34	23	0.3
South Carolina	141	96	1.3	72	49	0.7
South Dakota	15	10	0.1	8	5	0.1
Tennessee	226	153	2.0	115	78	1.0
Texas	1,102	748	10.0	560	380	5.1
Utah	144	98	1.3	73	50	0.7
Vermont	33	22	0.3	17	11	0.2
Virginia	585	397	5.3	297	202	2.7
Washington	930	631	8.4	472	320	4.3
West Virginia	40	27	0.4	20	14	0.2
Wisconsin	281	191	2.5	143	97	1.3
Wyoming	8	5	0.1	4	3	0.0

[table continued]

	Total			
State	Additional R&D		Wages	Employment

U.S. Total	33,492	22,725	303.2
Alabama	306	208	2.8
Alaska	29	20	0.3
Arizona	466	316	4.2
Arkansas	59	40	0.5
California	7,225	4,902	65.4
Colorado	636	431	5.8
Connecticut	952	646	8.6
Delaware	150	102	1.4
D.C.	360	244	3.3
Florida	666	452	6.0
Georgia	412	280	3.7
Hawaii	55	37	0.5
Idaho	104	70	0.9
Illinois	1,330	903	12.0
Indiana	557	378	5.0
Iowa	175	119	1.6
Kansas	158	107	1.4
Kentucky	131	89	1.2
Louisiana	100	68	0.9
Maine	45	31	0.4
Maryland	1,316	893	11.9
Massachusetts	2,286	1,551	20.7
Michigan	1,620	1,099	14.7
Minnesota	701	476	6.3
Mississippi	78	53	0.7
Missouri	350	237	3.2
Montana	80	54	0.7
Nebraska	84	57	0.8
Nevada	74	50	0.7
New Hampshire	200	136	1.8
New Jersey	1,820	1,235	16.5
New Mexico	527	358	4.8
New York	1,484	1,007	13.4
North Carolina	857	581	7.8
North Dakota	30	21	0.3
Ohio	935	634	8.5

Oklahoma	86	58	0.8
Oregon	403	274	3.7
Pennsylvania	1,258	853	11.4
Rhode Island	101	68	0.9
South Carolina	213	145	1.9
South Dakota	22	15	0.2
Tennessee	341	231	3.1
Texas	1,662	1,128	15.0
Utah	218	148	2.0
Vermont	50	34	0.5
Virginia	882	598	8.0
Washington	1,402	951	12.7
West Virginia	61	41	0.5
Wisconsin	424	288	3.8
Wyoming	12	8	0.1

Note: Additional R&D and wages in millions of dollars; employment in thousands.

Source: Ernst & Young LLP calculations and National Science Foundation *National Patterns of R&D Resources* 2008.

FOOTNOTES

[1] For a discussion of the use of the R&D credit in the United States see *Supporting innovation and economic growth: The broad impact of the R&D credit in 2005*, Prepared by Ernst & Young LLP for the R&D Credit Coalition, April 2008.

[2] For example, see Congressional Budget Office, *R&D and Productivity Growth*, June 2005.

[3] The regular credit is an incremental credit in that taxpayers receive credit only for qualified research expenditures (QRE) that exceed a defined base amount. This design is intended to focus the tax incentive on the last dollar of research spending with the intent of making the credit more revenue efficient; that is, to encourage greater research spending per dollar of government revenue forgone. The incremental nature of the credit and the calculation of the base amount, however, has been a source of considerable complexity.

[4] For a more detailed discussion of the mechanics of the credit and the factors important for determining its incentive effects see General Accounting Office, *The Research Tax Credit's Design and Administration Can Be Improved*, GAO-10-136, November 2009.

[5] The net effective credit rate is measured as the credit rate multiplied by one minus a taxpayer's tax rate. Thus, for the unlimited regular credit, the net effective credit is 13 percent or 20%*(100%-35%).

[6] In some studies, the user cost of capital is used instead of the "price" variable described here. However, in a model that relates the percentage change in price to the percentage change in research spending, only the tax term from the

user cost of capital will remain. Thus, in many specifications the user cost and tax price approaches are equivalent.

[7] This corresponds to the lower end of the long-run effect reported in the survey by Hall and Reneen (2000).

[8]The range for the annual revenue cost is from Joint Committee on Taxation, *Estimated Budget Effects of the Revenue Provisions Contained in the President's Fiscal Year 2011 Budget Proposal*, JCX-7-10R, March 15, 2010.

[9] Francisco Moris and Nirmala Kannankutty, "New Employment Statistics from the 2008 Business R&D and Innovation Survey," National Science Foundation InfoBrief, NSF 10-326 July 2010.

END OF FOOTNOTES