



Ending the R&D Tax Credit Stalemate

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ISSUE BRIEF

VOLUME 3

NUMBER 4

APRIL 2015

The 113th Congress extended the research and development (R&D) tax credit through the end of 2014 by passing the Tax Increase Prevention Act (H.R. 5771), which President Obama signed into law on December 19, 2014.

That the fate of this credit in 2015 remains unknown is not surprising. Since its inception in 1981, it has expired eight times, been extended 16 times, and been modified on several occasions. In recent years, the R&D tax credit was mixed into a package with other one-off tax breaks such as equipment deductions for small businesses and specific Medicare reimbursements, all of which expired on a regular basis and prompted political debates over their extensions. Such “tax extenders,” as they are sometimes called, can create an impression that the discrete provisions within the package are all minor pieces of legislation. But that impression does no justice to the real economic significance of the R&D tax credit.

In fiscal year 2012, U.S. firms received R&D tax credits totaling \$11.1 billion, or about 8 percent of the estimated \$140.9 billion spent by federal agencies on defense and non-defense R&D that year.¹ IRS data from 2008 further reveal that firms in the manufacturing sector accounted for nearly 70 percent of total credits claimed, with the computer and electronic products, chemical, and transportation equipment industries benefitting the most.²

SUMMARY

- This brief explores the history, logistics, and policy implications of the temporary R&D tax credit, and offers recommendations for additional research that would help determine the merit of making the credit permanent.
- Using new, restricted-access IRS data and an instrumental variables strategy, the brief offers an unbiased estimation of the effectiveness of the R&D tax credit, showing that corporate research intensity—the ratio of R&D spending to sales—is indeed highly sensitive to the tax subsidy rate. When it gets cheaper for firms to spend on qualified R&D, they actually do spend more, as policymakers hope.
- Going forward, it would be helpful to know if the credit would be even more effective in a permanent regime, where companies could make long-term research plans with confidence. Further research also is needed to see whether the R&D tax credit leads to greater economic growth than would have been possible absent the credit, as well as whether this credit is functioning merely to reward firms for investing in research they would have done anyway. But keeping the R&D credit as a temporary “tax extender” seems imprudent, given its effectiveness.



Given the importance of technological advances in stimulating long-term economic growth, the level of R&D spending in the United States rightfully commands the attention of industry leaders, policymakers and researchers. The R&D credit, also known as the research and experimentation (R&E) credit, rewards firms that increase their research spending with a tax credit worth up to 20 percent of their expenditures above a determined, firm-specific base amount. According to the GAO, large corporations have dominated the use of this credit, and two-thirds of large companies surveyed in 2015 stated that they utilize the federal R&D credit.^{3, 4}

Aside from the United States' direct and indirect efforts to support R&D generally through federal agencies and grants, federal tax law offers two incentives for private R&D: a deduction for qualified research spending under Section 174 of the Internal Revenue Code (IRC), and a non-refundable tax credit for qualified research spending above a base amount under IRC Section 41. These two tax advantages reduce the after-tax price of R&D investment and jointly are referred to as the "R&D tax credit" in this brief. It is their com-

bined effect on the after-tax price of, and impact on, R&D spending that I assess here. This brief explores the history and logistics of the R&D tax credit, sheds new light on its effectiveness, and considers recent legislative reform proposals and the policy issues that continue to challenge the current iteration of the credit. Given the effectiveness of the "temporary" tax credit in spurring R&D spending, the brief also offers recommendations for additional research that would help determine the merit of making the credit permanent.

HOW THE CREDIT WORKS

Congress first adopted a tax credit for R&D expenditures as part of the Economic Recovery Tax Act of 1981 in order to stanch the decline in private R&D which took hold in the early 1970's. Intentionally designed to be temporary so as to reduce its impact on the federal budget, the credit was the first of its kind. It allowed firms to earn a tax credit on spending they already were able to expense under the existing Section 174 expensing provision.⁵

Seeking to incentivize corporations to invest in new R&D that may or may not have had a practical

application for their own businesses, the original credit rewarded qualified research expenditures (QREs) in excess of what the firm would have spent in the absence of the credit by lowering the after-tax cost of qualified research. The economic rationale for this tax break was that private R&D spending creates spillover effects that benefit society at large but cannot be captured entirely by the firm doing the spending, despite the abundance of intellectual property protections available in the U.S. Further, subsidizing marginal R&D expenditures may afford U.S. firms a competitive advantage in global markets.

The credit defined a firm's base level of R&D spending and granted a tax credit equal to a fraction of spending above that base level. Originally, the credit was equal to 25 percent of QREs above the base amount. The base was defined as the firm's average qualified R&D spending in the previous three years or 50 percent of current spending, whichever was greater. The Tax Reform Act of 1986 later reduced the statutory credit rate from 25 to 20 percent.

Because a firm's base was originally a moving average of its past spending, adding qualified research spending in any given year would

NOTES

- 1 Office of Management and Budget. "Analytical Perspectives, Fiscal Year 2014," 2013.
- 2 U.S. Department of the Treasury, Office of Tax Policy. "Investing in U.S. Competitiveness: The Benefits of Enhancing the Research and Experimentation (R&E) Tax Credit," March 25, 2011. <http://www.treasury.gov/resource-center/tax-policy/Documents/Investing-in-US-Competitiveness-Benefits-of-RandE-Tax-Credit-3-2011.pdf>
- 3 U.S. Government Accountability Office (GAO). "The Research Tax Credit's Design and Administration Can Be

Improved," GAO-10-136, November 6, 2009. <http://www.gao.gov/products/GAO-10-136>

- 4 Summary of the BDO USA LLP 2015 Survey of 100 tax directors of large public companies available at <http://blogs.wsj.com/cfo/2015/04/09/rd-tax-credits-lead-investment-decisions-survey/>. Reference: BDO.
- 5 The Omnibus Budget Reconciliation Act of 1989 later required firms to reduce their Section 174 deduction by the entire amount of research credits claimed.
- 6 Congressional Research Service (CRS). "Research Tax

Credit: Current Law and Policy Issues for the 114th Congress," March 13, 2015. <http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL31181.pdf>.

- 7 CRS.
- 8 For a detailed account of the specifics of each requirement and how they have changed over time, see CRS.
- 9 U.S. Department of the Treasury. "Treasury Issues Final Regulations Clarifying Research and Experimentation Expenditure Rules for Businesses," Press Release, July 23, 2014. <http://www.treasury.gov/connect/blog/Pages/>



increase the firm's base by one-third of the increase in each of the subsequent three years, essentially tempering the continued use of the credit, as the tax credit was only given for a percentage above the base. This provision created dynamic disincentives for current qualified R&D spending, leading to negative marginal credit rates for some firms and lower than statutory rates for many others. To fix this issue, in 1989, Congress established a new formula for the base as the firm's average gross receipts in the previous four tax years multiplied by the firm's "fixed-base percentage," a measure of historic research intensity, or 50 percent of current qualified spending, whichever was greater. The firm's fixed-base percentage was defined as and remains its ratio of total qualified R&D expenditures to total gross receipts between 1984 and 1988, subject to a 16 percent ceiling. Start-ups and firms lacking gross receipts or QREs for the years between 1984 and 1988 were assigned a three percent fixed-base percentage.

Since its inception, the traditional credit's incentive effect has varied widely among firms, in part due to the 1984-1988 fixed-base percentage and also due to the requirement that the base amount for the credit not

be less than 50 percent of current tax year QREs, in order to receive the 20 percent statutory rate. In other words, when current QREs exceed twice the historically defined base, the redefined base is increased 50 cents for each additional dollar of R&D spending. Overall, 3.5 to 9.5 percent of firms (5 to 16 percent of firms earning a credit) between 1981 and 1990 had marginal credit rates equal to the statutory rate, depending on the year. In some cases, circumstances around credit incentives have led established firms to invest less in R&D as a share of revenues.⁶

THE CURRENT SYSTEM

The R&D tax credit that expired at the end of 2014 consisted of four components: the traditional research credit that has been discussed above, an alternative simplified credit (ASC), the university basic research credit for fostering collaboration with U.S. higher education institutions, and the energy research credit. The latter two could be claimed in conjunction with one of the former two if a firm qualified.⁷

The ASC, a research tax credit that firms can permanently opt for in lieu of the traditional research credit, was introduced in 2007 for firms that

struggle to qualify for the traditional R&D tax credit despite the traditional credit's start-up provisions. Currently the ASC provides a credit equal to 14 percent of current year QREs that exceed 50 percent of the average QREs for the three preceding tax years. In the beginning of 2009, the ASC replaced the Alternative Incremental Research Credit (AIRC) election, which was available to firms that could not claim the traditional credit from 1996 through 2008. The traditional research credit and the ASC are mutually exclusive, and the choice of which to claim comes down to QREs.

THE QRE ISSUE

Under IRC rules, qualified research expenditures have had to satisfy four loosely defined requirements. Qualifying activities must be "experimental;" the sought-after knowledge must be "technological in nature;" and the research must be aimed at developing a "new business component." Lastly, this component must have "a new or improved function, performance or reliability or quality." In other words, detailing or aesthetically tweaking current products or processes does not qualify. Upon first glance, a reasonable person might disagree with another reasonable person about what does

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final-regulations-rande.aspx.

¹⁰ Internal Revenue Code, Section 41 Credit for Increasing Research Activities. http://www.irs.gov/pub/irs-regis/research_credit_basic_sec41.pdf.

¹¹ U.S. Department of the Treasury. "General Explanations of the Administration's Fiscal Year 2016 Revenue Proposals," February 2015. <https://www.treasury.gov/resource-center/tax-policy/Documents/General-Explanations-FY2016.pdf>.

¹² CRS.

¹³ BDO.

¹⁴ The IV strategy directly addresses the simultaneity of R&D spending and marginal credit rates.

¹⁵ Rao, Nirupama. "Do Tax Credits Stimulate R&D Spending? The Effect of the R&D Tax Credit in its First Decade," Forthcoming, 2015. <http://wagner.nyu.edu/files/faculty/publications/RD032014.pdf>.

¹⁶ GAO.

¹⁷ For more information, see the joint report from the Treasury Department and White House entitled "The President's

Framework for Business Tax Reform" from February 2012. <http://www.treasury.gov/resource-center/tax-policy/Documents/The-Presidents-Framework-for-Business-Tax-Reform-02-22-2012.pdf>.

¹⁸ Hall, B. H., and J. Van Reenen. "How Effective are Fiscal Incentives for R&D? A Review of the Evidence," Research Policy, 29, 449-469. 2000.

¹⁹ Treasury, 2011.

²⁰ Treasury, 2015.

²¹ GAO.



and does not qualify as a QRE, and disputes between industry, the IRS, and Treasury have persisted since the introduction of the tax credit.⁸

In the fall of 2013, the Treasury Department broadened the ability of firms to claim QREs by allowing them access to the credit for a new product, even when they are able to sell the product to their customers directly and benefit early and often from their own research. The final regulations were issued in the summer of 2014 and specified that “subsequent actions taken by the taxpayer’s trade or business with the product have no effect on the eligibility of R&E expenditures for a tax deduction if the expenditures are otherwise qualifying R&E expenditures.”⁹ Notably, these rules are retroactive, so firms can accrue tax benefits for previous years, and they will be implemented without a mandate to estimate the budgetary impact for which they will be responsible—potential lost revenue included.

So which expenditures count as qualified and which do not? Eligible QREs include wages for in-house R&D; supplies, like prototypes and testing materials; contract research; and basic research payments to qualified non-profit organizations. According to the Treasury Department, approximately 70 percent of QREs are labor costs. Excluded research expenditures for the purposes of IRC Section 41 are adaptations of existing business components for specific customers; studies related to market research, data collection, and quality control; software for internal use only; research conducted outside the U.S.; and all research related to the social sciences, arts, or humanities.¹⁰

These lists are not comprehensive, but do illustrate the complex system that firms must navigate before calculating the portion of their total R&D spending that may qualify for the research credit.

This complexity is especially problematic, as it creates compliance challenges for firms and enforcement challenges for the IRS, as companies claiming the credit automatically trigger audit flags.¹¹ Concerned about the legitimacy of late or amended claims for the credit, the IRS decided to designate “research credit claims” as a tier 1 compliance issue in 2007, opening the approval of these credits up to subjective judgments and interpretations.¹² At the same time, it’s possible that some firms that are eligible for the tax credit don’t take advantage of it.

These compliance challenges and information barriers can carry serious economic implications. Among companies planning to expand into new U.S. markets within the next three years, three-quarters listed tax credits, exemptions and reductions as having the greatest impact on that decision, in a 2015 survey. Of the 35 percent of companies that did not use R&D credits, a majority thought they could not qualify for it.¹³ This belief can be consequential, for as detailed in my research, described below, there has been a clear and significant increase in R&D spending among those firms that have claimed the tax credit.

A NEW UNDERSTANDING OF THE CREDIT’S EFFECTIVENESS

In my recent paper, I use new, restricted access IRS data and an

instrumental variables (IV) strategy¹⁴ to determine an unbiased estimation of the effectiveness of the R&D tax credit and whether it actually increases corporate research spending as intended.¹⁵ I focus on the years 1981 through 1991—the last year prior to the credit’s first lapse in 1992—because tax policy changes that were common in the credit’s early years and critical to the identification strategy have been absent more recently. The IRS data is necessary to accurately measure firms’ marginal credit rates, which are difficult to infer from annual R&D spending as reported in public financial filings. R&D expenses reported publicly in 10-k filings and compiled in Compustat conform to a broader definition of R&D that includes both R&D conducted abroad and domestic research expenditures that do not qualify for the R&D tax credit because they fail to meet QRE criteria. If firms respond to changes in subsidies for qualified R&D by rearranging their shares of qualified and non-qualified spending, there is little way of identifying such movements through public data alone. Because a firm’s credit rate is determined by its relative QREs, changes in the composition of spending can affect credit rates. In comparing tax subsidy measures constructed from previously studied public financial data to tax subsidy measures constructed using IRS data, I find that they differ widely and that the differences vary from year to year, suggesting that the public data could lead to biased elasticity estimates of the effect of the tax credit on firm spending.

The IRS statement of income (SOI) data are drawn from a panel



sample of corporate tax returns (Form 1120), with items relating to R&D spending pulled from Form 6765. Among other details, the data report annual QREs, base amounts, tentative R&D tax credits, and limitations due to insufficient tax liabilities. Because the IRS SOI data include both public and private firms and do not oversample large firms, only a small set of firms appear in both the Compustat and IRS SOI data. In general, the Compustat data suggest that more firms—from 2.7 to nearly 22 percent, depending on the year—qualify for an R&D tax credit than actually do (see Figure 1).

Despite the improved accuracy of the IRS data, firms typically only report the details of research spending in years when they apply for the R&D tax credit. If, for example, a firm has insufficient income tax liabilities and does not apply for a credit, its qualified spending is unknown, and missing values appear as zeros on the SOI, likely understating R&D spending. Additionally, IRS SOI data only report QREs and do not provide any sense of how a firm’s non-qualified spending responds to subsidies for qualified spending. Shifting or re-labeling expenses as QREs may be occurring behind the scenes, but this lack of information limits any analysis.

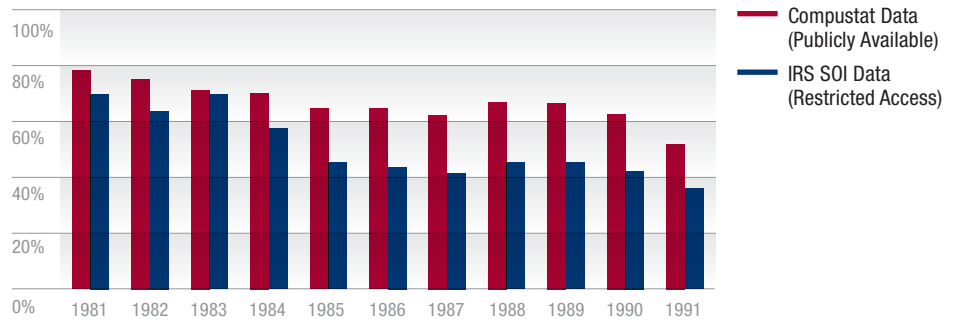
FINDINGS

My estimates of the price elasticity for R&D expenditures imply that corporate research intensity—the ratio of R&D spending to sales—is highly sensitive to the tax subsidy rate. Short-run elasticity estimates exceed one, meaning that a 10 percent reduc-

tion in the cost of R&D leads the average firm to increase its research intensity by more than 10 percent. In other words, when it gets cheaper to spend on qualified R&D, firms actually do spend more, as policymakers hope. Analysis shows that wages and supplies account for the bulk of the increase in research spending. In the long-run, R&D expenditures increase even more over time, but firms do

But there are some important caveats regarding broader interpretations of this analysis. For example, research decisions made by firms over thirty years ago may not represent current spending by industry, size, domicile, etc. Also, my analysis does not assess the impact of firms’ expectations of future R&D tax credits on research spending. During its first decade, the credit was always

FIGURE 1: SAMPLE OF SAME FIRMS CLAIMING THE R&D TAX CREDIT BY DATA SOURCE



not time their research spending to maximize their R&D tax credits. This perhaps reflects uncertainty about the continued existence of the credit. In a dynamic analysis, I find that small and young firms appear more responsive and their short-run response is stronger, suggesting that they may face lower adjustment costs or liquidity constraints in financing R&D. Elasticities of qualified and total (qualified and non-qualified) research intensities from a smaller sample of firms suggest that they do respond to changes in the user cost largely by increasing their qualified spending, meaning that the type of R&D which the federal credit deems qualified research is, in fact, an important margin on which the credit affects firm behavior.

renewed before it expired. Since then, the credit has been allowed to lapse several times, most of the time being reinstated retroactively. On one occasion in 1995, however, the credit was simply allowed to expire for a year. In the present, less predictable fiscal environment, estimates from an era of greater certainty may not be fully applicable.

Looking beyond my own findings, other research on the tax credit has proven insightful in recent years. The GAO determined that in 2005 the credit reduced the after-tax price of additional qualified research by an estimated 6.4 to 7.3 percent. The range here is due to assumptions about discount rates and the length of any delay in using the tax credit—an



important point, given the GAO's discovery that 44 percent of total net credits earned in 2005 could not be used immediately. Since the R&D tax credit is a component of the General Business Credit (since the 1986 legislation), these unused credits are subject to a yearly cap and can be carried back one year or carried forward twenty years. Even more noteworthy, the GAO identified disparities in the incentives provided to different firms. Some received no credit while others were eligible for credits

up to 13 percent of their marginal R&D spending.¹⁶ Furthermore, their analysis found that a significant portion of credits were earned for spending that firms would have done even without the tax advantage and were not used to support the kinds of new research with spillover effects originally intended by the legislation. A major part of the problem, the GAO concluded, was the traditional credit's 1980's fixed-base percentage.

Also, a study commissioned by the Obama administration concluded in

2012 that each dollar of foregone tax revenue from the credit causes firms to invest at least a dollar in R&D. The administration relied on estimates from the Treasury Department which indicate that the elasticity for research spending is around -1, meaning that the research credit produces a dollar-for-dollar-increase in research spending.¹⁷ Other scholarly research finds even larger effects.¹⁸ There is general agreement in the research that the tax credit increases qualified R&D investments made by firms.

FIGURE 2: RECENT LEGISLATIVE PROPOSALS TO EXTEND AND/OR MODIFY THE R&D TAX CREDIT

	S. 2260	H.R. 4438 and H.R. 4	H.R. 880	FY2016 Budget
Traditional Credit Extension	Through 2015 (Modified)	Permanent (Modified)	Permanent (Modified)	Through 2015 (Current), then Permanent (Modified)
Changes to the Traditional Credit	Full amount of the credit can be applied to the corporate AMT Up to \$250,000 of the credit can be applied to current tax year payroll taxes when income tax liabilities are insufficient	Equal to 20% of current tax year QREs above a base amount (base = 50% of the previous three tax year's average annual QREs), plus similar statutory changes to the university and energy research credits	Same as H.R. 4438 and H.R. 4 Also, full amount of the credit can be applied to the corporate AMT for eligible small firms	Repealed after 2015 ASC credit rate increased from 14% to 18% and allowed to offset AMT liability
Changes to Credit for Firms with Insufficient QRE History	N/A	Equal to 10% of current tax year QREs (and university research payments) If less than three years of QREs/payments	Same as H.R. 4438 and H.R. 4	Eliminate the reduced ASC rate of 6% for businesses without QREs in previous three years
Status	Passed by Senate Finance Committee (2014)	Both Passed by House (2014)	Introduced to House Ways and Means Committee (2015)	Requested by President (2015)

Sources <https://www.congress.gov/bill/113th-congress/senate-bill/2260>
<https://www.govtrack.us/congress/bills/113/hr4>
<https://www.govtrack.us/congress/bills/113/hr4438>
<https://www.govtrack.us/congress/bills/114/hr88>
<https://www.treasury.gov/resource-center/tax-policy/Documents/General-Explanations-FY2016.pdf>



POLICY RECOMMENDATIONS

As private sector companies continue to lobby for a permanent tax credit, which would eliminate the uncertainty in calculating the after-tax cost of R&D investments, future research that assesses how policy certainty affects research credit responses would be useful to policymakers, as they decide whether a longer-term commitment to the research credit is worth the budgetary cost.

There is little reason to believe that the firm's ratio of research spending to gross receipts from nearly three decades ago, when multiplied by its average gross receipts over the prior four years, is an appropriate base for firms.¹⁹ Indeed, policymakers themselves acknowledge this, as is evident from recent legislation proposed in both houses of Congress (see Figure 2). There are several reasons why the credit has not already been made permanent, but lost revenue seems to be the main culprit, at least from a political perspective.

In response to the modifications to the R&D tax credit requested in President Obama's fiscal year 2016 budget proposal, the Treasury Department projected that repealing the traditional credit and making permanent

the ASC with an increased statutory rate of 18 percent would cost the federal government \$127.7 billion over the next decade.²⁰ However, traditional budget models do not measure the dynamic effects of legislation, so determining the second order effects of extending the credit would provide a more accurate projection of the cost of permanence, beyond the simple static effect to the Treasury's coffers.

Though the GAO suggests that adding a minimum base to the ASC and eliminating the traditional credit may solve the incentive issue detailed above²¹, enhancing the ASC could leave more firms with negative credit rates in some years in the way that the traditional credit did before the 1989 base reformulation. Given the high and robust elasticities estimated in my research, any policy shift that would lead to lower credit rates could substantially reduce corporate research spending. Redirecting tax expenditures away from the traditional credit and toward the ASC therefore should be considered carefully.

CONCLUSION

The "temporary" R&D tax credit is effective at spurring research spending, as my recent findings show.

Going forward, it would be helpful to know if the credit would be effective in a permanent regime where companies can make long-term research plans with confidence. Understanding exactly why qualified expenditures appear to be so much more responsive than broader definitions of R&D—that is, whether firms are re-allocating research expenditures from non-qualified to qualified, or are simply re-labeling research spending—would also be useful in designing a permanent research credit. Without these latter insights, an accurate determination cannot be made about whether the R&D tax credit leads to greater economic growth than would have been possible absent the credit, nor can we conclude definitively whether or not this credit is functioning merely as a windfall for a select few companies and rewarding them for investing in research they would have done anyway. Continuing to lump this credit in with "tax extenders" and subjecting it to frequent, short-term renewal debates seems imprudent for such an effective tool. The consideration of permanency as proposed in much of the recent legislation appears warranted.



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Nirupama Rao currently is Visiting Assistant Professor of Business Economics and Public Policy at the Wharton School of the University of Pennsylvania. She is an Assistant Professor of Economics and Public Policy at NYU’s Wagner School of Public Service. Her research concerns the economic effects of fiscal policy, focusing on the impact of policy on firm production, investment and pricing decisions and individual consumption decisions. She has studied how excise taxes on oil production affect the extraction decisions of domestic producers, the effectiveness of federal tax credits for R&D, and investigated the composition and importance of corporate deferred taxes. She has also been working on projects relating to the interaction of regulatory policy and taxation, how tax liabilities evolve over individual’s lifetimes and how prices affect food choices. She is a recipient of the National Tax Association Dissertation Award. Rao completed her PhD in economics at MIT in June 2010, where she previously earned her undergraduate degree. Prior to graduate school, she worked at the Andrew W. Mellon Foundation.

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