Research Tax Credit: Current Law, Legislation in the 113th Congress, and Policy Issues

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Summary

Technological innovation is a primary engine of long-term economic growth, and research and development (R&D) serves as the lifeblood of innovation. The federal government encourages businesses to invest more in R&D in several ways, including a tax credit for increases in spending on qualified research above a base amount.

This report describes the current status of the credit, summarizes its legislative history, discusses policy issues it raises, and describes legislation in the 113th Congress to modify or extend it. The report will be updated as warranted by legislative activity and other developments affecting the credit.

The research credit (also known as the research and experimentation (R&E) tax credit) has never been a permanent provision of the federal tax code. It expired at the end of 2011 and was retroactively extended in early 2013 through the end of that year. Since its enactment in mid-1981, the credit has been extended 15 times and significantly modified five times. While the credit is usually assumed to be a single credit, it actually consists of four discrete credits: (1) a regular credit, (2) an alternative simplified credit (ASC), (3) a basic research credit, and (4) an energy research credit. A taxpayer may claim one of the first two and each of the other two, provided it meets the requirements for each.

In essence, the research credit attempts to boost business investment in basic and applied research by reducing the tax price (or after-tax cost) of undertaking qualified research above a base amount. As a result, the credit's effectiveness hinges on the sensitivity of the demand for this research to decreases in its cost. It is unclear from available studies how sensitive that demand is.

While most analysts and lawmakers endorse the use of tax incentives to generate increases in business R&D investment, some have reservations about the current credit. Critics contend the credit is not as effective as it could be because of certain flaws in its design, such as a lack of permanence, uneven and inadequate incentive effects, non-refundability, and an unsettled definition of qualified research.

The 112th Congress made few changes to the credit. Under the American Taxpayer Relief Act of 2012 (ATRA, P.L. 112-240), the credit was extended from January 1, 2012, through the end of 2013. ATRA also clarified the rules governing the use of the credit by companies involved in acquisitions to ensure that taxpayers who sell or otherwise dispose of a business unit receive the credit for qualified research expenses incurred before the change in ownership. Finally, the act altered the rules used to determine the allocation of the credit among members of a controlled group of businesses to make that allocation proportionate to each member's share of total qualified research expenses for the group.

Two bills to further modify the credit have been introduced in the 113th Congress. H.R. 119 would permanently extend the current credit. H.R. 120 would extend the credit through the end of 2014, increase the rates of the regular and ASC credits for 2013 and 2014 only, and allow qualified small businesses to transfer any credit they can claim to other businesses for cash and exclude that cash from their gross income.

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Introduction

Economists have gained notoriety for their differences of opinion on a variety of policy issues. Notable examples include the long-term economic effects of large, permanent tax cuts; the impact of illegal immigration on domestic wages; and the best way to achieve price stability, full employment, and greater income equality. But on the issues of the impact of technological innovation on economic growth in the long run and the proper role of government in the development of new technologies, there is relatively little dissent among practitioners of what some have called the dismal science.

In general, economists agree that technological innovation has accounted for a major share of long-term growth in real per-capita income in the United States.[1] It is useful to clarify what economists mean by technological innovation, since such a complex concept can mean different things to different professions. Economists who study the forces driving economic growth tend to see innovation as a convoluted and uncertain process that embraces the acquisition of new scientific and technical knowledge and its application to the development of new goods and services or methods of production through research and experimentation. Learning-by-doing and learning-by-using often play crucial roles in this process.

In economies dominated by competitive markets, technological innovation is driven mainly by the efforts of competing firms to gain, sustain, or reinforce competitive advantages by being the first to introduce or use new or improved products or services; more efficient production processes; or more effective strategies for management, marketing and promotion, and customer service and support.

Most economists would also agree that private R&D investment is likely to be less than the amounts that would be warranted by its economic benefits. The reason for this is thought to lie in the nature of these benefits. Firms generally cannot capture all the returns to their R&D investments, even in the presence of patents, trademarks, and other instruments of intellectual property protection, and their strict enforcement. Numerous studies have found that the average social returns to private R&D investments greatly exceeded the average private returns.[2] This finding held true whether a firm invested in research projects narrowly focused on its existing lines of business, or in research projects aimed at extending the boundaries of knowledge in particular scientific disciplines in ways that had no obvious or immediate commercial applications.

Economists refer to an excess of social returns over private returns as the spillover effects or external benefits of R&D. There are several channels through which the returns from innovation may escape full capture by the innovating firms and spill over to society at large. The most common ones are reverse engineering by competing firms, migration of research scientists and

[1] Linda R. Cohen and Roger G. Noll, "Privatizing Public Research," *Scientific American*, September 1994, p. 72.

[2] See, for example, Edwin Mansfield, "Microeconomics of Technological Innovation," in *The Positive Sum Strategy*, Ralph Landau and Nathan Rosenberg, eds. (Washington: National Academy Press, 1986), pp. 307-325; and John C. Williams and Charles I. Jones, "Measuring the Social Return to R&D," *Quarterly Journal of Economics*, vol. 113, no. 4, November 1998, pp. 1119-1135.

engineers from one firm to another, and the availability of new or improved goods and services at prices below what most consumers would be willing to pay.[3]

When seen through the lens of standard economic theory, the external benefits of technological innovation take on the appearance of a market failure. They signal that too few resources are being allocated to the activities leading to the discovery and commercial development of new technical knowledge and know-how. To remedy this failure, most economists recommend the adoption of public policies aimed at boosting or supplementing private investment in R&D.

The federal government supports R&D in a variety of ways. Direct support comes mainly in the form of research performed by federal agencies and federal grants for basic and applied research and development intended to support concrete policy goals, such as protecting the natural environment, exploring outer space, advancing the treatment of deadly diseases, and strengthening the national defense. Indirect support is more diffuse. The chief sources are federal funding of higher education in engineering and the natural sciences, legal protection of intellectual property rights, special allowances under antitrust law for joint research ventures, and tax incentives for business R&D investment.

Federal tax law offers two such incentives: (1) an unlimited expensing allowance for qualified research spending under Section 174 of the Internal Revenue Code (IRC), and (2) a non-refundable tax credit for qualified research spending above a base amount under IRC Section 41—known as the research and experimentation (R&E) tax credit, the research tax credit, the R&D tax credit, or the credit for increasing research activities. The deduction has been a permanent provision of the IRC since it was first enacted in 1954. Its main advantages are that the deduction simplifies tax accounting for R&D expenditures and encourages business R&D investment by taxing the returns to such investment at a marginal effective rate of zero. A similar policy objective lies behind the research tax credit, which has been a temporary provision of the IRC since it went into effect in July 198.1 The credit is intended to stimulate more business R&D investment than otherwise would occur by lowering the after-tax cost of qualified research.[4] But unlike the deduction, it complicates tax compliance for firms claiming the credit. In FY2010, the combined budgetary cost of these incentives totaled an estimated $9.5 billion, or 6.5% of the estimated $147.1 billion authorized for federal defense and non-defense R&D that year.[5]

This report examines the current status of the R&E tax credit, describes its legislative history, discusses some important policy issues raised by it, and identifies legislative proposals in the 113th Congress to extend or otherwise modify the credit. It will be updated to reflect significant legislative activity and other developments affecting the credit's status.

[3] For a brief discussion of these channels, see Bronwyn H. Hall, "The Private and Social Returns to Research and Development," in *Technology, R&D, and the Economy*, Bruce L. R. Smith and Claude E. Barfield, eds. (Washington: Brookings Institution and American Enterprise Institute, 1996), pp. 140-141.

[4] For more information on the Section 174 expensing allowance, see U.S. Congress, Senate Committee on the Budget, *Tax Expenditures*, committee print, 107th Cong., 2nd sess. (Washington: GPO, 2002), pp. 55-58.

[5] Office of Management and Budget, *Analytical Perspectives, Fiscal Year 2012* (Washington: GPO, 2011), pp. 66 and 367.

Design of the R&E Tax Credit

Although many think of the research tax credit as a single unified credit, it has four discrete components: a regular research credit, an alternative simplified credit (ASC), a basic research credit, and a credit for energy research.[6] Each is non-refundable. In any tax year, taxpayers may claim no more than the basic and energy research credits, plus either the regular credit or the ASC**.** To prevent taxpayers from benefiting twice from the same expenditures, any research tax credit claimed must be subtracted from deductible research expenses. The four components of the research tax credit are due to expire at the end of 2013.

Qualified Research Expenditures

Ultimately, claims for the regular credit and the ASC rest on the definition of qualified research expenditures (QREs). There are two aspects to this definition.

Nature of Qualified Research

One aspect deals with the nature of qualified research itself. Under Section 41(d) of the federal tax code, research must satisfy four criteria in order to qualify for the regular credit and the ASC. First, the research must involve activities that qualify for the deduction under Section 174: namely, the activities must be "experimental" in the laboratory sense and aimed at the development of a new or improved product or process. Second, the research must seek to discover information that is "technological in nature." Third, it should strive to gain new technical knowledge that is useful in the development of a new or improved "business component," which is defined as a product, process, computer software technique, formula, or invention to be sold, leased, licensed, or used by the firm performing the research. And fourth, the research must entail a process of experimentation aimed at the development of a product or process with "a new or improved function, performance or reliability or quality."

According to Section 41(d)(3), research satisfies the four criteria if it is intended to develop a new or improved function for a business component, or to improve the performance, reliability, or quality of a business component. By contrast, research fails to meet these criteria if its main purpose is to modify a business component according to "style, taste, cosmetic, or seasonal design factors."

Businesses, the courts, and the IRS have clashed repeatedly over the interpretation of the four criteria. Although the IRS issued final regulations clarifying the definition of qualified research in December 2003 (T.D. 9104), disputes between businesses and the IRS over what activities qualify for the credit have continued.[7]

[6] Firms investing in qualified research that could not claim the regular credit had the option of taking what was known as an alternative incremental R&E tax credit (or AIRC), under IRC Section 41(c)(4), for tax years from 1996 to 2008. The Emergency Economic Stabilization Act of 2008 (P.L. 110-343) repealed the AIRC for the 2009 tax year, and Congress has not reinstated it. See page 14 for more details on the AIRC.

[7] See the discussion of concerns raised by the current definition of qualified research in the "Incomplete and Ambiguous Definition of Qualified Research" section of this report.

Section 41(d)(4) identifies the activities for which the credit may not be claimed. Specifically, the credit does not apply to

- research conducted after the start of commercial production of a "business component";
- research done to adapt an existing business component to a specific customer's needs or requirements;
- research related to the duplication of an existing business component;
- surveys and studies related to data collection, market research, production efficiency, quality control, and managerial techniques;
- research to develop computer software for a firm's internal use (except as allowed in any regulations issued by the IRS);
- research conducted outside the United States, Puerto Rico, or any other U.S. possession;
- research in the social sciences, arts, or humanities; and
- research funded by another entity.

Expenses Eligible for the Credit

The second aspect of the definition of QREs concerns the expenses to which the credit applies. Under Section 41(b)(1), qualified expenses relate to both in-house research and contract research. In the case of in-house research, the regular credit and ASC apply to the wages and salaries of employees and supervisors engaged in qualified research, as well as the cost of materials, supplies, and leased computer time used in this research. In the case of contract research, the credits apply to the full amount paid for qualified research conducted by certain small firms, colleges and universities, and federal laboratories; 75% of payments for qualified research performed by certain research consortia; and 65% of payments for qualified research performed by certain other non-profit entities dedicated to scientific research.

As a result, the credits do not cover all the expenses a company incurs in conducting qualified research. Specifically, outlays for depreciable durable assets used in qualified research such as buildings and equipment, overhead expenses (e.g., heating, electricity, rents, leasing fees, insurance, and property taxes), and the fringe benefits of research personnel are excluded. The exclusion of these expenses has implications for the incentive effect of the credit (more on this later). According to some estimates, the excluded expenses account for 27% to 50% of business R&D spending.[8]

Regular Research Credit

The regular research tax credit has been extended 15 times and significantly modified five times. Under IRC Section 41(a)(1), it is equal to 20% of a firm's QREs beyond a base amount. Such an incremental design is intended to encourage firms to spend more on R&D than they otherwise

[8] U.S. Office of Technology Assessment, *The Effectiveness of Research and Experimentation Tax Credits* (Washington: 1995), p. 29.

would by lowering the after-tax cost to business taxpayers of investing in qualified research above some normal amount by as much as 20%.[9] Given that business R&D investment appears sensitive to its cost, a decline in the after-tax cost of R&D can be expected to spur a rise in business R&D investment, all other things being equal.[10]

The base amount for the regular credit is designed to approximate the amount a firm would spend on qualified research in the absence of the credit. As such, the base amount can be viewed as a firm's normal or preferred level of R&D investment. Two rules govern the calculation of the base amount under IRC Section 41(c). First, it must be equal to 50% or more of a firm's QREs in the current tax year—a rule that some refer to as the 50-percent rule.[11] Second, the base amount depends on whether the business taxpayer is considered an established firm or a start-up firm. Established firms are defined as firms with gross receipts and QREs in at least three of the tax years from 1984 through 1988. Start-up firms, by contrast, are defined as firms whose first tax year with both gross receipts and QREs occurred after 1983, or firms that had fewer than three tax years from 1984 to 1988 with both gross receipts and QREs.[12] The base amount for all firms, established or start-up, is the product of a fixed-base percentage and average annual gross receipts in the previous four tax years. An established firm's fixed-base percentage is the ratio of its total QREs to total gross receipts in 1984 to 1988, capped at 16%. By contrast, a start-up firm's fixed-base percentage is set at 3% during the firm's first five tax years with spending on qualified research and gross receipts. Thereafter, the percentage gradually adjusts to reflect a firm's actual experience, so that by its 11th tax year, the percentage equals the firm's total QREs relative to its total receipts in the 5th through 10th tax years.

In general, the lower a firm's fixed-base percentage, the better its chances of claiming the regular credit. Furthermore, a firm can expect to benefit from the regular credit if its ratio of QREs in the current tax year to average annual gross receipts in the previous four tax years is greater than its fixed-base percentage. (See **Table 1** for a calculation of the regular credit for a hypothetical established firm and **Table 2** for a calculation of the regular credit for a hypothetical start-up firm.)

Table 1. Sample Calculations of the Regular and Alternative Simplified Research Tax Credits in 2013 for an Established Firm

($ millions)

Year	Gross Receipts	Qualified Research Expenses
1984	100	5
1985	150	8
1986	250	12
1987	400	15

[9] For a variety of reasons, which will be discussed in a later section of the report, the actual or effective rate of the credit is much lower than 20%.

[10] Available studies indicate that the price elasticity of demand for R&D ranges from 0.2 to 2.0, which means that a 1% reduction in the cost of R&D would raise R&D spending between 0.2% and 2%.

[11] In other words, the expenses against which the regular research credit may be claimed can equal no more than 50% of total QREs in a given tax year.

[12] The definition of a start-up firm has changed a few times since the research credit was enacted. Presently, it denotes a firm that recorded gross receipts and QREs in a tax year for the first time after 1993.

Year	Gross Receipts	Qualified Research Expenses
1988	450	16
1989	400	18
1990	450	18
2006	835	45
2007	915	50
2008	1,005	53
2009	1,215	60
2010	1,465	70
2011	1,650	85
2012	1,825	95
2013	1,900	100

Source: Congressional Research Service.

Calculation: Regular Research Tax Credit

Compute the fixed-base percentage:

1. Sum the qualified research expenses for 1984 to 1988: $56 million.

2. Sum the gross receipts for 1984 to 1988: $1,350 million.

3. Divide the total qualified research expenses by the total gross receipts to determine the fixed-base percentage: 4.0%.

Compute the base amount for 2013:

1. Calculate the average annual gross receipts for the four previous years (2009-2012): $1,539 million.

2. Multiply this average by the fixed-base percentage to determine the base amount: $62 million.

Compute the regular tax credit for 2013:

1. Reduce the $100 million in qualified research expenses for 2013 by the greater of the base amount ($62 million) or 50% of the qualified research expenses for 2013 ($50 million): $38 million.

2. Multiply this amount by 20% to determine the regular R&E tax credit for 2013: **$7.60 million**.

Calculation: Alternative Simplified Research Credit

1. Calculate the average qualified research expenditures in the three previous years (2010-2012): $83 million.

2. Divide this amount by 2: $41.5 million.

3. Subtract this amount from qualified research expenditures in 2013: $58.5 million.

4. Multiply this amount by 0.14 to determine the alternative simplified research credit for 2013: **$8.2 million**.

Table 2. Sample Calculations of the Regular and Alternative Simplified Research Tax Credits in 2013 for a Start-up Firm

($ millions)

Year	Gross Receipts	Qualified Research Expenses
2005	30	35
2006	42	40
2007	55	45
2008	60	55
2009	210	65
2010	305	73
2011	400	82
2012	475	90
2013	600	105

Source: Congressional Research Service.

Calculation: Regular Research Tax Credit

Compute the fixed-base percentage:

1. According to current law, a start-up firm's fixed-base percentage is fixed at 3% for each of the first five years after 1993 when it has both gross receipts and qualified research expenses; it then adjusts according to a formula over the next six years to reflect the firm's actual research intensity. Thus, the fixed-base percentages are 3% for 2005 through 2009, 7.4% in 2010, 8.9% in 2011, and 12.0% in 2012, and 14.9% in 3013.

Compute the base amount for 2013:

1. Calculate the average annual receipts for the four previous years (2009-2012): $347.5 million.

2. Multiply this amount by the fixed-base percentage (14.9%) to determine the base amount: $52 million.

Compute the regular tax credit:

1. Reduce qualified research expenses for 2013 ($105 million) by the greater of the base amount ($52 million) or 50% of the qualified research expenses for 2013 ($52.5 million): $52.5 million.

2. Multiply this amount by 20% to determine the regular R&E tax credit for 2013: **$10.5 million**.

Calculation: Alternative Simplified Research Credit

1. Calculate the average qualified research expenditures for the three previous years (2010-2012): $82 million.

2. Divide that amount by 2: $41 million.

3. Subtract that amount from qualified research expenditures in 2013: $64 million.

4. Multiply this amount by 0.14 to determine the alternative simplified research credit for 2013: **$9.0 million**.

Alternative Simplified Credit

The most recent addition to the array of research tax credits provided by Section 41 is the alternative simplified credit (ASC). It was established by the Health Care and Tax Relief Act of 2006 (P.L. 109-432). Under Section 41(c)(5), a business taxpayer may claim the ASC in lieu of the regular credit. The ASC is equal to 14% of a taxpayer's QREs in the current tax year above 50% of its average QREs during the three previous tax years. If a taxpayer has no QREs in any of those years, then the credit is equal to 6% of its QREs in the current tax year. A decision to elect the ASC remains in effect until a taxpayer gains the consent of the IRS to claim the regular research credit. (See **Table 1** for a hypothetical calculation of the ASC for an established firm and **Table 2** for a similar calculation of the ASC for a startup firm.)

Taxpayers with one or more of the following conditions may benefit more from the ASC than the regular credit:

- a relatively large base amount under the regular credit;
- incomplete records for determining the base period as a start-up firm;
- substantial growth in gross receipts in recent years; and
- a complicated history of mergers, re-organizations, acquisitions, and dispositions.

Alternative Incremental Research Credit

Firms investing in qualified research that could not claim the regular credit had the option of claiming the alternative incremental R&E tax credit (or AIRC), under IRC Section 41(c)(4), for tax years from 1996 to 2008. The Emergency Economic Stabilization Act of 2008 (P.L. 110-343) repealed the AIRC for the 2009 tax year, and Congress has not reinstated it. When a firm elected the AIRC for a particular tax year, it had to continue to do so, unless the firm received permission from the IRS to switch to the regular research credit. There was some concern that such a rule deterred firms from claiming the AIRC, even though they might have been better off doing so.

The definition of QREs for the AIRC was the same as the definition of QREs for the regular credit. But that was where the similarity between the two credits ended. While the regular credit

is equal to 20% of QREs in excess of a base amount, the AIRC, in the final year it could be taken, was equal to 3% of a firm's QREs above 1% but less than 1.5% of its average annual gross receipts in the previous four tax years, plus 4% of its QREs above 1.5% but less than 2.0% of its average annual gross receipts in the previous four tax years, plus 5% of its QREs greater than 2.0% of its average annual gross receipts in the previous four tax years.

In general, firms benefited from the AIRC if their QREs in the current tax year exceeded 1% of their average annual gross receipts during the past four tax years. Moreover, the AIRC was probably of greater benefit than the regular credit was to business taxpayers with relatively high fixed-base percentages, or whose research spending was declining, or whose sales were growing much faster than their research spending. (See **Table 1** for a calculation of the AIRC for a hypothetical established firm, and **Table 2** for a calculation of the AIRC for a hypothetical start-up firm.)

University Basic Research Credit

Firms that enter into contracts with certain non-profit organizations to perform basic research may be able to claim a separate research credit for some of their expenditures for this purpose under IRC Section 41(e). A primary aim of the credit is to foster collaborative research involving U.S. firms and colleges and universities. The credit is equal to 20% of total payments for qualified basic research above a base amount, which is known as the "qualified organization base period amount." This amount has little in common with the base amount for the regular R&E tax credit, except that both amounts seem intended to approximate what firms would spend on qualified research in the absence of the credits.[13]

For the purpose of the credit, basic research is defined as "any original investigation for the advancement of scientific knowledge not having a specific commercial objective."

The credit does not apply to qualified basic research done outside the United States, or to basic research in the social sciences, arts, or the humanities.

In addition, the basic research credit applies only to payments for qualified basic research performed under a written contract by the following organizations: educational institutions, nonprofit scientific research organizations (excluding private foundations), and certain grant-giving organizations.

Firms conducting their own basic research may not claim the credit for their expenditures for this purpose, but the spending may be included in their QREs for the regular credit or ASC. In

[13] Calculating a firm's base amount for the basic research credit is more complicated than calculating its base amount for the regular credit. For the basic research credit, a firm's base period is the three tax years preceding the first year in which it had gross receipts after 1983. The base amount is equal to the sum of a firm's minimum basic research amount and its maintenance-of-effort amount in the base period. The former is the greater of 1% of the firm's average annual in-house and contract research expenses during the base period, or 1% of its total contract research expenses during the base period. For a firm claiming the basic research credit, its minimum basic research amount cannot be less than 50% of the firm's basic research payments in the current tax year. The latter is the difference between a firm's donations to qualified organizations in the current tax year for purposes other than basic research and its average annual donations to the same organizations for the same purposes during the base period, multiplied by a cost-of-living adjustment for the current tax year.

addition, basic research payments eligible for the credit that fall below the base amount are treated as contract research expenses and may be included in the QREs for those credits as well.

Energy Research Credit

Under IRC Section 41(a)(3), taxpayers may claim a tax credit equal to 20% of payments to certain entities for energy research. To qualify for the credit, the payments must be made to a non-profit organization exempt from taxation under IRC Section 501(a) and "organized and operated primarily to conduct energy research in the public interest." In addition, at least five different entities must contribute funds to the organization for energy research in a calendar year; none of these entities may account for more than half of total payments to the organization for qualified research.

The credit also applies to the full amount (i.e., 100%) of payments to colleges and universities, federal laboratories, and certain small firms for energy research performed under contract. In the case of small firms performing this research, a business taxpayer may claim a credit for the full amount of payments with two limitations. First, the taxpayer cannot own 50% or more of the stock of the small firm performing the research (if the firm is a corporation), or hold 50% or more of the small firm's capital and profits (if the firm is a non-corporate entity such as a partnership). Second, the firm performing the research must have an average of 500 or fewer employees in one of the two previous calendar years.

Because the credit is flat rather than incremental, it is more generous than the other four components of the research tax credit.

Option to Claim a Refundable Research Tax Credit in Lieu of Bonus Depreciation in 2008 and 2009

As a result of the Economic Stimulus Act of 2008 (P.L. 110-185), corporate and non-corporate firms could claim an additional first-year depreciation deduction equal to 50% of the cost of qualified property placed in service between March 31, 2008, and December 31, 2008. The deduction was known as the 50% bonus depreciation allowance. A provision of the Housing and Economic Recovery Act of 2008 (P.L. 110-289) gave corporations only the option of claiming a limited refundable tax credit for unused research and alternative minimum tax (AMT) credits stemming from tax years before 2006, in lieu of any bonus depreciation allowance they could claim for qualified property acquired after March 31, 2008. The credit was capped at $30 million for a single corporation and was set to expire at the end of 2008.

The American Recovery and Reinvestment Act of 2009 (ARRA, P.L. 111-5) extended both the first-year 50-percent bonus depreciation allowance and the option to claim a refundable research and AMT credit through 2009.

Under the Tax Relief, Unemployment Compensation Reauthorization, and Job Creation Act of 2010 (P.L. 111-312), the option to monetize unused AMT credits from tax years before 2006 in lieu of claiming a bonus depreciation allowance was extended so that it applied to qualified property acquired after March 31, 2008, and before January 1, 2013. The extension did not apply to unused research credits from the same tax years.

Legislative History of the Research Tax Credit

The research tax credit entered the tax code as a temporary provision through the Economic Recovery Tax Act of 1981 (P.L. 97-34). In adopting the credit, the 97th Congress was hoping to stem a decline in spending on R&D by the private sector as a share of U.S. gross domestic product that commenced in the late 1960s. Around the time the credit was enacted, more than a few analysts thought the decline was a primary cause of both a slowdown in U.S. productivity growth and an unexpected loss of competitiveness by a variety of U.S. industries in the 1970s. A majority in Congress concluded that a "substantial tax credit for incremental research and experimental expenditures was needed to overcome the reluctance of many ongoing companies to bear the significant costs of staffing and supplies, and certain equipment expenses such as computer charges, which must be incurred to initiate or expand research programs in a trade or business."[14]

The initial credit was equal to 25% of qualified research spending above a base amount, which was equal to average spending on such research in the three previous tax years, or 50% of current-year spending, whichever was greater. It is not clear from the historical record why Congress chose a statutory rate of 25%. But there is no evidence that the rate was chosen on the basis of a rigorous assessment of the gap between the private and social returns to R&D investment, or the sensitivity of R&D expenditures to declines in their after-tax cost. Any taxpayer that claimed the credit and could not apply the entire amount against its current-year federal income tax liability was allowed to carry the unused portion back as many as three tax years, or forward as many as 15 tax years. The credit was to remain in effect from July 1, 1981, to December 31, 1985.

Congress made the first significant changes in the original research tax credit with the passage of the Tax Reform Act of 1986 (TRA86, P.L. 99-514). Among the many significant changes it made in the federal tax code, the act extended the credit through December 31, 1988, and folded it into the general business credit under IRC Section 38, thereby subjecting it to a yearly cap. In addition, the act lowered the credit's statutory rate to 20%, modified the definition of QREs so that the credit applied to research intended to produce new technical knowledge deemed useful in the commercial development of new products and processes, and created a separate 20% incremental tax credit for payments to universities and certain other nonprofit organizations for the conduct of basic research according to a written contract. The reduction in the credit's rate seemingly was not based on an analysis of the credit's effectiveness in the first five years. Rather, it seemed to stem from the overriding goals of TRA86, which were to lower income tax rates across the board, broaden the income tax base, and shrink the differences in tax burdens among major categories of business investments. Since 1954, firms investing in R&D had already been benefiting from the option to expense qualified R&D spending under the IRC Section 174 expensing allowance.[15]

The regular and basic research credits were further altered by the Technical and Miscellaneous Revenue Act of 1988 (P.L. 100-647). Specifically, the act extended the credits through December

[14] U.S. Congress, Joint Committee on Taxation, *General Explanation of the Economic Recovery Tax Act of 1981*, joint committee print, 97th Cong., 1st sess. (Washington: GPO, 1981), p. 120.

[15] U.S. Congress, *General Explanation of the Tax Reform Act of 1986*, joint committee print, 100th Cong., 1st sess. (Washington: GPO, 1987), p.130.

31, 1989. It also curtailed the overall tax preference for private-sector R&D investment by requiring business taxpayers to reduce any deduction they claim for research spending under IRC Section 174 by half of the sum of any regular and basic research credits they claim. This new rule decreased the maximum effective rate of the regular research tax credit by a factor equal to 0.5 times a taxpayer's marginal income tax rate.[16]

Continuing disappointment with the design of the original credit among interested parties led to the enactment of several additional changes in the regular credit through the Omnibus Budget Reconciliation Act of 1989 (OBRA89, P.L. 101-239). Much of the disappointment was focused on the formula for determining the base amount of the credit. Critics rightly pointed out that under the formula, which was based on a three-year moving average of a firm's annual spending on qualified research, an increase in a firm's research spending in one year would raise its base amount in each of the following three years by an amount equal to one-third of that increase, possibly making it more difficult to claim the credit in those three years. Some argued that such a design would be less cost-effective in boosting business R&D investment than one in which a firm's base amount was completely independent of its current spending on qualified research.[17]

To address this concern, OBRA89 changed the formula for the base amount so that it was equal to the greater of 50% of a firm's current-year QREs, or the product of the firm's average annual gross receipts in the previous four tax years and a "fixed-base percentage." The act set this percentage equal to the ratio of a firm's total QREs to total gross receipts in the four tax years from 1984 to 1988, capped at 16%. OBRA89 also made the credit available on more favorable terms to start-up firms, which it defined as firms without gross receipts and QREs in three of the four years from 1984 to 1988; these firms were assigned a fixed-base percentage of 3%. In addition, the act effectively extended the credits to December 31, 1990 (by requiring that QREs incurred before January 1, 1991, be prorated), made it clear that firms could apply the regular credit to QREs related to current lines of business and possible future lines of business, and required firms claiming the regular and basic research credits to reduce any deduction they claim under IRC Section 174 by the entire amount of the credits.

In 1990 and 1991, Congress passed two bills that, among other things, temporarily extended the credits. The Omnibus Budget Reconciliation Act of 1990 (P.L. 101-508) extended the credits through December 31, 1991, and repealed the requirement that QREs made before January 1, 1991, be prorated. And the Tax Extension Act of 1991 (P.L. 102-227) pushed the expiration date for the credits forward to June 30, 1992. A major obstacle to longer extensions of the credits at the time lay in congressional budget rules requiring that the revenue cost of lengthy or permanent extensions be scored over 10 fiscal years and offset with tax increases or cuts in non-defense discretionary spending.

Although Congress passed two bills in 1992 that would have extended the credits beyond June 30 of that year, President George H. W. Bush vetoed both for reasons that had nothing to do with the credit provisions. As a result, the credits expired and remained unavailable from July 1, 1992, until the enactment of the Omnibus Budget Reconciliation Act of 1993 (OBRA93, P.L. 103-66) in August 1993. That act extended the credits retroactively from July 1, 1992, through June 30,

[16] For a business taxpayer in the 30% tax bracket, the rule reduced the maximum effective rate of the regular research credit from 20% to 17.5%: .20 x [1-(.5 x .30)].

[17] See U.S. Congress, Joint Economic Committee, *The R&D Tax Credit: An Evaluation of Evidence on Its Effectiveness*, joint committee print, 99th Cong., 1st sess. (Washington: GPO, 1985), pp. 17-22.

1995. It also modified the fixed-base percentage for start-up firms. Specifically, a firm lacking gross receipts in three of the years from 1984 to 1988 was assigned a percentage of 3% for the first five tax years after 1993 in which it reported QREs. Starting in the sixth year, the percentage was to adjust gradually so that by the 11th year the percentage would reflect its actual ratio of total QREs to total gross receipts in five of the previous six tax years.

Congressional inaction allowed the credits to expire again on June 30, 1995. They remained in abeyance until the enactment of the Small Business Job Protection Act of 1996 (P.L. 104-188) in August 1996. That act retroactively reinstated the credits from July 1, 1996, to May 31, 1997, leaving a one-year gap in the credit's coverage since its inception in mid-1981. The act also expanded the definition of a start-up firm to include any firm whose first tax year with both gross receipts and QREs was 1984 or later, added a three-tiered alternative incremental research credit (AIRC) with initial rates of 1.65%, 2.2%, and 2.75%, and made 75% of payments for qualified research performed under contract by nonprofit organizations "operated primarily to conduct scientific research" eligible for the regular credit and the AIRC.

The credits expired again in 1997, but they were extended retroactively from June 1, 1997, to June 30, 1998, by the Taxpayer Relief Act of 1997 (P.L. 105-34). A further extension of the credits to June 30, 1999, was included in the revenue portion of the Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1998 (P.L. 105-277).

Under circumstances reminiscent of 1997, the credits expired in 1999. But the revenue portion of the Ticket to Work and Work Incentives Improvement Act of 1999 (P.L. 106-170) extended them from July 1, 1999, to June 30, 2004. It also increased the three rates of the AIRC to 2.65%, 3.2%, and 3.75% and expanded the definition of qualified research to include qualified research performed in Puerto Rico and the other territorial possessions of the United States.

On October 4, 2004, President George W. Bush signed into law the Working Families Tax Relief Act of 2004 (P.L. 108-311), which included a provision extending the research tax credit through December 31, 2005.

The Energy Policy Act of 2005 (P.L. 109-58) added a fourth component to the research tax credit by establishing a credit equal to 20% of payments for energy research performed under contract by qualified research consortia, colleges and universities, federal laboratories, and eligible small firms.

Under the Tax Relief and Health Care Act of 2006 (P.L. 109-432), the research tax credit was extended retroactively through the end of 2007. The act also raised the three rates for the AIRC to 3%, 4%, and 5%, and established yet another research tax credit, known as the alternative simplified credit (ASC). This fifth component of the credit was equal to 12% of QREs in excess of 50% of average QREs in the past three tax years; for business taxpayers with no QREs in any of the three preceding tax years, the credit was equal to 6% of QREs in the current tax year.

The Emergency Economic Stabilization Act of 2008 (P.L. 110-343) retroactively extended the research credit through 2009. It also raised the rate of the ASIC from 12% to 14% and repealed the AIRC for the 2009 tax year only.

Under the Housing and Economic Recovery Act of 2008 (P.L. 110-289), corporations gained the option for the 2008 tax year only of claiming a limited refundable credit for unused research and

AMT credits from tax years before 2006, in lieu of any bonus depreciation allowance they could claim for qualified assets placed in service between March 31, 2008, and December 31, 2008.

The American Recovery and Reinvestment Act of 2009 (P.L. 111-5) extended that option through 2009, along with the bonus depreciation allowance that applied in 2008.

As a result of the Tax Relief, Unemployment Compensation Reauthorization, and Job Creation Act of 2010, (P.L. 111-312), the research credit was extended through 2011.

After a one-year lapse, Congress retroactively extended the credit through 2013 and made some minor changes in the rules governing the allocation of research credits among members of controlled groups of companies and the use of the credit by parties to business acquisitions by passing the American Taxpayer Relief Act of 2012 (P.L. 112-240).

Going back to the mid-1990s, a cycle seems to emerge every time the credit is about to expire. The cycle commences when congressional and business supporters of the credit issue public statements calling for a permanent extension of the credit and denouncing what they see as the folly of repeated temporary extensions.[18] Then the President expresses his support for such an extension. In the next stage of the cycle, leaders in both houses of Congress enter into negotiations on tax legislation that may include a permanent extension of the credit. But in the end, Congress and the President can agree only on a limited extension of the credit, stymied by the difficulty of reconciling the revenue cost of a permanent extension with other budget priorities. The main elements of the cycle seemed to reappear in the recent round of negotiations between Congress and President Obama over agreeing on a bill to avoid across-the-board rises in individual tax rates at the end of 2012.

Effectiveness of the Research Tax Credit

For analysts and lawmakers alike, probably the most important policy issue raised by the research tax credit is its effectiveness. Basically, there are two approaches to assessing this critical aspect of the credit.

Among economists, the preferred approach is to compare the social benefits from any added qualified research induced by the credit with the social costs of that research. Such an undertaking involves comparing the returns to society of the additional qualified research spending associated with the credit to the opportunity costs to society of those outlays. The social cost of the credit can be thought of as the net loss of tax revenue because of the credit, together with the public and private costs of administering the credit. Unfortunately, this approach has little application in policymaking, largely because it is difficult to measure accurately the social returns to R&D.[19]

[18] Martin A. Sullivan, "Research Credit Hits New Heights, No End in Sight," *Tax Notes*, vol. 94, no. 7, February 18, 2002, p. 801.

[19] The principal barriers to measuring the social returns to R&D are developing adequate price indices for the cost elements of R&D for specific industries, specifying the time period in which to assess the productivity gains from R&D, and determining the depreciation rate for a society's stock of R&D assets. For a detailed discussion of these issues, see Bronwyn H. Hall, "The Private and Social Returns to Research and Development," in *Technology, R&D, and the Economy*, Bruce L. Smith and Claude E. Barfield, eds. (Washington: Brookings Institution, 1996), pp. 141-145.

As a result, economists have relied on the next best approach: estimating the additional qualified research (if any) stimulated by the regular credit, and comparing the dollar value of that gain with the tax revenue lost because of the credit. Such an approach compares the direct benefits (i.e., added research investment) with the direct costs (revenue loss) of the regular credit. It presupposes that the social returns to the research far exceed the private returns, and that the optimal size of any tax subsidy for R&D can be estimated. If the ratio of benefits to cost is greater than one, then the credit can be seen as a more cost-effective way to boost research than direct research subsidies; if it is less than one, then funding the research directly would be more cost-effective.[20]

What do available studies say about the effectiveness of the regular research credit? Going back to the early days of the credit, economists who have evaluated its impact on business investment in qualified research have used a variety of methods to estimate the amount of additional research that can be attributed to the credit. These methods were reviewed in a 1995 study by economist Bronwyn Hall.[21] She found that the studies using data on the credit from 1981 to 1983 came up with lower estimates of the added research associated with one dollar of the credit than did the studies based on data from 1984 and after. Taking into consideration the strengths and weaknesses of the studies, Hall concluded that the credit led to a "dollar-for-dollar increase in reported R&D spending on the margin."[22] In other words, over the period (mid-to-late 1980s) covered by the later studies, she found that one dollar of the credit resulted in a company spending an additional dollar on qualified research, suggesting that the credit was as cost-effective as federal research grants.

Stimulative Effect of the Credit

What does available evidence say about the stimulative effect of the credit? This effect refers to the percentage increase in research spending over a period that can be attributed to the credit. Answering the question entails applying what is known about the responsiveness of business spending on research to declines in its tax price to the reduction in the aggregate cost of research that could be due to the credit.

In theory, the credit stimulates increased investment in qualified research by lowering the after-tax cost of undertaking another dollar of research. In other words, the credit lowers the tax price of research, and firms respond to the reduced prices by spending more on it, all other things being equal. Early studies of the responsiveness of research spending to price decreases estimated that the tax price elasticity of demand for research was less than one, perhaps somewhere between -0.2 to -0.5. This meant that a 10% reduction in the after-tax (or net) cost of research would lead to an increase in research spending of 2% to 5%. More recent studies, however, indicated that research spending was more sensitive to price changes. On the whole, they suggested that the tax price elasticity was closer to -1.0 in the short run, which meant that a 10% reduction in the cost of research would trigger a 10% rise in research spending. Several of the studies also concluded that

[20] This argument assumes that government research grants to the private sector do not lead firms receiving the grants to reduce their own R&D spending by similar amounts.

[21] See Bronwyn H. Hall, *Effectiveness of Research and Experimentation Tax Credits: Critical Literature Review and Research Design*, report for Office of Technology Assessment, June 15, 1995, pp. 11-13, available at http://emlab.berkeley.edu/~bhhall/papers/BHH95%20OTArtax.pdf.

[22] Ibid., p. 18.

research tax credits may have an even larger impact on research spending in the longer run, on the order of -2.0.

Still, the question of how responsive the demand for research is to tax price decreases remains open to further debate and analysis, since available studies have data and methodological limitations that cast serious doubt on the validity of their estimates. In an assessment of the revenue effects of President Bush's FY2004 budget request, the Joint Committee on Taxation (JCT) noted that "the general consensus when assumptions are made with respect to research expenditures is that the price elasticity of research is less than -1.0 and may be less than -0.5."[23] Therefore, considering the findings of the studies that have been done, it seems reasonable to assume that the short-run price elasticity for qualified research lies between -0.4 and -0.8.

A measure of the reduction in the cost of qualified research that can be attributed to the credit is its average effective rate. The rate captures the percentage reduction in that cost that is due to the credit. It is derived by dividing the total amount of claims for the research credit in a tax year by some measure of total business spending on qualified research in the same year. For the research tax credit, there are two such measures: QREs, as reported by the IRS, and business spending on domestic basic and applied research and development, as reported by the National Science Foundation (NSF). As a result, the average effective rate can be computed for both QREs and business investment in domestic R&D.

As **Table 3** shows, the average effective rate of the credit from 1999 to 2009 was 3.3% for business investment in domestic R&D and 5.3% for QREs. This implies that the credit lowered the average after-tax cost of R&D investment by 3.3% and qualified research by 5.3% during that decade. By contrast, the statutory rate is 20% for the regular credit and 14% for the ASC. While claims for the regular credit accounted for nearly all QREs in 1999, QREs associated with claims for the ASC amounted to two-thirds of total QREs in 2009.

The gap between the rates largely reflects the difference in the scope of QREs and business R&D spending, as estimated by the NSF. Aggregate QREs amounted to 62.2% of aggregate business R&D spending from 199 to 2009. The NSF estimate covers domestic R&D funded by firms. It is based on annual surveys of business R&D and takes into account the wages, salaries, and fringe benefits of research personnel; the cost of materials and supplies, overhead expenses; and depreciation related to research activities. Excluded from the estimate are expenditures on the buildings and equipment used in research, quality control, routine product testing, and prototype production.[24] By contrast, QREs represent total spending on research that is eligible for the credit, as reported to the IRS on Form 6765; they cover the wages and salaries of research personnel, materials, supplies, leased computer time used in qualified research, and 65% to 75% of contract research funded by the taxpayers claiming the credit. Since the NSF figures include more of the total cost of business investment in R&D, they should be larger than the QREs for the same years.

The figures in **Table 3** suggest that the credit delivered, at most, a modest stimulus to domestic business R&D investment from 1999 to 2009. Specifically, assuming the price elasticity of demand for qualified research lies between -0.4 and -0.8, and the credit lowers the net cost of

[23] U.S. Congress, Joint Committee on Taxation, *Description of Revenue Provisions in the President's Fiscal Year 2004 Budget Proposal*, JCS-7-03, 108th Cong., 1st sess. (Washington: March 2003), p. 250.

[24] National Science Foundation, Division of Science Resource Statistics, *The Methodology Underlying the Measurement of R&D Expenditures: 2000 (data update)* (Arlington, VA: December 10, 2001), p. 2.

business spending on qualified research by 5.3%, one can argue the credit may have boosted that spending somewhere between 2.1% (0.4 x 5.3%) and 4.2% (0.8 x 5.3%), compared with the investment that might have taken place in the absence of the credit.[25]

Table 3. Business and Federal Spending on Domestic Research and Development, and Claims for the Federal Research Tax Credit, 1999 to 2009

($ billions)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Business Spending on Domestic R&D (BSDRD)[a]	$162	$183	$185	$177.5	$183	$188	$204	$223	$243	$254	243
Qualified Research Spending (QRS)[b]	$103	$110	$100	$116	$124.5	$116	$130	$145	$158	$151	$143
Federal R&D Spending[c]	$75	$76	$84.5	$94	$103.5	$112	$119	$122	$127	$127	$133
Current-Year Research Tax Credit[d]	$5.3	$7.2	$6.4	$5.7	$5.5	$5.6	$6.4	$7.3	$8.3	$8.3	$7.9
Ratio of Credit to BSDRD (%)	3.3%	3.9%	3.5%	3.2%	3.0%	3.0%	3.1%	3.3%	3.4%	3.3%	3.2%
Ratio of Credit to QRS (%)	5.2%	6.5%	6.4%	4.9%	4.4%	4.8%	4.9%	5.0%	5.2%	5.5%	5.5%

[25] This estimate assumes that all the credits claimed in each year of that decade were used immediately and were not subject to reduction because of IRS audits. Delays in the use of any credit shrink its present value, and thus its marginal effective rate. For instance, if a taxpayer claims a research credit of $1 million, has a discount rate of 5%, and cannot use the credit for three years, then the present value of the credit drops to about $864,000. Because the top marginal effective rate for the credit is 13%, owing to the rule that any deduction of research expenditures under Section 174 must be reduced by the amount of the credit, the delay in using the credit lowers the marginal effective rate to 11.2% (13% x 0.864). Delays can occur for two reasons: time-consuming IRS audits or insufficient or no tax liability against which to apply credit in the current tax year.

A 2009 report on the design of the research tax credit by the Government Accountability Office (GAO) casts doubt on the plausibility of the assumptions underlying the estimated stimulative effect of the credit from 1998 to 2008. The report found that 44% of the "total net credits earned" in 2005 could not be used immediately and thus could be carried back one tax year or forward up to 20 tax years. It also noted that IRS data on examinations of claims for the credit by corporations with annual business receipts of $1 billion or more from 2000 to 2003 indicated that the examiners recommended changes that would have lowered the aggregate amount of credits claimed by 16.5% in 2000, 19.3% in 2001, 27.1% in 2002, and 24.5% in 2003. See U.S. Congress, Government Accountability Office, *Tax Policy: The Research Tax Credit's Design and Administration Can Be Improved*, GAO-10-136 (Washington: November 2009), pp. 14-15.

Source: National Science Foundation, Division of Science Resources Statistics, *Science and Engineering Indicators 2012*, appendix table 4-3; National Science Foundation, Division of Science Resources Statistics, *Federal Funds for Research and Development: Fiscal Years 2009-11*, table 1; Internal Revenue Service, available at http://www.irs.gov/uac/SOI-Tax-Stats-Corporation-Research-Credit.

a. Total spending on domestic basic and applied research and development by companies only.

b. Spending on research that qualifies for the regular, alternative incremental, and university basic research tax credits, as reported by corporations claiming the credit on their federal income tax returns.

c. Federal obligations for defense and non-defense R&D spending by fiscal year.

d. Total value of claims for the regular, incremental and basic research tax credits reported in federal corporate income tax returns. Because of limitations on the use of the general business credit, of which the research credit is a component, and audits of corporate claims for the credit by the Internal Revenue Service, the total amount of the research credit actually used in a particular year may differ from the total amount claimed.

Policy Issues Raised by the Current Research Tax Credit

Many policy analysts and lawmakers endorse the use of tax incentives to spur increased business R&D investment. Yet the current research tax credit sometimes seems to attract more words of criticism than praise. The main concern of critics is that the credit has not been as effective as it should have because of what they say are certain problems with its design. In their view, the credit can yield its intended benefits only if it is altered to remedy five problems in particular: (1) the credit is not a permanent provision of the IRC; (2) it still has weak and uneven incentive effects; (3) it is not refundable; (4) the definition of qualified research remains incomplete and ambiguous, and thus a major source of disputes between the IRS and taxpayers; and (5) the credit is not targeted at investments that are likely to generate relatively large economic benefits. Each potential difficulty is discussed in some depth below.

Lack of Permanence

The research tax credit is due to expire on December 31, 2013. At least one bill to extend it permanently has been introduced in the 113th Congress—a step that the Obama Administration has supported in its last three budget requests. The credit has never been a permanent provision of the IRC, despite repeated attempts in Congress to extend it permanently in the past decade.[26] In fact, the credit has now been extended 15 times, most recently by the American Taxpayer Relief Act of 2012.

This lack of permanence is a cause for concern to many because it is thought to weaken the credit's incentive effect. Many R&D projects have planning horizons that extend beyond a year or two. If business managers cannot count on receiving the credit over the expected life of an R&D project, they may not take it into account when setting the size of annual R&D budgets. If this were to happen, the credit would be likely to exert little or no influence over R&D investment decisions. Instead of boosting R&D investment, a temporary research tax credit could end up

[26] The R&E tax credit has been in effect for each year between July 1, 1981, and the present except for period from July 1, 1995, to June 30, 1996, when it expired. Since July 1, 1996, the credit has not been renewed to include this period.

restraining it by compounding the uncertainty that typically characterizes projected after-tax returns on planned R&D investments, and by keeping the cost of capital for such investments higher than it otherwise would be. A combination of added uncertainty and larger capital costs may deter managers from pursuing some of the R&D projects they would undertake if the credit were permanent.

Still, it seems unlikely that all firms investing in R&D would be affected in the same manner by a temporary research tax credit. Firms with relatively long R&D planning horizons and relatively high fixed costs for R&D investment might show more sensitivity to uncertainty in the availability of a credit than firms with shorter horizons and relatively low fixed investment costs. For example, it is conceivable (though hard to prove) that a string of temporary credits may lead pharmaceutical firms to expand their research budgets slower than software firms, simply because pharmaceutical R&D projects, on average, have longer planning horizons and require greater investments in plant and equipment than software R&D projects do.

Uneven and Inadequate Incentive Effects

Critics maintain that another significant problem with the research tax credit is its incentive effect. A credit's incentive effect refers to the size of the benefit it offers eligible taxpayers. In the view of critics, the research credit's incentive effect varies among firms conducting qualified research in ways that are not supported by economic theory and can even defeat the credit's purpose. In addition, they contend that this incentive effect is too meager to offset the inclination of firms to invest less in research than its potential spillover benefits warrant. To what extent can it be said that the credit's incentive effect is too uneven and small?

Uneven Incentive Effect

The regular credit's incentive effect appears to vary widely among firms investing in qualified research, including those that gradually increase their research investment over an extended period. Evidence for such variation can be found in a number of sources, including a 1996 study by economist William Cox that estimated which of a large group of domestic corporations with sizable research budgets in 1994 should have be able to claim the regular credit.

The study was based on a sample of 900 publicly traded U.S.-based firms with the largest R&D budgets, culled from a database maintained by Compustat, Inc. Under the reasonable assumption that QREs for these firms were equal to 70% of their reported R&D spending for 1994, Cox determined that 62.5% of the firms could be considered established firms for the purpose of claiming the regular credit, as they had both business revenue and QREs in three of the years from 1984 to 1988; the remainder were treated as start-up firms. Cox found that 78% of the 900 firms in the sample (44.4% of the established firms and 33.5% of the start-up firms) could have claimed the credit in 1994, while 22% could have claimed no credit (18% of established firms and 4% of start-up firms).[27] He also found that 34% of all firms (32.3% of established firms and 1.7% of start-up firms) had QREs greater than their base amounts but less than twice those amounts, allowing them to claim credits with a marginal effective rate of 13%, and that 43.8% of

[27] CRS Report 96-505, *Research and Experimentation Tax Credits: Who Got How Much? Evaluating Possible Changes*, by William A. Cox, pp. 5-10. (The report is out of print. Copies may be obtained from Gary Guenther (202) 707-7742, upon request.) (Hereinafter cited as Cox, *Research and Experimentation Tax Credits*.)

all firms had QREs greater than double their base amounts, allowing them to claim credits with a marginal effective rate of 6.5%.[28] These rates measure the reduction in the after-tax cost of qualified research as a result of taking the regular credit. In addition, Cox found that some of the most research-intensive firms could claim either no credit or credits with a marginal effective rate half as large as the rate for the credits that could be claimed by firms with much lower propensity to invest in research.

The results seemed to confirm that the regular credit was most beneficial to firms whose research intensities had grown since their base periods and least beneficial to firms whose research intensities had changed little or not at all or had shrunk since their base periods. Most of the firms whose research intensities had declined found themselves in that position for two reasons: (1) their R&D spending was lower in 1994 than it was in their base period, or (2) their sales revenue had grown faster than their R&D expenditures over the same period.

Critics of the design of the regular credit argue that the pattern of R&D subsidization found in the Cox study is unfair and arbitrary, has no justification in standard economic theory, and undercuts the intended purpose of the credit, which is to encourage all firms to spend more on R&D than they otherwise would. Cox said as much when he concluded that the wide variation in the marginal effective rates of the credit among the firms in his analysis suggested "that society places a higher value on adding R&D at certain firms than at others and on adding R&D of certain types than others, when little or no basis for such different valuations exists."[29]

Two rules governing the use of the regular credit are responsible for most of the variation in its incentive effect. One is the requirement that the base amount for the regular credit cannot be less than 50% of QREs. The other rule is the requirement that established firms use gross receipts and QREs from 1984 to 1988 to calculate their fixed-base percentages.

In combination, the rules can produce remarkably dissimilar outcomes in the use of the regular credit among firms that spend substantial amounts on qualified research. Of particular concern to critics are firms whose research-intensity (as measured by spending on R&D as a share of revenue) has shrunk over time. The structure of the U.S. economy can and does change markedly in a period of 20 or so years. So it is likely that economic and competitive conditions in research-intensive industries today bear little resemblance to the conditions that prevailed in the 1980s. Most of the firms that have remained in business as independent entities and invested considerable amounts in R&D relative to revenues since then face much different climates for R&D investment. In some cases, the change in circumstances has led established firms to invest less in R&D as a share of revenues. Firms in this position may not be able to claim the regular credit, even if they spend relatively large sums on R&D.[30]

[28] Their effective credit rate was lower because each firm was subject to the 50-percent rule, which reduced the marginal effective rate of the credit on R&D spending above the base amount by 50%.

[29] Cox, *Research and Experimentation Tax Credits*, p. 10.

[30] Two examples are aerospace and semiconductor chip manufacturers. See McGee Grisby and John Westmoreland, "The Research Tax Credit: A Temporary and Incremental Dinosaur," *Tax Notes*, vol. 93, no. 12, December 17, 2001, p. 1633.

Inadequate Incentive Effect

In claiming that the regular credit's incentive effect is inadequate, critics actually have in mind two different measures of the effect. One deals with the credit rate deemed essential to coaxing companies to increase their R&D investments to socially optimal levels; the other concerns differences between the regular credit's statutory rate and its average marginal effective rate. Both measures are examined here.

Research Credit Rate and Socially Optimal Levels of Investment in Research

Critics maintain that the average effective rate of the regular credit is too low to support levels of business investment in research commensurate with its economic benefits. To substantiate this contention, they point to another study by Cox, one that focused on the efficacy of the research tax credit.[31] Cox built the analysis around the premise that tax incentives can overcome the private sector's inclination to invest too little in the creation of new technical knowledge and know-how. For tax incentives to have this effect, they must be designed so they subsidize R&D spending above and beyond what firms would undertake on their own, and they must be large enough to "raise private after-tax returns on R&D investments to the levels that would result from applying the same rate of taxation to the social rate of return from R&D."[32] A variety of studies from the past 50 years or so have concluded that the median private rate of return on R&D investment is roughly 50% of the median social rate of return.[33] Thus, assuming that the average social pre-tax rate of return is two times the average private pre-tax rate of return, the optimal R&D tax subsidy would double the private after-tax rate of return to R&D investment. For example, given a corporate tax rate of 35%, after-tax returns would equal 65% of pre-tax returns for corporations, assuming no tax subsidies or preferences. In this case, the optimal R&D tax subsidy would double the private after-tax returns to R&D investment by increasing them to 130% of pre-tax returns [2 x (1-0.35)].

Cox's analysis implied that the optimal average effective rate for an R&D tax subsidy, or a combination of such subsidies (e.g., a research tax credit combined with the treatment of research expenditures as a current business expense), was 30%. In discussing the policy implications of this finding, Cox noted that such a rate was an average and thus would not address the considerable variation among R&D investments in the difference between private and social returns. So using tax incentives to boost pre-tax returns on R&D investment by 30% across all industries would provide excessive subsidies for projects with below-average spillover benefits and insufficient subsidies for projects with above-average spillover benefits. According to Cox, lawmakers should be aware that "this imprecision is unavoidable, and its consequences are hard to assess."[34]

How do existing federal tax subsidies for R&D investment compare with Cox's assessment of the optimal R&D tax subsidy? To determine the incentive effect of then-current federal subsidies, he estimated the pre-tax and after-tax rates of return under 1995 federal tax law for a variety of

[31] See CRS Report 95-871, *Tax Preferences for Research and Experimentation: Are Changes Needed?* by William A. Cox. (This report is out of print. Copies may be obtained from Gary Guenther at (202) 707-7742, upon request.) (Hereinafter cited as Cox, *Tax Preferences for Research and Experimentation*.)

[32] Ibid., p. 8.

[33] See, for example, Edwin Mansfield, *The Positive Sum Strategy*, pp. 309-311.

[34] Ibid., p. 9.

hypothetical R&D projects. The projects differed in the share of R&D expenditures devoted to depreciable assets like structures and equipment, the share of R&D expenditures eligible for both expensing under IRC Section 174 and the regular research credit, and the economic lives of the intangible assets created by the investments. Cox compared the combined effect of expensing and the credit on after-tax returns to investment in capital-intensive, intermediate, and labor-intensive R&D projects producing intangible assets with economic lives of 3, 5, 10, and 20 years.[35]

Expensing has the effect of equalizing the pre-tax and after-tax rates of return on an investment, since it taxes the income earned by affected assets at a marginal effective rate of zero.[36] For the typical business R&D investment, it is likely that only part of the total cost may be expensed under IRC Section 174, as tangible depreciable assets like structures and equipment do not qualify for such treatment. Therefore, how expensing affects an R&D investment's after-tax rate of return depends on two factors: (1) the percentage of the total cost that may be expensed, and (2) the marginal effective tax rate on income earned by the assets (including labor) eligible for expensing.

The regular research credit raises the after-tax rate of return only on a portion of current-year QREs: those above a base amount. So its effect on the after-tax returns to an R&D investment depends on both the percentage of the investment's total cost that qualifies for the credit and the effective tax rate on income earned by assets eligible for the credit.

Allowing for these limitations on the benefits of expensing and the regular credit, Cox estimated that expensing and the credit together produced median after-tax rates of return ranging from 101.0% of pre-tax returns for a hypothetical capital-intensive project yielding intangible assets with an economic life of 20 years to 124.7% for a hypothetical labor-intensive project yielding intangible assets with an economic life of three years.[37] As these percentages are less than 130%, he inferred that the research tax subsidies in existence in 1995 did not increase private after-tax returns to R&D investments to the "levels warranted by the spillover benefits that are thought to be typical" for these investments.[38]

Gap Between the Credit's Average Effective Rate and Its Statutory Rate

Some critics of the regular credit see its incentive effect in a somewhat different, though related, light. For them, a more important concern than the credit's potential to boost business investment in research to socially optimal levels is any differences between the regular credit's average effective rate and its statutory rate of 20%. As noted earlier, whatever differences exist from firm to firm can be ascribed largely to three of the rules governing the use of the credit.

[35] In the case of capital-intensive projects, 50% of outlays go to structures and equipment, 35% qualify for expensing and the credit, and 15% qualify for expensing alone. In the case of intermediate projects, 30% of outlays go to structures and equipment, 50% qualify for expensing and the credit, and 20% qualify for expending alone. And in the case of labor-intensive projects, 15% of outlays go to structures and equipment, 65% qualify for expensing and the credit, and 20% qualify for expensing only.

[36] See Jane G. Gravelle, "Effects of the 1981 Depreciation Revisions on the Taxation of Income from Business Capital," *National Tax Journal*, vol. 35, no. 1, March 1982, pp. 2-3.

[37] Cox, *Tax Preferences for Research and Experimentation*, p. 15.

[38] Ibid., p. 17.

One of the rules is the basis adjustment under IRC Section 280C(c)(1), which requires taxpayers investing in qualified research to reduce any deduction for research expenditures they take under IRC Section 174 by the amount of any research credit they claim. This adjustment effectively adds the credit to a firm's taxable income and taxes it at the firm's income tax rate. Consequently, for business taxpayers taking the credit that are subject to the maximum corporate or individual tax rate of 35%, the basis adjustment decreases the marginal effective rate of the credit from 20% to 13%. Firms have the option of computing the regular research credit at a statutory rate of 13% in exchange for leaving intact any Section 174 deduction.

A second rule is the requirement that the base amount for the regular credit cannot be less than 50% of a firm's current-year QREs. Perhaps unintentionally, the rule curtails the credit's potential benefit to established firms whose ratio of current-year QREs to gross income is more than double their fixed-base percentages, or more than double the 16% cap on the fixed-base percentage—which is to say established firms that historically have invested heavily in qualified research. Start-up firms, whose current-year ratio of QREs to gross income exceeds 6% during their first five tax years, or whose current-year ratio is more than double their fixed-base percentages in the next six tax years, also are affected by the rule. For both sets of firms, it further reduces the marginal effective rate of the credit to 6.5%.

The third rule is the exclusion of expenditures for equipment and structures and overhead costs from expenses eligible for the regular credit—even though many business research investments involve the acquisition of elaborate buildings and sophisticated equipment, and all research projects have overhead costs. In this case, the rule's effect on the marginal effective rate of the credit depends on the share of the cost of an R&D investment to which the credit does not apply. As this share rises, the credit's marginal effective rate drops, all other things being equal. For example, if expenditures for physical capital account for half of the cost of an R&D investment, then the marginal effective rate of the credit for the entire investment is half of what it would be if the entire cost were eligible for the credit. For firms subject to the 50% rule that invest in research projects where physical capital represents 50% of the total cost, the marginal effective rate could fall to 3.25%.

In addition, in a 2009 report on problems with the credit's design, the GAO brought into the analysis of the credit's marginal effective rate the impact of delays in the use of the credit. In essence, they reduce the present value of the credit, and such a reduction lowers the rate. The longer the delay and the larger a taxpayer's discount rate, the larger the rate decline. GAO estimated the marginal effective rate for all the corporations in the IRS database that claimed the credit in 2003 to 2005 and used them to compute a weighted average rate for all taxpayers. It found that the rate ranged from 6.4% to 7.3%, depending on the assumptions about the length of any delay in using the credit and the discount rate.[39]

As these considerations suggest, one of the keys to bolstering the regular credit's incentive effect is to increase its marginal effective rate. There are two ways to do so: (1) keep the current statutory rate and relax or repeal one or more of the three rules, and (2) retain the rules but raise the credit's statutory rate to offset their effects.

Cox analyzed the effects of both options on after-tax rates of return for the same hypothetical R&D investments discussed above. In the case of labor-intensive R&D projects, he estimated that

[39] GAO, *The Research Tax Credit's Design and Administration Can Be Improved*, p. 14.

1995 research tax preferences produced median after-tax returns that were 124.7% of pre-tax returns for projects yielding intangible assets with an economic life of three years, and 115.5% for projects yielding intangible assets with an economic life of 20 years. Repealing the basis adjustment for the credit caused median after-tax returns to increase to 146.0% of pre-tax returns for assets with a three-year economic life, and 130.1% for assets with a 20-year economic life.[40] Increasing the statutory rate of the credit to 25% but retaining existing rules (including the basis adjustment) led to similar results: median after-tax returns for assets with a three-year economic life were an estimated 133.9% of pre-tax returns, and an estimated 121.9% for assets with a 20-year economic life.[41] As one might expect, increasing the rate to 25% and removing the basis adjustment led to the biggest boost in the ratio of after-tax returns to pre-tax returns: 165.8% for assets with a three-year economic life, and 143.4% for assets with a 20-year economic life.

If it is true that the optimal R&D tax subsidy should raise after-tax returns to 130% of pre-tax returns, Cox's analysis suggested that keeping the regular credit's statutory rate at the current level of 20% but eliminating or relaxing the three rules governing the credit's use might be the better policy option for strengthening the credit's incentive effect.

Non-refundable Status

The research tax credit is non-refundable. This means that only firms with sufficient income tax liabilities may benefit from the full amount of the credit claimed in a tax year. In addition, the credit is a component of the general business credit (GBC) under IRC Section 38, and therefore subject to its limitations. For firms undertaking qualified research, a key limitation is that the GBC cannot exceed a taxpayer's net income tax liability, less the greater of its tentative minimum tax under the alternative minimum tax or 25% of its regular income tax liability above $25,000. Unused GBCs may be carried forward 20 years or back one year. Although there are some advantages to having an inventory of tax credits to apply against future or past tax liabilities, the advantages do not necessarily outweigh the disadvantages for firms investing in R&D. One disadvantage is that a business taxpayer is better off using the full amount of a credit today, rather than 5 or 10 years from now, owing to the time value of money.

Critics contend that the credit's lack of refundability can pose a special problem for small, fledgling, research-intensive firms. In recent decades, numerous commercially successful technological innovations have originated with such firms. Many of them spend substantial sums on R&D during their first few years, while recording a stream of net operating losses. In the view of critics, a non-refundable research credit is likely to reduce the typical small, research-intensive start-up firm's prospects of survival and growth, as the firm cannot count on having access to the credit when the need for it is greatest. To remedy this problem, some advocate making the credit wholly or partially refundable for firms under a certain asset or employment size or age.[42] Other options include allowing small start-up firms that cannot use the current-year credit to sell it to other firms or use it to offset their employment taxes.[43]

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[40] Ibid., p. 27.

[41] Ibid., p. 27.

[42] For further discussion of the possible benefits to small firms of making the credit wholly or partially refundable, see Scott J. Wallsten, "Rethinking the Small Business Innovation Research Program," in *Investing in Innovation*, Lewis M. Branscomb and James H. Keller, eds. (Cambridge, MA: MIT Press, 1998), pp. 212-214.

[43] Michael D. Rashkin, "The Dysfunctional Research Credit Hampers Innovation," *Tax Notes*, June 6, 2011, p. 1066.

Incomplete and Ambiguous Definition of Qualified Research and Difficulties in Using the Credit

Critics claim that another problem raised by the current research tax credit is the activities that qualify for it. At its core, the issue concerns the definition of qualified research and how the IRS and taxpayers interpret it in the real world of business investment in basic and applied research.

Critics argue that the statutory definition in IRC Section 41(d) and IRS regulations implementing it are vague and incomplete. In their view, this lack of clarity and finality, coupled with the complexity of the credit, the difficulty of documenting claims for the credit in a manner that passes muster with the IRS, and a lack of useful guidance from the IRS and courts, paves the way for protracted and costly disputes between taxpayers and the IRS over the validity of claims for the credit.[44] These disputes can dampen the stimulative effect of the credit in two ways. IRS audits of claims for the credit can lead to firms receiving smaller credits than they thought they were entitled to. In addition, the prospect of having a claim audited and engaging in a lengthy dispute with the IRS over its legitimacy can deter some firms that invest in qualified research from claiming the credit.

Original Definition

Under the original credit, which was in effect from 1981 through 1985, research expenditures generally qualified for the credit if they were eligible for expensing under IRC Section 174. There were three exceptions to this general rule, however: no credit could be claimed for research conducted outside the United States, research in the social sciences or humanities, and any portion of research funded by another entity. Section 174 allows business taxpayers to deduct all "research or experimental expenditures" incurred in connection with their trade or business, without defining those outlays.

The IRS filled the gap by issuing regulation 1.174-2(a), which defined research or experimental expenditures as "research and development costs in the laboratory sense," especially "all such costs incident to the development or improvement of a product." Expenditures can be considered R&D costs in the "experimental or laboratory sense" if they relate to activities intended to discover information that would eliminate uncertainty concerning the development or improvement of a product." Uncertainty exists in the R&D process when the information available to researchers does not clearly show how they should proceed in developing a new product or improving an existing one. According to the regulation, the proper standard in determining whether research expenditures qualify for expensing under Section 174 is the "nature of the activity to which the expenditures relate, not the nature of the product or improvement being developed."

Changes Under the Tax Reform Act of 1986

Responding to a concern that business taxpayers were claiming the credit for activities that had more to do with product development than technological innovation, Congress tightened the

[44] Disputes over the credit are a recurring issue in IRS audits of large corporations in manufacturing, energy, chemicals, and information technology. See Alex E. Sadler and Jennifer A. Ray, "Navigating the Research Credit," *Tax Notes*, September 19, 2011, p. 1254.

definition by adding three tests through the Tax Reform Act of 1986 (TRA86).[45] Under the act, qualified research still had to involve the activities eligible for expensing under Section 174. But such activities also had to satisfy the following criteria:

- they were directed at discovering information that is "technological in nature" and useful in the development of a new or improved business component for the taxpayer;
- they constituted "elements of a process of experimentation; and"
- they were intended to improve the function, performance, quality or reliability of a business component.[46]

TRA86 defined a business component as "a product, process, computer software, technique, formula, or invention" held for sale or lease or used by a taxpayer in its trade or business. It also specified that research aimed at developing new or improved internal-use software could qualify for the credit only if it met the general requirements for the credit, was intended to develop software that was innovative and not commercially available, and involved "significant economic risk."

Subsequent IRS Guidance

In light of the significant changes made by the act, there was renewed pressure on the IRS to issue final regulations clarifying the meaning and limits of the three new tests for qualified research. But for reasons that still are not entirely clear, the IRS did not issue proposed regulations (REG-105170-97) on the tests until December 1998.

Among other things, the regulations set forth guidelines for determining whether or not a business taxpayer has discovered information that is "technological in nature" and "useful in developing a new or improved business component of the taxpayer" through a "process of experimentation that relates to a new or improved function, performance, reliability, or quality." The IRS proposed that research would meet the so-called discovery test if it were intended to obtain "knowledge that exceeds, expands, or refines the common knowledge of skilled professionals in the particular field of technology or science." At the same time, according to the proposed regulations, such a standard did not necessarily mean the credit would be denied to taxpayers who made technological advances in an "evolutionary" manner, or taxpayers who failed to achieve the desired result, or taxpayers who were not the first to achieve a certain technological advance. In addition, the IRS proposed that research would meet the experimentation test if it were to draw upon the "principles of physical or biological sciences, engineering, or computer science (as appropriate)" to evaluate "more than one alternative designed to achieve a result where the means of achieving the result are uncertain at the outset." Such an evaluation should involve developing, testing, and refining or discarding hypotheses related to the design of new or improved business components.

The release of the proposed regulations drew more criticism than praise from the business community. Much of the dissent focused on the proposed guidelines for the discovery test. A

[45] See P.L. 99-514, Section 231.

[46] U.S. Congress, Joint Committee on Taxation, *General Explanation of the Tax Reform Act of 1986*, JCS-10-87 (Washington: GPO, 1987), pp. 132-134.

widely shared complaint was that the "common knowledge" test violated the intent of Congress and would prove burdensome and unworkable for tax practitioners because it was too subjective. Most tax practitioners and businesses that commented on the proposal urged the IRS to jettison the test.[47]

After reviewing the many comments it received and examining recent case law and the legislative history of the research tax credit, the IRS issued what was intended to be a final set of regulations (T.D. 8930) on the definition of qualified research in late December 2000. While differing somewhat from the proposed regulations, the final regulations retained the common knowledge test for determining if the information gained through research was technological in nature and useful in the development of a new or improved business component. But they clarified the application of the test by noting that the "common knowledge of skilled professionals in a particular field of science or engineering" referred to information that would be known by those professionals if they were to investigate the state of knowledge in a field of science or engineering before undertaking a research project. The final regulations also carved out a safe harbor for patents by affirming that a taxpayer would be presumed to have passed the common knowledge test if the taxpayer could prove it had been awarded a patent for a new or improved business component. They also established new standards for determining when the development of computer software for internal use qualified for the credit. Specifically, research on internal-use software was eligible for the regular credit only if it satisfied the general requirements for the credit, entailed "significant economic risk," and resulted in the development of innovative software that was not commercially available.

To the surprise of some, the final regulations aroused as much opposition within the business community as the proposed regulations. A principal concern was the IRS's insistence on retaining the discovery test. Many tax practitioners also complained that a number of the provisions in the final regulations were not included in the proposed regulations, precluding public comment on them.[48]

This second round of criticism spurred the IRS to take an unusual procedural step. About one month after the release of the regulations, the Treasury Department published a notice (Notice 2001-19) retracting them. The notice also requested further comment "on all aspects" of the suspended regulations, promised that the IRS would carefully review all questions and concerns, and committed the IRS to issue any changes to the final regulations in proposed form for additional comment.[49]

In December 2001, the IRS delivered on this promise by releasing more proposed regulations (REG-112991-01). They departed in some important ways from previous guidance. Among other things, the regulations did not include the requirement set forth in T.D. 8930 that qualified research seek to discover "knowledge that exceeds, expands, or refines the common knowledge of skilled professionals in a particular field of science or engineering." The regulations also modified the definition of the experimentation test so that it became a "process designed to

[47] Sheryl Stratton and Barton Massey, "Major Changes to Research Credit Rules Sought at IRS Reg Hearing," *Tax Notes*, May 3, 1999, pp. 623-624.

[48] David L. Click, "Treasury Discovers Problems With New Research Tax Credit Regulations," *Tax Notes*, March 12, 2001, p. 1531.

[49] Sheryl Stratton, "Treasury Puts Brakes on Research Credit Regs; Practitioners Applaud," *Tax Notes*, vol. 90, no. 6, February 5, 2001, pp. 713-715.

evaluate one or more alternatives to achieve a result where the capability or the method of achieving that result, or the appropriate design of that result is uncertain as of the beginning of the taxpayer's research activities." The determination of whether a taxpayer engaged in such a process would be made on the basis of relevant facts and circumstances. In addition, the proposed regulations stipulated that internal-use software could not to be sold, leased, or licensed to third parties and was eligible for the credit only if it is intended to be novel in its design or applications. Tax practitioners and businesses generally approved the proposed changes.[50]

About two years later, the IRS published another set of final regulations (T.D. 9104) that was intended to clarify the definition of qualified research and certain other matters related to the credit.[51] Some analysts saw them as an attempt by the IRS to adhere to congressional intent in altering the definition of qualified research, as specified in TRA86.

The regulations noted that information is technological in nature if the process of experimentation used to discover it relies on the principles of the physical or biological sciences, engineering, or computer science. Though they discarded the discovery test included in T.D. 8930, the regulations made it clear that taxpayers would be deemed to have discovered information that is technological in nature by applying "existing technologies.... and principles of the physical or biological sciences, engineering, or computer science" in the process of experimentation. Such a discovery would not depend on whether a taxpayer succeeded in developing a new or improved business component. At the same time, having a patent for a business component would be considered "conclusive evidence that a taxpayer has discovered information that is technological in nature that is intended to eliminate uncertainty concerning the development or improvement of (such a) component."

In addition, T.D. 9104 shed additional light on what constituted a "process of experimentation." Basically, the regulations specified that such a process had three critical aspects. First, the actual outcome must be uncertain at the outset. Second, the process must allow researchers to identify more than one approach to achieving a desired outcome. And third, researchers must use certain scientific methods to evaluate the efficacy of these alternatives (e.g., modeling, simulation, and a systematic trial-and-error investigation). The regulations stressed that a process of experimentation is evaluative in nature and therefore "often involves refining throughout much of the process the taxpayer's understanding of the uncertainty the taxpayer is trying to address." A taxpayer's relevant facts and circumstances should be considered in determining whether it has engaged in such a process.

Remaining Concerns

Although the regulations seemed to settle several contentious issues regarding the definition of qualified research, they did not address several other issues regarding claims for the credit that are viewed as consequential by many firms.

[50] For more details on the latest set of proposed regulations and reactions to them in the business community, see David Lupi-Sher and Sheryl Stratton, "Practitioners Welcome New Proposed Research Credit Regulations," *Tax Notes*, December 24, 2001, vol. 93, no. 13, pp. 1662-1665.

[51] Alison Bennett, "IRS Issues Final Research Credit Rules With Safe Harbor For Qualified Activities," *Daily Report for Executives*, Bureau of National Affairs, December 23, 2003, p. GG-2.

One issue is the circumstances under which spending on the development of internal-use software can be deemed eligible for the credit. In proposed regulations issued in 2001, the IRS stated that any costs incurred to develop such software were eligible for the credit only if the software was intended to be unique or novel and to differ in a "significant and inventive" way from previous software. But in the absence of further guidance on the meaning of "significant and inventive," disputes between IRS examiners and taxpayers over the validity of claims for the credit tied to internal-use software are more likely than not. One analyst has noted that since the release of the final regulations, the IRS has interpreted the definition of significant and inventive in a way that imposes the same requirements on the development of internal-use software that the discarded discovery test did.[52]

Another issue is the eligibility of research aimed at achieving significant cost reductions. Cost reduction is not identified in the statute as a purpose of qualified research, but the research required to lower costs can be as challenging as research done to improve a business component's reliability or performance. Some have pointed out that research that allows a product or process to deliver the same performance at a reduced cost represents an improvement in performance.[53]

In addition, tax practitioners have complained that in the wake of the strong opposition within the business community to T.D. 8930, the IRS has stopped using revenue rulings and regulations in favor of internal administrative announcements to communicate its interpretations of the IRC Section 41. These announcements, according to these critics, are sent to IRS employees in an effort to build a uniform approach to auditing claims for the credit that avoid public comment. Critics charge that these internal communications force some business taxpayers to "resort to costly litigation to determine the application of Section 41 to their facts and circumstances," undermining the credit's incentive effect.[54]

Finally, substantiation of claims for the credit remains a significant source of disputes with the IRS, curtailing its incentive effect. 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 April 2007. Supporting claims for the credit typically requires subjective judgments that are subject to differing interpretations. These differences often surface in IRS examinations of claims for the credit. Examiners allegedly "routinely" deny claims because they do not strictly follow IRS's documentation standards, even though the standards never have been clarified in IRS regulations.[55] Taxpayers are upset because the IRS expects them to provide supportive evidence without useful guidance on the required documentation standards. In its defense, the IRS maintains that it cannot audit claims for the credit unless it has detailed records linking specific expenses to specific qualified research activities. According to a 2009 GAO report, in many cases, "taxpayers settle for 50 cents on the dollar when the IRS challenges a claim."[56]

[52] Christopher J. Ohmes, David S. Hudson, and Monique J. Migneault, "Final Research Credit Regulations Expected to Immediately Affect IRS Examinations," *Tax Notes*, February 23, 2004, p. 1024.

[53] Michael D. Rashkin, *Research and Development Tax Incentives: Federal, State, and Foreign* (Chicago: CCH Inc., 2003), p. 87.

[54] David L. Click, "Zeal and Activity in the Arena of the Research Tax Credit," *Tax Notes*, December 15, 2008, p. 1307.

[55] David Click, "Substantiating the Research Credit," *The Tax Adviser*, vol. 41, no. 4, April 2010, p. 227.

[56] GAO, *The Research Tax Credit's Design and Administration Can Be Improved*, p. 33.

Insufficient Focus on Innovative Research Projects

Another problem with the current research credit, according to critics, is that it is not targeted at research projects with a significant potential for producing substantial economic benefits. In their view, the design of the credit makes it likely that it generates less bang for the buck in the long run than federal grants for basic and applied research in fields with broad commercial applications.

Assessing the validity of this claim is a challenge, largely because it is unclear at the outset of a research project how innovative it will prove to be. There are no known studies that undertake such an assessment. Nonetheless, the contention seems plausible in a way that might be difficult to disprove.

In general, businesses seek the highest possible return on their investments. So in selecting research projects to fund, they can be expected to assign a higher priority to projects that are likely to earn substantial profits in the short run than to projects directed at expanding the frontiers of knowledge in a scientific field that have relatively low prospects of yielding profits in the short run. This assumes, of course, that a firm has the option of investing in either kind of project or both at the same time.

Such an expectation not only seems reasonable by the logic of business investment and growth, but it is consistent with several significant trends in U.S. research spending that stretch back to the 1950s. As **Figure 1** illustrates, the federal government has long served as the major source of funding for basic research performed in the United States; from 1955 to 2008, its share of total spending (in current dollars) for this purpose was about three times the share for businesses, though the gap has narrowed somewhat since the early 1980s. At the same time, U.S.- and foreign-based companies steadily expanded their share of total funding for applied research and development performed in the United States in that period; by 2008, the business share was 88% greater than the federal share for applied research and more than five times greater for development.

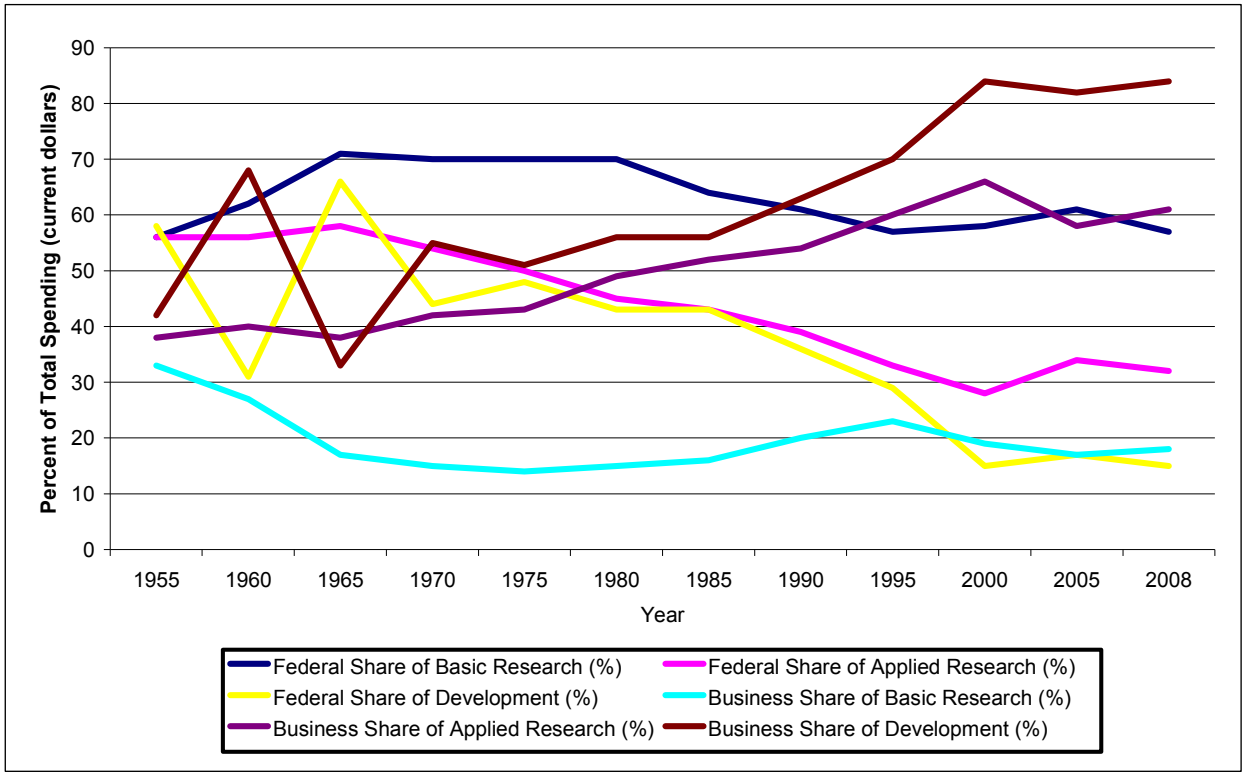
These trends arguably confirm that the average firm prefers to invest much more in applied research and development than in basic research. This is hardly surprising, as the returns on investment in basic research tend to be more difficult to appropriate and more uncertain at the outset, than the returns to investment in applied research and development. The trends also lend support to the view that the credit mainly subsidizes research projects with relatively small spillover benefits, as it applies to qualified projects involving basic and applied research, as well as development.

To address this concern, critics recommend that Congress modify the credit so that it expressly targets investment in research aimed at developing "breakthrough products that create new product categories or innovative enhancements to existing products."[57] Among the options are (1) replacing the current credit with one that has a larger credit rate (say 30%) for such expenditures and(2) transferring the authority to administer the credit to the NSF. A presumed advantage of using the NSF rather than the IRS to identify investments that would qualify for the revised credit

[57] Rashkin, "The Dysfunctional Research Credit Hampers Innovation," pp. 1066-1067.

is that the NSF has a greater supply of the expertise required to evaluate research projects for the purpose of determining which could be regarded as innovative.[58]

Figure 1. Share of U.S. Spending (current dollars) on Research and Development Held by the Federal Government and Businesses, 1955 to 2008



Source: National Science Foundation, Division of Science Resources Statistics, *National Patterns of R&D Resources: 2008 Data Update*, NSF 10-314, tables 6-8.

Legislation in the 112th and 113th Congress to Modify and Extend the Research Tax Credit

The research tax credit has enjoyed strong bipartisan support since its inception, and there is no evidence that the current Congress is an exception.

For over two decades, a major obstacle to extending the credit longer than a year or two, or to improving its efficacy, has been the revenue cost of doing so. If anything, this issue is even more of an obstacle in the current Congress, which has been grappling with finding politically feasible ways to reduce or eliminate current and projected future budget deficits and federal debt.

[58] Rashkin, "The Dysfunctional Research Credit Hampers Innovation," p. 1069.

112th Congress

A number of bills to revise the research credit were introduced in the 112th Congress. The changes they would have made are summarized below.

House

H.R. 871 would have permanently extended the current credit and increased the credit rate for taxpayers with more than 50% of gross receipts from domestic production activities.

H.R. 942 would have permanently extended the ASC and increased its rate to 20%; it would also have extended the regular credit through 2012 and then repealed it.

H.R. 1329 would have made the same changes as H.R. 871.

H.R. 1693 would have permanently extended the current credit and raised the rate for the ASC to 17%.

H.R. 1773 would have permanently extended the current credit, increased the ASC rate to 20%, and repealed the AIRC.

H.R. 2632 would have modified Section 41 of the federal tax code to create a new credit for "initial life sciences research." The regular credit would have been equal to 40% of qualified expenses, while the ASC would have been equal to 28% of those expenses, capped at $150 million per taxpayer. The entire amount of payments for qualified contract research conducted by certain research consortia, federal laboratories, and eligible small firms would have qualified for the credit. Life sciences research would have qualified for the credit if it involved "the branch of knowledge or study of biology, biochemistry, biophysics, bioengineering, biotechnology, microbiology, genetics, or physiology," as it related to human beings.

H.R. 5727 would have extended the research tax credit through 2016 and modified the ASC so that its rate, which is 14%, would have risen by one percentage point for each 2% gain in a company's full-time equivalent (FTE) manufacturing employment over the five previous tax years. The rise in the credit rate would have been capped at 20% for companies with a 12% or greater increase in qualified employment. In addition, the increase in the ASC beyond the amount calculated with a 14% rate would have been limited to $5,000 multiplied by the number of qualified employees taken into account in determining the increased credit.

H.R. 5893/S. 3217 would have revised the current research credit to include a refundable credit for firms that had less than $5 million in the current tax year and had no gross receipts in any tax year before the previous five years. The credit would have been limited to the lesser of $250,000 or 20% of W-2 wages paid for each qualified business.

H.R. 6109 would have extended the current research credit through the end of 2012.

H.R. 6240 would have extended the credit for five years, through the end of 2016, and raised the statutory rate for the ASC to 25% for tax years beginning after December 31, 2011.

Senate

S. 155 would have raised the rates for the four research credits by "bonus amounts" that varied with the share of a taxpayer's gross receipts derived from domestic production activities.

S. 239 would have altered the university basic research credit so that it applied to research with specific commercial objectives or applications.

S. 361 would have extended the current credit though 2016 and increased the ASC rate from 14% to 20% for tax years after 2012 (or from 6% to 10% for taxpayers with at least one tax year out of the previous three with no QREs).

S. 825 would have permanently extended the ASC, raised its rate to 20% (and 10% for companies not eligible for the higher rate) for tax years after 2011, and made the credit refundable for companies with 500 or fewer employees in the current tax year. It would also have created an enhanced credit for domestic manufacturers that received more than 50% of their gross receipts from domestic production activities.

S. 1410 would have changed the research credit in the same manner as H.R. 2632.

S. 1577 would have permanently extended the ASC, increased its rate to 20% (and 10%), and repealed the current regular, university basic research, and energy research credits.

S. 1866 would have permanently extended the ASC and increased its rate to 20%, extended the regular credit through 2012 (and then allowed it to expire), and allowed domestic manufacturers to claim a bonus credit if their domestic production receipts accounted for 50% or more of their total production gross receipts. The bonus amount would have risen for each 10-percentage point gain in the share of the former to the latter, up to a share of 100%.

S. 3217 would have established the same credit for small young companies as H.R. 5893.

S. 3460/H.R. 6319 would have permitted any C corporation, partnership, or S corporation with less than $5 million in gross receipts in the current tax year and no gross receipts in any tax year before the previous five tax years to use any research tax credit it is due to offset up to $250,000 in payroll taxes for employees.

S. 3521, as reported by the Senate Finance Committee on August 2, 2012, would have retroactively extended the credit through 2013. It also would have modified the rules governing claims for the credit by companies under common control and the computation of the credit when a business or major portion thereof changes hands.

113th Congress

House

H.R. 119 would permanently extend the research tax credits.

H.R. 120 would extend the credits through 2014, raise the rate of the regular credit to 30% and the rates for the maximum and minimum ASC to 20% and 12% in 2013 and 2014 only, and

permit qualified small firms to transfer credits they can claim but not use to other businesses for cash and to exclude those payments from their gross incomes.

Other Noteworthy Perspectives on the Future of the Credit

In its budget request for FY2013, the Obama Administration asks Congress to permanently extend the existing research credit and increase the rate for the ASC from 14% to 17%. The projected revenue cost for these changes is $108.5 billion from FY2013 to FY2022.[59]

In a report issued in November 2009, the Government Accountability Office (GAO) recommended that Congress consider simplifying the credit by eliminating the regular credit and establishing a minimum base amount for the ASC equal to 50% of a taxpayer's current-year QREs.[60] The report also noted that if Congress prefers to retain the structure of the existing credit, it might consider updating the base period that many companies are required to use to calculate their fixed-base percentages for the regular credit. Finally, GAO recommended that Congress consider making certain changes in the administration of the credit to reduce the compliance burden on firms and the cost to the IRS of ensuring that claims for the credit comply with existing regulations.

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[59] Department of the Treasury, *General Explanations of the Administration's Fiscal Year 2013 Revenue Proposals* (Washington: Feb. 2012), pp. 31 and 202.

[60] U.S. Government Accountability Office, *The Research Tax Credit's Design and Administration Can Be Improved*, GA0-10-136 (Washington: November 2009), p. 39.