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CRS Report for Congress

Research Tax Credit: Current Status and Selected Issues for Congress

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Summary

Technological innovation is a major driving force behind long-term economic growth, and research and development (R&D) serves as the lifeblood of innovation. In economies dominated by competitive markets, privately owned firms are responsible for a large share of R&D investment, mainly in a bid to become more competitive and improve their prospects for future growth. Because firms generally cannot capture all the returns to their R&D investments, they are inclined to spend less on R&D than its overall economic benefits would warrant. Partly in a bid to negate this inclination, the federal government supports business R&D in a variety of ways, including a tax credit for increases in R&D spending.

This report examines the status of the credit, summarizes its legislative history, discusses some key policy issues it raises, and describes legislation in the 110th Congress to modify or extend it. The report will be updated to reflect recent legislative activity.

The research tax credit has never been a permanent provision of the federal tax code and is due to expire at the end of 2007. Since its enactment in mid-1981, the credit has been extended 12 times and significantly modified five times. While the credit is often thought of as a single unified credit, it has five components: (1) a regular credit, (2) an alternative incremental credit (AIRC), (3) an alternative simplified credit (ASIC), (4) a basic research credit, and (5) an energy research credit. All but the energy research credit are incremental in that the credit applies only to qualified research spending above a base amount.

In effect, the research tax credit tries to stimulate increased business R&D investment by reducing the after-tax cost to firms of undertaking qualified research beyond a base amount. A key factor shaping the efficacy of the credit is the sensitivity of firms to changes in the cost of R&D. Although most analysts and lawmakers support the use of research tax credits, the design of the current federal credit has long been a target of criticism. A major concern of critics is that the design works against the credit's efficacy. They blame this problem on several factors, including the credit's temporary and non-refundable status and what they call its inadequate and disparate incentive effects.

At least six bills to extend the credit have been introduced in the 110th Congress: S. 14, S. 41, S. 592, S. 833, H.R. 1712, and H.R. 2138. More specifically, S. 41 and H.R. 1712 would extend the credit permanently and replace the regular credit, AIRC, and ASIC with a new simplified credit equal to 20% of a firm's qualified research expenses above half of its average qualified research expenses in the three previous tax years, among other things. By contrast, S. 592 would extend the current credit through 2012, and S. 14 and S. 833 would extend it permanently, without making additional changes in the design of the credit. H.R. 2138 would establish the same simplified credit as S. 41/H.R. 1712, retain the regular credit, abolish the AIRC, and permanently extend all remaining credits.

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Introduction

Economists may be notorious for their disagreements on a variety of important 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 public policy in the development of new technologies, there is relatively little discord among practitioners of what some call the dismal science.

Most economists would 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 fair to ask what economists mean by technological innovation. After all, such a complex idea can have different meanings among different professions. Economists who study the dynamics of economic growth generally 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 by the unrelenting efforts of competing firms to gain, sustain, or reinforce a decisive competitive advantage 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. Private investment in research and development (R&D) serves as the lifeblood of innovation.

Most economists would also agree that private R&D investment is likely to be less than would be warranted by its economic benefits. The reason for this shortfall lies 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

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

investments greatly exceed the average private returns.[2] This finding holds true whether a firm invests 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 have no obvious or immediate commercial applications.

Economists refer to any excess of social over private returns as the spillover effects or external benefits of R&D. There are several channels through which the returns from innovation may elude full capture by the innovating firms and spill over to society at large. Among the most common channels are reverse engineering by competing firms, migration of senior research scientists and engineers from one firm to another, and the availability of new or newly improved goods and services at prices lower than those most consumers would be willing to pay.[3] When filtered through the lens of conventional economic theory, the external benefits of technological innovation take on the appearance of a market failure, in which too few resources are allocated to the activities leading to the discovery and commercial development of new technical knowledge and know-how. To remedy this failure, most economists advocate the adoption of public policies aimed at boosting or supplementing private investment in R&D, especially those investments likely to generate relatively large external benefits, such as basic research.

Partly in an effort to stimulate increased private R&D investment, the federal government supports R&D in a variety of direct and indirect 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) a deduction 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

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[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.

[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.

R&D expenditures and encourages business R&D investment by taxing the returns to such investment at a marginal effective rate of 0. A similar policy objective undergirds the research tax credit, which has been a temporary provision of the IRC since it went into effect in July 1981. The credit is intended to stimulate more business R&D investment than would occur in the absence of the credit by lowering the after-tax cost of qualified research.[4] But unlike the deduction, it complicates tax compliance for firms claiming the credit. In FY2006, the combined budgetary cost of these incentives totaled an estimated $10.0 billion, or 7.5% of the estimated $132.3 billion spent on 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 110th Congress to extend the credit or enhance its incentive effect. It will be updated to reflect significant legislative activity and other developments affecting the status of the credit.

Design of the Current R&E Tax Credit

Although the research tax credit often is thought of as a single unified credit, it has five discrete components: a regular research credit, an alternative incremental research credit (or AIRC), an alternative simplified incremental credit (or ASIC), a basic research credit, and a credit for energy research. Each is non-refundable, and each is due to expire at the end of 2007. In any tax year, business taxpayers may claim **no more than** the basic and energy research credits, plus one of the following: the regular credit, the AIRC, or the ASIC. To prevent business taxpayers from receiving two tax benefits for the same expenditures, any research tax credit claimed must be subtracted from the amount of qualified research expenses deducted under IRC section 174.

Qualified Research Expenditures

Ultimately, claims for the regular credit — as well as the AIRC and ASIC — rest on the definition of qualified research expenditures (QREs). There are two critical aspects to this definition.

One aspect deals with the nature of qualified research itself. Under IRC section 41(d), research must satisfy four criteria in order to qualify for the regular, AIRC, and ASIC credits. First, it must involve activities that qualify for the deduction under IRC section 174: which is to say that 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 be intended to discover information that is

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[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 2006* (Washington: GPO, 2005), pp. 66 and 317.

"technological in nature." Third, it should seek 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." The third and fourth tests were added by the Tax Reform Act of 1986.

According to IRC section 41(d)(3), research meets the four criteria if it seeks 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."

Business taxpayers, the courts, and the IRS have clashed repeatedly over the application of the four criteria for qualified research. Although the IRS issued final regulations clarifying the definition of qualified research in December 2003 (T.D. 9104), further disputes between business taxpayers and the IRS over what activities qualify for the credit appear unavoidable.[6]

IRC section 41(d)(4) identifies 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.

The second critical aspect of the definition of QREs concerns the expenses eligible for the credit. Under IRC section 41(b)(1), qualified expenses arise from both in-house research and contract research. In the case of in-house research, the regular, AIRC, and ASIC credits 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 three 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 other non-profit entities dedicated to scientific research.

It is useful to understand which expenses related to R&D investments are ineligible for the credits. Specifically, they do not apply to spending on depreciable assets used in qualified research such as buildings and equipment, overhead expenses

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

for such research (e.g., heating, electricity, rents, leasing fees, insurance, and property taxes), and the fringe benefits of research personnel. The exclusion of these expenses can have important implications for the incentive effect of the credit (more on this later). Excluded expenses may account for 27% to 50% of business R&D spending.[7]

Regular Research Credit

The regular research tax credit has been extended 12 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 would by lowering the after-tax cost to business taxpayers of investing in qualified research above some normal amount by as much as 20%.[8] Given that business R&D investment appears sensitive to its cost, a decline in the after-tax cost of R&D should spur a rise in business R&D investment, all other things being equal.[9]

The base amount for the regular credit seems 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 a tax year — a rule that some refer to as the 50-percent rule.[10] 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 three or more 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.[11] 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 eleventh tax year, the percentage

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

[8] 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%.

[9] 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%.

[10] 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.

[11] 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.

equals the firm's total QREs relative to its total receipts in the fifth through tenth tax years.

In general, the lower a firm's fixed-base percentage, the better its chances of claiming the regular credit. And 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 Incremental R&E Tax Credits in 2006 for an Established Firm

($ millions)

Year	Gross Receipts	Qualified Research Expenses
1984	100	5
1985	150	8
1986	250	12
1987	400	15
1988	450	16
1989	400	18
1990	450	18
1991	550	20
1992	600	25
1993	550	23
1994	620	20
1995	700	25
1996	660	35
1997	710	30
1998	800	35
1999	835	45
2000	915	50
2001	1,005	53
2002	1,215	60
2003	1,465	70
2004	1,650	85
2005	1,825	95
2006	1,900	100

Source: Congressional Research Service.

Calculation: Regular R&E 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 2006:

1. Calculate the average annual gross receipts for the four previous years (2002-2005): $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 2006:

1. Begin with the qualified research expenses for 2006 of $100 million and subtract the base amount ($62 million) or 50% of the qualified research expenses for 2006 ($50 million), whichever is greater: $50 million.
2. Multiply this amount by 20% to determine the regular R&E tax credit for 2006: **$10 million**.

Calculation: Alternative Incremental R&E Tax Credit

1. Calculate the average annual gross receipts for the four previous years (2002-2005): $1,539 million.
2. Multiply this amount by 1% and 1.5% and 2%: $15 million, $23 million, and $31 million.
3. Begin with the qualified research expenses for 2006 ($100 million) and subtract 1% and 1.5% and 2% (respectively) of the average annual gross receipts for 2002 to 2005: $85 million, $77 million, and $69 million.
4. Multiply the difference between $85 million and $77 million by 0.03: $0.24 million.
5. Multiply the difference between $77 million and $69 million by 0.04: $0.32 million.
6. Multiply $69 million by 0.05: $3.45 million.
7. Sum the totals from steps 4, 5, and 6 to determine the alternative incremental R&E tax credit: **$4.01 million**.

Alternative Incremental Research Credit

Firms investing in qualified research that are unable to claim the regular credit have the option of claiming the alternative incremental R&E tax credit (or AIRC), under IRC section 41(c)(4). However, a decision to claim the AIRC does have consequences for future tax years. When a firm elects the AIRC in a particular tax year, it must continue to do so in future tax years, unless the firm receives permission from the IRS to switch to another research credit. There is some concern that such a rule deters firms from claiming the AIRC, even though they may be better off doing so.

The definition of QREs for the AIRC is the same as the definition of QREs for the regular credit. But that is where the similarity between the two credits ends. Unlike the regular credit, which is equal to 20% of QREs in excess of a base amount, the AIRC is 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 can benefit from the AIRC if their QREs in the current tax year exceed 1% of their average annual gross receipts during the past four tax years. In addition, the AIRC is likely to be of greater benefit than the regular credit to business taxpayers with relatively high fixed-base percentages, or whose research spending is declining, or whose sales are 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.)

Table 2. Sample Calculations of the Regular and Alternative Incremental R&E Tax Credits in 2006 for a Start-up Firm

($ millions)

Year	Gross Receipts	Qualified Research Expenses
1998	30	35
1999	42	40
2000	55	45
2001	60	55
2002	210	65
2003	305	73
2004	400	82
2005	475	90
2006	600	105

Source: Congressional Research Service.

Calculation: Regular R&E Tax Credit

Compute the fixed-base percentage:

1. By definition, the firm is a start-up. According to current law, a start-up firm's fixed-base percentage is fixed at 3% for each of the five years after 1993 when it has both gross receipts and qualified research expenses, and then it 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 1999 through 2002, 7.4% in 2003, 8.9% in 2004, 12.0% in 2005, and 14.7% in 2006.

Compute the base amount for 2006:

1. Calculate the average annual receipts for the four previous years (2002-2005): $347.5 million.
2. Multiply this amount by the fixed-base percentage to determine the base amount: $51 million.

Compute the regular tax credit:

1. Begin with the qualified research expenses for 2006 ($105 million) and subtract the base amount ($51 million) or 50% of the qualified research expenses for 2006 ($52.5 million), whichever is greater: $52.5 million.
2. Multiply $52.5 million by 20% to determine the regular R&E tax credit for 2006: **$10.5 million**.

Calculation: Alternative Incremental R&E Tax Credit

1. Calculate the average annual gross receipts for the four previous years (2002-2005): $347.5 million.
2. Multiply this amount by 1%, 1.5%, and 2%: $3.5 million, $5.2 million, and $6.9 million.
3. Begin with the qualified research expenses for 2006 ($105 million) and subtract 1.0%, 1.5%, and 2.0% (respectively) of the average annual gross receipts for 2002 to 2005: $101.5 million, $99.8 million, and $98.1 million.
4. Multiply the difference between $101.5 million and $99.8 million by 0.03: $0.05 million.
5. Multiply the difference between $99.8 million and $98.1 million by 0.04: $0.07 million.
6. Multiply $98.1 million by 0.0375: $4.9 million.
7. Sum the totals from steps 4, 5, and 6 to determine the alternative incremental R&E tax credit: **$5.0 million**.

Alternative Simplified Credit

The most recent addition to the array of research tax credits available under IRC section 41 is what is known as the alternative simplified incremental credit (ASIC). Under IRC section 41(c)(5), a business taxpayer may claim the ASIC in lieu of the regular credit or AIRC. The ASIC is equal to 12% of a taxpayer's QREs in the current tax year above 50% of its average QREs in 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. As with the AIRC, a decision to claim the ASIC remains in effect for succeeding tax years, unless a taxpayer gains the consent of the IRS to claim another research credit.

Basic Research Credit

Firms that enter into contracts with certain non-profit organizations to perform basic research may be able to claim a tax 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 between 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 such credits.[12]

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[12] 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

(continued...)

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 can be included in their QREs for the regular credit, AIRC, or ASIC. In 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 any of those credits.

Energy Research Credit

Under IRC section 41(a)(3), business 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 discrete 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 such 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 under two conditions only. 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 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.

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[12] (...continued)
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.

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 looking for ways to stem a decade-long 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 contributed to a slowdown in U.S. productivity growth and a surprising 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."[13]

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 a statutory rate of 25% was chosen. But there is no evidence that the rate was chosen on the basis of a rigorous assessment of the gap between private and social returns to business R&D investment, or the sensitivity of R&D expenditures to declines in their after-tax cost. Any taxpayer that claimed the credit and was unable to 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 supposed 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 under a written contract. The reduction in the credit's rate appeared not to be based on any rigorous analysis of the credit's effectiveness in the first five years. Rather, it seemed to flow 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 assets. Firms investing in R&D already benefitted from the

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[13] 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.

option to expense qualified R&D spending under the IRC section 174 expensing allowance.[14]

The regular research 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 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 total amount 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.[15]

Continuing disappointment with the design of the original credit among interested parties led to the enactment of additional significant changes in the regular credit through the Omnibus Budget Reconciliation Act of 1989 (OBRA89, P.L. 101-239). Much of the disappointment stemmed from 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 increase its base amount in each of the following three years by one-third of that increase in research spending, 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 independent of its current spending on qualified research.[16]

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), permitted firms to apply the regular credit to QREs related both 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.

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

[15] 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)].

[16] 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.

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. The Tax Extension Act of 1991 (P.L. 102-227) pushed the expiration date for the credits ahead 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 estimated 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 design or incentive effects of the credits. As a result, they 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. The act extended the credits retroactively from July 1, 1992, through June 30, 1995. It also modified the fixed-base percentage for start-up firms. Under OBRA93, 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 firm's sixth year, the percentage was to adjust gradually so that by its eleventh 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 inactive until the enactment of the Small Business Job Protection Act of 1996 (P.L. 104-188) in August 1996. The 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. It 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 an alternative incremental research credit (i.e., the 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 or alternative incremental credits.

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).

In a reprise of events in 1997, the credits expired yet again in 1999. But Congress passed a measure late in the year reinstating them retroactively. Under the revenue portion of the Ticket to Work and Work Incentives Improvement Act of 1999 (P.L. 106-170), the credits were extended from July 1, 1999 to June 30, 2004. The act 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 all payments for energy research performed under contract by qualified research consortia, colleges and universities, federal laboratories, and eligible small firms.

Finally, 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 a new research tax credit, known as the alternative simplified credit (or ASIC). This fifth component of the credit is 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 is equal to 6% of QREs in the current tax year.

Beginning in the mid-1990s, a cycle emerged every time the credits were about to expire, one that seems active today. The cycle starts when staunch supporters of the credit in Congress and among influential business groups issue public statements calling for a permanent extension of the credits and denouncing what they see as the folly of repeated temporary extensions.[17] Often, the President in office when the cycle begins supports such an extension. In the next stage of the cycle, leaders in both houses of Congress enter into earnest negotiations on tax legislation that includes a permanent extension of the credit. Still, in the end, Congress and the President agree on a relatively short extension of the credit, stymied by an inability to reconcile the revenue cost of a permanent extension with their other budget priorities.

Effectiveness of the Research Tax Credit

For analysts and lawmakers alike, the most important policy issue raised by the research tax credit concerns how effective it has been in the more than 25 years of its existence. There are two basic approaches to assessing the credit's effectiveness.

Among economists, the preferred approach is to compare the social benefit from any added R&D stimulated by the credit with the social cost of that R&D. Such an ambitious undertaking involves comparing the returns to society of the additional R&D spending spurred by the credit with the opportunity costs to society of the resources represented by this added R&D. The social cost of the credit can be thought of as the net loss of tax revenue because of the credit and the public and private costs of administering the credit. Unfortunately, this approach to assessing the effectiveness of the research tax credit is of limited usefulness in policymaking,

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

largely because it is exceedingly difficult to measure accurately the social returns to R&D.[18]

As a result, economists have tended to rely on a less sweeping and rigorous approach: estimating the additional R&D (if any) stimulated by the regular credit, and comparing the value of that R&D with the tax revenue lost because of the credit. Such an approach examines the direct benefits (i.e., added R&D investment) and costs (revenue loss) of the regular credit. It presupposes that the social returns to R&D far exceed the private returns, and that the optimal size of any tax subsidy for R&D can be estimated. The approach also sheds light on another policy issue raised by research tax credits: namely, whether they are more cost-effective than direct research subsidies such as government grants or subsidized loans. If the added R&D stimulated by the regular credit were to exceed its revenue cost, then a case could be made that a research tax credit is a more cost-effective way to boost overall R&D investment than direct research subsidies. But if the revenue cost of the regular credit were greater than the added R&D it engenders, then one can argue that direct research subsidies are more cost-effective than tax subsidies in boosting overall R&D investment.[19]

What do existing studies of the regular credit's effectiveness say about its direct benefits and costs? For the most part, these studies are an exercise in counterfactual analysis. They attempt to answer the following question: how much more R&D did firms claiming the credit perform as a result of the credit? Researchers use a variety of methods to estimate the amount of R&D that can be attributed to the regular credit. These methods were examined in a 1995 study by economist Bronwyn Hall.[20] She found that studies based on data from 1981 to 1983 differed markedly from those based on data from 1984 and after. More specifically, she found that the earlier set of studies produced lower estimates of the additional R&D undertaken per dollar of the credit than the estimates produced by the later set of studies. In light of the strengths and weaknesses of both sets of studies, Hall concluded that the credit contributed to a "dollar-for-dollar increase in reported R&D spending on the margin."[21] This meant that each dollar of the credit stimulated an additional dollar of business R&D investment.

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[18] 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.

[19] 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.

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

[21] Ibid., p. 18.

In theory, the credit stimulates increased business R&D investment by lowering the after-tax cost of undertaking another dollar of R&D beyond some normal (or base) amount. It is reasonable to expect firms investing in R&D to respond to this reduction in cost by spending more on R&D, all other things being equal. So the critical considerations in estimating the amount of business R&D investment that is due to the credit are the responsiveness of business R&D investment to decreases in its after-tax cost, and the extent to which the credit lowers the after-tax cost of business R&D.

Relatively little research has been done on how responsive business R&D investment is to changes in its after-tax cost. The standard measure of this sensitivity is known as the price elasticity of R&D demand. Existing studies have come up with estimates of the long-run price elasticity ranging from -0.2 to -2.0. These results imply that a decline in the after-tax cost of R&D of 10% can be expected to produce a rise in R&D spending in the long run of anywhere from 2% to 20%. In an analysis of the President Bush's FY2004 budget proposal, the Joint Tax Committee 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."[22]

As the main findings of Bronwyn Hall's 1995 study (cited above) suggest, less uncertainty surrounds the extent to which the regular credit shrinks the after-tax cost of qualified research. Basically, one dollar of the credit reduces this cost by one dollar. By making such a credit available, the federal government (or U.S. taxpayers) effectively shares the cost of qualified research with the private firms financing it. Thus, a measure of the overall reduction in the after-tax cost of domestic business R&D investment as a result of the credit is the credit's average effective rate, which is measured as the ratio of the total amount of claims for the credit in a year to some measure of domestic business R&D spending, such as QREs.

This rate can be computed for both QREs and total business R&D spending. As **Table 3** shows, the average effective rate of the credit from 1996 to 2003 was 3.3% for industry R&D spending and 5.5% for QRE. These rates indicate that the credit has lowered the after-tax cost of domestic business R&D by about 3% and the after-tax cost of qualified research by 5% to 6%.

The gap between the rates largely reflects the differences between QREs and industry R&D spending, as estimated by the National Science Foundation (NSF). Aggregate QREs came to 60% of aggregate business R&D spending from 1996 to 2003. The NSF estimate pertains to all domestic R&D performed by firms and funded by industry and other non-federal entities. It is based on annual surveys of R&D in industry and covers the wages, salaries, and fringe benefits of research personnel, and the cost of materials and supplies, overhead expenses, and depreciation related to research activities. The estimate excludes expenditures on

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

plant and equipment used in research.[23] By contrast, QREs represent total spending on qualified research that is eligible for the credit. They are reported on the tax returns business taxpayers claiming the credit and cover wages and salaries, materials and supplies, leased computer time, and 65% to 75% of contract research funded by these entities. Given the differences between the two sources, one would expect industry R&D spending to be greater than QREs, as it covers a broader segment of R&D expenses than QREs.

What can be said about the impact of the regular credit on domestic R&D? The figures in **Table 3** indicate that the credit delivered a modest stimulus to domestic business R&D investment from 1996 to 2003. Specifically, assuming that the price elasticity of demand for R&D falls between -0.5 and -1.0, and the lowers the cost of business R&D investment by 3.3%, the credit may have raised business R&D investment by 1.65% to 3.3% over that period.

Table 3. U.S. Industrial R&D Spending, Federal R&D Spending, and the Research Tax Credit, 1996 to 2003

($ billions)

	1996	1997	1998	1999	2000	2001	2002	2003
Industry R&D Spending[a]	121.0	133.6	145.0	160.3	180.4	181.6	177.5	183.3
Qualified Research Spending[b]	38.3	85.3	95.9	102.7	109.9	99.8	116.1	124.5
Federal R&D Spending[c]	70.6	73.5	75.3	80.3	83.1	91.2	102.0	117.4
Current-Year Research Tax Credit[d]	2.2	4.5	5.3	5.3	7.2	6.5	5.8	5.6

Source: National Science Foundation, Division of Science Resources Statistics, *InfoBrief: Increase in U.S. Industrial R&D Expenditures Reported for 2003 Makes Up For Earlier Decline*; National Science Foundation, Division of Science Resources Statistics, *Survey of Federal Funds for Research and Development: Fiscal Years 2000, 2001, and 2002*; Internal Revenue Service, Statistics of Income Division, e-mail data transmissions.

a. Total spending on domestic industrial R&D by companies and other non-federal entities, including nonprofit organizations and state and local governments.
b. Spending on research that qualifies for the regular and alternative incremental research tax credits as reported by business taxpayers claiming the credit on their federal income tax returns.
c. Budget authority for Federal defense and non-defense R&D spending by fiscal year.

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[23] 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.

d. Total value of claims for the regular, incremental and basic research tax credits included on federal income tax returns. Because of limitations on the use of the general business credit, of which the research credit is a component, the total amount of the research credit allowed in a particular year is likely to differ from the amount claimed.

Policy Issues Raised by the Current Research Tax Credit

Most policy analysts and lawmakers endorse the use of tax incentives to spur increased domestic business R&D investment. Yet the current research tax credit seems to attract more criticism than praise. A major concern of critics is that the credit is not as effective as it should be because of what they say are flaws in its design. In their view, the credit will have its intended benefits only if these flaws are corrected. Critics blame what they claim is the credit's relatively weak incentive effect on five shortcomings in particular: (1) the credit is not a permanent provision of the IRC; (2) it still has weak and arbitrary incentive effects; (3) it is not refundable; (4) the definition of qualified research remains incomplete and too ambiguous; and (5) the credit is not targeted at R&D investments that generate greater social returns than private returns. Each problem is examined below.

Lack of Permanence

The research tax credit is due to expire on December 31, 2007. A few bills to extend it permanently are being considered in the current Congress — a step that the Bush Administration supports. The credit has never been a permanent provision of the IRC, despite repeated attempts in Congress to extend it permanently in the past decade.[24] In fact, the credit has been extended 12 times, most recently by the Tax Relief and Health Care Act of 2006.

This lack of permanence is a matter of concern to many because it is thought to weaken the credit's incentive effect. Many R&D projects have planning horizons extending beyond a few years. If business managers cannot count on receiving the credit over the expected life of an R&D project, then they are unlikely to take it into account when setting the size of annual R&D budgets. In such a situation, the credit would have little or no influence over R&D investment decisions, defeating its purpose. Instead of boosting R&D investment, a temporary R&D tax credit might end up restraining it by compounding the uncertainty that characterizes projected after-tax returns on planned R&D investments. This heightened uncertainty may deter managers from pursuing R&D projects they would be likely to undertake if the credit were permanent.

However, there are reasons to think that not all firms investing in R&D may be affected in the same way by a temporary research tax credit. Firms with relatively long R&D planning horizons and relatively high fixed costs for R&D investment

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[24] 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.

might show more sensitivity to uncertainty in the availability of a research tax credit than firms with shorter horizons and more flexible investment costs. For example, it is conceivable (though hard to prove) that a string of temporary credits could cause pharmaceutical firms to expand their research budgets at a slower rate than software firms, for the simple reason that pharmaceutical R&D projects, on average, have longer planning horizons and require greater initial investments in plant and equipment than do software R&D projects.

Weak and Uneven Incentive Effects

Critics maintain that another major flaw in the credit can be found in its incentive effect. In their view, this effect varies among firms conducting qualified research in ways that are not supported by economic theory and undermines the credit's purpose. The credit's incentive effect is also thought to be too weak to induce the increases in business R&D investment warranted by its social returns. Critics attribute these shortcomings to the design of the regular, AIRC, ASIC, and basic research components of the credit.

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 R&D investment over an extended period. Evidence for such variation can be found in a 1996 study by economist William Cox of firms that examined which of a large group of domestic corporations with sizable research budgets in 1994 should have be able to claim the regular research tax credit.

The study is 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. On the plausible assumption that QREs for these firms in 1994 were equal to 70% of their reported R&D spending, Cox estimated that 62.5% of the firms could be considered established firms for the purpose of claiming the regular research tax credit, because 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).[25] 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 all firms had QREs greater than double their base amounts, allowing them to claim credits with a marginal effective rate of 6.5%.[26] These rates measure the reduction in the after-tax cost of qualified research as a result of the regular credit. In addition, Cox determined that some of

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[25] 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.) (Hereafter cited as Cox, *Research and Experimentation Tax Credits*.)

[26] 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%.

the most research-intensive firms could claim either no credit, or they could claim credits with a marginal effective rate half as large as the rate of the credits that could be claimed by firms with much lower research intensities.

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

Critics of the regular credit say that the pattern of R&D subsidization found in the Cox study is unfair and arbitrary, has no justification in economic theory, and undercuts the intended purpose of the credit, which is to encourage firms to spend more on R&D than they otherwise would. Cox concluded that the wide variation in the marginal effective rates of the research tax credit that firms in his study could claim 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."[27]

Two rules governing the use of the regular credit explain most of its disparate incentive effects: (1) the rule requiring the base amount for the regular credit to be equal to 50% or more of QREs, and (2) the rule requiring established firms to use a fixed-base period of 1984 to 1988 in computing their fixed-base percentages.

In combination, the two rules can produce strikingly disparate outcomes in the use of the regular credit among firms spending substantial amounts on R&D. 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 very likely that economic and competitive conditions in R&D-intensive industries today bear little resemblance to the conditions that prevailed in the same industries in the mid-to-late 1980s. Most of the firms that have stayed intact since the early 1980s and invested heavily in R&D as a share of revenue at that time presumably face a much different competitive landscape and climate for R&D investment and growth. In some cases, these changed circumstances have 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 research credit, even if they spend relatively large sums on R&D.[28]

Weak or Inadequate Incentive Effect. In claiming that the regular credit's incentive effect is inadequate, critics are referring both to the credit rate deemed essential to raise business R&D investment to socially optimal amounts, and to

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

[28] 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.

differences between the regular credit's statutory rate and its average marginal effective rate. Both aspects of the regular credit's incentive effect are examined here.

Current R&D Tax Incentives are Inadequate. Critics maintain that the average effective rate of the regular credit is too low to boost business R&D investment to amounts commensurate with its overall economic benefits. To lend empirical support to this contention, they point to another study by Cox, one that focused on the efficacy of the research tax credit.[29] Cox built his 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."[30] A variety of studies have concluded that the median private rate of return on R&D investment is roughly 50% of the median social rate of return.[31] 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. 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 is 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."[32]

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 current federal subsidies, he estimated the pre-tax and after-tax rates of return under 1995 federal tax law for a variety of hypothetical R&D projects. The projects differed in the share of R&D expenditures devoted to depreciable assets like

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[29] 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.) (Hereafter cited as Cox, *Tax Preferences for Research and Experimentation*.)

[30] Ibid., p. 8.

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

[32] Ibid., p. 9.

structures and equipment, the share of R&D expenditures eligible for both expensing under IRC section 174 and the regular research tax 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.[33]

Expensing equalizes 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.[34] For the typical business R&D investment, it is likely that only part of its 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 tax credit raises the after-tax rate of return only on QREs 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.

Taking into account these limitations on the benefits of expensing and the regular credit, Cox estimated that expensing and the credit together produce 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.[35] As these percentages are less than 130%, he inferred that the R&D 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.[36]

Significant Gap Between the Credit's Average Effective Rate and Its Statutory Rate. Some critics of the current research tax credit see the credit's incentive effect in a somewhat different light. For them, what counts most is any difference between the regular credit's average effective rate and its statutory rate of

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[33] 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.

[34] 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.

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

[36] Ibid., p. 17.

20%. As noted earlier, whatever difference exists is due to three of the rules governing the use of the credit.

One of the rules is the basis adjustment under IRC section 280C(c)(1), which requires business taxpayers investing in qualified research to reduce whatever deduction for research expenditures under IRC section 174 they claim by any research tax credit they claim. This adjustment effectively taxes the credit at a firm's marginal income tax rate. Consequently, for business taxpayers subject to the maximum corporate and individual tax rates of 35%, the basis adjustment decreases the marginal effective rate of the credit from 20% to 13%. Business taxpayers have the option of computing the regular research credit at a rate of 13% and not adjusting any deduction taken under section 174 by the amount of the credit.

A second rule is the 50% rule, which requires that the base amount for the regular credit equal 50% or more of a firm's current-year QREs. The rule makes the credit less beneficial 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. It also makes the credit less attractive to 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. For both sets of firms, the rule further reduces the marginal effective rate of the credit to 6.5%.

A third rule affecting this rate is the exclusion of expenditures for equipment and structures and overhead costs from expenses eligible for the regular credit — even though many business R&D investments involve the purchase of elaborate buildings and sophisticated equipment, and all R&D projects entail overhead costs. The effect of the exclusion on the marginal effective rate of the credit depends on the overall share of an R&D investment that is ineligible for the credit. As this share rises, the 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 R&D projects where physical capital represents 50% of the total cost, the marginal effective rate of the credit could fall to 3.25%.

As these considerations suggest, the key to bolstering the regular credit's incentive effect is to increase its average effective rate. In essence, there are two ways to do so. One is to keep its current statutory rate and modify one or more of the three rules driving a wedge between the credit's marginal effective rate and its statutory rate. The second approach is to retain these rules but increase the credit's statutory rate.

Cox analyzed the effect of both options on after-tax rates of return for the same set of hypothetical R&D investments discussed above. In the case of labor-intensive R&D projects, he estimated that 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.[37] 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.[38] 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.

Assuming that the optimal R&D tax subsidy would 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 removing or relaxing the three rules governing the credit's use might be the best policy option for significantly boosting the credit's incentive effect.

Non-refundable Status

The research tax credit is non-refundable, which means that only firms with sufficiently large 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 all firms investing in R&D. In the case of firms with sizable net operating losses, there is no certainty that stored credits can be used before they expire. In addition, the time value of money means that a business taxpayer is better off using the full amount of a tax credit today, rather than five or 10 years from now.

Critics of the credit's design contend that its non-refundable status poses a special problem for small, fledgling research-intensive firms. In recent decades, numerous commercially successful technological innovations have originated with such firms. Many of these firms spend substantial sums on R&D during their first few years, despite experiencing large financial losses. In the view of critics, the credit's lack of refundability diminishes the typical small start-up firm's chances of survival or growth, as the firm cannot count on the credit to reduce its cost of capital for R&D investments. Some critics advocate making the credit wholly or partially refundable for firms under a certain asset, employment size, or age, as a means of

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[37] Ibid., p. 27.

[38] Ibid., p. 27.

both solving this problem and improving the domestic climate for technological innovation .[39]

Unsettled and Ambiguous Definition of Qualified Research

Another important policy issue raised by the current research tax credit relates to the activities that qualify for it. At its core, the issue concerns the definition of qualified research and how the IRS and business taxpayers apply it in the real world of business R&D.

Critics argue that the statutory definition in IRC section 41(d) and IRS regulations implementing it are vague and incomplete. This lack of clarity and finality, in their view, often paves the way for protracted and costly disputes between business taxpayers and the IRS over the validity of claims for the credit. Critics say that these disputes can curtail the stimulative effect of the credit by denying the full benefit of credits claimed by some firms investing in R&D, and by deterring some other firms investing in R&D from claiming the credit on the grounds that its potential benefits are dwarfed by the costs associated with IRS scrutiny of claims for the credit.

Under the original credit, which was in effect from 1981 through 1985, research expenditures qualified for the credit if they were also eligible for expensing under IRC section 174. There were three exceptions to this general rule: 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, but it does not define these expenditures.

The IRS filled this gap by issuing regulation 1.174-2(a), which defined research or experimental expenditures. According to the regulation, these expenditures refer to "research and development costs in the laboratory sense" and generally include "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 fund 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 indicate how to proceed in developing a new product or improving an existing one. According to the regulation, the proper focus 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."

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[39] 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.

Responding to a concern that business taxpayers were claiming the credit for activities that had more to do with product development than genuine technological innovation, Congress tightened the definition by adding three tests through the Tax Reform Act of 1986 (TRA86).[40] Under the act, qualified research still had to involve activities eligible for expensing under section 174. But such activities also had to satisfy the following criteria:

- they were directed at discovering information that "technological in nature" and useful in the development of a new or improved business component of 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.[41]

The act defined a business component as "a product, process, computer software, technique, formula, or invention" held for sale or lease, or to be 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."

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

Among other things, they set forth guidelines for determining whether or not a business taxpayer investing in R&D 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 what became known as the 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, the agency noted that such a standard did not necessarily mean the credit would be denied in the case of business taxpayers who made technological advances in an "evolutionary" manner, or business taxpayers who failed to achieve the desired result, or business 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

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

[41] 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.

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 unleashed a wave of criticism from the business community. Much of the dissent focused on the proposed guidelines for discovering technological information. A widely voiced 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 business taxpayers who commented on the proposal urged the IRS to scrap the test.[42]

After reviewing the many critical comments it received, along with recent case law and the legislative history of the research tax credit, the IRS issued what it described as 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 whether or not the information gained through research was technological in nature and useful in the development of a new or improved business component. But they further 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 such 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 business 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. Moreover, they set down 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 or AIRC only if it satisfied the general requirements for the credits, entailed "significant economic risk," and led to the development of innovative software that was not commercially available.

The final regulations seemed to arouse as much opposition within the business community as the proposed regulations that preceded them. A principal bone of contention was the IRS's insistence on retaining the controversial 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 those provisions.[43]

These criticisms 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

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

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

review all questions and concerns raised about them, and committed the IRS to issue any changes to the final regulations in proposed form for additional comment.[44]

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 jettisoned 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." They also revised the definition of a process of experimentation so that it was seen as a "process designed to 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 should be made on the basis of relevant facts and circumstances. In addition, the proposed regulations defined internal-use software as software that is developed not to be sold, leased, or licensed to third parties and specified that internal-use software is eligible for the credit only if it is intended to be novel in its design or applications. Tax practitioners and business taxpayers generally welcomed the proposed changes.[45]

On December 30, 2003, the IRS published still another set of final regulations (T.D. 9104) clarifying the definition of qualified research and other matters related to the credit.[46] Some analysts viewed them as an attempt by the IRS to follow strictly congressional intent in altering the definition of qualified research in TRA86.

The regulations specified 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. They did not retain the discovery test included in T.D. 8930, but affirmed that taxpayers can be deemed to have discovered information that is technological in nature by using "existing technologies.... and principles of the physical or biological sciences, engineering, or computer science." Such a discovery would not hinge on whether a taxpayer succeeds in its quest to develop 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."

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

[45] 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.

[46] 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.

In addition, T.D. 9104 sheds additional light on what constituted a "process of experimentation." Basically, the regulations noted that such a process had three critical elements. 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.

Although the regulations clarified a number of important issues regarding the definition of qualified research, they did not address several other issues that are important to many firms.

One such issue concerns 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 business taxpayers over the validity of claims for the credit involving 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 as the discovery test that the regulations eliminated.[47]

Another unresolved 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.[48]

Yet another unresolved issue with widespread reach is the definition of gross receipts for an affiliated group of companies. How these receipts are characterized helps determine a business taxpayer's base amount for the credit. Contradictory rulings by the IRS on this issue have caused considerable confusion for some U.S.-based multinational corporations with majority-owned foreign subsidiaries.[49]

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[47] 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.

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

[49] Annette B. Smith, "Continuing Uncertainty on Research Credit Definition of Gross (continued...)

Lack of Focus on R&D Projects With Relatively Large Social Returns

In the minds of some critics, another key policy issue raised by the credit relates to its efficacy in spurring increased business investment in R&D projects yielding relatively large spillover benefits — or the credit's "bang for the buck." They question whether an additional dollar of the credit leads to more investment in R&D with relatively high social returns than does an additional dollar of direct government spending on basic or applied research.

For many analysts and lawmakers, an advantage of the credit over direct research spending is that private companies, and not the federal government, decide which R&D projects are subsidized. Under current federal tax law, firms claim the credit for projects they decide to fund, and the federal government bears some of the cost.[50] The credit, used in combination with the expensing of research spending, enables market forces to determine which projects are pursued and which are jettisoned. Supporters of the credit believe that such an approach is more likely to promote greater diversity in the search for new technical knowledge and knowhow with profitable commercial applications than a direct subsidy such as federal R&D grants.

But some critics of the credit say that it does an exceptionally poor job of targeting R&D projects with large external benefits. While there are no known studies investigating this claim, it seems plausible. In general, business managers and owners seek the highest possible return on their investments. Consequently, in selecting R&D projects to pursue, it makes sense that they would assign a higher priority to projects likely to earn substantial profits for their firms in the short run than to projects likely to expand the frontiers of knowledge in a scientific field but to yield relatively meager returns in the short run. Such a predisposition is more than a matter of speculation. It is reflected in domestic industrial R&D spending: in 2001, according to data published by the National Science Foundation, U.S. industry spent a total of $184.9 billion on R&D, of which 5% went to basic research, 22% to applied research, and 73% to development.[51] This allocation reinforces the

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[49] (...continued)
Receipts," *Tax Adviser*, vol. 35, no. 7, July 1, 2004, p. 407.

[50] Joseph E. Stiglitz, *Economics of the Public Sector* (New York: W.W. Norton, 2000), p. 348.

[51] National Science Foundation, Division of Science Resource Studies, *National Patterns of Research and Development: 2003*, NSF 05-308 (Arlington, VA: 2005), tables B-4 to B-6, pp. 74, 76, and 78. For industry, the NSF defines basic research as "original investigations for the advancement of scientific knowledge ... which do not have specific commercial objectives, although they may be in fields of present or potential interest to the reporting company;" applied research as "research projects which represent investigations directed to the discovery of new scientific knowledge and which have specific commercial objectives with respect to either products or processes;" and development as "the systematic use of the knowledge or understanding gained from research directed toward the production of useful materials, devices, systems or methods, including design and development of prototypes and
(continued...)

impression that the credit is mainly subsidizing R&D projects with relatively modest social returns.

Some would modify the credit to give firms a stronger incentive to invest in basic research than in applied research or development. Among the options are redefining qualified research so that it applies to what is regarded as basic research only, and altering the basic research credit so that it offers a higher statutory rate than the regular R&E tax credit to basic research undertaken by a business taxpayer.

In considering whether to modify the credit to make it a more effective tool for stimulating business investment in R&D projects with relatively high social returns, lawmakers should keep in mind that the federal government has long served as the primary source of funding for basic research performed in the United States. In 2004, the federal government funded 62% of this research, compared to shares of 16% for industry, 13% for colleges and universities, and 9% for other nonprofit organizations.[52] This preponderance is neither surprising nor unjustified. Most firms are disinclined to invest more in basic research than applied research or development for the simple reasons that it is much more difficult to capture all or most of the returns on investment in basic research and the returns on this investment are more uncertain.

Legislation in the 110th Congress to Modify the Research Tax Credit

By all accounts, the research tax credit has enjoyed strong bipartisan support since its inception. There is no evidence that this support has weakened in the current Congress. A major concern raised by any legislative initiative to bolster permanently the credit's efficacy is the revenue cost of doing so at a time when the federal budget is in deficit and the House and Senate are operating under a so-called "pay-as-you-go" budget rule that requires any increases in discretionary spending or tax cuts to be offset by revenue increases or reductions in discretionary spending.

To date, at least six bills to modify the research tax credit have been introduced in the 110th Congress: S. 14, S. 41, S. 592, S. 833, H.R. 1712, and H.R. 2138. All would extend the credit: S. 14, S. 41, S. 833, H.R. 1712, and H.R. 2138 permanently; S. 592 through 2012.

In addition, S. 41(which Senate Finance Committee Chairman Max Baucus introduced on January 4, 2007) and H.R. 1712 (which Representative Eddie Bernice Johnson introduced on March 27) would make the following changes in the credit as of January 1, 2008:

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[51] (...continued)
processes," but excluding quality control, routine product testing, and production.

[52] See Brandon Shackelford, "U.S. R&D Continues to Rebound in 2004," *InfoBrief*, NSF06-306 (Arlington, VA: January 2006), p. 3.

- replace the current regular, AIRC, and ASIC credits with an alternative simplified credit equal to 20% of QREs above a base amount of 50% of average QREs in the three previous tax years — or 10% of QREs for business taxpayers with no QREs in at least one of the three previous tax years;

- increase the share of payments for contract research eligible for the credit from 65% to 80%;

- simplify the basic research credit so that it is equal to 20% of payments for contract basic research performed by educational institutions, certain scientific research organizations, and certain grant institutions; and

- require the IRS to complete a study for the House Ways and Means Committee and the Senate Finance Committee of taxpayer compliance with the record keeping requirements for the credit; the study should be completed within one year of the enactment of the provisions of S. 41 and focus on the extent to which business taxpayers maintain adequate records to justify claims for the credit and the burdens imposed on such taxpayers and the IRS by failures to comply with those requirements.

The Baucus/Johnson proposal has attracted support from several advocacy groups representing the interests of the private sector, including the National Association of Manufacturers.

H.R. 2138 would make fewer changes in the credit, but they still could have a significant impact on its effectiveness. Specifically, the bill would replace the current simplified credit with the same alternative simplified credit proposed in S. 41/H.R. 1712. It would also retain the current regular credit but abolish the AIRC.

In his budget proposal for FY2008, President Bush backs a permanent extension of the research tax credit and expresses a willingness to work with Congress to improve its incentive effect.[53]

A critical consideration for Congress in deciding whether to extend the credit permanently or enhance its incentive effect is the projected revenue cost of doing so. Recent and projected federal budget deficits have heightened concern over this cost and the reinstatement of a "pay-as-you-go" budget rule in the current Congress represent formidable obstacles to passing legislation addressing perceived problems with the current credit. The Bush Administration estimates that a permanent extension of the credit would entail a cumulative revenue loss of $117.3 billion from

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[53] Department of the Treasury, *General Explanations of the Administration's Fiscal Year 2008 Revenue Proposals* (Washington: February 2007), p. 105.

FY2008 through FY2017.[54] There is no question that the revenue loss would be greater if a permanent extension were coupled with changes in the design of the credit intended to improve its efficacy.

[54] Ibid., p. 131.