TAX INCENTIVES FOR RESEARCH, EXPERIMENTATION, AND INNOVATION

Scheduled for a Public Hearing
Before the
SENATE COMMITTEE ON FINANCE
on September 20, 2011

Prepared by the Staff
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INTRODUCTION

The Committee on Finance has scheduled a public hearing on September 20, 2011, concerning Federal tax incentives for research, experimentation, and innovation. This document,[1] prepared by the staff of the Joint Committee on Taxation, provides a summary and analysis of the present law Federal income tax rules designed to encourage these activities.

[1] This document may be cited as follows: Joint Committee on Taxation, *Tax Incentives for Research, Experimentation, and Innovation* (JCX-45-11), September 16, 2011. This document can be found on the website at www.jct.gov.

I. DESCRIPTION OF PRESENT LAW FEDERAL TAX INCENTIVES FOR RESEARCH

A. Deduction for Research Expenditures

Business expenses associated with the development or creation of an asset having a useful life extending beyond the current year must generally be capitalized and depreciated over such useful life. Taxpayers, however, may elect to deduct currently the amount of certain reasonable research or experimentation expenditures paid or incurred in connection with a trade or business.[2] Taxpayers may choose to forgo a current deduction, capitalize their research expenditures, and recover them ratably over the useful life of the research, but in no case over a period of less than 60 months.[3] Taxpayers, alternatively, may elect to amortize their research expenditures over a period of 10 years.[4] Generally, such deductions are reduced by the amount of the taxpayer's research tax credit (discussed in more detail in section B).[5]

Amounts defined as research and experimental expenditures under section 174 generally include all costs incurred in the experimental or laboratory sense related to development or improvement of a product.[6] In particular, qualifying costs are those incurred for activities intended to discover information that would eliminate uncertainty concerning the development or improvement of a product.[7] Uncertainty exists when information available to the taxpayer is not sufficient to ascertain the capability or method for developing, improving, and/or appropriately designing the product.[8] The determination of whether expenditures qualify as deductible

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[2] Sec. 174. Unless otherwise noted, all section references are to the Internal Revenue Code of 1986, as amended.

[3] Sec. 174(b). Taxpayers generating significant short-term losses often choose to defer the deduction for their research and experimentation expenditures under this section. Additionally, section 174 amounts are excluded from the definition of "start-up expenditures" under section 195 (section 195 generally provides that start-up expenditures either are not deductible or are amortizable over a period of not less than 180 days once an active trade or business begins). So as not to generate significant losses before beginning their trade or business, a taxpayer may choose to defer the deduction and amortize the section 174 costs beginning with the month in which the taxpayer first realizes benefits from the expenditures.

[4] Secs. 174(f)(2) and 59(e). This special 10-year election is available to mitigate the effect of the alternative minimum tax adjustment for research expenditures set forth in section 56(b)(2). Taxpayers with significant losses also may elect to amortize their otherwise deductible research and experimentation expenditures to reduce amounts that could be subject to expiration under the NOL carryforward regime.

[5] Sec. 280C(c). Taxpayers may alternatively elect to claim a reduced research tax credit amount under section 41 in lieu of reducing deductions otherwise allowed. Sec. 280C(c)(3).

[6] Treas. Reg. sec. 1.174-2(a)(1) and (2). Product is defined to include any pilot model, process, formula, invention, technique, patent, or similar property, and includes products to be used by the taxpayer in its trade or business as well as products to be held for sale, lease, or license.

[7] Treas. Reg. sec. 1.174-2(a)(1).

[8] Treas. Reg. sec. 1.174-2(a)(1).

research expenses depends on the nature of the activity to which the costs relate, not the nature of the product or improvement being developed or the level of technological advancement the product or improvement represents. Examples of qualifying costs include salaries for those engaged in research or experimentation efforts, amounts incurred to operate and maintain research facilities (e.g., utilities, depreciation, rent), and expenditures for materials and supplies used and consumed in the course of research or experimentation (including amounts incurred in conducting trials).[9]

However, generally no current deduction is allowable for expenditures for the acquisition or improvement of land or of depreciable or depletable property used in connection with any research or experimentation.[10] In addition, no current deduction is allowed for research expenses incurred for the purpose of ascertaining the existence, location, extent, or quality of any deposit of ore or other mineral, including oil and gas.[11]

B. Credit for Increasing Research Activities

1. In general

For general research expenditures, a taxpayer may claim a research credit equal to 20 percent of the amount by which the taxpayer's qualified research expenses for a taxable year exceed its base amount for that year.[12] Thus, the research credit is generally available with respect to incremental increases in qualified research. An alternative simplified research credit (with a 14 percent rate and a different base amount) may be claimed in lieu of the 20-percent credit.

A 20-percent research tax credit is also available with respect to the excess of (1) 100 percent of corporate cash expenses (including grants or contributions) paid for basic research conducted by universities (and certain nonprofit scientific research organizations) over (2) the sum of (a) the greater of two minimum basic research floors plus (b) an amount reflecting any decrease in nonresearch giving to universities by the corporation as compared to such giving during a fixed-base period, as adjusted for inflation. This separate credit computation is commonly referred to as the university basic research credit.[13]

Finally, a research credit is available for a taxpayer's expenditures on research undertaken by an energy research consortium. This separate credit computation is commonly

[9] Treas. Reg. sec. 1.174-2(a)(1). The definition of research and experimental expenditures also includes the costs of obtaining a patent, such as attorneys' fees incurred in making and perfecting a patent.

[10] Sec. 174(c).

[11] Sec. 174(d).

[12] Sec. 41.

[13] Secs. 41(a)(2) and (e).

referred to as the energy research credit. Unlike the other research credits, the energy research credit applies to all qualified expenditures, not just those in excess of a base amount.[14]

The research credit, including the university basic research credit and the energy research credit, expires for amounts paid or incurred after December 31, 2011.[15]

2. Eligible expenses

Qualified research expenses eligible for the research tax credit consist of: (1) in-house expenses of the taxpayer for wages and supplies attributable to qualified research; (2) certain time-sharing costs for computer use in qualified research; and (3) 65 percent of amounts paid or incurred by the taxpayer to certain other persons for qualified research conducted on the taxpayer's behalf (so-called "contract research expenses").[16] Notwithstanding the limitation for contract research expenses, qualified research expenses include 100 percent of amounts paid or incurred by the taxpayer to an eligible small business, university, or Federal laboratory for qualified energy research.[17]

To be eligible for the credit, the research not only has to satisfy the requirements of present-law section 174 (described in section A) but also must be undertaken for the purpose of discovering information that is technological in nature, the application of which is intended to be useful in the development of a new or improved business component of the taxpayer, and substantially all of the activities of which constitute elements of a process of experimentation for functional aspects, performance, reliability, or quality of a business component. Research does not qualify for the credit if substantially all of the activities relate to style, taste, cosmetic, or seasonal design factors.[18] In addition, research does not qualify for the credit if: (1) conducted after the beginning of commercial production of the business component; (2) related to the adaptation of an existing business component to a particular customer's requirements; (3) related to the duplication of an existing business component from a physical examination of the component itself or certain other information; or (4) related to certain efficiency surveys, management function or technique, market research, market testing, or market development,

[14] Sec. 41(a)(3).

[15] Sec. 41(h).

[16] Under a special rule, 75 percent of amounts paid to a research consortium for qualified research are treated as qualified research expenses eligible for the research credit (rather than 65 percent under the general rule under section 41(b)(3) governing contract research expenses) if (1) such research consortium is a tax-exempt organization that is described in section 501(c)(3) (other than a private foundation) or section 501(c)(6) and is organized and operated primarily to conduct scientific research, and (2) such qualified research is conducted by the consortium on behalf of the taxpayer and one or more persons not related to the taxpayer. Sec. 41(b)(3)(C).

[17] Sec. 41(b)(3)(D).

[18] Sec. 41(d)(3).

routine data collection or routine quality control.[19] Research does not qualify for the credit if it is conducted outside the United States, Puerto Rico, or any U.S. possession.[20]

3. Computation of allowable credit

Except for energy research payments and certain university basic research payments made by corporations, the research tax credit applies only to the extent that the taxpayer's qualified research expenses for the current taxable year exceed its base amount. The base amount for the current year generally is computed by multiplying the taxpayer's fixed-base percentage by the average amount of the taxpayer's gross receipts for the four preceding years. If a taxpayer both incurred qualified research expenses and had gross receipts during each of at least three years from 1984 through 1988, then its fixed-base percentage is the ratio that its total qualified research expenses for the 1984-1988 period bears to its total gross receipts for that period (subject to a maximum fixed-base percentage of 16 percent). All other taxpayers (so-called "start-up firms") are assigned a fixed-base percentage of three percent.[21]

In computing the credit, a taxpayer's base amount cannot be less than 50 percent of its current-year qualified research expenses.

To prevent artificial increases in research expenditures by shifting expenditures among commonly controlled or otherwise related entities, a special aggregation rule provides that all members of the same controlled group of corporations are treated as a single taxpayer.[22] Under regulations prescribed by the Secretary, special rules apply for computing the credit when a major portion of a trade or business (or unit thereof) changes hands. Under these rules, qualified research expenses and gross receipts for periods prior to the change of ownership of a trade or business are treated as transferred with the trade or business that gave rise to those expenses and receipts for purposes of recomputing a taxpayer's fixed-base percentage.[23]

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[19] Sec. 41(d)(4).

[20] Sec. 41(d)(4)(F).

[21] The Small Business Job Protection Act of 1996 expanded the definition of start-up firms under section 41(c)(3)(B)(i) to include any firm if the first taxable year in which such firm had both gross receipts and qualified research expenses began after 1983. A special rule (enacted in 1993) is designed to gradually recompute a start-up firm's fixed-base percentage based on its actual research experience. Under this special rule, a start-up firm is assigned a fixed-base percentage of three percent for each of its first five taxable years after 1993 in which it incurs qualified research expenses. A start-up firm's fixed-base percentage for its sixth through tenth taxable years after 1993 in which it incurs qualified research expenses is a phased-in ratio based on the firm's actual research experience. For all subsequent taxable years, the taxpayer's fixed-base percentage is its actual ratio of qualified research expenses to gross receipts for any five years selected by the taxpayer from its fifth through tenth taxable years after 1993. Sec. 41(c)(3)(B).

[22] Sec. 41(f)(1).

[23] Sec. 41(f)(3).

4. Alternative simplified credit

The alternative simplified research credit is equal to 14 percent of qualified research expenses that exceed 50 percent of the average qualified research expenses for the three preceding taxable years. The rate is reduced to six percent if a taxpayer has no qualified research expenses in any one of the three preceding taxable years. An election to use the alternative simplified credit applies to all succeeding taxable years unless revoked with the consent of the Secretary of the Treasury.

5. Impact on section 174 costs

However, deductions allowed to a taxpayer under section 174 (or any other section where such amounts qualify for the research credit) are reduced by an amount equal to 100 percent of the taxpayer's research tax credit determined for the taxable year.[24] Alternatively, taxpayers may elect to claim a reduced research tax credit amount under section 41 in lieu of reducing deductions otherwise allowed.[25]

[24] Sec. 280C(c).

[25] Sec. 280C(c)(3).

II. ANALYSIS OF DEDUCTION AND CREDIT FOR RESEARCH EXPENDITURES

A. Overview

Technological development is an important component of economic growth. However, although an individual business may find it profitable to undertake some research, it may not find it profitable to invest in research as much as it otherwise might because it is difficult to capture the full benefits from the research and prevent such benefits from being used by competitors. In general, businesses acting in their own self-interest will not necessarily invest in research to the extent that would be consistent with the best interests of the overall economy. The reason for this behavior is because costly scientific and technological advances made by one firm may be cheaply copied by its competitors. Research is one area where economists agree that government intervention in the marketplace may improve overall economic efficiency. However, increased tax benefits or more government spending for research may not always improve economic efficiency. It is possible to decrease economic efficiency by spending too much on research. Nonetheless, there is evidence that the current level of research undertaken in the United States, and worldwide, is lower than the efficient level.[26] Nevertheless, even if there were agreement that additional subsidies for research are warranted as a general matter, misallocation of research dollars across competing sectors of the economy could diminish economic efficiency. It is difficult to determine whether increasing the current levels of government subsidies for research activities while retaining the current allocation of such subsidies would increase or decrease overall economic efficiency.

If it is believed that too little research is being undertaken, a tax subsidy is one method of offsetting the private-market bias against research, so that the quantity of research projects undertaken approaches the optimal level. Policies employed by the Federal government to increase the aggregate level of research activities are direct spending and grants, favorable anti-trust rules, and patent protection, among others. The effect of tax policy on research activity is largely uncertain because there is relatively little consensus regarding the magnitude of the responsiveness of research to changes in taxes and other factors affecting its price. To the extent that research activities are responsive to the price of research activities, the research and experimentation tax credit should increase research activities beyond what they otherwise would be. However, the present-law research credit contains certain complexities and compliance costs that may obscure this effect.

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[26] See Zvi Griliches, "The Search for R&D Spillovers," *Scandinavian Journal of Economics*, vol. XCIV, (1992); M. Ishaq Nadiri, "Innovations and Technological Spillovers," National Bureau of Economic Research, Working Paper No. 4423 (1993); and Bronwyn Hall, "The Private and Social Returns to Research and Development," in Bruce Smith and Claude Barfield (eds.), *Technology, R&D and the Economy*, Washington, D.C.: Brookings Institution Press (1996), pp. 1-14. These papers suggest that the rate of return to privately funded research expenditures is high compared to that in physical capital and the social rate of return exceeds the private rate of return. Griliches concludes, "in spite of [many] difficulties, there has been a significant number of reasonably well-done studies all pointing in the same direction: R&D spillovers are present, their magnitude may be quite large, and social rates of return remain significantly above private rates." Griliches, p. S43. Charles I. Jones and John C. Williams, "Measuring the Social Return to R&D," *Quarterly Journal of Economics*, 113 (November 1998), also conclude that "advanced economies like the United States substantially under invest in R&D" p. 1120.

B. Scope of Research Activities in the United States and Abroad

In the United States, private for-profit enterprises and individuals, non-profit organizations, and the public sector undertake research activities. Total expenditures on research and development in the United States represent 2.8 percent of gross domestic product in 2009.[27] This rate of expenditure on research and development exceeds that of the European Union (1.9 percent) and the average of all countries that are members of the Organisation for Economic Co-operation and Development ("OECD") (2.3 percent), but is less than that of Japan (3.3 percent). In 2009, expenditures on research and development in the United States represented 41.24 percent of all expenditures on research and development undertaken by OECD countries; they were 35 percent greater than the total expenditures on research and development undertaken in the European Union, and were approximately 2.7 times such expenditures in Japan.[28]

Gross domestic expenditures on research and development in the United States grew from 2.7 percent of gross domestic product to 2.8 percent gross domestic product over the ten year period 1999-2009. This rate of growth exceeds that of the United Kingdom (0.0 percentage point increase), and Sweden (0.0 percentage point increase) over this same period, but is less than that of Germany (0.4 percentage point increase), Japan (0.3 percentage point increase), Israel (0.8 percentage point increase), and South Korea (1.19 percentage point increase).[29]

Business domestic expenditures on research and development in the United States were 2.0 percent of gross domestic product in 2009. This exceeds that of the United Kingdom (1.1 percent), France (1.4 percent) and Germany (1.9 percent), but is less than that of Israel (3.4 percent), Japan (3.5 percent), and South Korea (3.5 percent).[30]

A number of countries, including the United States, provide tax benefits to taxpayers who undertake research activities. The United States provides two types of benefits: tax credits for research activity and current expensing of research-related expenditures.[31] These two types of

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[27] OECD, *Science, Technology and Industry Scoreboard, 2011*. This data represents outlays by private persons and by governments.

[28] OECD, *Science, Technology and Industry Scoreboard, 2011*. While the OECD attempts to present this data on a standardized basis, the cross-country comparisons are not perfect. For example, the United States reporting for research spending generally does not include capital expenditure outlays devoted to research, while the reporting of some other countries does include capital expenditures.

[29] OECD, *Science, Technology and Industry Scoreboard, 2011.* The annual real rate of growth of gross domestic expenditures on research and development as a percentage of gross domestic product for the period 1999-2009 in the European Union and in all OECD countries was 0.18 percentage points and 0.17 percentage points, respectively. All reported growth rates are calculated in terms of U.S. dollars equivalents converted at purchasing power parity.

[30] OECD, *Science, Technology and Industry Scoreboard, 2011.* The annual real rate of growth of business expenditures on research and development as a percentage of gross domestic product for the period 1999-2009 in the European Union and in all OECD countries was 0.06 percentage points and 0.13 percentage points, respectively. All reported growth rates are calculated in terms of U.S. dollar equivalents converted at purchasing power parity.

[31] In the case of expensing, amounts are expended to create an asset with a future benefit. In most other instances this would result in the capitalization and recovery through amortization of such costs. The inherent issue

benefits each carry different incentives with potentially different effects on research activity. For example, incentive effects of incremental credits per dollar of revenue loss may be larger than the incentive effects in expensing policies which are not incremental. However, expensing of research costs may have lower administrative and compliance costs than incremental credits.

The OECD has attempted to quantify the relative value of such tax benefits in different countries by creating an index that measures the total value of tax benefits accorded research activities relative to a simple expensing of all qualifying research expenditures. Table 1, below, reports the value of this index for selected countries. A value of zero results if the only tax benefit a country offered to research activities was the expensing of all qualifying research expenditures. Negative values reflect tax benefits less generous than expensing. Positive values reflect tax benefits more generous than expensing. For example, in 2008, in the United States qualifying taxpayers could expense research expenditures and, in certain circumstances, claim the research and experimentation tax credit. The resulting index number for the United States is 0.066.[32]

with expenses incurred in research and development is whether or not an asset of any value is being (or will be) created. At the time the amounts are expended, such a determination is often impossible. Further, research and development costs usually are incurred with the goal of creating a new or improved product, service, process or technique, but more often than not, the efforts do not result in success. As such, U.S. GAAP does not require the capitalization and amortization of R&D costs.

[32] OECD, *Science, Technology and Industry Scoreboard, 2009*. The index is calculated as one minus the so-called "B-index." The B-index is equal to the after-tax cost of an expenditure of one dollar on qualifying research, divided by one minus the taxpayer marginal tax rate. Alternatively, the B-index represents the present value of pre-tax income that is necessary to earn to finance the research activity and earn a positive after-tax profit. In practice, construction of the B-index and the index number reported in Table 1 requires a number of simplifying assumptions. As a consequence, the relative position of the tax benefits of various countries reported in the table is only suggestive.

Table 1.−Index Number of Tax Benefits for Research Activities in Selected Countries, 2008

Country	Index Number[1]
Germany	-0.020
United States	0.066
United Kingdom	0.105
Ireland	0.109
Japan	0.116
Italy	0.117
Canada	0.180
Spain	0.349
France	0.425

[1]Index number reported is only that for "large firms." Some countries (notably Canada and the United Kingdom) have additional tax benefits for research activities of "small" firms.
Source: OECD, OECD Science, Technology and Industry Scoreboard, 2009.

C. Scope of Tax Expenditures on Research Activities

The tax expenditure related to the research and experimentation tax credit was estimated to be $4.9 billion for fiscal year 2009. The related tax expenditure for expensing of research and development expenditures was estimated to be $3.1 billion for 2009, growing to $6.5 billion for 2013.[33] The expenditures for fiscal years 2010 to 2014 are $12.6 billion and $26.3 billion for credits and expensing, respectively.[34]

As noted above, the Federal Government also directly subsidizes research activities. Direct government outlays for research have substantially exceeded the annual estimated value of the tax expenditure provided by either the research and experimentation tax credit or the expensing of research and development expenditures. For example, in fiscal 2008, the National Science Foundation gross outlays for research and related activities were $4.6 billion, the Department of Defense's budget for research, development, test and evaluation was $84.7 billion, the Department of Energy's science gross outlays were $3.9 billion, and the Department

[33] Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 2009-2013* (JCS-1-10), January 11, 2010, p. 29.

[34] Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 2010-2014 (JCS-*3-10), December 15, 2010, p.35.

of Health and Human Services' budget for the National Institutes of Health was $28.9 billion.[35] However, such direct government outlays are generally for directed research on projects selected by the government. The research credit provides a subsidy to any qualified project of an eligible taxpayer with no application to a grant-making agency required. Projects are chosen based on the taxpayer's assessment of future profit potential.

Tables 2 and 3 present data for 2008 on those corporations that claimed the research tax credit by industry and asset size, respectively. Over 21,000 corporations (including both C corporations and S corporations) claimed more than $8.7 billion of research tax credits in 2008.[36] Corporations whose primary activity is manufacturing account for somewhat less than one-half of all corporations claiming a research tax credit. These manufacturers claimed nearly 70 percent of all credits. Firms with assets of $50 million or more account for 18 percent of all corporations claiming a credit but represent more than 85 percent of the credits claimed. Nevertheless, as Table 3 documents, a large number of small firms are engaged in research and were able to claim the research tax credit. C corporations claimed $8.3 billion of these credits and, furthermore, nearly all of this $8.3 billion was the result of the firm's own research. Only $168 million in research credits flowed through to C corporations from ownership interests in partnerships and other pass-through entities.

By comparison, individuals claimed $463 million in research tax credits on their individual income tax returns in 2008. This $463 million includes credits that flowed through to individuals from pass-through entities such as partnerships and S corporations, as well those credits generated by sole proprietorships.

[35] Office of Management and Budget, *Appendix*, *Budget of the United States Government, Fiscal Year 2010*, pp. 1141, 293, 295, 297, 413, and 469.

[36] The $8.7 billion figure reported for 2008 is not directly comparable with the Joint Committee on Taxation Staff's $4.9 billion tax expenditure estimate for 2008 (Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 2008-2012* (JCS-2-08), October 31, 2008, p. 60). The tax expenditure estimate accounts for the present-law requirement that deductions for research expenditures be reduced by research credits claimed. Also, the $8.7 billion figure does not reflect the actual tax reduction achieved by taxpayers claiming research credits in 2008, as the actual tax reduction will depend upon whether the taxpayer had operating losses, was subject to the alternative minimum tax, and other aspects specific to each taxpayer's situation.

Table 2.–Percentage Distribution of Corporations Claiming Research Tax Credit and Percentage of Credit Claimed by Sector, 2008

Industry	Percent of Corporations Claiming Credit	Percent of Total R & E Credit
Manufacturing	45.2	68.8
Professional, Scientific, and Technical Services	26.1	9.9
Wholesale Trade	7.6	4.4
Information	6.0	11.1
Finance and Insurance	3.0	1.7
Holding Companies	2.8	0.8
Administrative and Support and Waste Management and Remediation Services	1.5	0.3
Retail Trade	1.3	1.0
Health Care and Social Services	1.3	0.5
Mining	1.1	0.4
Agriculture, Forestry, Fishing, and Hunting	0.9	0.1
Construction	0.7	0.2
Utilities	0.6	0.6
Arts, Entertainment, and Recreation	0.6	(1)
Real Estate and Rental and Leasing	0.5	0.1
Transportation and Warehousing	0.3	0.1
Educational Services	0.3	(1)
Accommodation and Food Services	0.1	(1)
Other Services	(1)	(1)
Wholesale and Retail Trade not Allocable	(2)	(2)
Not Allocable	(2)	(2)

(1) Less than 0.1 percent.
(2) Data undisclosed to protect taxpayer confidentiality.
Source: Joint Committee on Taxation staff calculations from Internal Revenue Service, Statistics of Income data.

Table 3.–Percentage Distribution of Corporations Claiming Research Tax Credit and of Credit Claimed by Corporation Size, 2008

Asset Size ($)	Percent of Firms Claiming Credit	Percent of Credit Claimed
0	1.6	1.1
1 to 99,999	5.5	0.1
100,000 to 249,999	5.3	0.2
250,000 to 499,999	3.0	0.1
500,000 to 999,999	7.0	0.3
1,000,000 to 9,999,999	39.4	5.2
10,000,000 to 49,999,999	20.1	6.2
50,000,000 +	18.0	86.9

Totals may not add to 100 percent due to rounding.
Source: Joint Committee on Taxation staff calculations from Internal Revenue Service, Statistics of Income data.

D. Flat Versus Incremental Tax Credits

For a tax credit to be effective in increasing a taxpayer's research expenditures, it is not necessary to provide that credit for all the taxpayer's research expenditures (i.e., a flat credit). By limiting the credit to expenditures above a base amount, incremental tax credits attempt to target the tax incentives to have the largest effect on taxpayer behavior.

Suppose, for example, a taxpayer is considering two potential research projects: Project A will generate cash flow with a present value of $105 and Project B will generate cash flow with a present value of $95. Suppose that the research cost of investing in each of these projects is $100. Without any tax incentives, the taxpayer will find it profitable to invest in Project A and will not invest in Project B.

Alternatively, consider the situation where a 10-percent flat credit applies to all research expenditures incurred. In the case of Project A, the credit effectively reduces the cost to $90. This increases profitability, but does not change behavior with respect to that project, since it would have been undertaken in any event. However, because the cost of Project B also is reduced to $90, this previously neglected project (with a present value of $95) would now be profitable. Thus, the tax credit would affect behavior only with respect to this marginal project.

Incremental credits do not attempt to reward projects that would have been undertaken in any event, but rather to target incentives to marginal projects. To the extent this is possible, incremental credits have the potential to be far more effective per dollar of revenue cost than flat credits in inducing taxpayers to increase qualified expenditures. In the example above, if an incremental credit were properly targeted, the government could spend the same $20 in credit dollars and induce the taxpayer to undertake a marginal project so long as its expected cash flow

exceeded $80. Unfortunately, it is nearly impossible as a practical matter to determine which projects would be undertaken in the absence of a credit and to provide credits only to those projects which would not have been undertaken. In practice, almost all incremental credit proposals rely on some measure of the taxpayer's previous experience as a proxy for a taxpayer's total qualified expenditures in the absence of a credit. This amount is referred to as the credit's base amount. Tax credits are provided only for amounts above this base amount.

Because a taxpayer's calculated base amount is only an approximation of what would have been spent in the absence of a credit, in practice, the credit may be less than optimally effective per dollar of revenue cost. If the calculated base amount is too low, the credit is awarded to projects that would have been undertaken even in the absence of a credit. If, on the other hand, the calculated base amount is too high, then there is no incentive for projects that are on the margin.

Nevertheless, the incentive effects of incremental credits per dollar of revenue loss can be many times larger than those of a flat credit. However, a flat credit generally has lower administrative and compliance costs than an incremental credit. Another important consideration is the potentially less than optimal allocation of resources and unfair competition that could result as firms with qualified expenditures determined to be above their base amount receive credit dollars, while other firms with qualified expenditures determined to be below their base amount receive no credit.

E. Fixed Base Versus Moving Base Credit

Taxpayers effectively have the choice of two different research credit structures for general research expenditures: the regular credit and the alternative simplified credit.[37] The regular credit is a wholly "incremental" credit, while the alternative simplified credit has an incremental feature. In addition, the base is determined differently in each case. The regular credit is a "fixed base" credit. With a fixed base credit, the incremental amount of qualified research expenditures is determined with reference to prior qualified research expenditures incurred over a fixed period of time. The alternative simplified credit is a "moving base" credit. With a moving base credit, the incremental amount of qualified research expenditures for a given year is determined by reference to qualified research expenditures incurred on a rolling basis in one or more prior years. The distinction can be important because, in general, an incremental tax credit with a base amount equal to a moving average of previous years' qualified expenditures is considered to have an effective rate of credit substantially below its statutory rate. On the other hand, an incremental tax credit with a base amount determined as a fixed base generally is considered to have an effective rate of credit equal to its statutory rate.

To understand how a moving base creates a reduction in the effective rate of credit, consider the structure of the alternative simplified credit. The base of the credit is equal to 50 percent of the previous three years' average of qualified research expenditures. Assume a

[37] A taxpayer election into one of these structures is permanent unless revoked by the Secretary. However, historically, permission to revoke an election has routinely been granted by the Secretary, effectively making the choice an annual election.

taxpayer has been claiming the alternative simplified credit and is considering increasing his qualified research expenditures this year. A $1 increase in qualified expenditures in the current year will earn the taxpayer 14 cents in credit in the current year but it will also increase the taxpayer's base amount by 16.7 cents (50 percent of $1 divided by three) in each of the next three years. If the taxpayer returns to his previous level of research funding over the subsequent three years, the taxpayer will receive two and one-third cents less in credit than he otherwise would have. Assuming a nominal discount rate of 10 percent, the present value of the one year of credit increased by 14 cents followed by three years of credits reduced by two and one-third cents is equal to 8.19 cents. That is, the effective credit rate on a $1 dollar increase in qualified expenditures is 8.19 percent.

An additional feature of the moving average base calculation of the alternative simplified credit is that it is not always an incremental credit. If the taxpayer never alters his research expenditures, the alternative simplified credit is the equivalent of a flat rate credit with an effective credit value equal to one half of the statutory credit rate. Assume a taxpayer spends $100 per year annually on qualified research expenses. This taxpayer will have an annual base amount of $50, with the result that the taxpayer will have $50 of credit eligible expenditures on which the taxpayer may claim $7 of tax credit (14 percent of $50). For this taxpayer, the 14-percent credit above the defined moving average base amount is equivalent to a seven-percent credit on the taxpayer's $100 of annual qualifying research expenditures.

The moving average base calculation of the alternative simplified credit also can permit taxpayers to claim a research credit while they decrease their research expenditures. Assume as before that the taxpayer has spent $100 annually on qualified research expenses, but decides to reduce research expenses in the next year to $75 and in the subsequent year to $50, after which the taxpayer plans to maintain research expenditures at $50 per year. In the year of the first reduction, the taxpayer would have $25 of qualifying expenditures (the taxpayer's prior three-year average base is $100) and could claim a credit of $3.50 (14 percent of the $75 current year expenditure less half of three year average base). In the subsequent four years, the taxpayer could claim a credit of $0.58, $1.75, $2.92, and $3.50.[38] Of course, it is also the case that a taxpayer may claim a research credit as he reduces research expenditures under a fixed base credit as long as the taxpayer's level of qualifying expenditures is greater than the fixed base.

Some have also observed that a moving base credit can create incentives for taxpayers to "cycle" or bunch their qualified research expenditures. For example, assume a taxpayer who is claiming the alternative simplified credit has had qualified research expenditures of $100 per year for the past three years and is planning on maintaining qualified research expenditures at $100 per year for the next three years. The taxpayer's base would be $50 for each of the next three years and the taxpayer could claim $7 of credit per year. If, however, the taxpayer could bunch expenditures so that the taxpayer incurred only $50 of qualified research next year, followed by $150 in the second year and $100 in the third, the taxpayer could claim no credit next year but $15.17 in the second year and $7 dollars in the third. While the example

[38] In the subsequent four years, 50 percent of the prior three years' expenditures equals $45.83, $37.50, $29.17, and $25.00. In each year, the taxpayer's expenditure of $50 exceeds 50 percent of the prior three years' expenditures.

demonstrates a benefit to cycling, as the majority of qualified research expenditures consist of salaries to scientists, engineers, and other skilled labor, the potential for cycling would likely be limited in practice.

F. The Responsiveness of Research Expenditures to Tax Incentives

As with any other commodity, economists expect the amount of research expenditures a firm incurs to respond positively to a reduction in the price paid by the firm. Economists often refer to this responsiveness in terms of price elasticity, which is measured as the ratio of the percentage change in quantity to a percentage change in price. For example, if demand for a product increases by five percent as a result of a 10-percent decline in price paid by the purchaser, that commodity is said to have a price elasticity of demand of 0.5.[39] One way of reducing the price paid by a buyer for a commodity is to grant a tax credit upon purchase. A tax credit of 10 percent (if it is refundable or immediately usable by the taxpayer against current tax liability) is equivalent to a 10-percent price reduction. If the commodity granted a 10-percent tax credit has an elasticity of 0.5, the amount consumed will increase by five percent. Thus, if a flat research tax credit were provided at a 10-percent rate, and research expenditures had a price elasticity of 0.5, the credit would increase aggregate research spending by five percent.[40]

While most, if not all, published studies report that the research credit induces increases in research spending, the evidence generally indicates that the price elasticity for research is substantially less than one. For example, one survey of the literature reaches the following conclusion:

> "In summary, most of the models have estimated long-run price elasticities of demand for research and development on the order of -0.2 and -0.5. However, all of the measurements are prone to aggregation problems and measurement errors in explanatory variables."[41]

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[39] For simplicity, this analysis assumes that the product in question can be supplied at the same cost despite any increase in demand (i.e., the supply is perfectly elastic). This assumption may not be valid, particularly over short periods of time, and particularly when the commodity−such as research scientists and engineers−is in short supply.

[40] It is important to note that not all research expenditures need be subject to a price reduction to have this effect. Only the expenditures that would not have been undertaken otherwise−so called marginal research expenditures−need be subject to the credit to have a positive incentive effect.

[41] Charles River Associates, "An Assessment of Options for Restructuring the R&D Tax Credit to Reduce Dilution of its Marginal Incentive" (final report prepared for the National Science Foundation) (February 1985), p. G-14. The negative coefficient in the text reflects that a decrease in price results in an increase in research expenditures. Often, such elasticities are reported without the negative coefficient, it being understood that there is an inverse relationship between changes in the "price" of research and changes in research expenditures.

In a 1983 study, the Treasury Department used an elasticity of 0.92 as its upper range estimate of the price elasticity of R&D, but noted that the author of the unpublished study from which this estimate was taken conceded that the estimate might be biased upward. See Department of the Treasury, "The Impact of Section 861-8 Regulation on Research and Development," p. 23. As stated in the text, although there is uncertainty, most analysts believe the elasticity is considerably smaller. For example, the General Accounting Office (now called the

If it took time for taxpayers to learn about the credit and what sort of expenditures qualified, taxpayers may have only gradually adjusted their behavior. Such a learning curve might explain a modest measured behavioral effect. A more recent survey of the literature on the effect of the tax credit suggests a stronger behavioral response, although most analysts agree that there is substantial uncertainty in these estimates.

> "[W]ork using US firm-level data all reaches the same conclusion: the tax price elasticity of total research and development spending during the 1980s is on the order of unity, maybe higher. … Thus there is little doubt about the story that the firm-level publicly reported research and development data tell: the research tax credit produces roughly a dollar-for-dollar increase in reported research and development spending on the margin."[42]

However, this survey notes that most of this evidence is not drawn directly from tax data. For example, effective marginal tax credit rates are inferred from publicly reported financial data

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Government Accountability Office) summarizes: "These studies, the best available evidence, indicate that spending on R&E is not very responsive to price reductions. Most of the elasticity estimates fall in the range of 0.2 and 0.5. . . Since it is commonly recognized that all of the estimates are subject to error, we used a range of elasticity estimates to compute a range of estimates of the credit's impact." See *The Research Tax Credit Has Stimulated Some Additional Research Spending* (GAO/GGD-89-114) (September 1989), p. 23. Similarly, Edwin Mansfield concludes: "While our knowledge of the price elasticity of demand for R&D is far from adequate, the best available estimates suggest that it is rather low, perhaps about 0.3," in Edwin Mansfield, "The R&D Tax Credit and Other Technology Policy Issues," *American Economic Review*, vol. 76, no. 2 (May 1986), p. 191.

[42] Bronwyn Hall and John Van Reenen, "How Effective Are Fiscal Incentives for R&D? A Review of the Evidence," *Research Policy*, vol. 29, 2000, p. 462. This survey reports that more recent empirical analyses have estimated higher elasticity estimates. One recent empirical analysis of the research credit has estimated a short-run price elasticity of 0.8 and a long-run price elasticity of 2.0. The author of this study notes that the long-run estimate should be viewed with caution for several technical reasons. In addition, the data utilized for the study cover the period 1980 through 1991, containing only two years under the revised credit structure. This makes it empirically difficult to distinguish short-run and long-run effects, particularly as it may take firms some time to appreciate fully the incentive structure of the revised credit. See Bronwyn H. Hall, "R&D Tax Policy During the 1980s: Success or Failure?" in James M. Poterba (ed.), *Tax Policy and the Economy*, vol. 7 Cambridge: The MIT Press (1993), pp. 1-35. Another recent study examined the post-1986 growth of research expenditures by 40 U.S.-based multinationals and found price elasticities between 1.2 and 1.8. However, the estimated elasticities fell by half after including an additional 76 firms that had initially been excluded because they had been involved in merger activity. See James R. Hines, Jr., "On the Sensitivity of R&D to Delicate Tax Changes: The Behavior of U.S. Multinationals in the 1980s" in Alberto Giovannini, R. Glenn Hubbard, and Joel Slemrod (eds.), *Studies in International Taxation*, Chicago: University of Chicago Press (1993). Also see M. Ishaq Nadiri and Theofanis P. Mamuneas, "R&D Tax Incentives and Manufacturing-Sector R&D Expenditures," in James M. Poterba, (ed.), *Borderline Case: International Tax Policy, Corporate Research and Development, and Investment,* Washington, D.C.: National Academy Press (1997). While their study concludes that one dollar of research tax credit produces 95 cents of research, they note that time series empirical work is clouded by poor measures of the price deflators used to convert nominal research expenditures to real expenditures.

Other research suggests that many of the elasticity studies may overstate the efficiency of subsidies to research. Most R&D spending is for wages and the supply of qualified scientists is small, particularly in the short run. Subsidies may raise the wages of scientists, and hence research spending, without increasing actual research. See Austan Goolsbee, "Does Government R&D Policy Mainly Benefit Scientists and Engineers?," *American Economic Review*, vol. 88 (May 1998), pp. 298-302.

and may not reflect limitations imposed by operating losses or the AMT. The study notes that because most studies rely on "reported research expenditures," a "relabeling problem" may exist whereby preferential tax treatment for an activity gives firms an incentive to reclassify expenditures as qualifying expenditures. If this occurs, reported expenditures increase in response to the tax incentive by more than the underlying real economic activity. Thus, reported estimates may overestimate the true response of research spending to the tax credit.[43]

To our knowledge, there have been no specific studies of the effectiveness of the university basic research tax credit.

G. Other Policy Issues Related to the Research and Experimentation Credit

Design features

Perhaps the greatest taxpayer criticism of the research and experimentation tax credit concerns its temporary nature. Research projects frequently span years. If a taxpayer considers an incremental research project, the lack of certainty regarding the availability of future credits increases the financial risk of the expenditure. A credit of longer duration may more successfully induce additional research than would a temporary credit, even if the temporary credit is periodically renewed.

An incremental credit does not provide an incentive for all firms undertaking qualified research expenditures. If the credit is wholly incremental, many firms will have current-year qualified expenditures below the base amount. These firms will receive no tax credit and will have an effective credit rate of zero. Although there is no revenue cost associated with firms with qualified expenditures below the base amount, there may be a distortion in the allocation of resources as a result of these uneven incentives. The alternative simplified credit, with its "moving base" structure and limited incremental feature, partially avoids this problem.

If a firm has no current tax liability, or if the firm is subject to the AMT or the general business credit limitation, the research credit must be carried forward for use against future-year tax liabilities. The inability to use a tax credit immediately reduces its present value according to the length of time between when it is earned and the time it actually is used to reduce tax liability.[44]

Effective rate of credit

Except for energy research, firms with research expenditures substantially in excess of their base amount are subject to the 50-percent base amount limitation. In general, although these firms received the largest amount of credit when measured as a percentage of their total

[43] Hall and Van Reenen, "How Effective Are Fiscal Incentives for R&D? A Review of the Evidence," p. 463.

[44] As with any tax credit that is carried forward, its full incentive effect could be restored, absent other limitations, by allowing the credit to accumulate interest that is paid by the Treasury to the taxpayer when the credit ultimately is utilized.

qualified research expenses, their marginal effective rate of credit was exactly one half of the statutory credit rate of 20 percent (i.e., firms subject to the base limitation are effectively governed by a 10-percent credit rate).

Although the statutory rate of the research credit is 20 percent, it is likely that the average effective marginal rate may be substantially below 20 percent. Reasonable assumptions about the frequency with which firms are subject to various limitations discussed above yield estimates of an average effective rate of credit between 25 and 40 percent below the statutory rate, i.e., between 12 and 15 percent.[45]

Since sales growth over a long time frame will rarely track research growth, it can be expected that over time each firm's base will drift from the firm's actual current qualified research expenditures. Therefore, if the research credit were made permanent, increasingly over time there would be a larger number of firms either substantially above or below their calculated base. This could gradually create an undesirable situation where many firms would receive no credit and have no reasonable prospect of ever receiving a credit, while other firms would receive large credits (despite the 50-percent base amount limitation). Thus, over time, it can be expected that, for those firms eligible for the credit, the average effective marginal rate of credit would decline while the revenue cost to the Federal government increased. The alternative simplified credit structure avoids this problem by having a moving base.

Sector-specific subsidies

As explained above, because costly scientific and technological advances made by one firm may often be cheaply copied by its competitors, research is one area where economists agree that government intervention in the marketplace, such as the subsidy of the research tax credit, can improve overall economic efficiency. This rationale suggests that the problem of a socially inadequate amount of research is not more likely in some industries than in other industries, but rather it is an economy-wide problem. The basic economic rationale argues that a subsidy to reduce the cost of research should be equally applied across all sectors. As described above, the Energy Policy Act of 2005 provided that energy- related research receive a greater tax subsidy than other research. Some argue that it makes the tax subsidy to research inefficient by biasing the choice of research projects. They argue that an energy-related research project could be funded by the taxpayer in lieu of some other project that would offer a higher rate of return absent the more favorable tax credit for the energy-related project. Proponents of the differential treatment for energy-related research argue that broader policy concerns such as promoting energy independence justify creating a bias in favor of energy related research.

Definitional issues

A 2009 Government Accountability Office ("GAO") study highlights several definitional issues affecting the administrability of the research credit, including the definition of credit-

[45] For a more complete discussion of this point, see Joint Committee on Taxation, *Description and Analysis of Tax Provisions Expiring in 1992* (JCS-2-92), January 27, 1992, pp. 65-66.

eligible supplies and internal use software.[46] In 1986, Congress narrowed the definition of credit-eligible research to exclude most research expenditures for the development of computer software for the taxpayer's own internal use. Specifically, research with respect to computer software that is developed by or for the benefit of the taxpayer primarily for the taxpayer's own internal use is eligible for the research credit only if the software is used in (1) qualified research (other than the development of the internal-use software itself) undertaken by the taxpayer, or (2) a production process that meets the requirements for the credit. Any other research activities with respect to internal-use software are not eligible for the credit except to the extent provided in regulations. Congress intended that regulations would make the costs of new or improved internal-use software credit eligible only if, in addition to satisfying all other requirements for the credit, the taxpayer establishes that (1) the software is innovative (e.g., the software results in a reduction in costs, or improvement in speed, that is substantial and economically significant), (2) the software development involves significant economic risk (e.g., the taxpayer commits substantial resources to the development and there is substantial uncertainty because of technical risk that such resources would be recovered with a reasonable period), and (3) the software is not commercially available for use by the taxpayer (e.g., the software cannot be purchased, leased, or licensed and used for the intended purpose).

In the conference report to the Tax Relief Extension Act of 1999, Congress noted "the rapid pace of technological advance, especially in service-related industries," and suggested that software research that otherwise satisfies the requirements of section 41 that is undertaken to support the provision of a service, should not be deemed "internal use" solely because the business component involves the provision of a service.[47]

Treasury's most recent attempt at guidance with respect to internal-use software was in a 2004 Advance Notice of Proposed Rulemaking in which Treasury noted that "the Treasury Department and the IRS are concerned about the difficulty of effecting Congressional intent behind the exclusion for internal-use software with respect to computer software being developed today. Despite Congress's broad grant of regulatory authority in section 41(d)(4)(E), the Treasury Department and the IRS believe that this authority may not be broad enough to resolve those difficulties."[48]

The uncertainty as to the availability of the research credit for the development of internal-use software may shift investment away from such research to other research which is clearly eligible for the credit. Such a shift may not represent the most efficient allocation of research funding.

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[46] Government Accountability Office, *The Research Tax Credit's Design and Administration Can Be Improved* (GAO-10-136), November 2009, pp. 69-79. Other issues included the definition of commercial production and the general qualification tests.

[47] H.R. Conf. Rep. No. 106-478, p. 132 (1999).

[48] 69 Fed. Reg. 43, 46 (January 2, 2004).

A second definitional issue relates to credit-eligible supplies expenditures. A 2009 court case concluded that supplies expenditures incurred with respect to property held for sale by the taxpayer were credit eligible even though identical costs with respect to property used in the taxpayer's trade or business were ineligible.[49] Present law generally treats as credit-eligible supplies expenditures for tangible property other than land, improvements to land, or property of a character subject to an allowance for depreciation. Taxpayers and the IRS disagree as to whether the cost of supplies used in constructing tangible property such as molds and prototypes, where such items are held for sale by the taxpayer, are eligible for the research credit.[50]

While allowing credits for a relatively expansive definition of research supplies might increase total credits claimed substantially, this does not by itself make the credit more or less efficient. What determines the efficiency of research subsidies is, as discussed above, the extent to which such subsidies cause new research that generates benefits for firms or individuals other than the researching firm.

Thus, if defining "supplies" more expansively causes additional research that other firms may copy easily, then the resulting increase in tax expenditures may improve economic efficiency if the benefit derived by other firms is sufficiently high. On the other hand, opponents may believe that relative to other credit-eligible expenditures, supplies expenditures are either less likely to benefit other firms, or that any such external benefits are particularly mild, or perhaps less likely to induce more research. Alternately, they might argue that, in principle, supplies expenditures improve efficiency, but that "supplies" is improperly defined so as to allow the inclusion of too many tangible goods with benefits accruing solely to the researching firm. If so, it might be argued that modifying the credit to limit the definition of supplies (or possibly disallowing the credit for supplies expenditures entirely) and focusing the credit on other forms of research or other expenditures could improve economic efficiency and any social benefits of research without requiring an increase in tax expenditures.

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[49] *T.G. Missouri Corp. v. Commissioner*, 133 T.C. 278 (2009). This case involved a taxpayer who developed and used production molds to manufacture auto parts. The taxpayer paid third-party toolmakers to build the production molds and then incurred additional design and engineering costs to modify the molds so that they could be used to produce the desired component parts. Some of the molds were then sold to the taxpayer's customers while others were not. In both cases, the taxpayer retained physical possession of the molds and used them to produce the parts. The findings of the Tax Court were that the molds sold to the taxpayer's customers were not depreciable assets (as required by section 41(b)(2)(C)(ii)) because they were held for resale. Thus, the costs associated with the molds were properly includable as supply costs for purposes of calculating the research credit (whereas costs associated with the molds that were not sold received the opposite result). See also *Trinity Industries v. United States*, 691 F. Supp. 2d 688 (DC TX 2010).

[50] Under present law, taxpayers also may be able to claim the research credit for what might otherwise be relatively routine supply costs. For example, consider a hypothetical cattle-raising firm trying to determine whether a new genetically-modified feed improves the size and health of its cows. One straightforward way of testing the new feed would be to give the new feed to a random sample of the firm's existing cattle and compare the results relative to the rest of the herd. In principle, such a firm might be able to claim a credit for all of the feed, including the regular feed given to the "control group" (i.e., all of the rest of the cows), even though the firm obviously would have fed all of the animals whether conducting this experiment or not.

Administrative complexity

Administrative and compliance burdens result from the research tax credit. The GAO has testified that the research tax credit is difficult for the IRS to administer.[51] According to the GAO, the IRS reports that it is required to make difficult technical judgments in audits concerning whether research is directed to produce truly innovative products or processes. Although the IRS employs engineers in such audits, the companies engaged in the research typically employ personnel with greater technical expertise and, as would be expected, personnel with greater expertise regarding the intended application of the specific research conducted by the company under audit. Such audits create a burden for both the IRS and taxpayers. The credit generally requires taxpayers to maintain records more detailed than those necessary to support the deduction of research expenses under section 174.[52] An executive in a large technology company has identified the research credit as one of the most significant areas of complexity for his firm. He summarizes the problem as follows:

> "Tax incentives such as the R&D tax credit … typically pose compliance challenges, because they incorporate tax-only concepts that may be only tenuously linked to financial accounting principles or to the classifications used by the company's operational units. … [I]s what the company calls "research and development" the same as the "qualified research" eligible for the R&D tax credit under I.R.C. Section 41? The extent of any deviation in those terms is in large part the measure of the compliance costs associated with the tax credit."[53]

In addition to compliance challenges, with the addition of the alternative simplified credit, taxpayers now have multiple research credit structures to choose from, including the energy research credit and the university basic research credit. The presence of multiple research credit options creates increased complexity by requiring taxpayers to make multiple calculations to determine which credit structure will result in the most favorable tax treatment.

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[51] Natwar M. Gandhi, Associate Director Tax Policy and Administration Issues, General Government Division, U.S. General Accounting Office, "Testimony before the Subcommittee on Oversight: Additional Information on the Research Credit," Committee on Ways & Means, United States House of Representatives, May 10, 1995. See also, Government Accountability Office, *The Research Tax Credit's Design and Administration Can Be Improved*, November 2009, pp. 87-98, noting that common controversy issues include the use of a cost center versus project accounting approach to tracking research expenditures, sufficiency of base period documentation, and sampling issues.

[52] Natwar M. Gandhi, Associate Director Tax Policy and Administration Issues, General Government Division, U.S. General Accounting Office, "Testimony before the Subcommittee on Taxation and Internal Revenue Service Oversight: Information on the Research Credit," Committee on Finance, United States Senate, April 3, 1995.

[53] David R. Seltzer, "Federal Income Tax Compliance Costs: A Case Study of Hewlett-Packard Company," *National Tax Journal*, vol. 50 (September 1997), pp. 487-493.