

functions. If the policy goal is to increase private sector R&D at the margin, with little or no impact on the allocation of R&D resources across different technologies or types of research, then the R&E tax credit may be an appropriate and relatively effective policy instrument. If the policy goal is to rectify the market's tendency to undersupply basic research or some other particular types of technologies, such as infrastructural or "generic" research, then the R&E tax credit may be relatively ineffective because it does not substantially alter the allocation of R&D resources across different research activities. Policy choices regarding the use and coordination of different R&D subsidy instruments undoubtedly would benefit from further research into the social rate of return to different forms of public and private R&D, as well as into the extent and nature of R&D market failures in the United States.

II. R&E Tax Credit Policy in the United States

Since enacted in 1981, the R&E tax credit has been extended six times and substantively changed four times. It has expired three times—in 1986, 1992, and on June 30th, 1995. After the first two expiration dates, Congress retroactively renewed the credit. Congress once again faces the same decision.

Part II of this report begins by reviewing the evolution of the R&E tax credit and describing the contentious and unresolved issue of defining qualified research under the credit. The subsequent section analyzes the size and distribution of R&E tax credits, with particular attention to the difficulties of assessing the actual value of the credit received by industry.

History and Scope of the R&E Tax Credit

The R&E tax credit was introduced in the Economic Recovery Tax Act of 1981. Originally, it was scheduled to be effective from July 1, 1981, to December 31, 1986. The Tax Reform Act of 1986 extended the credit, in a somewhat reduced form, through December 31, 1988. The Technical and Miscellaneous Revenue Act of 1988 added another year to the credit, as did the Omnibus Budget Reconciliation Act of 1989 and subsequently the Omnibus Budget Reconciliation Act of 1990. The Tax Extension Act of 1991 renewed the credit to June 30, 1992, and the Omnibus Budget Reconciliation Act of 1993 added three more years. On June 30, 1995, the R&E tax credit once again expired.

Most of these pieces of legislation also changed the terms of the credit, whether in the credit rate itself, the qualified expenditure rules, or the base level calculations (see table 1). In essence, however, the basic formula has been consistent: the R&E tax credit is computed by taking qualified R&D expenditures that exceed a certain base level,

multiplying by the statutory credit rate, and deducting this amount from corporate income taxes.¹⁵ Congress always has maintained an incremental tax credit structure because it has sought to encourage firms to increase their R&D spending beyond the level that they would do in the absence of any tax incentive. By setting a base period and rewarding only spending beyond that level, Congress can, in principle, avoid providing a tax subsidy for activity that would have taken place regardless.¹⁶

Initially, tax credit rules compared current year R&E spending with the level spent in the previous three years. This criterion was widely criticized because the more a firm spent on R&E in any given year, the harder it became to receive the credit in subsequent years. Consequently, in 1989 Congress changed the base comparison from the previous three years to a fixed period of taxable years during 1984-1988 (with an exception for start-up firms). Although this amendment has been considered an improvement by most observers, it is not without drawbacks.

The rationale for having a base period is to approximate what firms might have spent on R&D in the absence of the tax credit. This is an inherently difficult task, because industry and firm-level conditions fluctuate so much that no fixed base period necessarily represents a “typical” ratio of R&E spending.¹⁷ The selection of a fixed set of years, such as 1984-88, undoubtedly is unfair to some firms and overgenerous to others, depending on the firm’s R&D spending trajectory, its revenue growth trends, and its corresponding business cycle. One alternative is to allow firms to select their own base period, as start up firms can do to a certain extent under current provisions. However, arbitrary base periods would be very difficult to administer, and would likely encourage firms to select a particularly advantageous base period, which again would obscure any determination of a typical R&E spending pattern. If Congress does renew the R&E tax credit, it will eventually have to confront the problem of determining an adequate base period, as the 1984-88 period recedes and becomes increasingly irrelevant to current business practices.¹⁸

¹⁵ There is a three-year carryback and fifteen-year carryforward provision for firms with no income tax liability in the current year. After 1988, the credit also reduces the R&D expenditure available for deduction from current income under the old section 174 rules (between 1981 and 1989, the amount of research spending that qualified for the research and experimentation tax credit also could be expensed as well). For additional modifications, see table 1.

¹⁶ As discussed later in the text, it is difficult to estimate how much R&D would actually take place in the absence of the credit. Some observers argue that the credit generally promotes new R&D spending on the margin, as designed, while others hold that credit in large part rewards R&D spending that would take place regardless of the tax incentive.

¹⁷ As discussed above, rolling base periods were used initially, and were discarded because additional R&E spending in one year increases the base level for subsequent years, thereby reducing the incentive effect to conduct more R&D in any given year.

¹⁸ One could easily argue that this is already the case in some industries, such as computing and communications, where there has been an enormous amount of growth and rapid business turnover since 1984-88.

Table 1: History of R&D Tax Treatment in the United States, 1981-1995

Period	Credit Rate	Corp. Tax Rate	Definition of Base	Qualified Expenditures	Effect on Sec. 174 Deduction	Foreign Allocation Rules
July 1981 to Dec. 1986	25%	46%	Max of previous 3-year average or 50% of current year	Excluded: Research done outside U.S. or funded by others; research in the humanities and social sciences.	none	100% deduction against domestic income.
Jan. 1987 to Dec. 1987	20%	40%	same	Narrowed definition to "technological" research. Excluded leasing.	none	50% deduction against domestic income; 50% allocation.
Jan. 1988 to Apr. 1988	20%	34%	same	same	none	64% deduction against domestic income; 36% allocation.
May 1988 to Dec. 1988	20%	34%	same	same	none	30% deduction against domestic income; 70% allocation.
Jan. 1989 to Dec 1989	20%	34%	same	same	-100% credit	64% deduction against domestic income; 36% allocation.
Jan. 1990 to Dec. 1991	20%	34%	1984-88 R&D to sales ratio times current sales; max.16; .03 for startups.	same	-100% credit	same
Jan. 1992 to Dec. 1993	20%	34%	same; startup rules modified.	same	-100% credit	same
Jan. 1994 to June 1995	20%	35%	same	same	-100% credit	50% deduction against domestic income; 50% allocation.

SOURCE: Bronwyn H. Hall, 1993. "R&D Tax Policy During the 1980s: Success or Failure?" *Tax Policy and the Economy* 7: 1-53, updated.

In addition to establishing the term of the base period, the current law also caps the allowable ratio of R&E spending to gross receipts at 16 percent. Presumably, this feature helps firms that are extremely research-intensive—the higher the base percentage, the more difficult it is for firms to earn credits in future years; conversely, the lower the percentage, the easier it is to accumulate future credits.

In practice, however, high base period R&E intensity ratios may be less of a problem than ratios that are underestimated and consequently too low. Unpublished Internal Revenue Service data indicate that the average base period percentage reported

by firms on their 1992 tax returns was only 1.7 percent. The IRS notes that because the fixed base period is relatively far in the past—1984-88—the agency often runs into documentation problems when challenging individual firms’ base period calculation. Since gross receipts are more easily verified even for past periods, this means that the IRS usually must accept firms’ estimates of how much R&E they funded in the base period. Given the difficulty of documenting past R&E activity, not to mention intrinsic problems in defining qualified research (discussed below), firms may have some latitude to favorably adjust their base period R&E intensity ratio. Anecdotal interview evidence obtained by OTA indicates that some firms indeed “game” the rules either in this manner or by adjusting or “relabeling” their R&E spending categories to meet IRS definitions of qualified research.¹⁹ One corporate executive, representing a company that has received R&E tax credits since 1981, stated that he would prefer to exchange the R&E tax credit for a much simpler tax structure because he ultimately wastes company resources figuring out how to play current tax rules to his advantage. Some analysts have argued that this is a relatively common activity, and that relabeling may account for a significant portion of the apparent increase in R&D spending induced by the tax credit.²⁰ At the same time, however, prior OTA research on R&D in the pharmaceutical industry found little evidence of relabeling.²¹ Divergent evidence along these lines suggests that relabeling may vary across industries given differences in the nature of the R&D enterprise as well as the degree to which the tax definition of R&E accommodates actual R&D practices. Unfortunately, the amount of relabeling that actually takes place is impossible to determine, leaving an element of uncertainty in the equation connecting R&D spending to the R&E tax credit.

Apart from relabeling and other issues associated with base period rules, an additional rule limits the amount of the credit firms can obtain in any given tax year. Firms are allowed to claim the lesser of 1) the difference between their current year R&E spending and the base period multiplied by their average annual gross receipts for the previous four years; or 2) 50 percent of their current year’s R&E spending.²² However, if a firm’s current R&D spending is more than double its base period spending, then it must use 50 percent of its current spending as the base from which to calculate the credit. The 50 percent rule has become much more important since the 1989 law replaced the three-year rolling base period with the fixed 1984-88 period—the further the base period

¹⁹ To the extent that it takes place, R&E relabeling is not unlike many other types of expenditure allocation judgments that taxpayers invariably have to make in the face of ambiguous definitions and other sources of uncertainty in the tax code.

²⁰ Edwin Mansfield (1984b).

²¹ Judith L. Wagner, OTA, personal communication. See also chapter 8 of U.S. Congress, OTA (1993).

²² This rule does not apply to cash payments made for basic research conducted by educational institutions, scientific research organizations, and certain other qualified organizations, as determined under section 41(e) of the Internal Revenue Code. As discussed below, this expenditure category receives separate treatment under the R&E tax credit.

recedes, the more likely firms will be subject to the 50 percent rule. The U.S. General Accounting Office found that almost 60 percent of the corporations that reported R&E spending on their 1992 tax return were limited by the 50 percent rule.²³ These corporations, which accounted for two-fifths of the credit earned, essentially had the incentive effect of the credit cut in half.²⁴ Small firms are much more likely to be limited by the 50 percent rule than are larger firms, for reasons that are as yet unclear.²⁵

Perhaps the most vexing issue in actually determining the actual scope of the R&E credit is the definition of qualified research. The definition of research under section 41 of the Internal Revenue Code, which establishes rules for the R&E tax credit, builds upon the definition of “research and experimental expenses” under section 174, which establishes rules for amortizing or “expensing” R&E expenditures. Corporations have been able to deduct R&E expenses from taxable income since 1954: section 174 of the Internal Revenue Code permits firms to either deduct (“expense”) research outlays from taxable income in the year that the spending occurs, or depreciate research spending over a period of at least five years.²⁶ Except when firms have no tax liability, it is more advantageous to expense than to depreciate.

Originally, section 174 left research undefined except to exclude both expenditures on land or property and spending for mineral exploration. In 1957 the Treasury Department issued regulations defining research under section 174, but deductions were rarely audited because the section was of relatively little benefit and because routine compensation and supplies were frequently treated as deductible by the IRS anyway, which made the choice of expensing through section 174 largely inconsequential.

The situation changed significantly in 1981, when Congress enacted the research and experimentation tax credit (now codified as section 41 of the Internal Revenue Code). Section 174’s admittedly vague definition of research suddenly had significant tax consequences, as firms could now claim a credit against their federal tax liability based on

²³ GAO (1995a); p.11 and appendix IV.

²⁴ Since 1989, firms have not been able to deduct or “expense” from their taxable income those R&E expenses for which they claim a tax credit. After accounting for the reduced value of expensing, firms generally earn 13 cents for each dollar of R&E over the firm’s base amount (the statutory tax credit rate is 20 percent). For firms subject to the 50 percent rule, each additional dollar of R&E also increases the base by 50 cents; consequently, these firms earn 6.5 percent on the additional R&E dollar, or half of that earned by firms not subject to the 50 percent rule. See U.S. Congress, GAO (1995a); p.30. On the expensing provisions in section 174 of the Internal Revenue Code, see the subsequent text above.

²⁵ One would expect that small firms may be more affected by the 50 percent rule because they generally have a smaller fixed base percentage than large firms. According to the GAO, however, this fact does not fully explain the greater sensitivity of small firms to the 50 percent rule. See U.S. Congress, (1995a); p.32.

²⁶ Separate rules exist under section 861 for the allocation of foreign source income to R&D expenses. These rules have been changed repeatedly during the 1980s, and remain a particular source of controversy. For analysis of this provision, see Hines (1994a) (1994b) (1993).

R&E expenses that met the criteria of section 174 (among other conditions). That same year, Congress asked the Treasury Department to clarify section 174. Since there was no statutory definition of research in section 174, business representatives questioned whether the Treasury Department had the authority to narrow the scope of deductible research expenses. The debate over section 174 regulations was made largely moot by the 1986 Tax Reform Act, which restricted the definition of allowable research under the R&E tax credit.²⁷ Clarification of the broader section 174 definition of deductible R&E expenses continued through three sets of proposed regulations, offered in 1983, 1989 and 1993, eventually culminating in final regulations in 1994—13 years after the original request for clarification.²⁸

The 1986 amendments to the R&E tax credit gave the Treasury Department the authority to better define qualified research under section 41 of the Internal Revenue Code, which covers the tax credit itself. In 1989, the Treasury Department did issue final regulations for section 41 claims made prior to 1986, yet it has yet to announce final regulations for the R&E tax credit as defined by the 1986 Tax Reform Act and subsequent amendments. The delay in accomplishing this task represents in part the intrinsic difficulties of defining “qualified research” as well as the practical reality that the credit has never been a permanent feature of the tax code.²⁹

Consequently, section 174 regulations remain significant in determining qualified research expenditures under the R&E tax credit. The current general rule for section 174 (applicable to tax years beginning after October 1994) defines research or experimental expenditures as those “in the experimental or laboratory sense if they are for activities intended to discover information that would eliminate uncertainty concerning the development of improvement of a product.”³⁰ The term “product” includes “any pilot model, process, formula, invention, technique, patent, or similar property.” Several types of spending are specifically disallowed: ordinary testing for quality control, efficiency surveys, management studies, consumer surveys, advertising, historical or literary research, and the acquisition of another’s patent, model, production, or process.

²⁷ Whether the definition of qualified research established in 1986 is more restrictive or more expansive than previous definitions remains a matter of debate. In general terms, the IRS views the 1986 definition under section 41(d) as more restrictive than prior years, while some in industry argue that it actually is broader in scope. As discussed below, there are no final regulations governing the 1986 definition of qualified research under section 41, and the issue remains controversial.

²⁸ The final regulations for section 174 are widely considered to be satisfactory, although they were preceded by a considerable amount of controversy. For detailed accounts of the legislative history and evolution of section 174 regulations, along with congruent interpretive debates, see Hudson (1991) and McConaghy and Ruge (1993).

²⁹ As of June 30, 1995, the IRS had a backlog of over 500 tax provisions awaiting final regulations. Although the IRS continues to devote staff resources to resolving section 41 regulatory issues, one would expect that the lack of permanent tax legislation in this area might retard the final resolution of the R&E tax credit.

³⁰ Treasury regulations (sec. 1.174-2(a)).

If a firm's R&E expenses meet these criteria, they pass the first test for qualified research expenditures under section 41 of the Internal Revenue Code. Allowable expenditures primarily include wages and supplies used for qualified research services, payments for the right to use computers for qualified research, and a percentage of payments made for contract research. However, section 41 remains rather vague on the meaning of qualified research itself—generally, the credit is available to research “undertaken for the purpose of discovering information” that is “technological in nature” and “intended to be useful in the development of a new or improved business component.” Ultimately, the definition is far more specific about the types of research that are excluded than those that qualify for the credit; in addition to the research excluded from section 174, the statute for the credit disallows the following types of research:

- research conducted after commercial production begins;
- research related to style, taste, cosmetic, or seasonal design factors;
- research related to the adaptation of an existing business component to a particular customer's requirement or need;
- routine data collection;
- research conducted outside the United States; and
- any research in the social sciences, arts, or humanities.

The amount of qualified research also is determined by the whether the research is performed in or outside the firm. Sixty-five percent of qualified research conducted by outside contractors can be used toward the R&E tax credit. This 65 percent serves as a rough proxy for the fact that many overhead costs and support staff activities would not qualify for the credit if the research were performed in-house. Rather than requiring contracted organizations to itemize their research expenditures, Congress assumed that 35 percent of the contracted amount was for such extraneous expenditures. In 1992, firms that filed for the credit contracted \$8 billion to outside firms for research, of which \$5.2 billion (i.e., 65 percent) was allowable for the credit.³¹

Payments made for basic research conducted in universities, certain scientific research organizations, tax-exempt scientific organizations, and certain grant organizations receive separate tax treatment than in-house or other research that is contracted out. However, in practice firms make relatively little use of the basic research provision in section 41(e) of the Internal Revenue Code: in 1992, firms applying for the credit spent only \$980 million on basic research performed by universities and other qualified organizations, compared with approximately \$35 billion spent in-house and \$8 billion spent on outside contractors.³² After all requisite calculations and adjustments, the tax

³¹ IRS, unpublished data provided to OTA. See table 2 regarding the relative magnitude of different types of research expenditures that qualify for the R&E tax credit.

³² In 1992, total qualified research amounted to \$43.3 billion. After subtracting the base amount and making other requisite calculations and adjustments, the total R&E credit claimed was \$1.6 billion.

credit provision for basic research payments to qualified organizations amounted to \$188 million of the total \$1.6 billion in credits claimed in 1992. The relatively modest use of this provision may derive in part from the tax credit's definition of basic research as "any original investigation for the advancement of scientific knowledge not having a specific commercial objective."³³ Presumably, few firms will spend much on research with no commercial objective unless they have philanthropic or other intentions, in which case they may be able to use other tax provisions such as those for charitable deductions.

Although section 41 provides some clarification of qualified research under the credit by specifically excluding certain activities, the general definition of qualified research remains vague and contentious. Stipulating that the credit applies to information that is "technological in nature" provides little guidance to firms or the IRS, nor do the conditions that the technology be "useful" for the development of a "new or improved" component add any additional clarity. Firms frequently dispute the meaning of qualified research with the IRS. In audited cases, the scope of allowable research emerges from a negotiating process among firms and their accounting or legal representatives, the IRS, and sometimes the judicial system. A key component of most audits involves the disposition of employee time between qualified research and other activities (e.g. managerial responsibilities, production or marketing responsibilities, etc.); disputes in this area turn not only on uncertainty over the meaning of qualified research but also on the ability of firms to adequately document qualified wage and supply costs.

Large firms (e.g. those with more than \$250 million in assets) are routinely audited; those with fewer assets are audited based on other criteria. Audits typically are performed by general IRS examiners, who may be assisted either by IRS engineers (usually in cases involving large taxpayers) or by an individual or team from the IRS Industry Specialist Program (in cases involving taxpayers with less than \$250 million in assets).³⁴ IRS engineers possess specialized knowledge on particular industries or lines of work, and are best able to answer technical questions on disputes between firms and the IRS over whether certain company activities constitute allowable research. However, due to insufficient staff the IRS rarely assigns engineers to audits involving firms with less than \$250 million in assets (such firms accounted for 30 percent of the credit in 1992), and even in cases involving large firms it is not always possible to assign an engineer who has a background relevant to the firms' line of business. Staff from the Industry Specialist Program (ISP) often provide the expertise needed in cases involving smaller taxpayers. However, the ISP program has only one staff person in the country who is responsible exclusively for assisting R&E tax credit examinations across all industries.

Payments made for basic research conducted by qualified organizations accounted for 2.3 percent of all qualified research and 11.8 percent of the total R&E credit claimed in 1992.

³³ Internal Revenue Code, section 41(e)(7)(A). In addition, the provision excludes basic research in the social sciences, arts, or humanities as well as any basic research conducted outside the United States.

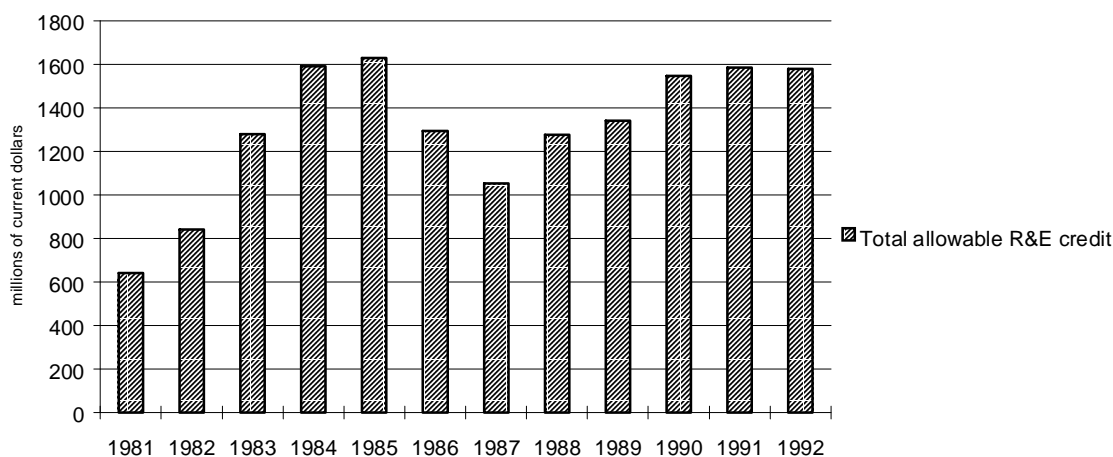
³⁴ The Industry Specialist Program within the IRS is designed primarily to secure national consistency in tax treatment within particular industries.

As discussed in the next section, the unknown net outcome of the auditing process constitutes but one source of uncertainty over the actual value of R&E tax credits earned by corporations in any given tax year.

The Size and Distribution of R&E Tax Credits

In 1992 (the most recent available data), the IRS reported that firms filed for nearly \$1.6 billion in research and experimentation tax credits. This amount has fluctuated since the credit's inauguration in 1981, but has remained steady since 1990 (see figure 2).

Figure 2: R&E Tax Credits Claimed by U.S. Firms, 1981-1992



Source: Internal Revenue Service.

The dollar value of R&E tax credits actually received by firms remains unknown, due to several complicating factors that, in all likelihood, reduce the actual tax subsidy provided to firms. First, the 1986 Tax Reform Act placed the R&E tax credit under the General Business Credit, which consists of twelve different tax credits (including credits for investment, low-income housing, oil recovery and renewable electricity, employee tips, and several types of employment credits). The General Business Credit caps the overall possible credit from its twelve components, and can therefore significantly reduce the value of the research and experimentation tax credit.³⁵ Available evidence indicates that the General Business Credit can limit the effective allocation of R&E tax credits in a given

³⁵ The procedures initiated in 1986 also make it more difficult to determine the effective R&E tax credit rate from public data, and do not provide the same level of industry detail available in prior years because the R&E tax credit was removed as a separate line item in the IRS Statistics of Income. The credit is still listed in one of the tables for the whole corporate sector, but detailed industry breakdowns are no longer available.

year by at least 30 percent—in 1992, for example, corporations filed for nearly \$1.6 billion in research and experimentation tax credits, but were able to use only \$1.1 billion in General Business Credits (including the R&E credit) that year.³⁶

Second, the Tax Reform Act of 1986 also strengthened the alternative minimum tax (AMT) system, which was designed to limit the overall benefits that corporations may derive from tax breaks by ensuring a minimum tax rate of 20 percent. Like the limitation on the General Business Credit, the AMT also can cap the R&E tax credit effectively available to individual firms. For instance, if a firm is subject to the AMT, it cannot claim the R&E tax credit in the current year, but must carry it forward (for up to fifteen years) until it is subject to regular corporate tax. Also, the rate of taxation under AMT is 20 percent, rather than the statutory corporate rate of 34 percent; consequently, firms that are temporarily subject to the AMT will face tax incentives that favor investment in intangibles over tangibles, relative to what they would face under ordinary corporate taxation.³⁷ In practice, only a small number of large manufacturing firms filed AMT returns in 1988, accounting for 3 percent of the total tax bill paid by manufacturing firms that year (Statistics of Income 1988), so the AMT may have a relatively small effect on the credit. At the same time, however, the AMT is more likely to reduce the R&E tax credit available to firms during recession years, when corporate profits are down. Again, there is no definitive method for gauging the impact of the AMT on the R&E tax credit from publicly available data, but a conservative estimate places the impact at roughly five percent.

Finally, the research and experimentation tax credit is further reduced by IRS audits. Unfortunately, no one—apparently not even the IRS—has any data on either the percentage of R&E tax credit claims that are audited or the net reduction in value of the R&E tax credit after auditing. Complicating the problem is the fact that audits often extend through several tax years, and contested cases often last five or more years. Nevertheless, existing evidence suggests that most audits result in significant downward adjustments in the allowable credit amount. Based on a survey of IRS examiners, the U.S. General Accounting Office estimated that IRS agents proposed reductions in 79 percent of the cases in which the R&E tax credit was audited during the first half of the 1980s, with an average net IRS downward adjustment of nearly 20 percent.³⁸ Interview evidence conducted by OTA for this report suggests that the audit process continues to reduce the allowable R&E tax credit by approximately the same amount.³⁹ In addition, definitional uncertainties, documentation problems, and other factors often encourage firms as well as the IRS to settle R&E tax credit disputes solely on the basis of the hazards

³⁶ U.S. Congress, GAO (1995a): p.5. Corporations may carry forward some unused tax credits, although the present value of those credits is usually lower due to the effects of inflation, changes in the firm's tax status, and other factors.

³⁷ See Lyon (1991).

³⁸ U.S. Congress, GAO (1989); pp.18-19, Table 2.1.

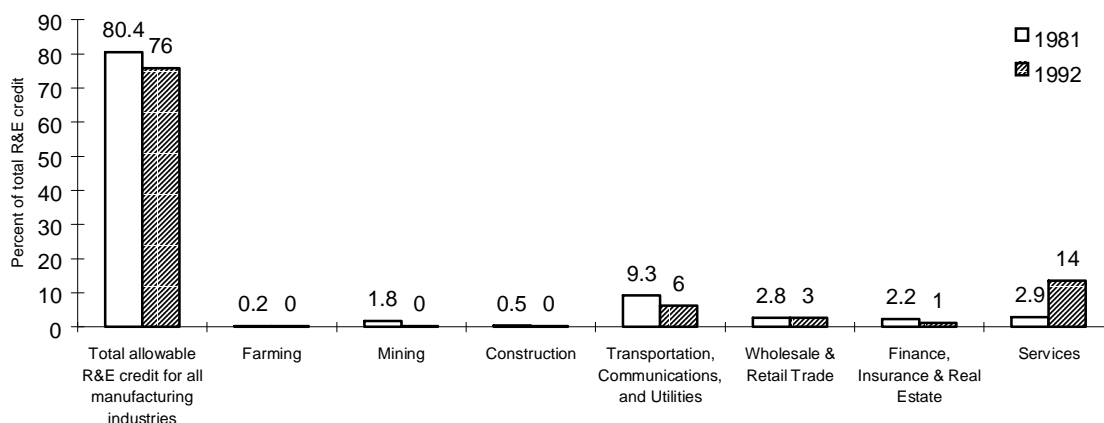
³⁹ Based on OTA discussions with industry executives, tax consultants in the major auditing firms that handle R&E tax credit cases, and IRS officials.

of litigation, with little if any reference to the actual R&E performed. Moreover, corporate tax settlements typically are complicated affairs that involve numerous disputes at once, which increases the possibility that the effective value of the credit could be determined by unrelated aspects of the firm's tax status and bargaining position.

Given the net downward adjustments to the credit through IRS audits, along with the limits placed on the credit by the General Business Credit and the Alternative Minimum Tax, it is difficult to gauge how much the actual value of allowable R&E tax credits differs from the amount claimed by firms. OTA estimates that the combined effect of these factors can reduce the amount of R&E tax credits actually granted to firms in any given tax year by as much as one-third of the amount claimed. In addition, credits granted can be claimed in different years, as firms can carry forward (for up to 15 years) or carry back (for up to 3 years) the value of the credit, depending on changes in the firm's tax status. This variation further complicates the problem of determining the value of R&E tax credits received by industry in any given year.

Since the policy began in 1981, most of the R&E tax credit has been claimed by manufacturing firms, which accounted for three-fourths of the total credit claimed in 1992 (see figure 3). The share of the credit claimed by manufacturing and mining has declined over time, as several service industries (including health care, education, and various business services) have increased their share. The decline in manufacturing's share is partly if not largely due to the fact that manufacturing has been a shrinking portion of the economy, with its share of total employment falling since 1981 from 22 percent to 16 percent of the work force. Within manufacturing, 80 percent of the credit is claimed by four sectors: chemicals and allied products (30 percent, with pharmaceuticals accounting for 22.1 percent), electrical equipment (18 percent), transportation equipment (18 percent), and machinery (14 percent).⁴⁰

Figure 3: Distribution of R&E Tax Credits by Industry, 1981 and 1992



Data source: Internal Revenue Service.

⁴⁰ U.S. Congress, GAO (1995a); Table II.3, p.19 (based on IRS SOI data).

Economic and business trends since the inception of the R&E tax credit have significantly influenced which firms obtain it. Among manufacturing firms, military and aerospace firms benefited greatly from the credit during the 1980s but most no longer can due to declining business in these industries (partly a product of reduced federal spending). Mergers also can affect whether a firm is eligible for the credit. For example, when an R&D-intensive line of business merges with one less intensive, the overall ratio of R&D to sales falls. Obviously, firms make merger decisions based on factors other than the R&E tax credit, but the loss of tax benefits from the credit due to mergers has led some firms to argue that the law should gauge R&E investment by line of business rather than by firm.⁴¹ For example, TRW has noted that because of its operations in space and defense (where its R&D investment has declined) and the automotive business (where its R&D has risen), it receives less benefit from the credit for its automotive research than it would if it operated solely in the automotive industry.⁴² The Aerospace Industries Association also has argued that mergers even among firms in the same line of business often results in a lower percentage of sales devoted to R&E (due to economies of scale), and that therefore such mergers result in less benefit from the research and experimentation tax credit.⁴³

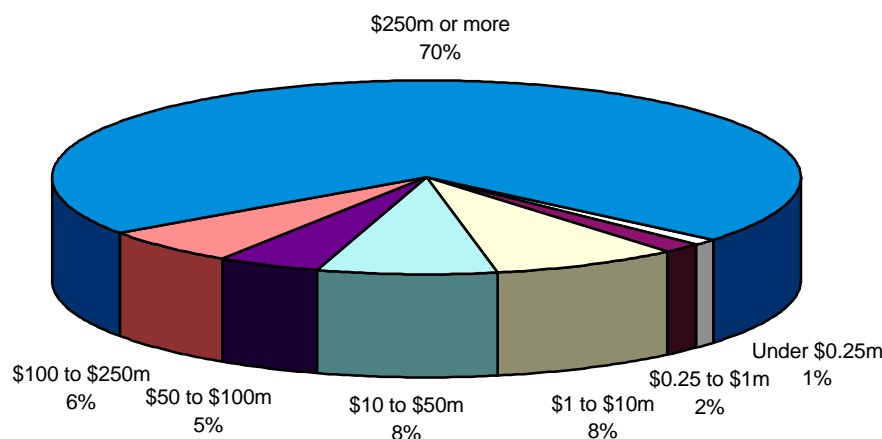
Large firms account for most of the R&E tax credits actually claimed (see figure 4). In 1992, firms with \$10 million or less in assets claimed approximately 11 percent of the credit, while firms with assets between \$10 and \$250 million claimed about 19 percent; the rest of the credit—70 percent—was claimed by firms with over \$250 million in assets. This distribution in part reflects the concentration of R&D in the United States within large firms; as discussed below, however, small R&D-performing firms may have special difficulties using the credit.

Most of the credit that firms claim is for compensation of employees engaged in qualified research, which constituted 62 percent of qualified R&E expenses claimed by all firms in 1992 (see table 2). Supplies represented the second most significant category of qualified research, and contract research the third. Less than \$200 million was claimed for the rental or lease of computers, about the same amount that was claimed for basic research payments to qualified organizations (including but not limited to universities); both categories represent less than one-half of one percent of all qualified research.

⁴¹ Mergers conceivably could result in the opposite outcome as well: if an R&D-intensive firm merges with a less R&D intensive firm, and the former previously was subject to the 50 percent rule and consequently could not claim a credit for all qualified research performed, then after the merger the new firm could claim a higher R&E tax credit.

⁴² Testimony before the House Ways and Means Committee, Subcommittee on Oversight, Hearings on the Research and Experimentation Tax Credit, May 20, 1995.

⁴³ Testimony before the House Ways and Means Committee, Subcommittee on Oversight, Hearings on the Research and Experimentation Tax Credit, May 20, 1995.

Figure 4: Distribution of R&E Tax Credits by Corporate Size, 1992

Data source: General Accounting Office, based on Internal Revenue Service, Statistics of Income (1992).

Table 2: Distribution of Qualified Research Expenses for the R&E Tax Credit, 1992

Expenditure Category	Amount Claimed (millions)	Percent of Total Qualified Research
Wages	26,845.8	62.0%
Supplies	8,568	19.8%
65% of contract research	5,222.7	12.1%
Rental/lease cost of computers	192.3	0.4%
Basic research payments to qualified organizations	188.4	0.4%
Total qualified research	[43,291]	[94.7%]

Note: "Qualified research" represents the full amount of research expenses allowed under the R&E tax credit. The actual credit received is a function of the fixed base percentage, the base amount for the given tax year, the 50 percent rule and other limitations, and the statutory credit rate of 20 percent. In 1992, the \$43 billion of qualified research expenses generated a tax credit value of approximately \$1.6 billion. Note also that total qualified research is slightly higher than the sum of the categories listed due to variations in how many taxpayers responded to each individual line on IRS form 6765.

In 1992, firms conducted \$43.3 billion of qualified research, which after all requisite calculations generated a tax credit value of approximately \$1.6 billion. By comparison, the tax revenue cost of research expensed under section 174 is slightly larger,