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An Overview of California's Research and Development Credit

LEGISLATIVE ANALYST'S OFFICE

Prepared for:

Assembly Committee on Revenue and Taxation

An Overview of California's Research and Development Tax Credit

Introduction

The Assembly Committee on Revenue and Taxation has requested that the Legislative Analyst's Office (LAO) review and assess the effectiveness and appropriateness of the California research and development tax credit (RDC), which is available to taxpayers under both the personal income tax (PIT) and the corporation tax (CT). Specifically, the Legislature requested that the LAO provide a report that reviews existing information related to the effectiveness of the RDC, and discusses additional information or research that would be required to more thoroughly evaluate its impact on economic activity in California.

Pursuant to this request, this report addresses the following topics regarding the RDC:

- Background information regarding the program's intent and provisions.
- Detailed information on program features and applicability.
- Associated tax policy issues and rationale for the program.
- Descriptive information on program utilization.
- Evaluation of the existing research literature regarding the effects of the tax incentive on economic activity.
- Options for further analysis of the program's impacts and effectiveness.

LAO Findings and Recommendations. Economic theory suggests that without some form of subsidy, overall research and development (R&D) spending in society would be lower than the economically optimal level. A strong case can be made that such a subsidy is appropriate at the *federal* level. In addition, under certain circumstances, *state* tax subsidies may also be justified. However, we are not aware of economic evidence which, on balance, justifies a state credit in addition to the federal credit.

Although the program does benefit those taxpayers who use it and there may exist localized spillover benefits that result from a state RDC, a state credit is likely to be costly overall relative to the benefits it provides in terms of additional research activity. In addition, even if such a state credit were warranted, very little is known regarding what would constitute the appropriate level of such a credit. Direct research-related spending (such as through the University of California) may well be a more effective means of achieving the same objective.

Given these issues, we recommend to the Legislature that no further expansion of the state's RDC occur unless convincing evidence is found indicating that this is warranted. Furthermore, we recommend that the Legislature consider reducing the

credit or phasing it out over time, especially given the substantial direct revenue losses associated with the program and the state's current budgetary position.

Background on the RDC

What Is the RDC?

Tax Program Basics. The RDC is a tax program that allows taxpayers filing under the CT and, in most cases, the PIT to reduce their tax liabilities to the extent that they engage in particular types of R&D activities. The RDC was established in 1987, pursuant to Chapter 1138, Statutes of 1987 (AB 53, Klehs), and Chapter 1139, Statutes of 1987 (SB 572, Garamendi), and is generally tailored after a similar federal credit.

The RDC is available only for certain types of qualified research activities that take place in California and exceed a certain base level of R&D expenditures (as determined by the level of R&D expenditures undertaken by the taxpayer in prior years). The credit may both be used to offset current-year tax liabilities and "carried forward" to offset tax liabilities in future years, but may not be "carried back" to offset past years' liabilities. Various details regarding programmatic features of the RDC are provided in Figure 1 (see next page).

Specific Program Characteristics. The RDC features two separate programs:

- ***Qualified Research Credit.*** The credit for *qualified* research is available for certain types of research activities conducted by the taxpayer, and is available to both PIT and CT taxpayers. The credit is equal to 15 percent of the amount of qualified incremental expenditures over a calculated "base amount" (as discussed below) of R&D expenditures.

- ***Basic Research Credit.*** The credit for *basic* research is available for certain types of research activities conducted by selected outside entities on behalf of the taxpayer, and is available to CT taxpayers only. The credit is equal to 24 percent of expenditures over a calculated base amount for certain types of research carried out by independent research institutions and universities.

The RDC also has additional provisions for particular types of businesses that result in making the above programs more accessible and/or generous than they otherwise would be. Specifically:

- For firms taking the basic research RDC and engaged in biopharmaceutical research activities or other biotechnology R&D activities, the types of institutions that may carry out basic research is expanded to include research hospitals owned by universities or charitable institutions.

- With respect to the qualified research RDC, start-up companies may take a tax credit equal to 3 percent of the firm's qualified R&D expenditures for the first

five years of operation, and thus are allowed to count *all* R&D expenditures rather than being limited to the incremental *increase* in such expenditures.

- An alternative credit is available under both the qualified and basic research RDC programs that allows certain otherwise ineligible CT taxpayers to avail themselves of the program. This is a taxpayer election that typically benefits those firms whose R&D expenses have not kept pace with their gross receipts.

Figure 1

Characteristics of California's RDC

	Tax Credit Programs	
	Qualified Research	**Basic Research**
Research type	Technological focus related to new product development.	Basic (nonapplied) research activities.
Taxpayer eligibility	PIT and CT taxpayers.	Corporations.[a]
Qualifying spending	Wages, supplies, and certain services.	Payments to qualified institutions under written contract.
Credit rate	15 percent over base R&D amount.[b]	24 percent over base-period amount.[c]
Research entity	Taxpayer.	Universities and charitable institutions.
Special provisions	New businesses benefit from alternative base period to make it easier to qualify. Alternative incremental credit is available to some businesses.	Biopharmaceutical and biotechnology businesses may use other research agents. Alternative incremental credit is available to some businesses.

a Except Subchapter S corporations.

b Base amount is R&D percentage of gross receipts in a base period adjusted for current gross revenues.

c Base-period amount is R&D percentage of gross receipts in a base period.

Other Provisions and Limitations of the RDC. As noted above, the RDC may be used only to the extent that it offsets current or future years' PIT and CT tax liabilities. However, the credit may not be used in these years to offset the corporate Minimum Tax, the Alternative Minimum Tax (AMT) under the PIT and the CT, or certain other taxes levied on Subchapter S corporations (such as taxes on built-in gains and excess net passive income). In addition, firms that claim the RDC must either: (1) reduce their deductions related to research expenses by the amount of the credit claimed or (2) take

a reduced RDC, equal to the normal RDC adjusted according to the taxpayer's marginal tax rate.

The RDC is not a refundable credit, nor, as noted above, may it be carried back to prior income years. However, there is no limit to the number of years the RDC may be carried forward before being claimed. Unlike the similar federal program (discussed in Appendix A), California's RDC does not have a sunset date and is therefore permanent unless specific action is taken by the Legislature to terminate, restrict, or suspend the program.

Finally, the credit may not be used by a member of the same "unitary" (or combined) corporate group, but rather may only be used by the business entity actually incurring the R&D expenses. As a result, RDCs from various entities within a combined group may not be "pooled" and used to reduce the tax liability of the parent corporation (in contrast to the treatment of *income* for unitary or combined groups).

Previous Changes to the RDC

Since its inception, the RDC has been expanded dramatically. In addition to those changes that are discussed above with respect to biopharmaceutical and biotechnology companies, the alternative incremental RDC was added in 1998, and the rates for this program component were raised in 2000.

The most significant changes that occurred were those having to do with the credit's rate. When the RDC was adopted, the rates were 8 percent for qualified research and 12 percent for basic research expenditures. These rates were increased in 1996 to 11 percent and 24 percent, respectively. The rate for qualified research was increased again in 1999 to 12 percent, and in 2000 to 15 percent (the basic research credit rate has remained at 24 percent).

Underlying Intent of the RDC Legislation

Unlike certain other tax incentive programs adopted by the state which have had specific economic development goals, the RDC appears to have been adopted simply as a means of generally encouraging more R&D activity within the state. The reasons for this may have related to the types of employment associated with R&D activities or positive perceptions of the economic development that such activities represent.

In addition, given that several other states already had adopted various R&D incentives by the time California enacted its RDC, the enabling legislation may have also been related to a desire to keep California competitive as a destination for R&D activities. (RDCs in selected other states are discussed in Appendix A.) Finally, the measure was approved in conjunction with a state conformity bill relating to major federal tax law changes contained in the 1986 Tax Reform Act. This may have provided an additional motivation to approve a state RDC similar in many respects to the federal program. The California credit was largely modeled after the 1981 federal R&D credit.

Since the initial adoption of the program, additional changes to the credit seem to have been reflective of concerns regarding the state's business climate, and a desire to attract economic activity perceived as being conducive to high growth. For example, the adoption of the alternative credit, more generous treatment of certain industries, and increases in the credit rates appear to reflect attempts to direct investment in particular ways and increase the availability of the credit. Despite these past enhancements, however, there appear to be continuing issues raised by California businesses regarding the structure of the RDC and how to improve it from the business perspective (see Appendix B).

Provisions of the RDC in Detail

Eligibility for the RDC

As noted, the RDC is available to taxpayers under both the state PIT and CT. The credit is generally claimed by general corporations filing under the state's CT; however, it is also available to individuals—as well as pass-through entities such as S corporations, estates and trusts, and partnerships—filing under the PIT.

How Does the RDC Work?

Calculating the amount of the RDC is a multistage process that involves determining *qualified research expenses* (or costs) for both a historical period and for the period for which the RDC is being claimed. The average share of gross receipts represented by R&D expenditures for the historical period (or, the *base percentage*) is compared to R&D expenditures for the current period in order to calculate a *base amount* upon which the RDC itself is calculated. The credit is an incremental credit, and is only available for that portion of R&D expenditures that are in *excess* of this calculated base amount. This procedure is described in more detail below and in the qualified research credit example presented in Figure 2.

Identifying Qualified R&D Expenses. In order to meet eligibility requirements for the RDC, the research activities of the taxpayer must meet certain requirements (Step 1 in Figure 2). For the *qualified research* RDC, research activities must be:

- Related to the development of information which is technological in nature.
- Intended for application to the development of a new or improved business product of the taxpayer—specifically related to function, performance, reliability, or quality.
- Performed in the State of California.

The expenses associated with such research activity must fall under one of the following categories in order to be qualified expenses:

- Employee compensation related to direct research activities.

- Certain contract expenses paid to nonemployees (contractors) for research activities.

- Costs of nondepreciable personal tangible property used to conduct research.

For the *basic research* RDC, qualified expenditures are payments made to qualified research institutions for basic or applied research that is intended to advance scientific or engineering knowledge or improve the effectiveness of existing products. Eligible institutions for the receipt of such payments include universities, medical organizations owned by universities, scientific research organizations, charitable research hospitals, and basic research grant-making institutions.

Figure 2

Calculation of Qualified Research RDC Amount for a Hypothetical California Firm

(Dollars in Thousands)

Step 1: Identify Current-Year Qualified R&D Expenses	
Employee wages	$9,000
Cost of supplies	11,000
Rental and lease costs	1,000
Contract expenses (65 percent)[a]	3,500
R&D expenses	$24,500
Step 2: Calculate Base-Period Percentage	
1984-1988 gross receipts	$70,000
1984-1988 RDC expenses	9,500
R&D expenses as a percent of gross receipts[b]	13.6%
Step 3: Calculate R&D Base Amount	
Average annual gross receipts for 1998-2001	$143,750
Apply base-period percentage	13.6%
Base amount[c]	$19,509
Step 4: Calculate RDC	
Qualified R&D expenses ($24,500) over base amount ($19,509)	$4,991
Apply RDC percentage	15.0%
RDC amount	$749

[a] Assumes eligible contract expenses are 65 percent of total contract costs.

[b] Not to exceed 16 percent.

[c] Must be at least 50 percent of current year's R&D expenses.

Calculating the Base Percentage and the Base Amount. For the regular RDC, the *base percentage* is equal to qualified research expenses as a percent of gross receipts for at least three years during the period 1984 through 1988 (Step 2)—but not to exceed 16 percent. This base percentage is then multiplied by the firm's average gross receipts for the four years just prior to the current year in order to determine the *base amount* (Step 3). This amount, however, cannot be less than 50 percent of the current year's qualified expenses.

This base-amount calculation process represents an attempt to measure the firm's historical level of R&D expenses, and then adjust it to account for the firm's current revenue situation. The calculated base amount is then used to determine the amount of R&D spending the firm must exceed in a given year in order to be eligible for the regular credit. (A similar—but somewhat more generous—base-amount calculation is conducted in order to determine eligibility for the larger basic research RDC.)

Start-up firms—defined as those businesses that had fewer than three taxable years between 1984 and 1988, and had both gross receipts and qualified R&D expenses during this period—have special rules for the determination of the base amount. For these firms, the base amount is 3 percent of gross receipts for the first five years during which the firm has R&D expenses. For subsequent years, the base percentage relates to the firms' actual R&D expense ratio.

Calculating the Credit. For the regular RDC, the tax credit amount is equal to 15 percent of the excess of qualified R&D expenditures during the current year over the calculated base amount (Step 4). For the basic research RDC, the tax credit amount is 24 percent of the excess of current-year basic research expenses over the calculated base-period amount. (This credit must then be reduced to the extent that the taxpayer deducts for tax purposes a portion of R&D expenditures.)

In addition, an alternative credit is available to taxpayers upon election. This alternative credit (for both the qualified research RDC and the basic research RDC) is equal to a percentage (ranging from 1.49 percent to 2.48 percent) of a firm's qualified research expenses in excess of its average gross receipts for the previous four years.

Example of RDC Impacts on the Taxpayer and State Revenues

State Tax Liability. Based on the example presented above in Figure 2, the RDC's impact on state tax liabilities is illustrated in Figure 3. (This example assumes that the firm has no tax deductions for various R&D expenses and is not obligated to take the reduced R&D credit.) As indicated in Figure 3, without the RDC the hypothetical firm would have a state tax liability of $486,000. Assuming the firm has eligible R&D expenses that exceed the determined base amount, as shown in the example, the firm's state tax liability would be reduced to zero. In addition, since the firm's RDC exceeds its tax liability, a portion of the credit (in this case, $263,000) would be available to carry forward for use in future tax years.

Figure 3

California Corporate Tax Liability for a Hypothetical California Firm

(In Thousands)

Revenues	$150,000
Costs	
R&D expenses	24,500
Capital expenditures/depreciation	75,000
Other costs	45,000
Subtotal, Costs	($144,500)
Taxable income	$5,500
Precredit state corporate tax liability[a]	486
RDC credit[b]	749
Total state corporate tax liability	—
RDC available for carry-over	$263

[a] Based on corporation tax rate of 8.84 percent.

[b] From Figure 2 calculation. Assumes that there is no requirement to take the reduced credit.

State and Federal Tax Interactions. It is important for California policymakers to be aware that the revenue loss to the state resulting from the RDC overstates the net tax savings for the firm claiming the credit. This occurs because state taxes are deductible when computing federal taxable income. Consequently, when state taxes decrease due to the RDC, federal taxable income will increase, resulting in a higher federal tax liability. As shown in Figure 4, the hypothetical California firm we are using as an illustration would realize net total state and federal tax savings of $321,000 by using the RDC, even though the cost to the state in terms of revenue losses would be $486,000. This is because the $486,000 state tax reduction is partially offset by a $165,000 federal tax increase, due to the decline in deductible state taxes. Put another way, some of what the state loses in revenue in order to provide the credit ends up as increased revenue to the federal government.

Figure 4

California and Federal Corporate Tax Liabilities for a Hypothetical California Firm[a]

(In Thousands)

State and Federal Tax Liability Without RDC	
State taxable income	$5,500
State tax liability without RDC	486
Federal taxable income	5,014
Federal tax liability[b]	1,705
Total corporate tax liability	$2,191
State and Federal Tax Liability With RDC	
State taxable income	$5,500
State tax liability with RDC	—
Federal taxable income	5,500
Federal tax liability[b]	1,870
Total corporate tax liability	$1,870
Net Value to Firm of RDC	
Decreased state taxes	-$486
Additional federal taxes	165
Reduced taxes for firm	-$321

[a] Does not incorporate impacts of federal research and experimentation credit.

[b] Federal corporate tax liabilities are based on marginal tax rates ranging from 15 percent to 39 percent, depending upon income.

TAX POLICY ISSUES REGARDING THE RDC

A broadly targeted tax program such as the RDC raises important policy issues for legislators. In theory, there are legitimate arguments both in favor of, and opposed to, the RDC. These issues and the empirical evidence associated with them warrant careful consideration and review since the program—in a relative sense—results in higher tax burdens on those firms that cannot avail themselves of the tax credit than on those firms that can. (For example, in order to maintain the same level of revenue that is collected with the credit as would be raised without it, non-RDC eligible firms must pay more. Similarly, if the RDC were eliminated, taxes paid by non-RDC eligible firms could decline.) Given this, it is important to determine how much return the program produces in terms of achieving its desired objectives, and whether it does so in the most cost-efficient manner possible.

General Argument for R&D Incentives

The general argument for incentives to encourage R&D spending—including tax credits of various types—is well-established in the economic literature and familiar to many policymakers. The underlying theory is that R&D spending possesses some of the same characteristics as does a public good—such as "spillover benefits"—and in addition suffers from significant investment uncertainty. Because of these factors, economic analysts hypothesize that absent some form of nonmarket inducement to increase expenditures in R&D, the activity will suffer from under-investment.

The term spillover benefits—also known as positive externalities—refers to the notion that benefits from a firm's R&D activities are not restricted solely to that firm. Rather, consumers and other firms that did not invest in the project will benefit from these investments as well. These benefits can take such forms as knowledge, new products and technologies, reduced consumer prices, and increased productivity for other firms. Economic research has found empirical evidence that R&D spillover effects do occur, most notably through improvements in productivity—a key driving force behind increases in per-capita income and economic growth generally.

The existence of spillover benefits implies that the return from an investment in R&D can be greater for society overall (inclusive of the return to the investing firm) than that which accrues just to the investing firm itself. If this occurs, under-investment will result since the firm will engage in R&D spending only to the point where it no longer receives a net benefit, even though additional investment would still benefit society as a whole. As evidence of this, the social rate of return has been estimated in certain areas of R&D to be, at the margin, substantially in excess of the private rate of return. Since firms do not invest enough in such projects, R&D investment, in a social sense, will often be too low. By reducing the cost of R&D activities to firms, tax credit proponents argue that government can encourage greater investment in R&D, thereby causing R&D activities to more closely approximate the socially optimal level.

Arguments Supporting the California RDC

While the existence of spillover effects represents the basis for the principal argument for an R&D credit at the federal level, the arguments for a state-level R&D credit are somewhat different, although in some respects they build from the same general justification.

Social Benefits Exceed Private Benefits. This argument builds directly from the above-noted general argument for an R&D credit but applies it to the state level. Those who take this point of view suggest that while some of the benefits from California's RDC are likely to occur outside of the state, a large portion of the RDC benefits are localized and will thus accrue to the state. Proponents note that the geographic clustering of R&D activity can result in the "capturing" of these benefits and localizing the spillover effects. In addition, some view the federal credit as insufficient, and believe that an additional state credit is necessary to reach the socially appropriate R&D spending level.

Encouragement of Specific Economic Activity. A second major argument proponents offer in favor of R&D tax credits is the more general claim that tax credits promote economic activity in particularly beneficial sectors. Supporters of state-level tax credits maintain that R&D activities result in high-paying, high-value-added employment and are thus worthy of public subsidies. They argue that the jobs that are created through the RDC result in a high multiplier effect on consumption spending within the state. Proponents also argue that California's RDC and similar credits encourage businesses to locate within a state by lowering the overall rate of taxation and increasing the firms' rate of return.

Business Costs and Business Climate. Another major argument offered by some RDC proponents is based on the view that California is a high-cost state in which to conduct business and that the R&D credit is an appropriate means through which to lower overall costs. For this reason—and because other states have similar tax incentives—RDC supporters believe California should not only adopt particular economic development measures that result in reduced tax liabilities for certain types of firms, but also enact high-profile indicators of a friendly tax climate—such as the RDC. They say the RDC thus allows California to compete with other states for R&D and related types of economic activity.

Arguments Against the RDC

Tax Credits Inefficient. Although there is broad consensus that government encouragement of R&D investment is warranted based on the existence of spillover benefits, there are criticisms of the tax credit as a means of addressing this issue. Tax incentives, no matter how carefully designed, will generally result in awarding tax benefits for at least some investment that would have occurred anyway, thus diluting any incentive benefit. Critics of tax credits argue that appropriate levels of R&D activity can be generated through more efficient mechanisms, such as through direct government action or explicit and highly targeted subsidies.

Spillover Effects Not Localized. A second criticism is that state-level subsidization of R&D activities is difficult to justify because spillover effects cannot be confined to within a state. This argument is not a general one against R&D tax credits per se, but rather a criticism of the enactment of these policies at the state and local levels. Because of the "openness" of the national and world economies, these critics argue that a large portion—or in some cases even a majority—of the spillover benefits are likely to accrue outside of California. California would then be in the position of subsidizing the economies of other states and possibly even other nations.

California's Credit Too High. An additional concern that has been raised by some is that the amount of the RDC subsidy—particularly in California—is too high. Critics of the program argue that given the size of the subsidy, too much R&D may be produced, resulting in a misallocation of resources and lower economic output for the state than what would occur without the credit. This could occur if, in responding to tax-based incentives, firms ignore other investment opportunities with higher actual economic returns.

State Credits Not Effective. Finally, some opponents argue that due to the presence of a federal credit, state credits of this type have less impact on investment. Those raising this issue maintain that diminishing marginal returns to investment in R&D means that the net benefits from the additional research prompted by state tax credits may be quite small.

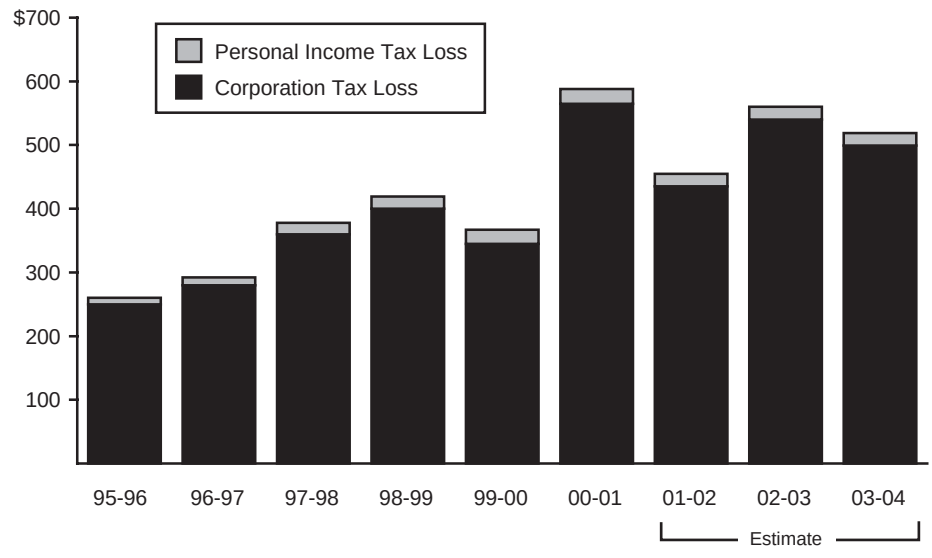
USE OF THE RDC BY BUSINESSES

Direct Revenue Impact of the RDC

The RDC is one of the most significant tax programs in the state in terms of the amount of foregone revenues from the PIT and the CT. Figure 5 indicates the magnitude of the RDC-related revenue losses that have been incurred by the state over the past few years. These estimates are based on *direct* revenue reductions from RDC claims, which may be partially offset by *indirect* revenue increases due to the additional economic activity generated by the credit. The Department of Finance (DOF) has estimated in the past that the indirect effect of the RDC is approximately 10 percent—that is, for every $100 of direct revenue loss, a partially offsetting $10 of revenues is generated from induced economic activity. The direct revenue impact is estimated to have increased from $455 million in 2001 02 to an estimated $560 million in 2002 03, before decreasing to $519 million in 2003 04. Assuming a 10 percent indirect revenue impact, the net revenue loss to the state in 2003 04 would be approximately $467 million.

Figure 5

The RDC Results in Substantial Revenue Losses

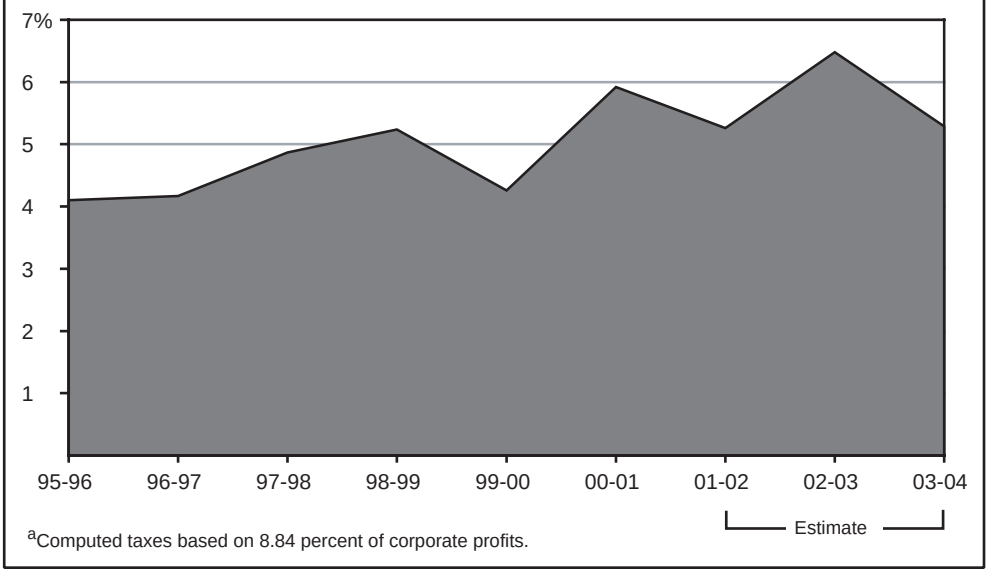


These foregone revenues due to R&D credit claims under the CT are projected to be about 5.3 percent of estimated total CT revenues in 2003 04, representing a decrease from the 6.5 percent estimated for 2002 03 and a substantial increase from the roughly 4 percent share that prevailed prior to 2000-01. The generally increasing trend in the RDC share of CT revenues shown in Figure 6 is due in part to the combined effects of the increase in the credit rate and the relatively stagnant CT revenue base. The RDC claims under the PIT are a relatively minor share of overall credit claims and represent a very small portion of PIT revenues (less than 0.1 percent).

Figure 6

RDC Revenue Losses Have Generally Increased Over Time

Revenue Loss As a Percent of Corporation Tax Revenues[a]



[a]Computed taxes based on 8.84 percent of corporate profits.

RDC Claims by Sector and Industry

The use of the RDC by CT taxpayers is concentrated in particular sectors, as shown in Figure 7. For 2001, the largest *dollar* amount of RDC claims is concentrated in the electrical and electronics equipment sector (including computer equipment and related industries), which accounts for almost 40 percent of the total dollar value of credits. However, the largest *number* of tax returns with RDC claims is in the "other nonmanufacturing" category, which represents about 43 percent of these returns. More detailed information regarding the distribution of RDC claims by industry sector—available for income year 2000 but not 2001—is presented in Appendix C.

Figure 7

RDC Returns and Claims Are Distributed Differently by Industry

2001 Income Year [a]
(Dollars in Thousands)

Industry	Tax Returns With RDC Claims		Amount of RDC Claimed	
	Number	Percent of Total	Value	Percent of Total
Food and kindred products	15	0.9%	$700	0.2%
Chemical and allied products	36	2.3	9,200	2.2
Pharmaceuticals	45	2.8	56,900	13.4
Electrical and electronic equipment	371	23.2	165,700	39.0
Other manufacturing	435	27.3	80,800	19.0
Other nonmanufacturing	694	43.5	111,700	26.3
Totals	**1,596**	**100.0%**	**$425,000**	**100.0%**

[a] Reflects RDC claims under the CT, but excludes claims under the PIT for which classification by industry is not readily available.

Estimated Unused RDCs

Since RDCs may be carried over indefinitely, there is a large stock of unused RDCs that may be claimed in future tax years. As of tax year 2001, there were in excess of $5 billion in unclaimed RDCs. Over 50 percent of the value of these credits was attributable to the electrical and electronic equipment sector, with other manufacturing and pharmaceuticals industries accounting for about 10 percent each. The budgetary significance of these RDC carryovers is that if the RDC were eliminated or restricted, significant revenue benefits may not be apparent until well after the tax policy change.

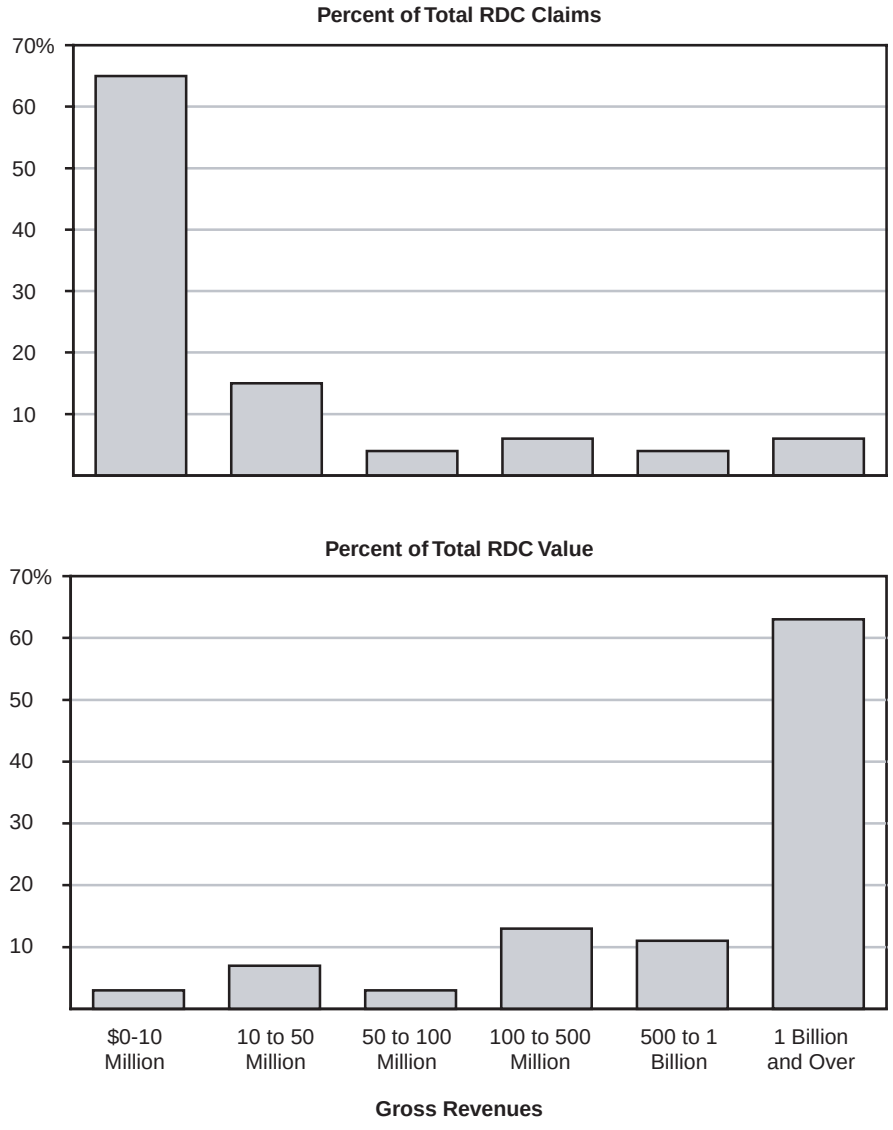
RDC Claims by Size of Firm

Most tax returns with RDC claims are filed by small- and medium-sized businesses, as measured in terms of their gross revenues. As shown in Figure 8, over 60 percent of returns with RDC claims are filed by businesses with gross revenues of under $1 million. In terms of the actual dollar value of RDCs claimed, however, over 60 percent is attributable to large businesses (those with gross revenues in excess of $1 billion). These data suggest that most of the benefit of the credit accrues to large business concerns, although such data do not give any indication of the relative importance of the RDC to large or small businesses, including how it affects their financial performance and profitability.

Figure 8

Distribution of RDC Usage Varies by Business Size[a]

(2001)



[a]Includes only RDCs claimed by firms filing CT returns.

Measuring the Impacts and Effectiveness of the RDC

In evaluating the impacts and effectiveness of RDCs, economists have focused on estimating the amount by which investment has increased as a result of the tax credit (and have generally ignored any spillover benefits stemming from such investment). A one-to-one ratio of reduced tax revenue to induced investment is thought to represent a meaningful effectiveness threshold, based on the assumptions that: (1) a $1 increase in investment in response to a $1 tax credit suggests that the tax credit may be more cost-effective than a well-structured direct R&D subsidy and (2) due to the potential existence of social benefits from such investment in R&D, the ratio implies that the tax credit will result in positive total net benefits.

It should be noted, however, that meeting the minimum benefit/cost ratio threshold does not necessarily indicate that an R&D tax subsidy is the best policy for the state to undertake. Numerous other tax and spending programs may also meet and/or exceed this minimum threshold; however, there may be inadequate funding available to support them all. Thus, ideally, the return to an R&D subsidy program should be assessed and then compared with the return to these various other taxation and spending programs in order to ensure that programs with the best return (or highest priority) are funded first.

Impact of the Federal Credit

A number of research studies have provided estimates of the amount of investment induced by the federal research and experimentation credit (REC). Although most of the original studies that were conducted in the early 1980s found the credit to have minimal impact, more recent studies suggest that $1 of tax credit induces at least $1 in additional R&D investment (with some studies indicating a response in excess of $1.50). Appendix D lists the results of selected analyses of the investment impacts of the federal REC. It is generally thought that the more recent studies of the impact of the federal credit have resulted in more accurate estimates due to the following factors:

- ***Methodological Advances.*** These include improvements to quantitative study methods as well as the incorporation of structural economic changes.

- ***Data Improvements.*** These involve longer observation periods, greater use of sampling, and more extensive and complete sources of information.

Despite advances in study methodologies and data, however, there remain several issues and problems with respect to the validity of currently available research findings on the REC. These include:

- ***Firm-Level Data.*** Researchers typically cannot obtain firm-specific data regarding tax status due to privacy concerns, and consequently must rely on estimates.

- ***Expenditure Data.*** *Total* R&D expenditures as opposed to *qualified* R&D spending are sometimes used, meaning that studies could result in measuring the impact of the credit on *all* R&D expenditures, not just those qualifying for the credit.

- ***Labeling Issues.*** The R&D expenses may be structured or "labeled" so as to qualify for the credit without actually changing spending patterns, resulting in overestimation of the impact of the credit.

In addition to studies on the federal REC, there have been a number of studies based on other countries' tax credits. On average, these studies have found that $1 of tax credits generates slightly less than $1 of additional investment (implying that the credit essentially offsets funds that would otherwise be devoted to R&D). Some economists argue that direct subsidies could therefore be more likely to result in more investment in research and development than credits produce. This would, of course, depend on the appropriate targeting of the direct subsidy. This alternative is discussed in Appendix E.

Impact of State Credits

We are not aware of significant or conclusive studies on the impact of state-level R&D tax credits. As discussed previously, the major arguments against a state-level R&D credit are (1) the inefficiency and low marginal impact of state tax credits and (2) the migration or leakage of spillover benefits to other states and potentially other countries.

Inefficiencies and Marginal Returns. Tax credits from R&D can be inefficient to the extent that at least some of the credit will go towards investment that would have occurred anyway. The existence of diminishing marginal returns (or a decrease in the return with each incremental dollar of investment) to investment in R&D means that benefits from additional research prompted by the state credit will be less than the benefits that occur as a result of the preexisting federal credit. As a result, the research that indicates that the federal credit may result in at least one additional dollar of research for every dollar in tax credits may not be applicable in the case of state credits. And, to the extent that the return to the federal program is less than one-to-one, any state program would *likely* be even *less* effective (absent compensating spillover benefits).

Spillover Benefits. Regarding the second issue above, spillover benefits are likely to occur from R&D investment resulting from the RDC, but it is unclear how much of this would occur in California versus outside of the state. While some suggest that such spillover benefits are most significant in geographic areas in which research is conducted, there is no conclusive evidence with regard to the degree of localized benefits, nor is there any indication as to what the appropriate R&D subsidy might be to induce R&D investment up to an optimal level. To the extent that the benefits of R&D spending accrue outside of the state, this would argue for an expanded *federal* role as opposed to state-level credits. Nevertheless, it is at least possible that the localized spillover effects could result in a state

receiving net benefits from both research and growth in economic activity as a result of the RDC.

Assessing the Net Impacts of a State Credit. The above two major issues regarding state-level R&D credits could have quite different implications for state tax policy. On the one hand, the presence of a state credit would tend to have a relatively lower benefit in terms of additional research than the federal credit, provided that the incremental impact of this type of tax policy is declining. This would suggest that the effectiveness of a state credit would be less than that indicated by the federal credit. On the other hand, to the extent that localized spillover benefits are induced by state-level incentives, these would tend to argue in favor of California's RDC. Unfortunately, very little is currently known regarding the exact dynamics of these factors or their relative magnitudes.

CONCLUSIONS

Key Findings

Our principal findings from reviewing California's RDC are as follows:

- Many economists and other analysts believe that private R&D spending is too low from a social perspective and thus requires public financial support to reach the appropriate level. This under-investment is due to the likely presence of beneficial spillovers as well as the financial uncertainties associated with R&D spending.

- Research regarding the federal R&D credit generally indicates that every $1 in credit induces additional research of around $1 or more. Overall, it is probable that state-level credits, including California's RDC, are less effective than those at the federal level. Thus, the RDC's effectiveness relative to other means of encouraging additional R&D investment (such as through direct expenditures or grants) is still uncertain.

- Very little is known about what the appropriate level is for the RDC, including whether the state's current credit rate is too high or too low. This uncertainty is due largely to the inherent difficulties associated with measuring the public and private benefits of the additional research induced by the RDC compared to alternative uses of funds.

Given the above, we recommend that the Legislature not expand the RDC unless convincing evidence is found indicating that this is warranted. Furthermore, we recommend that the Legislature consider reducing the credit or phasing it out over time, especially given the substantial direct revenue losses associated with the program and the state's current budgetary position.

Alternatives for Further Study

In our report on the state's manufacturers' investment credit (MIC), we identified several options regarding additional study, if the Legislature chose to pursue issues regarding the impact of the tax credit program. (See Legislative Analyst's Office, *An Overview of California's Manufacturers' Investment Credit,* October 2002.) Generally, these same approaches might be used in further investigating the impacts of the RDC as well.

Should the Legislature wish to pursue further specific investigation into the effects of the RDC, there are several different options, each with its own set of advantages and disadvantages. With each of the approaches, attempts would have to be made to separate the effect of the RDC from other factors that have an effect on economic activity. Such independent measurement of the RDC's impact is essential in estimating its effectiveness. In many cases, a particular approach would require the collection and analysis of substantial amounts of data. Possible data collection options would include voluntary filings by individual firms or collection of investment and other data by the California Franchise Tax Board in conjunction with businesses' tax filings.

The principal approaches we believe are alternative options to studying the impact of R&D and other tax incentives are:

- ***Survey Methodology.*** This approach involves surveying executives regarding business investment decisions. The principal advantages are that it: (1) provides *direct* information regarding important factors in investment decision making and (2) avoids the complex statistical assumptions that plague data-intensive analysis. The disadvantages of this approach include: (1) the difficulty in locating the individual(s) responsible for firm-specific site location or investment decisions, (2) the quality and completeness of responses, and (3) the lack of precise measures of the impact of the various factors influencing investment decisions.

- ***Case Study Technique.*** This approach examines the effect of specific tax incentives on individual firms. The principal advantage of this method is that it allows the investigative technique to be tailored to specific economic situations and the unique circumstances of individual firms. The major drawback of this approach is that it is difficult to separate other factors in assessing the effects of any incentive measure. In addition, there are the added issues of establishing a basis of comparison for assessing the tax incentive's effect and the difficulty in applying any specific findings to more general circumstances.

- ***"Hypothetical Firm" Methodology.*** Under this technique, hypothetical firms of varying sizes, profitability, and industry characteristics are "created" and "placed" in particular geographic locations. Models are then constructed to replicate operating ratios, balance sheets, income, and tax statements for these "make believe" firms. Through these means, the effect of state and local taxes on a firm's performance can be calculated. Although this method measures directly

the impact on profit of state and local taxes, it does not measure the incentive effect of changes in state and local taxes on firms' expansion and location decisions.

- ***Econometric Approach.*** This approach represents an attempt to distinguish the impact of nontax factors from tax-related factors. If data are available and the model is appropriately constructed, the tax impacts can be isolated from the effect of other factors. Unfortunately, suitable data are frequently neither available nor easily producible, and properly specifying appropriate models can be a difficult undertaking. This means that construction of a model that is sufficiently robust and complex to reliably measure changes in investment activity due to tax policies, especially if they are small or variable, can be an expensive and time-consuming activity.

- ***Computable General Equilibrium (CGE) Modeling.*** The use of CGE modeling incorporates many of the estimation techniques and methodologies of the econometric approach, and therefore suffers from many of the same data concerns and modeling issues. However, the CGE approach does have the advantage of being able to specify (either based on empirical information or assumptions) structural relationships and interactions between and among economic variables in the model. The DOF has such a model that it uses for dynamic estimates of tax law changes, which may be suitable as a means of looking at the effect of various tax incentives. The committee may wish to discuss with DOF the potential use of this model to analyze the impact of the RDC.

APPENDIX A

R&D CREDITS AT THE FEDERAL LEVEL AND IN OTHER STATES

The Federal Research and Experimentation Tax Credit

The California RDC is modeled after the federal research and experimentation credit (REC), which was first introduced as part of the 1981 federal tax reform changes. Set to expire in 1986 but subsequently extended, the REC was initially equal to 25 percent of qualified research and experimentation (R&E) expenses in excess of the average R&E expenses over the previous three years. The credit has been altered and extended a number of times, but has never been made permanent. Some of the most notable past changes were:

- In 1986, the regular credit was reduced to 20 percent, and the definition of qualified research expenditure was narrowed. In addition, a 20 percent basic research credit was established, and both credits were extended for two years.

- In 1988, businesses using the credit were required to reduce research expense deductions by 50 percent of the credit. In addition, the way in which the credit was calculated was changed from a floating average to a fixed-base percentage of the years 1984 through 1988. (This step was intended to prevent the incentive effect of the tax credit from diminishing over time as firms' R&E expenditures increased.) The credit was also extended through 1990.

- In 1989, the percentage by which businesses using the credit were required to reduce research expense deductions was increased to 100 percent.

- In 1990, the credit was extended for one year.

- In 1991, the credit was extended for one year.

- In 1992, the credit expired.

- In 1993, the credit was restored and made retroactive for 1992 expenses.

- In 1995, the credit expired.

- In 1996, the credit was reinstated for one year.

- In 1997, the credit expired.

- In 1998, the credit was restored and made retroactive for 1997 expenses.

- In 1999, the credit was extended for five years.

There have been numerous proposals by Congress to make the credit permanent—including in the most recent budget—although none have been successful.

The Federal and California Research Credits Compared

Although the California credit is based on the federal credit, there are a number of significant differences:

- The California credit is permanent and can only be claimed for research done in-state.
- The rates of the regular credit, the basic research credit, and the alternative incremental credit all differ between the federal and state programs.
- The definition of gross receipts used to calculate the base amount is different. In California, gross receipts pertain only to those sales within the state, as opposed to all sales (see discussion below).
- Federal tax law does not recognize hospitals run by public universities and certain cancer facilities as qualified organizations for the basic research credit, while California does.

California's Credit Can Be Greater Than the Federal Credit. Businesses can receive a larger tax *credit* from the California RDC than from the federal REC because of the differing definitions of gross receipts, despite the fact that the federal credit *rate* is larger than California's credit rate. For example, a firm that does all of its R&D research in California, but sells its end product throughout the United States, will have a lower base amount under California's tax credit due to less gross receipts. California's method of calculating base amounts provides an incentive for nationwide firms to locate their R&D facilities in California.

State-Level R&D Tax Credits

There has been a considerable increase in the number of states offering R&D credits over the past 20 years. Currently, a total of 31 states (including California) have R&D credits, while only nine states offered such credits in 1977. Of the 31 states, all but Hawaii calculates the credit in the same manner as California. (Hawaii has eliminated the requirement that expenses exceed a certain amount, and instead offers a credit equal to 20 percent of all qualified research expenses.) Only a few states offer the alternative incremental credit or the basic research credit.

In 1999, the latest date for which information is available, California led the nation in research and development expenditures ($47.9 billion), accounting for approximately 20 percent of research and development activities in the United States. California ranked eighth nationally in terms of research and development expenditures as a proportion of gross state product (GSP). Figure A-1 displays the top ten states, each in absolute R&D expenditures and expenditures as a proportion of GSP.

Figure A-1

Research and Development Expenditures Data for Selected States

1999
(Dollars in Billions)

State	R&D Amount	Share of U.S. Total		Share of GSP[a]		R&D Tax Credit Rate and Other Information
		Percent	Rank	Percent	Rank	
California	$47.9	20.7%	1	3.9%	8	15 percent over base amount.
Michigan	18.8	8.1	2	6.1	2	No R&D tax credit.
New York	14.1	6.1	3	1.9	25	9 percent of new research equipment purchases.
Texas	12.4	5.4	4	1.8	26	Established in 2002.
Massachusetts	12.2	5.3	5	4.6	4	10 percent over base amount.
Pennsylvania	10.7	4.6	6	2.8	14	10 percent over base amount.
New Jersey	10.5	4.5	7	3.2	12	10 percent over base amount.
Illinois	9.7	4.2	8	2.2	21	6.5 percent over base amount.
Washington	8.3	3.6	9	4.0	7	No corporate income tax.
Maryland	8.1	3.5	10	4.6	5	10 percent over base amount plus 3 percent.
New Mexico	3.3	1.4	19	6.4	1	4 percent of research expenses.
District of Columbia	2.5	1.1	23	4.5	6	No R&D tax credit.
Rhode Island	1.6	0.7	28	5.1	3	5 percent over base amount.
Delaware	1.3	0.6	31	3.9	9	10 percent over base amount.
Idaho	1.3	0.6	32	3.9	10	5 percent of total plus 5 percent over base amount.

[a] Gross State Product.

APPENDIX B

PERSPECTIVES OF INDUSTRY

Tax Credits in General

We held several meetings with various business representatives regarding their use of the RDC and other credits. The major points regarding tax incentives in general that were raised by industry representatives apply to both the manufacturers' investment credit (MIC) and the RDC. These comments were incorporated in the previously cited LAO report on the MIC and are repeated here.

Role of the Credits in Investment Decisions. Industry representatives stated that the credits do have an impact on investment decisions. Several companies incorporate the credits into their cost models. One firm noted that although they look at the tax ramifications of the credits, they do not quantify the marginal benefit of the credits themselves. Another firm indicated that their view is that credits help their "bottom line," suggesting that rather than act as an "incentive" they instead serve as a "reward."

Unitary Returns. California generally requires a member of a group of two or more related corporations to file a combined return. A combined or unitary return means that a corporation's taxable income is determined by adding all of its units' revenues and costs together. However, the RDC can only be applied to that unit which purchased the equipment or incurred the expenses qualifying for the credit. Industry noted that this limits the amount of the RDC that can be used. For instance, the credits could not be used to offset a firm's tax liability if the particular unit that purchased the equipment or incurred the expenses was unprofitable, even though the corporation as a whole had positive taxable income.

Availability Only for Profitable Firms. Due to the nature of tax credits, they can only be used when a firm has a tax liability. In any year a firm is not profitable, the credits go unused. In addition, since a firm's tax liability cannot fall below the AMT, firms with many deductions and credits may not be able to utilize the credits in their entirety.

Particulars of the RDC

General Comments. In general, industry's perception of the RDC was that it is a vital tool for economic development in the state and has become increasingly important for high technology firms as a means of offsetting high costs of doing business in the state. Companies appear to vary in their approach to the RDC in terms of investment planning. Many explicitly model the credit into their rate-of-return calculations, while a few took a more qualitative approach to site and investment planning.

Administrative Issues. Industry representatives indicated that compliance and administrative issues were much less problematic for the RDC than other tax programs, such as the MIC. The credit's qualification requirements and calculations are relatively straightforward and clear. In terms of auditing, since the federal government audits the similar federal REC, the additional costs imposed on taxpayers by the state for this function are viewed as being relatively minor.

"Monetizing" R&D Credits. Since the RDC can only be claimed by firms that have tax liabilities in a particular year, the credit is typically not immediately useable for start-up firms. Some analysts have suggested different means by which credits such as the RDC could be available to benefit start-up firms and thus provide an additional source of capital for them.

One such alternative is to turn the RDC into a refundable credit, whereby an actual tax liability would not be necessary in order to receive the benefit of the program. A second alternative would be to allow the "sale" of unused credits between firms. By these means, firms with R&D expenses (but with no tax liability) could sell their credits to other firms with tax liabilities. This latter program has been initiated on a limited basis in the State of New Jersey.

Appendix C

Detail on RDC Claims by Industry

Additional detail on the use of the RDC by industry is provided in Figure C-1. The data indicate the high concentration of the credit in computers and electronic equipment areas. The data presented in Figure C-1 are for income year 2000 and are more detailed than the data in Figure 7 of the text for 2001; however, more recent data at this level of detail are not currently available.

Figure C-1

RDC Activity by Industry[a]

2000 Income Year
(Dollars in Thousands)

Industry	Amount of RDC Claims	Percent of Total RDC Claims Amount
Manufacturing		
Computers	$245,295	43.3%
Electronic equipment	76,376	13.5
Chemicals	52,580	9.3
Transportation equipment	10,164	1.8
Machinery	3,740	0.7
Fabricated material	2,041	0.4
Petroleum refining	2,786	0.5
Paper	1,617	0.3
Other manufacturing	82,822	14.6
Subtotals	($479,100)	(84.6%)
Services		
Computer services	$40,378	7.1%
Scientific and technical services	9,822	1.7
Architectural and engineering services	4,361	0.8
Medical and diagnostic labs	1,283	0.2
Outpatient care centers	1,025	0.2
Subtotals	($57,344)	(10.1%)
Information	($11,328)	(2.0%)
Finance, Insurance, and Real Estate		
Loan brokers	$7,347	1.3%
Credit unions	1,051	0.2
Subtotals	($9,602)	(1.7%)
Trade		
Wholesale trade (durables)	$3,594	0.6%
Subtotals	($5,680)	(1.0%)
Non-Bank Holding Companies	$1,794	0.3%
Agriculture, Forestry, and Fishing	$852	0.2%
Construction	$328	0.1%
Transportation and Utilities	$221	—
Mining	$210	—
Totals	**$566,459**	**100.0%**

[a] RDC claims under the CT.

APPENDIX D

RESULTS OF TAX CREDIT IMPACTS

General and Business Taxes

Estimates of the impact of taxes on economic activity show broad variations by study, as shown in Figure D-1. For example, the median estimate for increased manufacturing investment given a 10 percent decline in *general* taxes (such as personal income taxes, and sales and use taxes) was 3 percent. Similarly, the median estimate for increased manufacturing investment given a 10 percent decline in *business* taxes (such as corporate income taxes and business license taxes) was 2 percent. In theory, since the effect of various taxes should be reflected to a greater or lesser extent in a firm's costs, the impact of reductions in general and business taxes should be somewhat similar.

The following figure summarizes the various results from these studies, grouping them by economic indicator:

Figure D-1

Evidence From Recent Studies

Change in Economic Activity Due to 10 Percent Decline in General Taxes

Economic Indicator	Number of Studies	Median Change	Change Range
Total employment	6	5.8%	0 to 8.5%
Manufacturing	13	1.0	-0.5 to 15.4
Investment in manufacturing	6	3.0	-5.4 to 10.2
Gross state product	12	0.7	-2.7 to 8.8
Manufacturing plant start-ups	3	1.8	0 to 4.0

Change in Economic Activity Due to 10 Percent Decline in Business Taxes

Economic Indicator	Number of Studies	Median Change	Change Range
Total employment	3	1.1%	0 to 1.6%
Manufacturing	2	NA	0 to 2.6
Investment in manufacturing	7	2.0	1.0 to 3.6
Gross state product	1	1.4	NA
Manufacturing plant start-ups	19	2.0	-6.0 to 15.7

[a] NA=Not available.

Impacts of R&D Credits

A number of studies have been conducted on the impact of the R&D credit at the federal level. As shown in Figure D-2, the results from the earlier studies indicate a much lower investment response to the credit than more recent studies. This has been interpreted as being largely due to improvements in data collections and study methodologies, with the general view being that the more recent studies are probably the most accurate.

Figure D-2

Selected Results of Research on the Effects of R&D Tax Credits

Author and Study Date	Time Coverage of Study	General Methodology	Positive or Negative Aspects	Estimate Regarding Additional Investment Per Dollar of Credit
Mansfield (1986)	1981-1983	Firm surveys.	Short observation period. Survey problems.	$.30 to $.60
U.S. General Accounting Office (1989)	1981-1985	Firm-level, time-series data.	Short observation period. Effects of other factors not controlled for.	.15 to .36
Baily & Lawrence (1987,1991)	1982-1989	Industry-level, time-series data.	Industry-level data assumes all firms are eligible for the credit.	1.30
Tillinger (1991)	1981-1985	Firm-level, cross-sectional, time-series data.	Short observation period and limited number of firms. Measurement bias.	.08 to .42
Berger (1993)	1982-1985	Firm-level, cross-sectional, time-series data.	Measurement bias, but includes large number of variables and a long observation period.	1.74
Hines (1993)	1984-1989	Firm-level data, comparing pre-1986 activity to post-1986 activity.	Small sample size, limited to multinational firms.	1.30 to 2.00
Hall (1993)	1981-1991	Firm-level, time-series data.	Tax price filters out non-credit influences on R&D spending.	2.00

APPENDIX E

TAX CREDITS AND DIRECT SUBSIDIES

Critics of R&D credits contend that direct subsidies can have a more effective impact on research and development activity than tax credits. Direct subsidization can theoretically result in an additional $1 of research for each $1 of subsidy (if properly structured). However, some economists challenge this notion and suggest that direct subsidization can "crowd out" private capital which would have otherwise funded the research, or result in windfalls to researchers in the form of higher salaries. Thus, the results may be that each dollar of direct subsidy does not necessarily result in one dollar of additional research.

An additional argument offered by some in favor of direct subsidies is that they more adequately address the problem of underinvestment than do tax credits. Underinvestment most likely occurs in situations where the disparity between private and social benefits is greatest. Since many if not most companies will choose to invest in R&D activities that result in the greatest private benefits, regardless of the social benefits involved, the tax credit potentially encourages at least some—and perhaps many—projects that have few additional social benefits to offer. In contrast, subsidies can be directed by policymakers towards projects whose social benefits are believed to be considerably larger than the private benefits. The caveat to this is that—given the difficulties associated with quantifying social benefits—projects that receive funding may not necessarily be those with the greatest net benefit.

The general consensus among economists is that it is currently not possible to empirically estimate which method—direct subsidy or tax credit—results in a greater investment per government dollar expended. The Federal Office of Technology Assessment (OTA) has concluded that the tax credit and direct subsidies are different types of policy instruments that serve different policy goals. The OTA argues that tax credits are an effective tool to increase private spending in the research area, while direct subsidies are needed to fix particular instances of underinvestment, such as in basic research.

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This report was prepared by Mark A. Ibele and reviewed by Jon David Vasche. The Legislative's Analyst Office (LAO) is a nonpartisan office which provides fiscal and policy information and advice to the Legislature.

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