June 8, 1999

MEMORANDUM FOR GENE SPERLING

FROM: TOM KALIL AND LISA GREEN

RE: PRE-MEETING WITH JOHN DOERR

Summary: You are having a brief (15 minute) meeting with John Doerr and Wade Randlett (TechNet political director) to discuss getting the high-tech community more engaged in (1) new markets; and (2) closing the skills gap. You should know that Doerr is over-committed, and that what we really want is some suggestions for how to get more high-tech companies engaged in these initiatives, some realistic sense of how much work he could personally devote to this, and an agreement to have a follow-up phone conversation.

- **Doerr's current involvement**: Doerr is on the Board of Advisors of Silicon Valley Community Ventures – whose mission is to use "business formation and free enterprise to stimulate job creation in low income neighborhoods." This organization makes loans and equity investments to small businesses in low-income neighborhoods, and also provides mentoring and other services. This is very much like a "New Markets Venture Capital Firm." **Rep. Zoe Lofgren from California** is a member of the board. (See attached information for full list of board members and more background).

Other high-tech activity: Another venture capitalist, Tim Draper, has worked with HUD to set up a venture capital firm (Zone Ventures) that will target investments in high-tech start-ups in South-Central and East Los Angeles. In exchange for the investment, companies must locate in the empowerment zone and must hire workers who live in the zone once the business starts growing. HUD is providing $25 million – they are trying to raise an equal amount from the private sector.

Suggested talking points on skills gap

- During the H1-B debate, we were in the odd posture of trying to deny that the skills gap was as bad as industry thought it was. I would like to view the skills gap as an opportunity, and a validation of the Clinton-Gore "investing in people" agenda.

- I think it would be great to have the President or the Vice President joining forces with the high-tech community to "train American workers first." The message would be – Al Gore and the high-tech industry want more Americans to be able to compete for high-tech jobs that pay 70 percent than the private sector average. I know that many leading companies are already doing a lot – but we obviously need to be doing more.

- Some specific thoughts we had include:

- A partnership with 25-50 **minority-serving institutions** (e.g. HBCUs, Hispanic Serving Institutions, Tribal Colleges) – with the private sector providing equipment donations, adjunct faculty and other support to increase the number of minorities working in high-tech fields. [Another idea is providing minority scholarships and support for minorities to take AP courses.]

- Scaling successful pilots with **community colleges** to train more American workers – with the private sector providing curriculum development, skills standards, faculty development, and equipment.

- Identifying a set of **"best practices"** to train American workers first – such as Section 127 "worker scholarships," internally advertising positions, investing at least 4 percent of payroll in worker training, etc.

- Supporting our efforts to recruit and retain **K-12 math and science teachers** by providing scholarships, summer employment, and teaching them to use technology effectively.

Suggested talking points on new markets

- As you may know, the President is launching a New Markets Initiative which will involve incentives and tax credits for investment in underserved and economically distressed communities through venture capital type funds.

- Your involvement in the **Silicon Valley Community Ventures** is exactly the type of business partnership that we want to encourage companies throughout the country to create.

- The President will be taking a trip in July to highlight the New Markets Initiative and I want to enlist your ideas and thoughts for what we can do to involve the high-tech community in this trip and in the broader initiative. Some of the specific ideas that we had include:

    - Mentoring and working with rural companies on **e-commerce**. For example, IBM and AOL are talking with us about promoting e-commerce in Indian Reservations.

    - Working in collaboration with low-income communities to establish more **Community Technology Centers**.

    - Developing software that could be as compelling as a video-game but would teach teenagers in low-income communities the skills they need to set up their own small business.

    - Working with us to craft the "New Markets Venture Capital Firm" and other proposals so that they will be attractive to investors.

June 8, 1999

MEMORANDUM FOR JOHN PODESTA, GENE SPERLING, DAVID BEIER

FROM: TOM KALIL

RE: MEETING WITH SILICON VALLEY EXECS

Summary: On Thursday, you are scheduled to meet with John Doerr and other Silicon Valley executives. They are likely to raise three issues: R&E credit, accounting issues, and Y2K liability reform. Sara Rosen-Wartell is preparing a separate memo on Y2K liability reform, this memo deals with the R&E credit and accounting issues.

You should also know that TechNet has been helpful in supporting the Administration's "Information Technology for the 21st Century" proposal – a $366 million increase in long-term IT research. Doerr and 35 other senior executives have signed a letter urging the Congress to provide full funding. Sensenbrenner has introduced legislation on the House side which is reasonably consistent with the Administration's proposal.

Meeting participants

- John Doerr, Kleiner Perkins
- David Ellington, NetNoir (provider of black content on Internet)
- Marc Andreesen, Chief Technology Officer, AOL (developed Mosaic – first graphical Web browser, as a student.)
- Wade Randlett (Political Director, TechNet)
- David Hayden, Chairman, CriticalPath (company provides outsourced services like e-mail).
- Ted Roth, President, Alliance Pharmaceuticals (company makes oxygen-carrying liquid drugs)
- Neil Weintraut, General Partner, 21st Century Internet Venture Partners (venture capitalist)
- Paul Lippe, Senior VP, Synopsis (software for chip design)

Secretary Daley (per Cheri Carter)	Jim Kelly, CEO UPS Labor intends to be involved in outreach for New Markets. Washington, DC	**770-828-6619** Attending 6/11 mtg. w/ Podesta & Sperling Sperling sent letter 5/19.	
	Jack Greenberg, CEO McDonald's Labor and Treasury intend to be involved in outreach for New Markets. Oak Brook, IL	**708-575-3000** Attending 6/11 mtg. w/ Podesta & Sperling	
	Ben Rosen, CEO Compaq Computers New York, NY	**212-687-5115** Attending 6/11 mtg. w/ Podesta & Sperling	
	Michael Dell, CEO Dell Computers Austin, TX	**512-338-4400** Attending 6/11 mtg. w/ Podesta & Sperling	
	Lewis Platt,CEO Hewlett Packard Palo Alto, CA	**650-857-4021** Sperling sent letter 6/4. Attending 6/11 mtg. w/ Podesta & Sperling	
	Lou Gerstner, CEO IBM Aramonk, NY	**914-499-4711** Attending 6/11 mtg. w/ Podesta & Sperling	
	Ronald Skates, CEO Data General Corporation Massachusetts	**508-898-6401** Attending 6/11 mtg. w/ Podesta & Sperling	

NEW MARKETS JULY TRIP
HI-TECH COMMUNITY

Priority	Company	Last Name	First Name	Phone	Washington Contact	DC Phone	DC Fax
	Adobe Systems	Warnock	John				
A-1	American Business Council	Rogstad	Barry				
	Autodesk	Bartz	Carol				
	Bentley Systems	Bentley	Greg				
	Corel Corporation	Cowpland	Michael				
A-1	Data General Corporation	Skates	Ronald	508-898-6401			
	Filemaker	Goupil	Dominque				
A-2	Intel	Grove	Andy	408-765-8080			
	Intuit	Harris	Bill				
	Kleiner Perkins, Caufield & Byers	Doerr	John	650-233-3353			
	Lotus Development	Papows	Jeff				
	Microsoft	Gates	Bill				
A-2	NCR Corporation	Nyberg	Lars	937-445-1575			
	Network Associates	Larson	Bill				
	Novell, Inc	Schmidt	Eric				
A-2	SGI	Belluzzo	Richard				
A-2	Sun Microsystems	McNealy	Scott	650-960-1300			
	Sybase	Chen	John				
	Symantec Corporation	Eubanks	Gordon				
A-2	Unisys	Weinbach	Lawrence	215-986-5612			
	Visio Corporation	Jaech	Jeremy				

Meeting with CoS and Silicon Valley Reps.
TBD
11:00am -- 11:45am, Thursday, June 10, 1999

Staff Contact: Tom Kalil and Lisa Green

Event:

You will participate in a meeting with the Chief of Staff and John Doerr and a small number of Silicon Valley Reps to discuss R&D tax credits.

Attachments:

A. Research Tax Credit Guidance from Talisman

B. Meeting with Silicon Valley Execs - Briefing Memo from Tom Kalil

C. Recent Articles:
- "Pooling's End Won't Clobber M&A Activity," WSJ, 6/9/99
- "The Earnings Illusion," Fortune Magazine, 5/26/99

D. Economic Benefits of the R&D Tax Credit – Explanation of the section 41 Research Credit - Coopers & Lybrand Tax Policy

A

RESEARCH TAX CREDIT

Question: Why is the Administration proposing an extension of the research credit?

Answer:

- The Administration consistently has supported the research tax credit.

- The Administration recognizes the importance of technology to our national ability to compete in the global marketplace. The research tax credit is one tool that could be useful in supporting and fostering American technology.

- The President's FY 2000 budget includes a one-year extension of the research tax credit.

- Although revenue constraints allowed only a one-year extension in the budget, we continue to believe that for the research tax credit to be most effective, it should be made permanent, to provide taxpayers with greater certainty in making long-range business plans. We will continue to work with Congress to provide for permanent extension.

Background:

The Administration's FY 1994 budget included a proposal to extend the research tax credit permanently. However, the Omnibus Budget Reconciliation Act of 1993 included a temporary extension through June 30, 1995. The Small Business Job Protection Act of 1996 extended the research tax credit for 11 months -- i.e., for the period July 1, 1996 through May 31, 1997. It did not reinstate the credit retroactively, so there was a one year gap when the credit was not in effect.

The Administration's FY 1997 budget supported an extension of the credit and offered to work with Congress to find ways to pay for it. The FY 1998 budget contained a one-year extension, from June 1, 1997, through May 31, 1998. The 1997 tax act extended the credit 13 months, through June 30, 1998. The FY 1999 budget proposed, and Congress enacted, a one-year extension of the credit through June 30, 1999.

Question: Why is the Administration proposing an extension of the research credit to Puerto Rico?

Answer:

- Current law provides an incentive for companies to conduct research in the United States, which is defined to exclude Puerto Rico for this purpose. The Administration believes that the resulting disincentive to conduct research in Puerto Rico is inappropriate. Research conducted in Puerto Rico, like research conducted elsewhere in the United States, should be supported and encouraged as a tool to improve our national ability to compete in the global marketplace.

Question: What is the focus of the proposed research credit regulations issued earlier this year?

Answer:

- The proposed regulations seek to define the scope of the activities that constitute qualified research. Most important, the proposed regulations elaborate on the requirement that the taxpayer undertake expenditures for the purpose of discovering information that is technological in nature. The proposed regulations provide that the taxpayer must seek to obtain knowledge that exceeds, expands or refines the common knowledge of skilled professionals in the particular field of science or technology. The test set forth in the proposed regulations is consistent with the legislative history of the 1986 Act that narrowed the scope of qualified research, and last year's legislative history reaffirming the scope of the discovery requirement. The proposed regulations clarify that the discovery requirement does not mean that the taxpayer must actually succeed in achieving the discovery, that the desired advance must be revolutionary, or that the taxpayer must in every circumstance be the first person to discover the information.

Office of Tax Policy
January 28, 1999

DISCUSSION OUTLINE
PROPOSED R&E CREDIT REGULATIONS

November 19, 1998

I. Background

- Section 41 provides a tax credit for increasing qualified R&E expenses
- Enacted in 1981 as a temporary credit and regularly extended since 1981
- In 1986, Congress tightened the definition of qualified research. Congress expressed concern that, in practice, taxpayers had applied the existing definition (expenses qualifying under section 174) too broadly and some taxpayers had claimed the credit for virtually any expense relating to product development.
- It has increasingly come to our attention that some taxpayers are abusing the credit
- In February, 1997, we announced that we were working on proposed regulations involving the credit.
- In November, 1997 we began publicly discussing the parameters of the definition of qualified research (the critical portion being called the "Discovery Test")
- In June, 1998 the Tax Court decided the Norwest Corp case including strong support for Treasury's version of the Discovery Test. (The decision reinforced the United Stationers decision in October, 1997, a District Court opinion.)
- On June 30, 1998, section 41 expired
- In October, 1998, section 41 was extended to June 30, 1999 retroactively to July 1, 1998 (*i.e.*, no gap). The legislative history to the extenders package included some discussion of the Discovery Test.

II Definition of qualified research

- Section 41(d) contains a three part test: research (1) which would qualify as research expenses as defined in section 174, (2) "which is undertaken for the purpose of discovering information -- (i) which is technological in nature, and (ii) ... which is intended to be useful in ... a new or improved business component of the taxpayer" (the "Discovery Test"), and (3) substantially all of the activities of which constitute elements of a process of experimentation.
- Treasury's view of the Discovery Test – the taxpayer must intend to discover information that is not within the common knowledge of skilled professionals in the relevant scientific or technological field
- The Norwest view of the Discovery Test – the taxpayer must expand or refine the principles of the hard sciences. (Arguably a more difficult test than Treasury's view.)
- Some taxpayers believe there is no Discovery Test. They argue that the second requirement is merely a technological activities test.

III Taxpayer favorable clarifications in proposed regulations

- Evolutionary advances are OK
- Actual discovery is not required (*i.e.*, failure is OK)
- An advance can qualify even though another taxpayer has previously discovered the information so long as the earlier discovery is not within the common knowledge (*e.g.*, the other taxpayer is maintaining the information as a trade secret)

TITLE I. EXTENSION AND MODIFICATION OF CERTAIN EXPIRING PROVISIONS

Subtitle A – Tax Provisions

A. Extension of Research Tax Credit
(sec. 101 of the House bill,[1] sec. 101 of S. 2622, and sec. 41 of the Code)

Present Law

Section 41 provides for a research tax credit equal to 20 percent of the amount by which a taxpayer's qualified research expenditures for a taxable year exceeded its base amount for that year. The research tax credit expired and generally does not apply to amounts paid or incurred after June 30, 1998.

Except for certain university basic research payments made by corporations, the research tax credit applies only to the extent that the taxpayer's qualified research expenditures for the current taxable year exceed its base amount. The base amount for the current year generally is computed by multiplying the taxpayer's "fixed-base percentage" by the average amount of the taxpayer's gross receipts for the four preceding years. If a taxpayer both incurred qualified research expenditures and had gross receipts during each of at least three years from 1984 through 1988, then its "fixed-base percentage" is the ratio that its total qualified research expenditures for the 1984-1988 period bears to its total gross receipts for that period (subject to a maximum ratio of .16). All other taxpayers (so-called "start-up firms") are assigned a fixed-base percentage of 3 percent.

Taxpayers are allowed to elect an alternative incremental research credit regime. If a taxpayer elects to be subject to this alternative regime, the taxpayer is assigned a three-tiered fixed-base percentage (that is lower than the fixed-base percentage otherwise applicable under present law) and the credit rate likewise is reduced. Under the alternative credit regime, a credit rate of 1.65 percent applies to the extent that a taxpayer's current-year research expenses exceed a base amount computed by using a fixed-base percentage of 1 percent (i.e., the base amount equals 1 percent of the taxpayer's average gross receipts for the four preceding years) but do not exceed a base amount computed by using a fixed-base percentage of 1.5 percent. A credit rate of 2.2 percent applies to the extent that a taxpayer's current-year research expenses exceed a base amount computed by using a fixed-base percentage of 1.5 percent but do not exceed a base amount computed by using a fixed-base percentage of 2 percent. A credit rate of 2.75 percent applies to the extent that a taxpayer's current-year research expenses exceed a base amount computed by using a fixed-base percentage of 2 percent. An election to be subject to this

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[1] All references to the "House bill" are to H.R. 4738, as passed by the House of Representatives on October 12, 1998.

alternative incremental credit regime may be made for any taxable year beginning after June 30, 1996, and such an election applies to that taxable year and all subsequent years (in the event that the credit subsequently is extended by Congress) unless revoked with the consent of the Secretary of the Treasury.

House Bill

The House bill extends the research tax credit for 18 months--i.e., generally, for the period July 1, 1998, through December 31, 1999.

Effective date.--The extension of the research credit is effective for qualified research expenditures paid or incurred during the period July 1, 1998, through December 31, 1999.

Senate Amendment

No provision. However, S. 2622, as introduced by Senators Roth and Moynihan, contains a provision that is similar to the provision contained in the House bill. S. 2622 extends the research tax credit for 12 months--i.e., generally, for the period July 1, 1998, through June 30, 1999.

Effective date.--The extension of the research credit is effective for qualified research expenditures paid or incurred during the period July 1, 1998, through June 30, 1999.

Conference Agreement

The conference agreement follows S. 2622 and extends the research credit for 12 months–i.e., generally, for the period July 1, 1998, through June 30, 1999.

In extending the credit, the conferees wish to reaffirm the scope of the term "qualified research." Section 41 targets the credit to research which is undertaken for the purpose of discovering information which is technological in nature and the application of which is intended to be useful in the development of a new or improved business component of the taxpayer. However, eligibility for the credit does not require that the research be successful-- *i.e.*, the research need not achieve its desired result. Moreover, evolutionary research activities intended to improve functionality, performance, reliability, or quality are eligible for the credit, as are research activities intended to achieve a result that has already been achieved by other persons but is not yet within the common knowledge (*e.g.*, freely available to the general public) of the field (provided that the research otherwise meets the requirements of section 41, including not being excluded by subsection (d)(4)).

Activities constitute a process of experimentation, as required for credit eligibility, if they involve evaluation of more than one alternative to achieve a result where the means of achieving the result are uncertain at the outset, even if the taxpayer knows at the outset that it may be technically possible to achieve the result. Thus, even though a researcher may know of a particular method of achieving an outcome, the use of the process of experimentation to effect a new or better method of achieving that outcome may be eligible for the credit (provided that the research otherwise meets the requirements of section 41, including not being excluded by subsection (d)(4)).

Lastly, the conferees observe the lack of clarity in the interpretation of the distinction between internal-use software, the costs of which may be eligible for the credit if additional tests are met, and other software. The conferees emphasize that application of the definition of internal-use software should fully reflect Congressional intent.

Effective date.–The extension of the research credit is effective for qualified research expenditures paid or incurred during the period July 1, 1998, through June 30, 1999.

June 8, 1999

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- Paul Lippe, Senior VP, Synopsis (software for chip design)

Research and Experimentation tax credit

- This incentive provides a 20 percent tax credit based on the increase in a firm's research and development compared to a base period.

- The R&E credit is scheduled to expire on June 30th, 1999. The Administration has proposed extending it for one year at a cost of $2.2 billion.

- High-tech companies argue that extending it one year at a time diminishes its effectiveness, since they can't plan on it and R&D is inherently long-term in nature. The credit lapsed in 1996 and was not retroactively extended.

- If companies can not make it permanent, they would at least like to see it extended for a longer period of time. Representative Archer has indicated that he will try to extend it for at least 5 years – in the context of a broader tax package.

- The Administration originally proposed making the credit permanent in 1993. However, following the failure of that effort, the Administration switched to proposing 1-year extensions, or to voicing general support for the credit and indicating a willingness to work with the Congress to find the offsets needed to pay for an extension.

Talking points:

- The Administration is a long-time supporter of the R&E credit – in fact, we proposed making it permanent in 1993.

- We think the credit is important to stimulate private sector investment in R&D – which will boost U.S. productivity and international competitiveness and create new industries.

- We are open to a longer extension of the credit – as long as the Administration and the Congress can agree on a fiscally responsible way to pay for it.

Accounting issues

- The Financial Accounting Standards Board (FASB), which is an independent private sector organization, is proposing to make a series of accounting changes that many high-tech companies oppose. You will recall that early in the Administration, the high-tech community launched a major campaign to fight a FASB decision on the accounting treatment of stock options.

- TechNet may not ask for anything specific at this meeting, they will probably just want to put this issue on our radar screen. They have a separate meeting with people from Levitt's office.

High-tech companies are particularly concerned about the following issues:

- **Pooling of interests**: Currently, companies have the option of putting a company that they acquire on their books at historical value as opposed to its current market value. FASB thinks that everyone should have to use the purchase method, which requires companies to put the assets and liabilities of the acquired company on their books at "fair" (current market value). High-tech companies don't like this because they have to amortize "goodwill" (difference between purchase price and tangible assets) – which depresses future earnings.

- **In-process R&D**: Companies have been writing off a large percentage of the acquisition cost of companies as "in-process R&D." By writing off a large percentage of the purchase price immediately, they can prevent a future drag on earnings that would occur if they had to amortize newly acquired assets. FASB thinks that this practice of writing it off should be ended.

- **Stock option repricing**: Companies want to be able to reprice stock options when the strike price their employees have is "underwater." Imagine that Tom has been given options with a strike price of $20, but the stock price of the company drops to $10, making his options worthless. If a company wants to reprice Tom's stock options – FASB thinks that this should be accounted for as a higher compensation expense.

<u>Reasons not to intervene</u>

- FASB is supposed to be independent.

- Good accounting leads to better investment decisions and transparent financial markets.

- FASB (and SEC) are convinced that some of these changes (eliminating pooling) are needed for international harmonization.

- Even business press (*Fortune*) and papers like *San Jose Mercury News* have supported FASB and criticized high-tech accounting practices. Some high-tech companies have clearly abused these rules – in some cases – trying to write off 100 percent of the purchase price of a company as "in process R&D."

- If acquisitions are sound economically and financially – they will still go forward.

<u>Reasons to intervene</u>

- Companies claim that changing the accounting rules will slow down innovation. Small high-tech companies are often purchased by bigger companies – and this is the "exit strategy" of venture capitalists. FASB's proposals will slow this down.

- Current accounting rules don't adequately recognize "intangibles" like R&D and intellectual property and R&D – why is FASB trying to fix some things and not others? Why not slow down and take a comprehensive look at high-tech accounting issues?

Suggested talking points

- We understand that you are meeting with people from Chairman Levitt's office this afternoon on this issue.

- We understand your concerns – but we do think there is a value to having an independent private sector led process for setting accounting standards that investors have confidence in. We don't think that having Congress try to set accounting standards is a good idea.

- We'd be happy to meet with you to understand your concerns in greater detail.

Pooling's End Won't Clobber M&A Activity

By ELIZABETH MACDONALD
Staff Reporter of THE WALL STREET JOURNAL

For months now, highly paid investment bankers have been wringing their hands over the prospect that a merger-accounting rule change will put the brakes on the merger-and-acquisition boom.

Don't bet on it.

Despite rumblings that the elimination of favorable accounting treatment for all-stock deals will bring a halt to mergers across the board, a new study by Goldman Sachs Group Inc. pinpoints the industries that may really suffer, those that will get pinched a bit and those that will escape unscathed.

The good news: There aren't that many that will be clobbered.

In one of the most thorough reviews of the matter to date, Goldman Sachs cites four industries that are likely to experience a merger drought after the rule change takes effect, as expected, Jan. 1, 2001: health-care information technology, medical devices, precious metals and advertising. The study, overseen by accounting guru Gabrielle Napolitano, is based on a survey of 60 Goldman stock analysts.

Another eight sectors could face a temporary merger slowdown: banking, brokerage firms, computer software, information-technology servicing, paper and forest products, tobacco, cosmetics and household products, and waste management.

Why these sectors? Acquisitive companies in these industries have relied heavily on so-called poolings of interest, the soon-to-be-eliminated all-stock accounting method. This is partly because many of these companies' stock prices have been so high that they have preferred using their stock as currency to complete deals.

Pooling, which has helped fuel the merger boom of the 1990s, showing up recently in the Citicorp/Travelers Group and Exxon/Mobil deals, clearly has a tremendous appeal to merging companies. In a pooling, companies simply add together their balance sheets and, presto, avoid sizable profit charges from goodwill, which is the premium paid for a company over and above its book value. Under the alternative method, so-called purchase accounting, goodwill must be written off over a 40-year period.

Many of the companies in these sectors have sizable goodwill already sitting on their books. In another change, accounting regulators want to cut the write-off period for goodwill to 20 years, hurting reported profits even more.

Given the potential size of goodwill charges, Goldman thinks companies in these sectors may not be in the marrying mood once pooling vanishes. This is true even though there recently has been a trend on Wall Street in which analysts value companies on the basis of their

Please Turn to Page C13, Column 4

Continued From Page C1

"cash earnings," which excludes the impact of goodwill charges to earnings. But for the time being, Ms. Napolitano says, many analysts still don't value companies on a cash-earnings basis.

"These are the risky industries because analysts typically value these companies strictly on a reported earnings basis, and not cash earnings," says Ms. Napolitano.

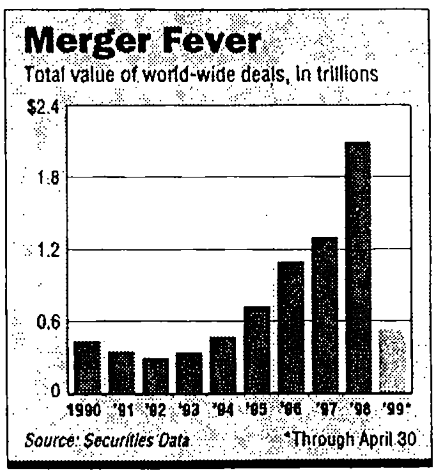
Robert Willens, a managing director at Lehman Brothers Inc., agrees. With cash earnings, price-to-earnings trading multiples and stock prices "will look much better than regular earnings per share once pooling gets killed," he says.

Another new study gives companies reason to worry about reported earnings once poolings die out. This one, by investment-banking firm Piper Jaffray of 8,677 deals completed between 1989 and 1997, shows that merged companies that used the pooling accounting method saw their reported earnings climb an average 21.1% in the 12 months after the deals were completed. That compares with 13.6% for mergers booked under purchase accounting, according to Daniel J. Donoghue, a managing director at Piper Jaffray who oversaw the study.

In turn, the poolers' stock prices beat the Standard & Poor's 500-stock index by 9.1% during the same period, while mergers that used purchase accounting saw their stock prices underperform the index by a negative 6.6%.

In light of all this, Ms. Napolitano, Mr. Willens and Rick Escherich, a managing director in J.P. Morgan's M&A group, expect a flurry of mergers in advance of pooling's demise. Notably, Goldman expects a run-up in deals in the biotechnology, brokerage and medical-devices sectors.

But in many other sectors, including automobiles, media and cable television, oil and gas, and personal computers, the death of pooling won't rustle a feather, Goldman says. Why? Because most companies in these sectors typically use cash to complete deals, and the stocks often are valued on a cash-earnings basis, Goldman says. And besides, these companies' expansion needs override the bookkeeping issues, Goldman says.



Pooling's End Won't Halt Mergers

April 26, 1999

SECTION: FEATURES/THE FORTUNE 5 HUNDRED; Pg. 206

LENGTH: 2594 words

HEADLINE: The Earnings Illusion;
Ever wonder why so many mergers make the CEO look like Superman? Odds are, it's not the strategic fit. It's the accounting.

BYLINE: Shawn Tully

BODY:

As much as any other single influence in the economy, merger mania was the force that shaped the FORTUNE 500 in 1998. And even if it seemed that certain CEOs had grown obsessed with empire building at the expense of their business--well, who could argue with the numbers? Deals seemed invariably to gussy up future earnings and add a particular gloss to that perennial touchstone of managerial excellence: return on equity.

Chance are, though, that those numbers are less the product of great synergies than of two sweetheart accounting provisions. Known as pooling of interests and write-offs for in-process research and development, these provisions have become wildly popular in the recent surge of deals. For example, in the early 1990s less than 5% of the deal volume (by dollars) used pooling-of-interests accounting. Last year pooling accounted for 55% of the volume, including deals by such giants of the FORTUNE 500 as Exxon (No. 4 in the 500), Citigroup (No. 7), BankAmerica (No. 11), SBC (No. 35), and McKesson (No. 59). Significantly, both pooling and in-process R&D write-offs are almost unheard of outside the U.S. Accounting standards in every other country either outlaw the provisions outright or severely restrict their use. Why? For the same reason that U.S. dealmakers find them so irresistible: By inflating reported earnings and covering up the true cost of an acquisition, they can make even a dog of a deal look brilliant.

It's important to remember that pooling and in-process R&D write-downs, like any accounting guidelines, are just rules for keeping score. They have absolutely no power over the real economics of a deal. They can't make a bad deal work or keep a good deal from paying off. But what they can do is frame how a merger is perceived, keep shareholders in the dark, and at the worst drive executives to gamble on dicey corporate couplings that they would never consider under stricter accounting standards.

None of this is any secret to accounting authorities. The Financial Accounting Standards Board, the industry body that sets the rules in the U.S., has already proposed axing in-process R&D write-offs, and it is leaning toward writing finis to pooling in as few as 20 months. (Those efforts are quite apart from the Securities and Exchange Commission's crackdown on other dubious accounting ploys; see Fortune Investor.) Not surprisingly, dealmakers are howling, particularly in financial services and technology, the two most enthusiastic users of the two loopholes. Chase, Citi, and J.P. Morgan, among others, have written urgent letters to the FASB on behalf of current standards. They say taking measures to tighten the rules will stifle innovation, lower American competitiveness, and bring the merger train to a screeching halt. And Dan Scheinman, general counsel of Cisco, waxes positively apocalyptic (in a California sort of way). "These measures," he says, "would disrupt the entire ecosystem of Silicon Valley."

To understand why they're so upset, flash back briefly to your college accounting course and to a basic principle of that science--namely, that the cost of an asset should be expensed over the asset's useful life. That idea works fine as long as the most important assets are things, like factories and equipment. In the knowledge economy, however, the old rules are about as practical as a smokestack in a chip fab. "The big wealth creation is shifting from factories to intellectual capital," says Baruch Lev, a professor at New York University's Stern School of Business. Today's most valuable assets are intangibles--brand names, customer lists, trademarks, research, and so on--to which it is hard to assign a specific value and useful life. Throwing up its hands, accounting regards these treasures as worth zero.

They're worth zero, that is, until someone pays for them. Then, suddenly, they must be accounted for at their purchase price. In a standard acquisition--known as a "purchase" transaction--the buyer is supposed to record a fair market value for everything it has bought, including intangibles. Since the market tends to consider a whole company as worth more than the sum of its parts, there's usually a gap between the company's purchase price and the value of all its assets. Accountants call this gap "goodwill." In theory, goodwill should equal the premium the buyer pays over and above the fair market value of all the acquired company's assets. In practice, however, acquirers seldom fix a value on the intangibles. Instead they appraise the tangible assets and dump everything else into goodwill.

That makes goodwill a critically important consideration in deals involving knowledge companies--especially infotechs and drugmakers--because virtually the entire purchase price of such companies shows up on the acquirer's books as goodwill. Accounting rules arbitrarily assign this catchall category a useful life that can be as long as 40 years. That means that the value of goodwill must be amortized--or written off--over that period. A dollar of amortization reduces reported earnings by a dollar. So a company that acquires a lot of goodwill is also acquiring a drag on future earnings.

That's where pooling of interests comes in. Under pooling, companies simply combine their existing assets at their historical cost. Most intangibles remain valued at zero. The bulk of what the acquirer has to amortize are the target's physical assets--which, in New Economy companies, represent a tiny fraction of the purchase price.

In short, most of the cost of acquiring a knowledge-based company simply vaporizes in a pooling merger. The buyer gets to report the earnings from the intangible assets it just bought, but it doesn't have to amortize any of the cost. That keeps reported earnings high. And the surviving company's balance sheet disguises evidence of the merger by minimizing growth in its base of assets. So compared to deals using purchase accounting, the return on equity looks as if it's on steroids.

Consider how pooling has paid off for one of the hungriest acquirers in the FORTUNE 500, BankAmerica CEO Hugh McColl. As the head of NationsBank, McColl concluded two megadeals last year, first purchasing Barnett Banks for $ 13.7 billion, then devouring BankAmerica for $ 42 billion and adopting its marquee name. Accounting consultant Jack Ciesielski notes that McColl paid a total of $ 55 billion in stock for the two acquisitions, $ 30 billion over the estimated fair market value of the assets purchased.

Thanks to pooling, BankAmerica's earnings per share can now grow unimpeded by the amortization of $ 30 billion in goodwill. Ciesielski estimates that had BA used traditional purchase accounting, amortization would have cut its projected 1999 earnings per share by 11%, from $ 4.65 to $ 4.16. Purchase accounting would also require BA to add that $ 30 billion to the balance sheet. The combination of higher equity and lower earnings would drop BA's return on equity in 1999 from a respectable 17% to 9.1%. Says Ciesielski: "BankAmerica is burying over half of the deals' equity cost."

Appealing as pooling may be, not every would-be dealmaker can use it. The method is forbidden, for example, if an acquirer is buying only part of another company, or if either party has been heavily purchasing its own shares. As a result, in Silicon Valley, where companies frequently swap businesses and buy back shares to mitigate options dilution, dealmakers often have no choice but to use purchase accounting.

Not to worry, though. For technology acquirers, the write-off for in-process R&D is almost as good as pooling in its magical effect on post-merger earnings and balance sheets. This peculiar provision requires buyers of companies with heavy research and development costs--basically any infotech or medical-technology company--to write off immediately the estimated value of products still in development. Why? Because it's impossible to predict whether the "in-process" R&D will lead to revenue-generating merchandise like software or a heart drug. So the prudent path, according to accounting standards, is to consider these projects nonassets and delete them from the balance sheet.

Nonsense, says Lev. "The acquirer is paying a real arm's-length price for the R&D," he points out. "It's expecting a stream of earnings from it. So not to consider the acquired R&D project an asset is unrealistic."

Unrealistic or not, R&D write-offs have been a boon to Cisco Systems, No. 192 in the FORTUNE 500. In the past 30 months, Cisco has bought 15 companies under purchase accounting for a total of $ 1.9 billion, while managing to write off no less than $ 1.5 billion of the purchases, or 80% of the cost. That's a lot of goodwill Cisco doesn't have to amortize against earnings. Cisco replies that it buys so many companies and takes so many R&D write-offs that its reported earnings would actually be higher without them. "The write-downs are the conservative, proper way to account for R&D," says Dennis Powell, Cisco's controller. "The outcome of any R&D investment is uncertain."

But where is the risk, really? Wall Street tends to ignore the earnings hits caused by R&D write-offs, as it does most one-time charges. But if the acquired research works out, Cisco gets full credit for the profits without having to amortize the cost of developing the product. "Cisco gets the earnings stream without the baggage of the assets," explains James Abate, a portfolio manager with Credit Suisse Asset Management.

What irks the authorities most about R&D abuse is its sheer brazenness. "Companies are being far too aggressive," says Edmund Jenkins, FASB's chairman. An acquirer can assign exaggerated values to in-process R&D projects and then write off the entire cost of an acquisition. It's a bizarre paradox, since the whole idea is that the outcome of R&D is so uncertain that it doesn't even rate as an asset. To stop the abuse, FASB has announced a preliminary plan to end in-process write-offs next year. The new rule would force companies to put in-process R&D on the books and expense it as the revenues from the research bear fruit.

In June, FASB will also present its official position on pooling. The board is almost certain to recommend that all acquisitions be accounted for under the traditional purchase method. Though FASB must still weigh the fierce complaints from banking and tech, the final decision is strictly up to its seven-member board. The odds favor reform, if only because one of FASB's main missions is harmonizing U.S. accounting with practices in other countries.

To be sure, limiting dealmakers to purchase accounting doesn't solve accounting's failure to keep up with the knowledge economy. Under the proposed FASB reforms, for example, reported earnings would go from cosmetically enhanced to understated. Still, getting rid of pooling and in-process R&D write-downs would have two major advantages. First, the entire acquisition price would sit on the buyer's books. If the merger fails, management has nowhere to hide. "Purchase leaves a trail that shows if the deal succeeds or flops," says Ciesielski. Managers would have to show that they're generating robust returns on the entire purchase price, not just the paltry assets they put on the books.

Second, companies would have to provide far richer details on their earning power. FASB wants companies to itemize and value all the intangibles and amortize them over the periods in which they actually earn money, instead of lumping them into goodwill. That alone would make reported earnings far more useful. And goodwill would become a specific number--the premium the acquirer paid over the target's stock price before the offer. But there's one drawback: If the merger is thriving, there's no reason to expense goodwill. With synergies lifting earnings, the goodwill should either stay the same or grow.

The ideal solution would be to leave goodwill on the books and write it down only if the merger fails, something FASB doesn't trust companies to do. But investors can crunch the numbers themselves. All you have to do is add back the amortization on assets that hold their value, including goodwill, in a successful deal. With once invisible assets like patents and brands clearly valued, mining the right figures would be far easier than it is today.

One thing is sure. Companies wouldn't want analysts to focus on the suddenly shrunken earnings per share they would have to report under FASB's proposed rule changes. They would start to steer analysts to cash-based earnings figures that do a better job reflecting performance in a knowledge economy. That would certainly be an ironic consequence of accounting reform: The great distorters of financial statements might end up showing Wall Street the way.

BOX STORY:

How Pooling Beautifies BankAmerica's Earnings

Using pooling of interests in the Barnett deal allows BankAmerica to report higher EPS and ROE than under purchase accounting.

ACCOUNTING METHOD	EARNINGS PER SHARE 1999	RETURN ON EQUITY 1999
POOLING	$ 4.65	17.0%
PURCHASE	$ 4.16	9.1%

OVERSTATEMENT 12% 87%

FORTUNE TABLE

BOX STORY:

THE OPTIONS DODGE

Even if FASB eliminates pooling and the write-off of in-process R&D, companies will get to keep another cherished loophole, the scandalously easy treatment of stock options. The similarity is striking. By minimizing the cost of acquisitions, pooling tempts CEOs to overpay for trophy acquisitions. And because companies don't have to expense options grants at all, options accounting encourages directors and managers to overpay their CEOs and other brass. Of course, options are not really free: They cost shareholders plenty by diluting earnings. Accounting expert Jack Ciesielski collected data showing what earnings for the 500's largest members would have been, had the companies subtracted the true cost of their options grants from reported earnings. He found five companies where earnings would have been at least 5% lower. Properly valuing big options grants at Lucent, for example, would cut reported earnings by 16.7%. Nor is the options gap just a trademark of Silicon Valley. If you adjust for options costs, Du Pont's earnings would be overstated by 8.9%.

COMPANY	EARNINGS PER SHARE		OVER-
	As reported	Adjusted for options	STATEMENT
LUCENT	$ 0.42	$ 0.35	20.0%
KMART	$ 0.51	$ 0.45	13.3%
PEPSICO	$ 0.95	$ 0.85	11.7%
MORGAN STANLEY	$ 4.15	$ 3.79	9.5%
DU PONT	$ 2.08	$ 1.91	8.9%
MOTOROLA	$ 1.94	$ 1.83	6.0%

FORTUNE TABLE

If companies had to expense the value of options at the time of the grant, some FORTUNE 500 companies would feel the pinch.

GRAPHIC: COLOR ILLUSTRATION: ILLUSTRATION BY ISTVAN BANYAI, COLOR PHOTO: MARC ROYCE, FASB chief Edmund Jenkins: "Companies are being too aggressive."; COLOR PHOTO: MARC ROYCE, Baruch Lev: "Pooling of interests is a joke."

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Economic Benefits of the R&D Credit

The Coopers & Lybrand Tax Policy Economics Group explains the economic benefits of the section 41 research credit.

ECONOMIC BENEFITS OF THE R&D TAX CREDIT

====== FULL TEXT ======

[1] This study was prepared by John Wilkins, Jon Hakken, Hy Sanders, Bob Zuraski, Qiang Ma, and John Guyton of the Coopers & Lybrand Tax Policy Economics Group for the R&D Credit Coalition.

[2] According to the authors, this new study of the research and experimentation tax credit (commonly known as the "R&D credit") shows the credit's significant positive stimulus to U.S. investment, innovation, wage growth, consumption, and exports, all contributing to a stronger economy and a higher standard of living for American workers. The study reports new findings from the Coopers & Lybrand Dynamic Economic Model that highlight the beneficial macroeconomic impact and industry-specific productivity gains caused by the credit. The study concludes that the R&D tax credit is such a powerful incentive that it will ultimately pay for itself due to its impact on productivity gains and economic growth, which increase federal revenue. The principal findings of the study are as follows:

o Making the R&D credit permanent will stimulate additional R&D. Over the 1998-2010 period, U.S. companies would spend $41 billion more (in 1998 dollars) on R&D as a result of permanently extending the credit.

o Additional R&D spending raises productivity. Innovations from additional R&D investment would begin to increase productivity almost immediately, adding more than $13 billion a year to the economy's productive capacity by the year 2010.

o Increased productivity from additional R&D generates a 31 percent return. Additional output capacity from gains in productivity produces a 31 percent annualized rate of return to R&D -- more than twice the typical rate of return to investments in plant and equipment.

- o The R&D credit increases economic growth. Higher productivity stimulated by the R&D credit would cause the economy to produce nearly $58 billion more (in 1998 dollars) of goods and services during the 1998-2010 period, including $33 billion of additional domestic consumption, $3 billion of additional residential construction, $12 billion of additional business investment, and $10 billion of additional net exports.

- o The R&D credit benefits the entire economy. Gains in productivity are not limited to sectors where investments in R&D take place. The gains would spill over to all sectors of the economy -- to agriculture, mining, basic manufacturing, and high-tech services. Technological innovations improve productivity in industries that make innovations and in industries that make use of those innovations.

- o Increased productivity from additional R&D would provide U.S. workers with higher wages and families with more after-tax income. By facilitating the expansion of opportunities in high-tech industries, the R&D credit would directly promote high-wage employment. Moreover, by improving productivity throughout the economy, the credit would boost wages in low-tech as well as high-tech industries.

- o The R&D credit raises personal income. As a result of productivity gains, personal income over the 1998-2010 period would be $61 billion higher; by 2010, personal income would be $11 billion higher per year. The after-tax benefit of this increase in income to U.S. taxpayers is equivalent to a $5 billion tax cut over five years and a $25 billion tax cut over 10 years.

- o The R&D credit allows economic growth with more output per worker, helping to ease the financial strain on federal entitlement programs caused by the aging of the baby boomers. Productivity gains would allow greater output with more efficiency, which is essential to ensure a strong and growing economy as America grays and its workforce shrinks. Such gains will help resolve the looming financial strain on federal retirement and health care programs without large increases in payroll taxes or sharp reductions in benefits.

- o The R&D credit would ultimately pay for itself. A permanent R&D credit would be an excellent investment for the government to make because it would raise taxable incomes enough to more than pay for itself. In the long run, $1.75 of additional tax revenue (on a present value basis) would be generated for each $1 the government spends on the credit, creating a win-win situation for both taxpayers and the government.

o The R&D credit lowers costs and prices. Higher productivity tied to the R&D credit's availability would significantly lower industry production costs. The annual cost savings for manufacturing industries alone would be nearly $5 billion annually by 2010. Those savings would result in significantly lower U.S. producer prices and consumer costs, especially for pharmaceuticals, communications equipment, chemicals, aircraft, and computers.

o The R&D credit improves trade and international competition. Lower producer prices would make U.S. industries more competitive in world markets. Exports of goods and services would increase, thereby improving the overall balance of trade. By 2010, annual exports of manufactured goods would be more than $6 billion higher, while imports of manufactured goods would be nearly $3 billion lower.

[3] For a complete description of the Coopers & Lybrand Dynamic Economic Model, which was used to produce this study, see Joint Committee on Taxation publication, Joint Committee on Taxation Tax Modeling Project and 1997 Symposium Papers, November 20, 1997. For more information about this study, contact Mark Weinberger, Washington Counsel P.C., Washington, (202) 293-7474. Mr. Weinberger serves as counsel to the R&D Credit Coalition.

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by the Coopers & Lybrand
Tax Policy Economics Group

I. Introduction

[1] This study, prepared by Coopers & Lybrand L.L.P.'s Tax Policy Economics Group for the R&D Credit Coalition, examines the impact R&D investments have on the U.S. economy's performance and on our overall standard of living. To quantify these effects, the study utilizes the Coopers & Lybrand Dynamic Economic Model to show how the productivity gains induced by the Research and Experimentation tax credit (commonly known as the "R&D credit") are distributed among different industries. In particular, this analysis finds that the credit is responsible for a significant increase in U.S. R&D spending, innovation, wage growth, consumption, investment, and exports, all of which have beneficial implications for the economy's performance and for the standard of living of American workers. Importantly, the study also finds that the R&D tax credit is such a powerful incentive that it will ultimately pay for itself because additional tax revenues generated by a stronger economy will more than offset the credit's cost.

[2] The R&D tax credit is deliberately designed to be incremental to stimulate additional private sector R&D spending. R&D spending has long been recognized as a major source of productivity gains. In enacting the credit and extending it eight times since 1981, Congress and prior administrations have recognized the efficacy of this policy because the R&D credit's benefits extend far beyond any particular company or industry undertaking the research. From an economywide perspective, businesses would ordinarily underinvest in R&D if the credit were not available because they would consider only their own economic benefits when deciding whether to pursue a particular course of research, ignoring the greater benefits that accrue to the economy. Indeed, this study shows that more than half of all economic benefits from R&D spending do not accrue to the specific sector undertaking the spending. Because of that dynamic, absent the R&D credit, the marketplace, which normally dictates the correct allocation of resources among different economic activities, would fail to capture the extensive spillover benefits of R&D spending that raise productivity, lower prices, and improve international trade for all sectors of the economy.

[3] As a direct result of permanently extending the R&D credit, U.S. companies would spend $41 billion more on R&D (in 1998 dollars) than they would in the absence of the credit during the 13- year period, 1998-2010. This additional R&D spending would result in inventions and innovations that would raise productivity and growth throughout the economy. More than $58 billion (in 1998 dollars) would be added to the

economy's production of goods and services during that same 13-year period. Of that amount, $33 billion dollars would represent increased domestic consumption; $3 billion would be devoted to increased residential construction; $12 billion would go to additional business investment; and the remaining $10 billion would increase net exports.

[4] Higher productivity from a permanent R&D credit would increase both wages and profits. As a consequence, the federal government would collect more tax revenue and save interest on the national debt, leaving both taxpayers and the government better off. By 2010, personal income would be $11 billion higher per year and $61 billion higher over the entire 1998-2010 period. On an after-tax basis, this personal income increase to U.S. taxpayers would be equivalent to a tax cut of $5 billion per year over a 5-year time frame and a $25 billion cut over 10 years.

[5] Because the R&D credit pays for itself in terms of greater tax revenues from induced economic growth, the credit is one of the best "investments" the government could make. Over the 1998-2010 period, induced economic growth offsets 47 percent of the "static" revenue cost of the credit; in 2010 alone, the additional economic activity compensates for more than 80 percent of the revenue cost. The analysis demonstrates that eventually the government will recoup $1.75 in additional tax revenue for every $1 it spends on the R&D credit.

[6] The increased productivity induced by the credit has important consequences for social security, Medicare, and other entitlement programs. This is because as the baby boom population reaches retirement and the labor force begins to shrink, rising productivity is essential to continued economic growth. The productivity gains induced by a permanent credit would save one billion hours of labor while still increasing GDP by $58 billion (in 1998 dollars) over the 1998-2010 period.

[7] Higher productivity resulting from permanently extending the R&D credit would lower costs and prices. In manufacturing alone, the annual cost savings would total nearly $5 billion by the year 2010. Correspondingly lower producer prices would make U.S. companies more competitive in world markets. As a result, by 2010, exports of U.S.-made manufactured goods would rise by more than $6 billion, while imports of manufactured goods would shrink by nearly $3 billion, thereby improving the balance of trade.

[8] The remainder of this study, divided into six sections and three appendices, details the findings outlined in this section and shows how they are consistent with other path-breaking research on the effects of private-sector R&D. Section II, The Importance of Innovations From R&D, provides perspective for the quantitative analysis by noting the enduring benefits of past R&D on the world today. Section III, R&D Spending and Economic Growth, describes the statistical relationship between R&D spending and economic growth. Section IV, Spillover Benefits of R&D, highlights the unique aspects of R&D, which distinguish it from other types of business investment. Unlike most other investments, researchers have consistently found that R&D generates private economic returns on average that are greater than those for other investments. Moreover, returns to the economy as a whole are much greater than those private returns, once benefits to other economic sectors are taken into account. Section V, Effectiveness of the R&D

Credit as a Stimulus, summarizes the findings of a number of recent studies and concludes that each credit dollar yields approximately $1 of additional R&D. Section VI, Economic Benefits of the R&D Credit, details results from the Coopers & Lybrand Dynamic Economic Model of the credit's impact on productivity, economic growth, wages, personal income, and net exports, and lower costs and prices. Section VII, Dynamic Budgetary Benefits of the R&D Credit, analyzes the degree by which the credit's benefits to the federal government offset any costs.

[9] The three technical appendices describe the Dynamic Economic Model, provide information on how productivity gains are simulated in the model, and quantify the productivity gains by industry.

II. The Importance of Innovations From R&D

[10] Historically, R&D has fostered technological innovations that have enriched mankind in many ways. Gains in productivity from technological advances during the 20th century have raised the standard of living in the United States and throughout the world.

[11] The advances in medicine made possible by R&D have greatly extended life expectancies in both developed and developing countries. R&D has invented drugs to cure debilitating and life- threatening diseases and created treatments for many common ailments that afflict both young and old.

[12] R&D has developed new materials and processes that not only have led to new products, but have created new occupations and new industries as well. R&D gave birth to the aerospace, computer, and pharmaceutical industries. The knowledge gleaned from R&D added continually to the ever-growing number of technical occupations -- occupations that include aerospace and computer engineers, to name just two. The use of new machines -- the products of R&D -- also created new occupations, as pilots were needed to fly airplanes and computer programmers were needed to develop software.

A. Diversity of Productivity-Enhancing Innovations

[13] With the advent of the assembly line, innovations in machinery have steadily improved productivity in manufacturing. Mass production raised wages and lowered costs. As a result, automobiles and household appliances were available to a growing middle class at prices they could afford. Recent innovations in machinery as a result of R&D have harnessed computer and laser technology to improve the precision and adaptability of machine tools. Computer-aided design and manufacturing equipment (CAD/CAM), for example, now converts design specifications into machining instructions for numerically controlled machines and automatically guides workpieces among machines on computer-controlled handling systems. Laser cutting tools fabricate parts to tolerances that other cutting methods cannot match. Robots assemble and weld more quickly and accurately than manual methods.

[14] Innovations in the chemical industry as a result of R&D have benefited many other industries. The development of polymers, for example, led to the creation of man-made fibers that brought huge gains in productivity to the textile industry because man-made fibers require fewer steps to produce and can be woven at far greater speeds. Innovations in chemical reformulation led to higher yields of gasoline and other fuels

from crude oil, which lowered the cost of transporting both products and people. Innovations in pesticides and crop genetics have helped to make U.S. agriculture four times more productive today than it was at the beginning of the 20th century.

[15] Innovations in communication equipment as a result of R&D have harnessed software with computer, laser, and fiber optic technology to vastly improve communication. Computer routers and phone switching gear coupled with the software that controls them have made worldwide communication by phone and the Internet possible and instantaneous. In addition, cellular technology now allows communication to take place almost anywhere.

[16] Innovations in the pharmaceutical industry as a result of R&D have greatly lowered the cost of health care. Vaccines have prevented the spread of contagious diseases, which if contracted would necessitate more expensive medical treatment. Anti-cancer drugs, in combination with radiation therapy, have provided an alternative to costly surgery in treating cancer. Anti-depression drugs have greatly mitigated the need for prolonged institutional treatment of psychological disorders.

[17] Thus, as a result of technological innovations by certain industries, productivity in all industries has improved greatly during the 20th century. Productivity gains in agriculture, mining, manufacturing, utilities, trade, and services all depend on technological innovations from R&D.

III. R&D Spending and Economic Growth

[18] Extensive evidence supports the premise that investments in R&D have large payoffs in terms of economic benefits. /1/ Increasing the U.S. economy's productivity is the key to sustaining the higher standard of living U.S. citizens currently enjoy and to guaranteeing the continued economic growth that will be necessary to meet the needs of an aging population. R&D yields new products improving the quality of life and new processes enabling firms to reduce production costs and thereby maintain their competitiveness.

[19] According to one study, market forces cause such product and process know-how to filter gradually outside of the businesses initially undertaking the R&D investments. As a consequence, this R&D -- irrespective of whether it proves to be financially beneficial to the innovating firm -- ultimately has accounted for at least half of the increases in output per worker. /2/

[20] Another recent report from the National Association of Manufacturers /3/ further clarifies the nature of the relationship between R&D and growth. Based on a series of statistical analyses, the study concludes that fluctuations in U.S. economic growth since the 1960s are tied directly to reduced investment in R&D and in physical capital. A most telling finding is that as increases in R&D lessened in recent decades, U.S. GDP growth also tapered off. Since the mid-1970s, technology has accounted for about 0.6 percent of private sector growth, compared with 1.3 percent during the 1960s.

A. R&D's Two-Fold Benefit

[21] Although investment in plant and equipment and R&D are two key sources of private sector firms' profitability (and, hence, beneficial to the economy), researchers distinguish between them in two respects. First, unlike tangible assets which deteriorate

and ultimately lose value, R&D provides a lasting source of economywide benefit in the form of productivity improvements. Output per unit of inputs permanently rises and, in this sense, R&D does not depreciate. In other words, the level of productivity achieved in the economy as a result of technological improvements based on R&D can be maintained indefinitely merely by replacing labor and capital of the same kind.

[22] Second, when compared with other inputs firms use in the production of goods and services, R&D is unique because its results spread beyond the immediate sector in which it is initially applied. Indeed, because research applications frequently extend far beyond the uses originally envisioned by the innovator, R&D investments typically fall short of levels that would prevail if the companies were able to internalize all of the ultimate benefits. The large gap between the economic returns kept by innovators and those reaped by others is due to the general fact that new ideas, although expensive to discover, are often inexpensive to replicate. Thus, the economic returns are relatively easily passed along and the economic benefits "spill over" and are shared with other spheres. Researchers conclude that society generally reaps more than half of the ultimate financial benefits from private-sector innovations. /4/

[23] Absent a mechanism to recover a portion of these foregone benefits, private businesses will never have the incentive to commit the full set of resources to R&D that would be best for the U.S. economy. Indeed, although the largest share of R&D historically has been funded by private businesses, which assume the risks of undertaking research and obtain the financing needed to develop new products and processes, such companies undertake only those investments which they estimate will provide a satisfactory rate of return, adjusted to reflect the risks. Providing a permanent stimulus to research and development ultimately enriches all U.S. citizens by encouraging firms to pursue those projects that would fail to be considered if there were no R&D tax credit.

IV. Spillover Benefits of R&D

[24] Economists generally are skeptical about any governmental assistance designed to promote particular activities. Nonetheless, because of features peculiar to R&D investments, many experts support various incentives targeted toward R&D spending. /5/ Unlike a machine that can be bolted to a factory floor and expected to produce a certain output, it is uncertain whether the knowledge resulting from R&D programs may be profitable. Scherer notes, for example, that "high-technology success rates are modest; the most successful 5 percent of venture capital start-ups yield 40 to 50 percent of the total capital gains from venture investments." However, many people other than the innovators are also likely to benefit from the new knowledge in some way. Indeed, although the private returns from R&D may be very short-lived for the initial innovator, the returns to the economy as a whole are extremely long-lived, as new innovations are built on the foundation of earlier innovations.

[25] There are widespread spillover economic benefits to successful innovations which outweigh the direct gains to the developers. For this reason, policymakers and economists have concluded that profit incentives alone are insufficient to motivate sufficient levels of R&D investment. Private firms assessing the potential costs and benefits from various projects will fail to consider potential gains other than their own. In

a recent review of the evidence on R&D's potential spillover benefits, the president's Council of Economic Advisers (CEA) summarized a broad set of studies quantifying the magnitude of the phenomenon of this spillover -- the difference between the private and social rates of return. Among the CEA's conclusions were that spillovers resulted in social rates of return to R&D averaging about twice the average estimated private rates of return of 20 to 30 percent. /6/ Table 1 reproduces the principal CEA results.

TABLE 1

COMPARISONS FROM STUDIES OF PRIVATE AND SOCIAL RATES OF RETURN

Author	Study	Private Rate of Return	Social Rate of Return
Nadiri	Innovations and Technological Spillover, National Bureau of Economic Research, 1993	20%-30%	50%
Bernstein-Nadiri	Product Demand, Cost of Production, Spillovers, and the Social Rate of Return to R&D, National Bureau of Economic Research, 1991	15%-28%	20%-110%
Goto-Suzuki	"R&D Capital, Rate of Return on R&D Investment and Spillover of R&D in Japanese Manufacturing Industries," Review of Economics and Statistics, 1989	26%	80%
Bernstein-Nadiri	"Interindustry Spillovers, Rates of Return, and Production in High-Tech Industries," American Economic Review, 1988	10%-27%	11%-111%
Scherer	"Using Linked Patent and R&D Data to Measure Interindustry Technology Flows," R&D, Patents and Productivity, 1984	29%-43%	64%-147%
Sveikauskas	"Technology Inputs and Multifactor Productivity Growth," Review of Economics and Statistics, 1981	10%-23%	50%
Mansfield	"Social and Private Rates of Return From Industrial Innovations," Quarterly Journal of Economics, 1977	25%	56%
Terleckyj	"Effects of R&D on the Productivity Growth of Industries: An Exploratory Study," 1974	29%	48%-78%

[26] Although table 1's results present the most complete report to date on the extent of R&D spillover benefits, it is instructive to examine more closely one of the earliest of these studies by Mansfield and his associates because the level of detail in their analysis regarding disparities between social and private rates of return makes the

problem of private sector underinvestment appear more genuine. Mansfield's pioneering work examined private company data on actual innovations, both successful and unsuccessful. And although he was among the first to report that the social return to R&D was very high and about twice the private return, more recent replications of his work have shown that this two-to-one relationship has continued to hold. /7/

[27] As shown in table 2, on balance for innovations, none of which could be characterized as breakthroughs, the median economic return equaled 25 percent, considerably above the standard return companies earn on most operations (which are effectively returns to tangible property) of about 10 percent. Mansfield found that in about one-third of his cases the private rates of return were so low that no company with the advantage of hindsight would have proceeded with the innovation; /8/ but the social rates of return were so high that from the overall economy's perspective the investments were very beneficial. From this evidence, absent an incentive such as the R&D credit, one can well imagine that there are likely to be many worthwhile investments that are never undertaken because their private returns are expected to be too low.

TABLE 2

RATES OF RETURN FROM R&D INVESTMENT IN DIFFERENT INNOVATIONS

Innovation	Type of Innovation	Private Rate of Economic Return	Social Rate of Economic Return Relative to Private Return
1 Stain remover	Innovation affecting households	4%	29:1
2 Thread innovation	Product innovation	27	11:1
3 Construction material	Product innovation	9	11:1
4 Chemical product innovation	Product innovation	9	8:1
5 Control system component	Product innovation	7	4:1
6 Drilling material	Product innovation	16	3:1
7 Chemical process innovation	Process innovation	4	3:1
8 Drafting innovation	Process innovation	47	2:1
9 Paper innovation	Product innovation	42	2:1
10 Machine tool innovation	Product innovation	35	2:1
11 Major chemical process innovation	Process innovation	31	2:1

12 Household cleaning device	Innovation affecting households	214	1:1
13 Dishwashing liquid	Innovation affecting households	46	1:1
14 Door control innovation	Product innovation	37	1:1
15 Chemical process innovation	Process innovation	25	1:1
16 Primary metals innovation	Product innovation	18	1:1
Median		25%	2:1

Source: Mansfield, "Social and Private Rates of Return From Industrial Innovations," 1977.

V. Effectiveness of the R&D Credit as a Stimulus

A. The Government's Role in Support of R&D

[28] The natural tendency for the private marketplace to underinvest in research because of an inability to capture all of R&D's economic benefits has led national policymakers to adopt a series of mechanisms to address the shortfall:

o government self-provision of R&D;

o government direction of R&D investments made by the private sector; and

o government stimulus to private industry's own R&D.

[29] These three options represent a continuum of solutions to remedy the underinvestment in R&D and each has an appropriate role to play. Certain highly sensitive national security research, for example, might be best performed with considerable government involvement. In the rapidly changing technological arena that characterizes the private sector economy, however, government stimulus of private R&D offers the greatest flexibility in quickly meeting changing market demands. For nearly two decades, the R&D credit has successfully stimulated private spending on R&D.

B. The R&D Tax Credit

[30] Since its introduction in 1981 as part of the Economic Recovery Tax Act (ERTA), the R&D tax credit has been extended eight times. Initially scheduled to sunset in 1986, the provision was temporarily extended in a modified form through 1988 by the Tax Reform Act of 1986. Subsequent legislation continued to extend the credit, at times reinstating it retroactively. In several instances, the rules governing the computation of the credit also were changed, although its most distinguishing feature -- the fact that the credit's value is based on the annual increase in a company's R&D spending relative to a historically determined base level -- has always been retained. /9/

[31] The Small Business Protection Act of 1996 added the alternative incremental research credit (AIRC), which taxpayers may elect to use in lieu of the traditional R&D

credit. This alternative regime complemented the credit already in place by providing a lower level of benefits to those firms who, for a variety of reasons, are unable to qualify for the traditional credit despite significant investments in R&D.

[32] In its most recent form, effective through June 30, 1998, and as reflected by the Taxpayer Relief Act of 1997, the incremental aspect of the credit has been preserved. (Table 3 shows the historical evolution of the credit.)

TABLE 3

HISTORY OF THE R&D TAX CREDIT

Period Credit in Effect	Credit Rate	Corporate Tax Rate	Definition of Base
July 1981 -- December 1985	25%	46%	Maximum of: (i) preceding 3-year R&D average; (ii) 50 percent of current year R&D.
January 1986 -- December 1988	20%	46%/34%	Qualifying R&D limited to "technological" activities.
January 1989 -- December 1989	"	34%	"
January 1990 -- December 1990	"	"	Maximum of: (i) preceding 4-year gross receipts average times lower of: 1984-1988 R&D/gross receipts ratio or 16 percent; (ii) 50 percent of current year R&D. For startups: 3 percent of average annual gross receipts.
January 1991 -- December 1991	"	"	"
January 1992 -- June 1992	"	"	"
July 1992 -- June 1995	"	34%/35%	"
July 1996 -- May 1997	"	35%	Alternative credit of: (i) 1.65 percent on R&D above 1 percent of preceding 4-year gross receipts average; (ii) 2.2 percent on R&D above 1.5 percent of same 4-year average; (iii) 2.75 percent on R&D above 2.0 percent of same 4-year average.
June 1997 -- June 1998	"	"	"

[33] When initially enacting the provision, policymakers sought to encourage private sector R&D spending beyond levels that firms would ordinarily invest absent any incentives; rewarding only incremental spending was consistent with this objective. The

credit would thereby maximize the tax incentive to increase R&D per dollar of tax cost to the U.S. Treasury. In its initial form, the increment qualifying for the credit was determined relative to baseline spending in the three prior years. As noted, in its current formulation the credit takes account of a firm's growth over time by relating the tax benefit to company spending above a predetermined level of R&D intensity -- the firm's ratio of R&D expenditures to sales revenues over a given period.

C. Recent Findings on the Credit's Effectiveness

[34] The R&D credit's effectiveness in inducing firms to increase research spending has been the subject of considerable debate. Part of the contention regarding its impact can be traced to uncertainty as to whether its availability has induced firms to undertake more R&D (i) by offsetting a portion of the spillovers common to such projects or (ii) by providing additional resources generally which firms may in turn opt to spend on R&D. Although there are certainly instances where smaller firms, which have particularly greater difficulty securing financing in capital markets, may view the credit as an additional financing resource, the available empirical evidence supports the conclusion that the credit's principal effect is to mitigate the spillover effects routinely experienced by firms performing R&D.

[35] Nearly all prominent researchers have concluded that the R&D credit stimulates an additional amount of private-sector R&D spending that is equal to or greater than the cost of the credit in forgone revenue. Most recently, for example, the Office of Technology Assessment (OTA) convened a panel of experts to prepare a report /10/ examining the credit's effectiveness and concluded that "for every dollar lost in tax revenue, the R&D tax credit produces a dollar increase in reported R&D spending, on the margin." /11/

[36] This finding that the credit covers its own cost and more has drawn repeated support from other analyses of this question. Based on her examination of 1981-to-1988 research spending when the original credit regime was in effect, Hall, for example, concludes that the credit generated about $2 billion annually (in 1982 dollars) of additional research activity compared with a revenue cost of about $1 billion per year. /12/ Previous studies by Baily and Lawrence, Berger, and Hines separately drew similar conclusions. /13/ Overall, the R&D benefit-to-tax cost ratio from these studies ranges between 1.3 and 2.0.

VI. Economic Benefits of the R&D Credit

[37] Making the R&D tax credit a permanent part of the tax code would encourage companies in the United States to perform more R&D by effectively lowering the after-tax cost of R&D. The additional R&D stimulated by the credit would boost productivity throughout the economy, which would benefit the United States in several important ways:

o Higher productivity from additional R&D would allow the United States to produce more goods and services to meet private and public needs.

o Higher productivity from additional R&D would enable U.S. industries to produce better quality goods at a lower cost, making U.S. products more competitive both at home and abroad.

o Higher productivity from additional R&D would provide U.S. workers with increased wages and U.S. families with more after-tax income.

[38] To quantify the benefits of the additional R&D stimulated by the credit, Coopers & Lybrand (C&L) used its Dynamic Economic Model to simulate the macroeconomic and industry effects of the productivity gains induced by a permanent R&D credit. The simulation, which forecasts economic effects through the year 2010, shows that a permanent R&D credit would be an excellent investment in America's future -- one that would raise the after-tax income of American taxpayers and ultimately pay for itself.

A. Additional R&D Stimulated by the Credit

[39] By lowering the after-tax cost of R&D, a permanent R&D credit would encourage companies to spend more on R&D. The credit would lower the cost of R&D by refunding to companies from 6.5 cents to 13 cents of taxes for each incremental dollar of R&D. /14/ Those tax savings would provide companies with an incentive to take research risks with less certain payoffs -- risks that would not be taken without the credit.

[40] For its simulation, C&L relied on the findings of the Office of Technology Assessment and assumed that the R&D credit would stimulate additional R&D spending roughly equal to its tax cost. Recent estimates by the Joint Committee on Taxation and the Office of Tax Analysis pegged the tax cost of a one-year extension of the credit at about 2 percent of the anticipated amount of privately funded R&D. /15/ Therefore, C&L chose to simulate the R&D response to a permanent R&D credit by raising the level of R&D spending in every industry by 2 percent.

B. Productivity Gained From Additional R&D

[41] Over the 1998-2010 period, a permanent R&D tax credit would encourage companies to spend about $41 billion more (at 1998 prices) on R&D. The innovations from that additional R&D would steadily increase the productive capacity of the U.S. economy. With a permanent R&D credit, the annual productive capacity of the U.S. economy (at 1998 prices) would grow $2 billion by 2000, $7 billion by 2005, and $13 billion by 2010.

[42] The additional spending on R&D increases future productivity in much the same way as additional investments in equipment and structures do, but the productivity gains from additional R&D are much greater than those for equipment and structures. The $13 billion increase in annual productive capacity from the $41 billion invested in additional R&D represents a remarkable 31 percent annualized real rate of return to the overall economy. /16/ Because of the spillover benefits from R&D, its social rate of return is more than twice the typical rate of return to physical investments in equipment and structures.

[43] Improvements in productivity allow industries to produce a given amount of output using fewer inputs. The inputs that are saved can be used elsewhere to produce more output or provide other social benefits. Which inputs are saved depends on the nature of the technological innovation. Some innovations may improve productivity by

using energy and other raw materials more efficiently. Other innovations may improve productivity in the workforce.

[44] For simulation purposes, C&L assumed that the productivity gains in each industry reduced all of the industry's input requirements by the same proportion. So, for example, a 1 percent increase in productivity in chemical manufacturing would result in approximately a 1 percent reduction in the intermediate inputs and labor that the chemical industry would need to produce a given amount of output.

C. Increased Economic Growth

[45] The higher productivity resulting from the credit would enable the economy to produce nearly $58 billion (at 1998 prices) of additional goods and services over the 1998-2010 period to satisfy increases in final demand. The extra $58 billion of goods and services would provide about $33 billion of additional personal consumption, $3 billion of additional residential construction, $12 billion of additional business investment, and $10 billion of additional net exports. On top of that, one billion hours could be freed from producing output and used to pursue personally rewarding and socially valuable activities that are not counted in GDP -- activities such as parenting children, doing volunteer work, studying for a new career, or planning a new business. Moreover, labor-saving gains in productivity will help to maintain the output capacity of the economy as the baby boom generation retires and the labor force shrinks.

[46] Taken together, the $58 billion of additional GDP and the labor savings make up the total social return over the 1998-2010 period resulting from the additional R&D performed during that period. The $58 billion of additional GDP is due entirely to the productivity gains caused by the additional R&D spending and does not include the additional R&D spending itself. In the simulation, the additional $41 billion of R&D spending during the 1998-2010 period added nothing to GDP because, by assumption, the credit only reallocated labor that was already employed doing non-R&D work.

D. Increased Wages and Personal Income

[47] Productivity gains from a permanent R&D credit would enable workers to earn higher wages. Wage increases would occur throughout the economy -- in "low-tech" as well as "high-tech" industries.

[48] Largely as a result of the gain in wages, personal income would be about $61 billion higher (at baseline nominal prices) over the 1998-2010 period. By 2010, personal income would be nearly $11 billion higher annually as a result of the R&D credit.

[49] Higher personal income (before taxes) would result in higher disposable income (after taxes). Disposable income would be about $47 billion higher (at baseline nominal prices) over the 1998- 2010 period. Disposable income would be up more than $8 billion per year by 2010.

[50] From an individual family's perspective, an increase in after-tax income would be as beneficial as a tax cut. The benefit to families from higher productivity would be equal in size to a $5 billion tax cut over five years, a $25 billion tax cut over 10 years, and a $47 billion tax cut over 13 years.

E. Lower Production Costs and Product Prices

[51] Additional R&D spending would increase productivity both in industries that undertake additional R&D spending in response to the credit and in industries that receive the spillover benefits from that additional R&D spending. In the simulation, the productivity increase of each industry depended on the cumulative amount of additional R&D done by that industry as well as the cumulative amount of additional R&D embodied in that industry's purchases of equipment and intermediate inputs from other industries that did additional R&D. Table 4 shows the overall gain in total factor productivity by 2010 for selected industries along with the share of that gain that is due to spillover benefits from the incremental R&D done by other industries. As expected, the largest productivity gains would occur in high-tech industries where much of the additional research would be performed. But even in high-tech industries, about one-third or more of the gain in productivity would be due to spillover benefits from the additional R&D done by other industries. For a high-tech service industry such as air transportation, all of the productivity gain would come from spillover benefits.

TABLE 4

GAINS IN TOTAL FACTOR PRODUCTIVITY FROM THE R&D CREDIT FOR SELECTED INDUSTRIES IN 2010

Industry	Percentage Increase in Productivity From the R&D Credit	Percentage of Productivity Increase Due to R&D Spillovers From Other Industries
Pharmaceutical	0.38%	16%
Computers	0.25	38
Aerospace	0.20	41
Medical instruments and supplies	0.19	35
Communication equipment	0.18	32
Communication services	0.18	47
Electrical industrial equipment	0.15	49
Motor vehicles	0.14	30
Plastic products	0.14	84
Household appliances	0.13	80
Chemicals	0.11	36
Rubber products	0.11	74
Air transportation	0.10	100
Wholesale and retail trade	0.06	99

Source: C&L Dynamic Economic Model

[52] Because of higher productivity, most industries would be able to pay higher wages to employees and still lower the price of their products. Price reductions throughout manufacturing would provide purchasers of manufactured goods with annual savings of nearly $5 billion by 2010. In high-tech industries, by 2010, lower prices from productivity gains would save customers about $500 million per year for drugs, $600 million per year for motor vehicles, $900 million per year for chemicals and plastic products, and $1.5 billion per year for computers and communication equipment.

[53] Lower prices resulting from the credit would make U.S. industries more competitive in world markets. In 2010, annual exports of manufactured goods would be more than $5 billion higher (at 1998 prices) while annual imports of manufactured goods would be nearly $3 billion lower (at 1998 prices). By 2010, exports of drugs, medical instruments and supplies, computers, and communication equipment would grow by $800 million annually and exports of chemicals, textiles, engines and turbines, aircraft, and motor vehicles would grow by $1.4 billion annually. In addition, higher productivity and lower producer prices in the United States would cut imports of paper, textiles, oil, and chemicals.

VII. Dynamic Budgetary Benefits of the R&D Credit

[54] From a fiscal policy perspective, a permanent R&D tax credit would be a wise investment because the gains in productivity would make the economy grow faster, thereby expanding taxable income and tax revenue by so much that the federal government would eventually recover more than the cost of the credit. In fact, for each dollar spent on the R&D credit, the federal government would ultimately recoup almost $2 plus accumulated interest. In other words, the payback from the R&D credit would extend beyond the 10- year budget period (1998-2007), but would provide an eventual return in additional tax payments of nearly twice the initial investment on a present-value basis.

[55] During the budget period, the payback from the R&D credit would be sizable, but not as large as it would be in the long run. To quantify the size of the payback over the budget period, C&L relied on the dynamic budget estimates from its simulation of the productivity gains induced by the credit. Those dynamic estimates show that the economic growth caused by the credit would affect both outlays and receipts of the federal government, offsetting about 18 percent of the credit's "static" revenue loss over a five-year budget period (fiscal years 1998-2002) and about 32 percent over a 10-year budget period (fiscal years 1998-2007). By 2010, the cumulative budget benefits from additional economic growth would offset about 47 percent of the cumulative "static" revenue loss. After a few more years, the budget benefits from additional economic growth would overtake the cumulative "static" revenue losses and the government would begin to accumulate a budget surplus as a result of the credit.

A. Long-Run Gains in Federal Revenue

[56] The R&D credit provides the federal government with an extraordinary investment opportunity -- one that would raise the after-tax income of American taxpayers, fully pay for itself, and eventually generate a surplus. Two factors contribute mightily to the budget benefits of the R&D credit. First, the credit effectively simulates additional R&D spending, generating at least one incremental dollar of R&D for each dollar of tax reduction. Second, the additional R&D spending leads to gains in productivity that provide large economywide returns -- estimated by numerous economic studies to range from 20 percent to 50 percent on a real annualized basis.

[57] A simple example demonstrates the dynamic budgetary benefits of the R&D credit. Suppose that the federal government spends $2 billion on the credit in 1998 and, as a result, businesses invest an equal amount in additional R&D. At a 31 percent real annualized rate of return, the additional R&D would increase the annual productive

capacity of the economy by $720 million (at 1998 prices) and, after taking account of the additional labor savings, would increase annual GDP by $500 million (at 1998 prices). That additional GDP would generate about $105 million (at 1998 prices) in additional tax receipts annually. /17/ Using a 3 percent real interest rate to discount the future stream of additional taxes yields a present value of $3.5 billion in offsetting revenue benefits -- a dynamic payback from higher productivity that eventually offsets 175 percent of the credit's "static" revenue loss. /18/

B. Dynamic Offsets Over the Budget Period

[58] The budgetary benefits from higher productivity were simulated along with the economic benefits using C&L's Dynamic Economic Model. Table 5 reports the dynamic budgetary benefits from the simulation and compares them to the "static" revenue loss. The table shows the cumulative offsets over a 5-year budget period (fiscal years 1998-2002), a 10-year budget period (fiscal years 1998-2007), and the entire period through fiscal year 2010.

TABLE 5

BUDGETARY BENEFITS FROM HIGHER PRODUCTIVITY IN BILLIONS OF CURRENT DOLLARS

	Fiscal Year Budget Periods		
	1998-2002	1998-2007	1998-2010
"Static" revenue loss	9.7	27.8	41.6
Dynamic effect on federal receipts:			
Individual and corporate income taxes	2.0	8.4	15.2
Payroll and other taxes	1.7	6.9	11.7
Total	3.7	15.3	26.9
Dynamic effect on federal outlays:			
Employee compensation and other purchases	0.6	2.7	4.2
Transfer payments	1.4	5.1	6.9
Interest payments, net savings	-0.1	-1.4	-3.6
Total	1.9	6.4	7.5
Dynamic offset	1.8	8.9	19.4
(as a percentage of the "static" loss)	18%	32%	47%

Source: C&L Dynamic Economic Model

[59] Higher productivity from the R&D credit would increase both wages and profits. As a result, the federal government would collect additional revenue, while still leaving taxpayers better off. Over the 1998-2010 period, individual and corporate income taxes would be about $15.2 billion higher and payroll and other taxes would be about $11.7 billion higher.

[60] Because wage rates in the public sector are tied to those in the private sector, wage increases from private-sector gains in productivity would drive up wages in the

public sector beyond the productivity gains there. As a result, federal government outlays for workers would increase. The additional cost of the federal workforce would add about $4.2 billion to federal outlays over the period 1998- 2010, negating a small portion of the budget benefit from higher productivity.

[61] Productivity gains would increase certain transfer payments. Those who retire between 1998 and 2010, for example, would be entitled to greater benefits under social security, having earned more income as workers. In total, increases in benefit payments would add about $6.9 billion to federal outlays over the 1998-2010 period.

[62] Federal interest payments would go down because the net budgetary benefits from higher productivity would shrink the amount of federal debt by more than $20 billion by 2010. Over the 1998-2010 period, the reduction in federal debt would save the federal government about $3.6 billion in interest payments.

[63] Over the 1998-2010 period, the net budget benefits from additional economic growth would offset about 47 percent of the cumulative "static" revenue loss. Moreover, the annual dynamic offset in 2010 from the additional R&D spending in prior years would be more than 80 percent of the "static" revenue loss in that year. Therefore, the percentage offset to the cumulative "static" revenue loss would exceed 47 percent after 2010 and continue to increase. Because the ever-growing offset would eventually exceed the cumulative "static" revenue loss, a permanent R&D credit would more than pay for itself in the long run.

Appendix A

The C&L Dynamic Economic Model

[64] C&L's study of the economic benefits of the R&D tax credit is based on simulations of the C&L Dynamic Economic Model. This appendix describes the structure of the model and how key variables in the model are determined. Appendix B explains how the productivity gains induced by the credit are simulated on an industry-by-industry basis. Appendix C discusses the derivation of the credit-induced gains in productivity by industry.

Overview

[65] The C&L Dynamic Economic Model is an interindustry macroeconomic forecasting and simulation model of the U.S. economy based on the University of Maryland's INFORUM LIFT model. The general idea of the model is to use econometric equations to predict final demand by category at an industry level. Then those detailed predictions are used along with the input-output relationships among industries to determine output by industry. The use of explicit input-output relations among industries assures absolute accounting consistency on the product side (among final demands, intermediate uses, and the production of products) and on the price side (among the price of products, the cost of materials used, and the value- added generated in making them).

[66] The model forecasts output, employment, prices, and intermediate sales information for 85 producing industries. It also forecasts factor costs (value-added) for 51 industries, including labor compensation, profits, depreciation, and net interest payments. In addition, it generates all standard macroeconomic aggregates, including

GDP, interest rates, inflation rates, the overall unemployment rate, and personal savings rates. These macroeconomic aggregates are generally the sum of industry forecasts. In other words, the model produces "bottom-up" results, where industry-level activities drive the macroeconomic totals. Consistency at the industry level gives the C&L model a clear advantage over other macroeconomic models for industry analyses.

Product Output

[67] The model uses the basic input-output equation to determine product output as the sum of final use and intermediate use:

OUT = A*OUT + FD

where OUT is a column vector of outputs for 85 industries, A is a square matrix of interindustry technical coefficients a(sub ij), which show how much of product i is needed to produce product j, and FD is a column vector of final demand for 85 industries. FD includes the following categories of final demand: consumer spending, investment, government spending, net exports, and changes in inventory.

[68] The final demand equations are estimated econometrically at detailed levels. There are equations for consumer spending (80 types), equipment investment spending (57 industries), construction (31 types), exports and imports (85 products each). These equations depend on industry and macroeconomic variables. For example, business investment spending by the motor vehicles industry depends on the output of motor vehicles, interest rates, and tax rates. Most of the estimated equations are based on econometric analysis of time-series data going back as far as the 1950s. In addition, there are various "bridge" matrices that translate consumer spending by category, equipment investment by industry, and structures purchases by type of structure into demands for goods and services by producing industries. For instance, the equipment-by-industry bridge translates the demand for equipment by the agriculture industry into equipment orders for the separate industries that produce agricultural machinery, construction equipment, engines and turbines, and motor vehicles.

Employment

[69] Output forecasts are combined with industry-level equations for labor productivity and average annual hours of work per job to determine the level of employment in each industry as follows:

JOB(sub i) = (OUT (sub i)/PRD(sub i))/YHR(sub i)

where

JOB(sub i) = Jobs for industry i;

OUT(sub i) = Output for industry i;

PRD(sub i) = Labor productivity (defined as output per hour) for industry i;

YHR(sub i) = Average annual hours of work per job for industry i.

Forecasts of labor productivity (PRD) by industry depend on business cycle effects and time trends. Forecasts of annual hours per job (YHR) by industry rely on movements in the unemployment rate and time trends.

Price Determination

[70] Prices for any product are a weighted sum of unit costs, including the cost of intermediate goods and direct factor costs (labor compensation, indirect business taxes, capital income, and other components of the value-added):

PRICE = PRICE*A + VA

where PRICE is a row vector of prices for 51 industries, A is the technology matrix referred to earlier, and VA is a row vector of value-added per unit of output for 51 industries.

[71] Costs of intermediate inputs are calculated using the input-output structure. For example, an increase in profits in the steel industry raises steel prices (all else constant), which increases the costs of motor vehicle manufacturers, and, in turn, raises the price of motor vehicles.

[72] Labor compensation is divided into wages and salaries and employer contributions for pensions, health insurance, social insurance, and other benefits, and is estimated at the 51-industry level. Capital income such as corporate profits, proprietor income, net interest payments, and capital consumption allowances are modeled separately, also at the 51-industry level.

Appendix B

Simulating Productivity Gains in the C&L Model

[73] The input-output structure of the C&L model provides an ideal tool for simulating gains in total factor productivity (TFP) on an industry-by-industry basis. TFP improvements measure the increase in output due to more efficient use of all factors of production, including intermediate inputs as well as labor and capital. An improvement in TFP means that a given amount of output can be produced with fewer inputs. The unused inputs can be conserved or reallocated to alternative uses.

[74] C&L's approach to simulating the TFP gain (TFPGRT) by industry that results from additional R&D is to model the gain as an average across-the-board reduction in labor, capital, and intermediate inputs. /19/ In implementing the TFP gains in the model, however, only labor productivity and interindustry technical coefficients can be explicitly adjusted. Specifically, for industry j, its estimated percentage gain in TFP, TFPGRT(sub j), is directly translated into an equal percentage increase in labor productivity (PRD(sub j), defined in Appendix A as output per hour) and the same percentage reduction in all a(sub ij)'s in the jth column of the A matrix for the cost savings in intermediate inputs.

[75] Because the model does not allow the explicit adjustment of capital income and other components of the value-added to reflect the TFP gain by industry, the exogenously imposed percentage changes to input-output coefficients and labor productivity are all "scaled" according to the following formula to ensure that the estimated TFP gains attributable to the R&D tax credit are fully implemented in the

model:

[equations omitted]

Thus, for example, if the dollar value of an industry's output was 10 percent greater than the sum of its intermediate costs and labor compensation, then the TFPGRTA for this industry would be 10 percent greater than TFPGRT.

Appendix C

Quantifying the Productivity Gain Due to the R&D Credit

[appendix omitted]

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Prior Coverage

Listed below are articles on the R&D credit that have previously appeared in Tax Notes.

"Does Internal-Use Software Qualify for the Research Credit?" by Janet S. Wong. Dec. 15, 1997, p. 1263.

"Designing a Research and Development Tax Credit," by Gene Steuerle. Aug. 5, 1996, p. 767.

"R&D Credit: How Should Research Be Subsidized?" by Gene Steuerle. July 29, 1996, p. 647.

"Giving Credit Where Credit Is Due: A Brief History of the Administration of the R&D Credit," by Philip A. Stoffregen. Jan. 16, 1995, p. 403.

"Research and Development Allocations Under Sections 861 and 864: An Author's Query," by Joel S. Newman. Aug. 2, 1993, p. 641.

"Congressional Intent, Long-Standing Authorities Support Broad Reading of Section 174," by Mark L. McConaghy and Richard B. Ruge. Feb. 1, 1993, p 639.

"The Effect of Base Changes in the Incremental Research and Experimentation Tax Credit," by B. Anthony Billings and Gary A. McGill. Mar. 2, 1992, p. 1155.

* * * * *

FOOTNOTES

/1/ Much of this research has focused on the impact the slowdown in R&D spending had on the productivity decline experienced during the 1970s. See, e.g., Griliches, "The Search for R&D Spillovers," Scandinavian Journal of Economics, 1992.

/2/ See Lichtenberg and Siegel, "The Impact of R&D Investment on Productivity -- New Evidence Using Linked R&D-LRD Data," Economic Inquiry, 1991, which studies the impact of R&D on private firms' productivity by examining Census Bureau company-specific data over the 1972-to-1985 period and concludes that there is strong evidence linking R&D and firm productivity. See also Griliches, "The Search for R&D Spillovers."

/3/ See Jasinowski, "The Case for Higher Growth: Technology, Disinflation and New

Economic Policies," 1996. The report cites studies performed by Brinner, "Technology, Labor and Economic Potential," Data Resources Inc.-McGraw Hill, 1978, and by Richards, "Technological Advance and Postwar Economic Growth," Eastern Economic Journal, 1992.

/4/ See Council of Economic Advisers, Economic Report of the President, 1995. Of course, remedies such as better enforcement of property rights through increased intellectual property protection internationally could improve the innovators' returns, but since intangible capital is essentially as mobile as the individuals involved in such research, intellectual property protection by itself is likely to be insufficient as a stimulus to promote further R&D investments.

/5/ See, e.g., a recent commentary in support of the R&D credit by Harvard University professor F.M. Scherer, "Raising Productivity on the Technology Frontier," appearing in the Federal Reserve Bank of Boston's publication Regional Review (January 1997).

/6/ See Council of Economic Advisers, Economic Report to the President, 1995.

/7/ See Congressional Research Service, Tax Preferences for Research and Experimentation: Are Changes Needed? 1995.

/8/ Indeed, table 2 excludes one investment from Mansfield's study that generated a loss.

/9/ A firm's base amount is calculated by multiplying the firm's "fixed base percentage" -- the ratio of firm R&D outlays to gross sales revenues in the period, 1984 to 1988 -- by average gross sales in the four preceding tax years.

/10/ See Office of Technology Assessment, The Effectiveness of Research and Experimentation Tax Credits, 1995.

/11/ An exception has been two studies prepared by the U.S. General Accounting Office (GAO), which challenge the credit's usefulness as a stimulus for additional private sector research (see The Research Tax Credit Has Stimulated Some Additional Research Spending, GGD-89-114, 1989 and Tax Policy: Pharmaceutical Industry's Use of the Research Tax Credit, GGD-94-139, 1994). The GAO's findings have less relevance today because they are based on dated 1981-to- 1985 information, do not examine the current structure of the credit, and have been challenged by a series of subsequent academic and government-sponsored studies. Observers of the credit have noted that structural changes to the credit substantially increased its incentive effect, making the current response greater than that reflected by the earlier data.

/12/ See "R&D Tax Policy During the 1980s: Success or Failure," in National Bureau of Economic Research, Tax Policy and the Economy, 1993.

/13/ See Baily and Lawrence, "Tax Incentives for R&D: What Do the Data Tell Us?" 1992; Berger, "Explicit and Implicit Effects of the R&D Tax Credit," Journal of Accounting Research, 1993; and Hines, "On the Sensitivity of R&D to Delicate Tax Changes: The Behavior of U.S. Multinationals in the 1980s," Studies of International Taxation, 1993.

/14/ The lower refund rate becomes effective when 50 percent of a company's current-year qualified R&D exceeds its base amount of R&D.

/15/ Both estimates of the cumulative tax loss through fiscal year 2002 from extending the R&D credit from June 1997 through May, 1998 totaled $2.1 billion. At the time those estimates were made, the anticipated level of R&D was based on data from the National Science Foundation through 1994. According to the National Science Foundation, total privately funded R&D in 1994 totaled $97.1 billion in 1994 -- up from $94.6 billion in 1993.

/16/ The social rate of return of 31 percent in the simulation is near the middle of the range of estimated rates of return to R&D. For confirmation, see table 1 of this study. According to Griliches, most empirical estimates fall between 20 percent and 50 percent ("Productivity Puzzles and R&D," Journal of Economic Perspectives, 1988).

/17/ According to CBO's recent update of the budget outlook (September 1997), federal tax collections will average slightly more than 19 percent of GDP over the 10-year budget period. Incremental tax collections on additional real GDP, however, would be about 110 percent of the average rate -- implying a 21 percent tax rate at the margin.

/18/ The 3 percent discount rate equals the projected real cost of federal borrowing based on CBO's projections of inflation and nominal federal interest rates on longer-term securities.

/19/ The estimation of the TFP gain by industry as a result of additional R&D stimulated by the tax credit is discussed in Appendix C.

/20/ See, e.g., Griliches, "Issues in Assessing the Contribution of R&D to Productivity Growth," The Bell Journal of Economics, 1979; Mansfield, "Basic Research and Productivity Increase in Manufacturing," American Economic Review, 1980; Scherer, "Interindustry Technology Flows and Productivity Growth," Review of Economics and Statistics, 1982; Terleckyj, "Direct and Indirect Effects of Industrial Research and Development on the Productivity Growth of Industries," in Kendrick and Vaccara, eds., New Development in Productivity Measurement (National Bureau of Economic Research, 1980).

/21/ See, e.g., Griliches, "Productivity, R&D, and Basic Research at the Firm Level in the 1970s," American Economic Review, 1986; Clark and Griliches, "Productivity Growth and R&D at the Business Level: Results From the PIMS Data Base," in Griliches, ed., R&D, Patents and Productivity (University of Chicago Press, 1984); Link, Research and Development Activity in U.S. Manufacturing (Praeger, 1981); Link, "Basic Research and Productivity Increase in Manufacturing: Additional Evidence," American Economic Review, 1981; Mansfield, "Rates of Return From Industrial Research and Development," American Economic Review, 1965; Griliches and Lichtenberg, "R&D and Productivity Growth at the Industry Level: Is There Still a Relationship?" in Griliches, ed., R&D, Patents, and Productivity (University of Chicago Press, 1984); Scherer, "Using Linked Patent and R&D Data to Measure Interindustry Technology Flows," in Griliches, ed., R&D, Patents, and Productivity (University of Chicago Press, 1984); Terleckyj, "Direct and Indirect Effects of Industrial Research and Development on the Productivity Growth of Industries," in Kendrick and Vaccara, eds., New

Development in Productivity Measurement (National Bureau of Economic Research, 1980); Wolff and Nadiri, "Spillover Effects, Linkage Structure, and Research and Development," Structural Change and Economic Dynamics, 1993; Wolff, "Spillovers, Linkages and Technical Change," Economic Systems Research, 1997.

/22/ How C&L quantified the various R&D variables by industry is described in the next section.

/23/ Following the conventional treatment in the economic literature, actual R&D expenditures are used as a proxy for R&D "capital."

END OF FOOTNOTES

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cc:
Subject: Silicon Valley CEOs

Skill gaps, new markets? we should prepare stuff for both Gene and john. agree?

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Subject: Silicon Valley CEOs

John will be meeting with Silicon Valley CEOs on **June 9 at 3:00**. I'll follow up with more information when I have it. Thanks.

New Markets w/ Doen

— Paper —

Investment in New Market Venture Capital Firms

putty

tech components to NMI.

like microenterprise

technology based training for entrepreneurs on technology

a type/ idea/

~~Technology Community Centers~~ mentoring technology centers

not enough $ to subsidize internet connectivity

informative microenterprises

. at least a technology community center

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Adults use for Resume
look for jobs
local health information

T.A. → software to learn how to
have their business

purchased 1st by one-stop capital shops

easy math become more

CTC ~~to~~ to Trip and [illegible]

Small Bus. Development Centers