Economic impact of tax proposals affecting research-intensive start-up businesses and qualified small business companies

Prepared for the Coalition of Small Business Innovators (CSBI)

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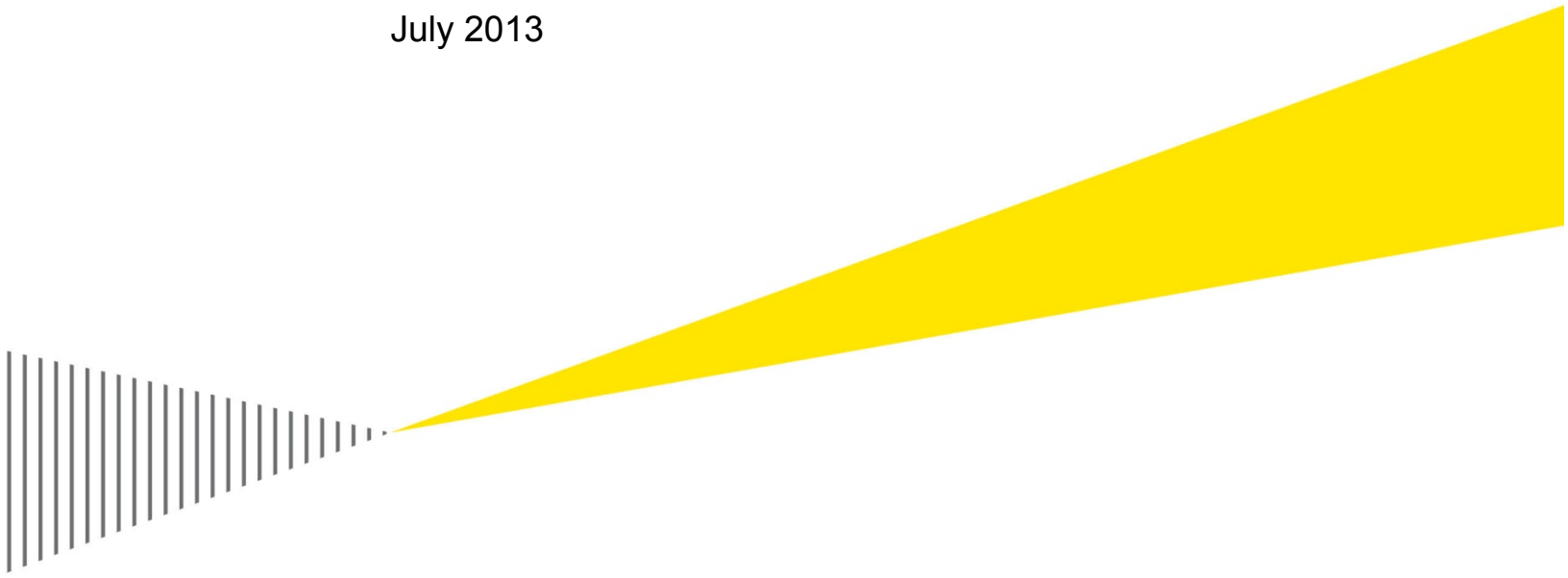

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Executive summary

The United States offers several tax incentives to encourage spending on research and development (R&D). Research-intensive start-up companies and their owners, however, are frequently unable to make effective use of these tax incentives. Start-up companies organized as C corporations generate net operating loss carry-forwards because they are in their pre-revenue phase of development and do not have taxable income to offset. Investors in start-up companies organized as pass-through entities are often unable to use the losses generated in the pre-revenue phase of development because the passive activity loss rules generally permit such losses to offset passive income only (which many investors do not have) or delay the use of the losses. Research-intensive start-ups often spend nearly a decade or more investing in a new technology or product prior to commercialization. Start-ups need to raise a great deal of capital to fund their investments and typically do so through several rounds of financing from external investors. During this pre-revenue phase neither the start-up company nor investors in the start-up company can use the tax incentives generated by their R&D investments.

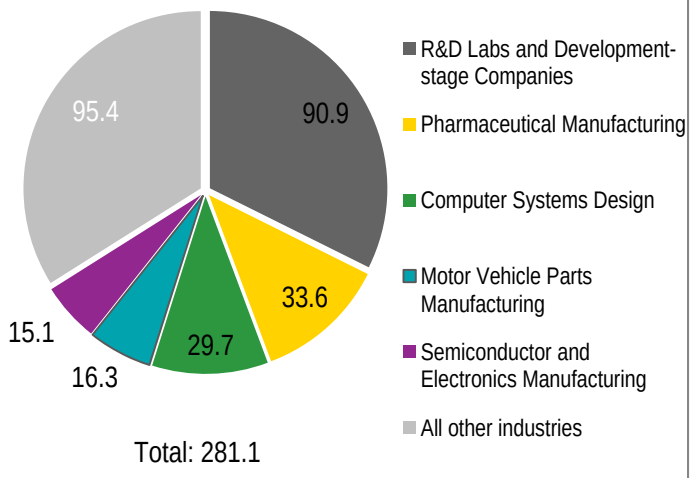
This report considers the economic impact of three potential tax changes that would encourage additional investment in R&D-intensive start-up companies and other small businesses:

- **R&D partnership structures**. This proposal would reform the passive activity loss (PAL) rules in Section 469 to promote the creation of R&D partnership structures. Qualifying R&D-intensive start-ups would be able to raise money from investors for specific projects and the investors would be able to use tax losses and credits generated by those projects on a current basis.
- **Reform Section 382 NOL limits**. This proposal would help R&D-intensive start-ups that are raising capital or involved in merger or acquisition (M&A) transactions to preserve the value of the tax deductions created by their R&D investments. Currently, new rounds of investment and M&A deals can trigger legal limits on the use of their R&D deductions.

In order to qualify for the benefits of either the R&D partnership structures or the Section 382 net operating loss (NOL) proposals, companies would have to have 250 or fewer employees, $150 million or less in aggregate assets, and meet at least one of two R&D-intensity tests. Based on publicly available data, it is estimated that companies meeting all three of these tests directly employ over 281,000 workers across many industries, as shown in Figure 1.

Figure 1: Industries with Qualifying Employment

(000s of Employees)



Note: NAICS 5417, 3254, 5415, 3363 & 3344; Source: EY analysis.

- **Extend and expand the QSBS exclusion**. This proposal would permanently extend the 100% capital gains exclusion from the sale of qualified small business stock (QSBS) that would reduce capital gains taxes for dispositions of equity interests in qualifying companies, increase the size limit for qualifying companies from $50 million to $150 million in assets, and extend the exclusion to companies organized as pass-through businesses. Companies that would qualify for this proposal are estimated to employ over 9 million workers in total, over 281,000 of which are in R&D-intensive start-ups.

This report finds that, if enacted together, these three proposals would increase total private sector R&D spending by 6% in the long-run. In today's economy, this amounts to an additional $15.3 billion in research spending by qualifying companies annually.

These proposals would increase total investment by $20.6 billion and result in an estimated 623,000 jobs in research-intensive companies, small businesses, their suppliers, and businesses that sell to employees (referred to herein as affected companies).

Enacting these proposals separately would reduce their economic impact somewhat. The estimated investment and employment impacts of these proposals, if enacted separately, are as follows:

- The R&D partnership structures proposal would increase investment by an estimated $10.3 billion per year, resulting in 156,000 additional jobs at affected companies.
- The reform of Section 382 would increase investment by a total of $5.5 billion per year, resulting in 85,000 additional jobs at affected companies.
- The extension and expansion of the QSBS provision would increase investment by $3.6 billion, resulting in 355,000 additional jobs at affected companies.

Figure 2: Total investment impact

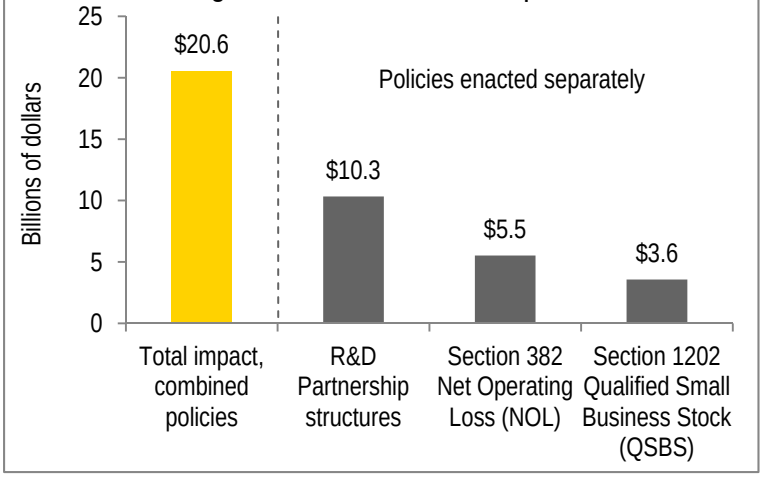
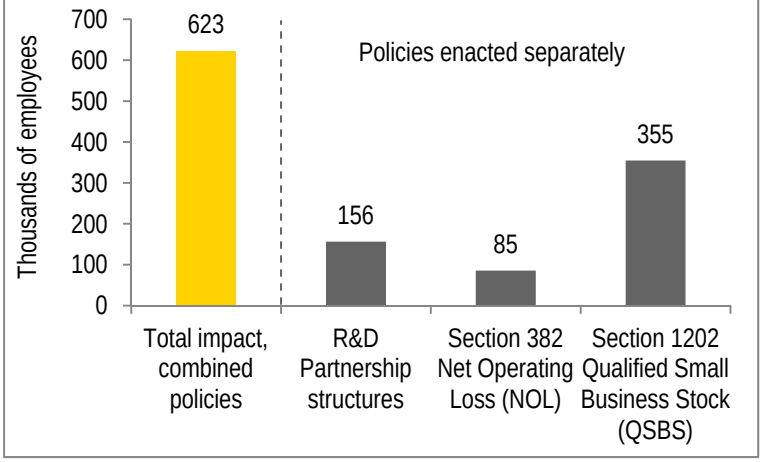


Figure 3: Total employment impact



Note: In the above figures, the separate policy impacts do not sum to the combined impact because, as estimated, the policies would have a greater combined impact if enacted simultaneously. Source: EY analysis.

I. Introduction

Research and development (R&D) in new technologies and new products is an important source of US economic growth and rising living standards.[1] Many of the societal benefits of R&D investments are not captured by the private companies that make them. Consumers benefit from the new technologies, products, and lower prices generated by investments in R&D. Workers benefit when productivity-enhancing innovation allows companies to create new jobs and pay higher wages. Suppliers benefit when their customers' R&D investments create new demand for their goods and services. For these reasons, companies may invest less in R&D than the level that would maximize the benefits to the overall US economy.[2]

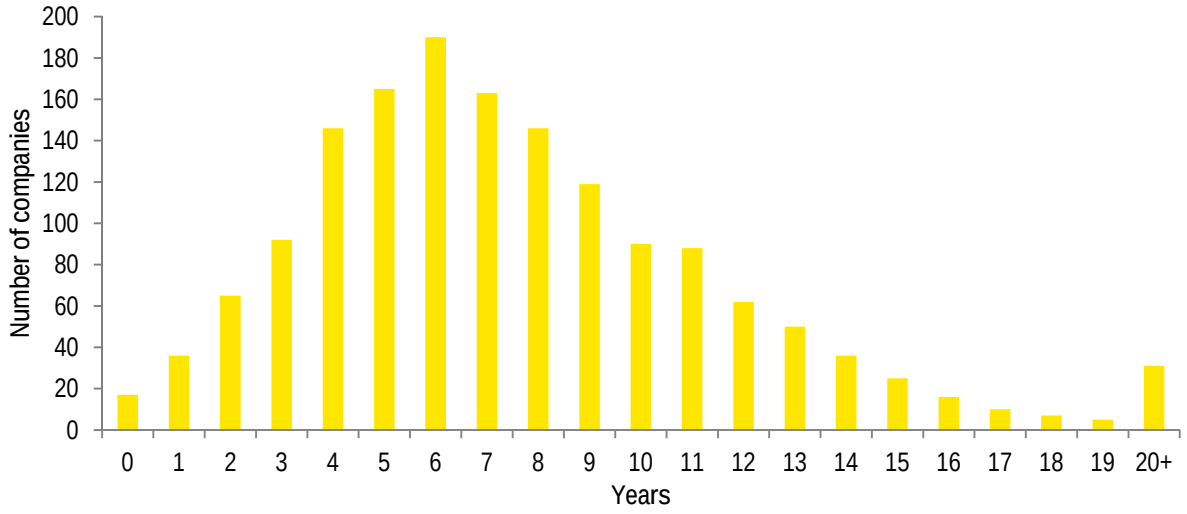
The United States has over many decades developed a set of tax incentives that are designed to increase the volume of R&D investments made by the private sector. These include the provisions that allow R&D expenditures to be expensed and the R&D tax credit.[3] R&D expensing allows companies to deduct the full value of their R&D expenditures in the year they are incurred rather than having to capitalize and depreciate them over the life of the investment. The R&D tax credit allows taxpayers to take a credit of up to 20% of their increased expenditures on qualifying R&D.[4] Together, these policies have been found to increase the amount of R&D conducted by the private sector.[5]

Despite the success of these tax policies in promoting R&D, some research-intensive companies or their investors have difficulty in taking advantage of these policies because they have no taxable income. R&D-intensive start-ups, for example, typically must invest in R&D for many years before they become profitable and during this "pre-revenue" phase of their development they generally cannot use the deductions or tax credits generated by their R&D investments. In addition, there are provisions of the Internal Revenue Code (the "Code") that make it less likely that R&D-intensive start-ups that do achieve profitability will ever be able to fully use their accumulated tax deductions and credits (e.g., Section 382). As a result, investors largely discount the value of these future potential deductions.

Start-ups need to raise a great deal of capital to fund their investments in new technologies and products but as new companies they typically lack the ability to fund themselves with retained earnings. Since they have little in the way of earnings and often few marketable assets as well, they generally cannot easily borrow. Instead, start-ups typically fund themselves with equity investment from investors willing to take considerable risk on a new technology or product.

Understanding the life-cycle of R&D-intensive start-ups is important to designing optimal government policies to encourage innovation. EY analyzed the investment life-cycles of 1,414 start-ups in R&D-intensive industries.[6] All of the companies received financing from venture capital funds at some point during the period from 2003 through 2012. The start-ups in the comprehensive sample on average typically received six rounds of external equity financing over this ten year period. Figure 4 shows that the last round of financing typically did not come until 8 years after the company's founding, with some companies still receiving additional equity investment more than 20 years after their founding. This illustrates the long time periods during which these companies are typically still generating losses, as evidenced by the continuing need for new investment, and are therefore unable to readily use tax incentives for R&D that require them to have taxable income.

Figure 4: Number of years from founding to most recent venture capital investment



Source: EY estimates based on data from the VentureOne database.

Even for those start-ups that become profitable and are able to use tax incentives for R&D against their taxable income, the long wait for those benefits greatly reduces their value. Under current law, many businesses struggling to raise capital to fund R&D investments in a new venture receive little or no value from tax incentives that may or may not be useable at some point in the future long after the company's most serious financing challenges are behind it.

Numerous studies have examined the linkage between R&D incentives and R&D spending. Most often these relate changes in the after-tax cost or "price" of research to research spending controlling for a variety of other factors that may also influence research spending. Many studies use firm level data, which provides a rich source of data from which to capture the impact of differences in the tax treatment of R&D over time and across firms on research spending.[7] Other studies use aggregated industry data, country data, and state-level data.[8] The different approaches allow for different sets of controls to account for non-tax factors that may influence research. Importantly, the studies are also drawing on different incentive structures over time, across different firms, across countries, and across states. Despite considerably varied results, most studies find sizable effects, and long-run effects tend to be considerably larger than short-run effects. This study assumes that in the long-run, for every one percent decrease in the price of research, research spending will rise by 1%. A summary of this literature can be found in Carroll, Prante and Quek (2011).[9]

II. Proposals to promote investment in R&D-intensive start-ups and other small businesses

This report considers the economic impact of three legislative proposals to spur increased investment in R&D-intensive start-ups and other small businesses by allowing companies and individuals to more fully use R&D incentives and keep more of their capital gains. These legislative proposals would:

1. Modify the passive activity loss restrictions to encourage individuals to invest in small, R&D-intensive pass-thru ("pass-though") businesses (the "R&D Partnership Structures Proposal");
2. Permit small, R&D-intensive corporations to carry forward losses with fewer restrictions after taking on new investors (the "Section 382 Net Operating Loss Reform Proposal");
3. Extend and expand the exclusion of capital gains from the sale of Qualified Small Business Stock (QSBS) (the "Section 1202 Capital Gains Proposal").

Proposal 1: R&D Partnership Structures Proposal

The R&D Partnership Structures Proposal would promote the creation of small, R&D-intensive companies organized as pass-through businesses – partnerships, S corporations and limited liability companies. These R&D-intensive start-ups would be able to raise money from investors for specific projects and the investors would be able to use the tax deductions generated by those projects. This proposal would exempt losses from investments in qualifying companies from application of the passive activity loss rules. In order to be eligible for this exception, the pass-through entity must qualify as a research-intensive small business. Research-intensive small businesses must meet an expenditure test, an aggregate gross assets test, and an employee test. These tests ensure that the proposed exception would only apply to small, R&D-intensive entities. Under the expenditure test, 75% of the pass-through entity's total expenditures would need to be made in connection with R&D-related activities or 50% of expenditures would need to be for "qualified research expenses" under Section 41. The aggregate gross assets test, which is a modified version of the Section 1202 aggregate gross assets test, requires that the aggregate gross assets of the pass-through entity not exceed $150 million (indexed for inflation).[10] The employee test would require that the pass-through entity have 250 or fewer employees.

Proposal 2: Section 382 Net Operating Loss Reform Proposal

The Section 382 Net Operating Loss Proposal would permit acquisitions of stock in qualified research-intensive small businesses organized as C corporations without triggering the application of Section 382 to the portion of such corporation's net operating loss (NOL) and other tax attributes that are attributable to R&D expenditures. Qualification as a research-intensive small business corporation is based on the same criteria used for qualified research-intensive pass-through entities discussed above in the R&D Partnership Structures Proposal (i.e., a minimum percentage of expenditures incurred in connection with R&D, not more than $150 million in aggregate gross assets, and 250 or fewer employees).

Proposal 3: Section 1202 Capital Gains Proposal

The most significant elements of the Section 1202 Capital Gains Proposal include broadening the criteria for a “qualified small business” under Section 1202. First, this proposal would increase the asset limit for qualifying small businesses from $50 million to $150 million. Second, it would allow pass-through entities such as partnerships and S-corporations to be “qualified small businesses” for the purposes of Section 1202. Third, it would make the 100% exclusion of capital gains from the sale of qualified small business stock permanent.

The Section 1202 Capital Gains Proposal also includes other changes including the exclusion from the calculation of aggregate gross assets certain intangibles as well as follow-on investments of cash under a safe harbor. These changes are intended to increase the effectiveness of Section 1202 tax incentives for investing in small businesses.

III. Economic impact of proposed policies

Each of these proposed policies would encourage additional investment in qualifying companies by reducing the cost of capital on those investments.[11] The cost of capital for pre-revenue companies can be considerably higher than for profitable companies because of their inability to use tax losses and credits. The R&D Partnership Structures Proposal and the Section 382 Net Operating Loss Reform Proposal would lower the cost of capital by allowing losses to be used more quickly or at all, which allows investors to accept a lower pre-tax return on an investment. The Section 1202 Capital Gains Proposal would reduce the cost of capital for a much wider group of small businesses by eliminating the capital gains tax on stock held in those businesses at least 5 years. For all three proposals, qualifying companies would then be able to raise more capital at a lower cost, helping finance their investments in R&D.

Cost of capital, taxes and investment

Before a company can make a major new investment in R&D or other assets it needs to raise the required capital. Whether capital comes in the form of debt or equity, investors will expect to be paid a financial return on the capital they provide. The return a company needs to provide investors in order to raise the capital to fund its investments is known as the company's "cost of capital." Investments that do not produce a large enough return to cover their cost of capital will lose money. For this reason, companies generally do not invest in projects that are not expected to cover their cost of capital.

Taxes raise a company's cost of capital because the company has to earn enough to cover its taxes and still pay a competitive return to its investors. Taxes also increase the return investors demand on their investments because they have to cover their tax obligations out of the payments they receive from the companies they invest in. A higher cost of capital due to taxes means that some investment projects that would have been funded will no longer be funded because after the cost of taxes is taken into account those projects would lose money. As a result, the level of taxation of business and investment income in an industry has an important impact on the level of investment in that industry.

Policies that lower the effective tax rate on an industry and its investors will lower the cost of capital for that industry and increase investment in that industry, all else equal.

The proposals have a direct effect on the investment, employment, and output by the companies themselves, and then also have indirect and induced effects as the additional economic activity by these companies ripples throughout the economy through suppliers and consumer purchases. The total long-run effect (direct, indirect, and induced) for all three tax proposals measured in relation to today's economy (i.e., 2013) is estimated to increase investment by $20.6 billion and result in more than 623,000 US jobs in affected companies.[12] The size of this effect would grow over time approximately in proportion to the growth of the economy.

Companies qualifying as research-intensive small business

In order to qualify for the benefits of either the R&D Partnership Structures or the Section 382 Net Operating Loss Proposals, companies must meet asset, employee, and R&D-intensity tests. Based on publicly available data, it is estimated that companies meeting all three tests currently employ over 281,000 workers. Companies able to meet all three of the tests are not equally distributed across industries. Estimated employment in qualifying companies across US industries, as defined by 4-digit NAICS codes, is shown below in Table 1.[13]

Table 1: Employment in companies meeting the asset, employee and R&D-intensity tests

NAICS	Description	Qualifying Employment (000s)
5417	Scientific Research and Development Services	90.9
3254	Pharmaceutical and Medicine Manufacturing	33.6
5415	Computer Systems Design and Related Services	29.7
3363	Motor Vehicle Parts Manufacturing	16.3
3344	Semiconductor and Other Electronic Component Manufacturing	15.1
5416	Management, Scientific, and Technical Consulting Services	11.4
3112	Grain and Oilseed Milling (includes ethanol manufacturing)	10.8
3391	Medical Equipment and Supplies Manufacturing	10.7
3399	Other Miscellaneous Manufacturing	8.5
3251	Basic Chemical Manufacturing	7.8
3359	Other Electrical Equipment and Component Manufacturing	7.8
3345	Navigational, Measuring, Electro-medical, and Control Instruments Manufacturing	7.0
3332	Industrial Machinery Manufacturing	6.7
3333	Commercial and Service Industry Machinery Manufacturing	4.6
3353	Electrical Equipment Manufacturing	4.6
5191	Other Information Services	3.3
5112	Software Publishers	2.4
3241	Petroleum and Coal Products Manufacturing	2.0
5179	Other Telecommunications	2.0
3351	Electric Lighting Equipment Manufacturing	1.8
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	1.4
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	1.3
	All other industries	1.3
	Total	281.1

Source: EY analysis; Based on data from Compustat and US Census County Business Patterns databases.

Proposal 1: R&D Partnership Structures Proposal

Three types of companies would benefit from the changes to the passive loss limitations on qualifying small, R&D-intensive pass-throughs under the R&D Partnership Structures Proposal: (i) C-corporations that carve-out R&D limited partnerships (RDLPs) (i.e., "spin-offs") in order to attract investors desiring to invest in R&D projects that are eligible for the tax incentives offered by the proposal; (ii) newly-formed and existing pass-through companies that qualify; and, (iii) C-corporations sufficiently small and R&D-intensive to qualify if they switch to pass-through form to take advantage of the benefits offered by this proposal.

A) *R&D limited partnership spin-offs.* Some larger companies may choose to spin off RDLPs to finance their R&D projects because outside capital would be willing to invest in the R&D project

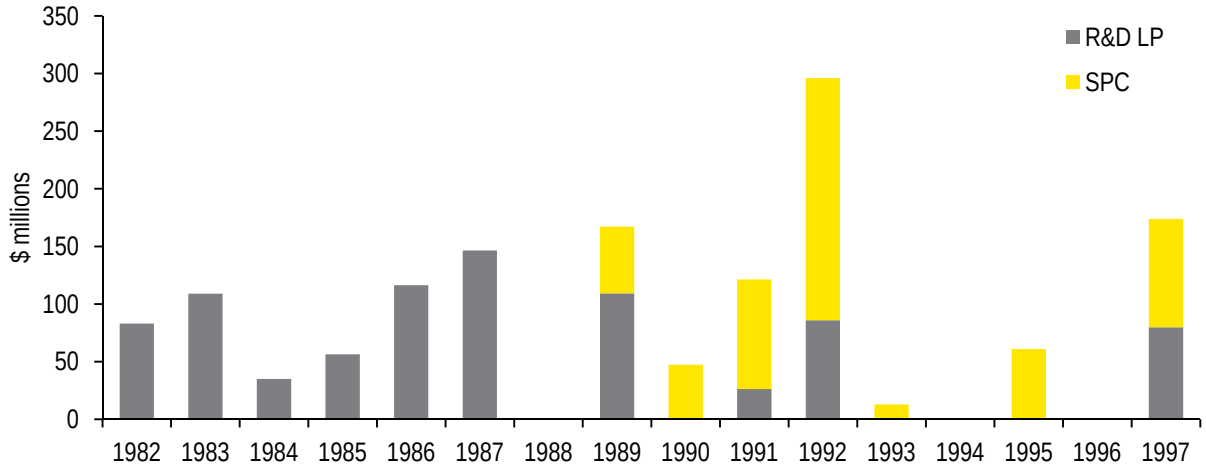
with the inducement of the flow-through of immediately available tax benefits from the R&D partnership structure. Spin-offs would also allow companies that have taxable income but that do not meet the asset, employee, or R&D tests to form RDLPs that do meet these tests.[14]

The potential growth of RDLPs is likely limited. Administrative costs for capital raised through RDLPs may be high compared to equity financing. For example, one study found that the costs to form an RDLP consumed 14% of the capital raised, versus only 3% to 4% for equity offerings by companies that were already publicly-traded.[15] This same study indicated that RDLPs need to be carefully structured to assure investors that no "adverse selection" incentives exist for sponsoring companies to put only their worst projects into RDLPs. As a result, only R&D projects with clear intellectual property protections and agreed upon research milestones are practical to include in RDLPs.

RDLPs enjoyed a brief popularity in the early 1980s. While these structures did offer investors tax advantages at that time, the Congressional Budget Office (CBO) found that RDLPs were effective at increasing funding for research and the Commerce Department actively promoted RDLPs to industry and offered assistance in their formation.[16] The former Congressional Office of Technology Assessment estimated the peak year for RDLPs was 1983, with $490 million of funding raised from investors. RDLPs reached their peak in the period from 1982-1984, representing 0.8% of all business R&D investment.[17]

Comprehensive data on RDLPs across industries and over time is not publicly available, but some academic researchers have hand-collected samples for particular industries and time periods. Figure 5 displays 15 years of data for the biotech industry for RDLPs and Special Purpose Corporations (SPCs), which are similar in function to RDLPs but organized as C-corporations.

Figure 5: Total value of RDLPs and SPCs in the biotech industry, 1982 -1997



Source: Schiff & Murray (2004); EY.

After the Tax Reform Act of 1986, the ability of RDLP investors to deduct passive losses from the partnership's R&D investments was severely restricted. RDLPs declined in response, but did not disappear. They were partly replaced by Special Purpose Corporations (SPCs) that offered better liquidity and lower costs. Also, the investor base shifted from individual investors toward institutional investors, who placed little value on the tax treatment of losses.[18] Accounting changes since the 1980s also limited the opportunity to move RDLPs "off balance sheet," reducing another aspect of their prior attractiveness.

The R&D Partnership Structures Proposal is estimated to reduce the gross cost of capital for projects organized as RDLPs by 38.8%. The lower cost of capital reflects the ability of losses from qualifying R&D investments to be used more quickly by individual investors through the partnership structures provision. This reduction in the cost of capital is combined with estimates of the responsiveness of research spending to its tax treatment in the long-run as reported in a broad range of academic studies to yield an estimated $2.0 billion increase in annual R&D investment by these companies (see Appendix A for a detailed explanation of the methodology).

B) *Existing small R&D-intensive start-up pass-through entities.* Small, R&D-intensive, start-up companies organized as pass-throughs, such as partnerships or S-corporations, that meet the asset, employee, and R&D tests outlined above, would gain an immediate tax benefit and reduction in their cost of capital under this proposal. Under current law, the passive activity loss rules limit the ability of passive investors to deduct a pass-through's losses from their ordinary income.[19] Removing this restriction would allow investors to accept a lower pre-tax return on their investment in qualifying pass-throughs. It is estimated existing small R&D-intensive start-up companies currently organized as pass-throughs would see their gross cost of capital on new investments drop from 14.6% to 10.7%, resulting in $3.5 billion of additional annual R&D investment by this type of company.

C) *Existing small R&D-intensive C corporations that convert to pass-through status.* Small, R&D-intensive, start-up C-corporations face a high cost of capital due to their inability to benefit from the tax deductions and credits generated by their R&D investments. It is estimated that the R&D Partnership Structures Proposal would result in 15% of small, research-intensive C-corporations converting to pass-through businesses in response to the R&D Partnership Structures Proposal.[20] This would lower their gross cost of capital from 28.8% to 10.7%, resulting in $3.7 billion of additional annual R&D investment by this type of company.

The R&D Partnership Structures Proposal is estimated to reduce the gross cost of capital for investment in R&D by these three sets of firms (RDLP spin-offs, start-up and existing pass-throughs, and start-up C-corps) sufficiently to generate an approximately 4% increase in private R&D spending over the long-run, translating into $9.2 billion per year of additional R&D investment by these companies.

Table 2 shows the estimated economic impact of the R&D Partnership Structures Proposal. The estimated $9.2 billion per year rise in R&D spending increases economic output in the R&D sector by the same amount, with $2.0 billion in spin-off RDLPs, $3.5 billion of the increased R&D output occurring in the start-up non-corporate sector, and $3.7 billion in the start-up C-corporation sector.[21] These changes in research expenditures are accompanied by increased research employment totaling 47,000 employees and increased labor income of research employees totaling $5.0 billion per year based on industry average ratios of research gross output and income. These changes are shown in Table 2 as direct economic impacts.

The estimated changes in the level of research activity (shown in the direct impact column of Table 2) result in additional indirect economic impacts related to supplier purchases by research labs and induced economic impacts related to employee consumption spending. The indirect economic impact of research activities includes employment by suppliers that sell chemicals, testing supplies, professional services, and other inputs to research labs. The induced economic impact includes employment of businesses that sell to employees of research labs and suppliers, such as restaurants, retailers, and personal services providers.[22] Combining the direct, indirect, and

induced impacts, the total estimated economic impact on affected companies of the R&D Partnership Structures Proposal is 156,000 jobs, $10.4 billion per year of labor income, and $26.1 billion of annual gross output.

Table 2: R&D Partnership Structures Proposal economic impact

	Direct impact	Indirect & induced impact	Total impact
RDLP SPIN-OFF SECTOR			
Employment (000s of employees)	9.6	22.6	32.2
Labor Income ($billions)	$1.0	$1.1	$2.1
Gross Output ($billions)	$2.0	$3.7	$5.7
Investment ($billions)	$2.0	$0.2	$2.3
START-UP PASS-THROUGH SECTOR			
Employment (000s of employees)	19	44	62
Labor Income ($billions)	$2.0	$2.2	$4.2
Gross Output ($billions)	$3.5	$6.5	$10.0
Investment ($billions)	$3.5	$0.4	$4.0
START-UP C-CORP SECTOR			
Employment (000s of employees)	18	43	62
Labor Income ($billions)	$2.0	$2.2	$4.1
Gross Output ($billions)	$3.7	$6.7	$10.4
Investment ($billions)	$3.7	$0.4	$4.1
TOTAL			
Employment (000s of employees)	47	110	156
Labor Income ($billions)	$5.0	$5.5	$10.4
Gross Output ($billions)	$9.2	$16.9	$26.1
Investment ($billions)	$9.2	$1.1	$10.3

Source: EY analysis; Based on IRS Statistics of Income data and the IMPLAN economic model.

Proposal 2: Section 382 Net Operating Loss Reform Proposal

The life-cycle of research-intensive start-ups typically involves many events likely to trigger the Section 382 limits on the NOLs generated by start-ups' R&D investments. Based on one estimate, 83% of the value of these NOLs may be lost.[23]

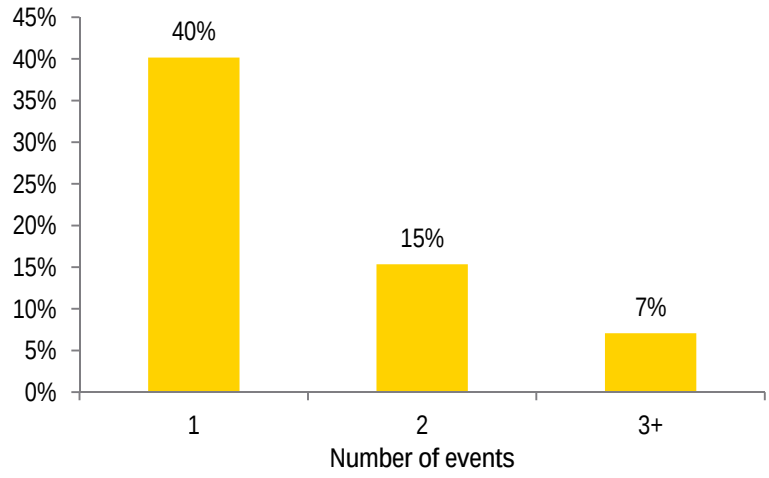
Most R&D-intensive start-ups do not become profitable as private, stand-alone entities. A small number of them become profitable, private companies and some are successful enough to go public through an Initial Public Offering (IPO). However, most start-ups are acquired by larger, more established companies that are better able to commercialize their innovations. Both IPOs and acquisitions frequently result in Section 382 limitations on the use (and therefore the value) of NOLs.

In addition, start-ups are typically funded by several rounds of external financing from venture capitalists (VC) or other investors. If a company raises enough money from enough new investors it could easily trigger Section 382 limits.

To evaluate the frequency of this phenomenon, each round of financing for 1,414 venture capital-backed companies in R&D-intensive industries was analyzed, based on a widely-used database of venture capital investments over the period 2003-2012 (Figure 6).[24] Transactions likely large

enough to qualify as a Section 382 event were identified in nearly two thirds of companies. Figure 6, shows the share of companies experiencing the indicated number of likely Section 382 events. Summing the columns shows that 63% of companies experienced at least one event and 22% of companies experienced more than one likely event.

Figure 6: Share of companies with likely Section 382 events due to raising venture capital



Source: EY analysis; Based on data from the VentureOne database.

Many of the capital raising-events during a typical start-ups life-cycle (e.g., IPO, acquisition, VC funding round) are likely to trigger a Section 382 event. As a result, most start-ups encounter Section 382 limits on the use of the NOLs they create during their often long pre-revenue, high R&D investment period.

The volume of NOLs in companies qualifying under the Section 382 Net Operating Loss Reform Proposal was estimated by examining the financial statements of every identified research-intensive start-up that went public between 2003 and 2012, coupled with data on venture capital investments at the company level.[25] The relationship between the NOL carry-forwards of newly public companies listed on their financial statements and the venture capital invested in them prior to going public was used to estimate the volume of NOLs in the much larger pool of companies that did not go public, as shown in Table 3.

Table 3: Estimated qualifying NOLs for public and private companies by industry, 2003-2012

NAICS	Industry description	NOLs ($millions)
3254	Pharmaceutical and Medicine Manufacturing	7,489.1
3344	Semiconductor and Other Electronic Component Manufacturing	1,086.2
5417	Scientific Research and Development Services	898.9
5112	Software Publishers	443.4
5415	Computer Systems Design and Related Services	368.1
3391	Medical Equipment and Supplies Manufacturing	363.7
3345	Navigational, Measuring, Electromedical, and Control Instruments Mfgrg	239.6
5191	Other Information Services	226.4
5179	Other Telecommunications	65.4
3359	Other Electrical Equipment and Component Manufacturing	59.5
3333	Commercial and Service Industry Machinery Manufacturing	59.3
3341	Computer and Peripheral Equipment Manufacturing	55.7
5416	Management, Scientific, and Technical Consulting Services	47.7
3342	Communications Equipment Manufacturing	38.2
3353	Electrical Equipment Manufacturing	29.1
3363	Motor Vehicle Parts Manufacturing	15.9
3351	Electric Lighting Equipment Manufacturing	9.4
3251	Basic Chemical Manufacturing	9.2
3332	Industrial Machinery Manufacturing	9.1
3241	Petroleum and Coal Products Manufacturing	6.7
3399	Other Miscellaneous Manufacturing	6.5
3112	Grain and oilseed milling	3.0
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	1.0
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	0.5
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	0.2
2111	Oil and gas extraction	0.1
Total		11,531.7

Source: EY analysis; Based on data from Compustat and VentureOne databases.

Removing the limits on the use of NOLs after a Section 382 event would increase the value of start-ups' R&D investments. Venture capitalists and other investors would be willing to accept a lower return on their investments in start-ups because the NOLs built-up on the start-ups' balance sheets would create a valuable asset and, in effect, place a floor under the value of their investment.

It is estimated that reforming the Section 382 limits would lower the gross cost of capital for C-corporation start-ups from 28.8% to 23.6%. The lower cost of capital results from previously limited losses being used more quickly, or at all, when the Section 382 limits are removed for qualifying R&D intensive investments under the proposal. Combining the lower cost of capital with the responsiveness of R&D investment to its tax treatment is estimated to result in an annual increase in R&D investment by $4.9 billion.[26]

As shown in Table 4, the $4.9 billion per year increase in research spending results in 25,000 additional research employees and $2.7 billion in additional annual labor income. The direct economic impacts are estimated to generate indirect (supplier-related) and induced (consumption-related) impacts including 60,000 additional jobs, $3.0 billion per year of labor income, and $9.0 billion of additional annual gross output. Combining the direct, indirect, and induced economic

effects of the Section 382 Net Operating Loss Reform Proposal, the impact is estimated to be 85,000 jobs.

Table 4: Section 382 Net Operating Loss Reform Proposal economic impact

Start-up C-corporation sector	Direct impact	Indirect & induced impact	Total impact
Employment (000s of employees)	25	60	85
Labor income ($billions)	$2.7	$3.0	$5.7
Gross output ($billions)	$4.9	$9.0	$14.0
Investment ($billions)	$4.9	$0.6	$5.5

Source: EY analysis; Based on IRS Statistics of Income data and the IMPLAN economic model.

Proposal 3: Section 1202 Capital Gains Proposal

The provision to allow a 100% exclusion on capital gains in QSBS held longer than 5 years was recently extended through 2013 as part of the American Taxpayer Relief Act of 2012. The Section 1202 Capital Gains Proposal would permanently extend the 100% exclusion, raise the asset cap from $50 million to $150 million (on an inflation-adjusted basis), and expand this provision to pass-through businesses. The Section 1202 Capital Gains Proposal otherwise incorporates the existing provisions of Section 1202, which is not limited to R&D-intensive companies. Unlike the other two proposals discussed in this report, companies would not also need to pass the employment and R&D-intensity tests to qualify under this proposal. It is estimated that companies employing over 9 million workers would qualify.

Since the tax on capital gains is generally deferred until realization, the effective tax rate can be low.[27] The additional benefits of the QSBS program reduce the gross cost of capital from 12.9% to 12.7% for qualifying C-corps and from 11.2% to 11.1% for qualifying pass-throughs.[28] These cost of capital reductions result in an overall increase in investment in qualifying companies in this sector of 1.5%.[29]

As shown below in Table 5, the direct employment impact of the proposal is an estimated 43,000 corporate employees and 103,000 pass-through employees, totaling 146,000 employees in the corporate and pass-through sectors. The indirect and induced impacts of this proposal include an estimated 208,000 jobs that result from increased supplier activity and employee personal consumption. Combining the direct, indirect, and induced impacts of the proposal, the total estimated impact on employment is more than 355,000 employees.[30]

Table 5: Section 1202 Capital Gains Proposal economic impact

	Direct Impact	Indirect & Induced Impact	Total Impact
CORPORATE SECTOR			
Employment (000s of employees)	43	71	114
Labor Income ($billions)	$2.4	$3.8	$6.2
Gross Output ($billions)	$8.0	$11.6	$19.6
Investment ($billions)	$0.5	$0.8	$1.3
PASS-THROUGH SECTOR			
Employment (000s of employees)	103	138	241
Labor Income ($billions)	$4.9	$7.3	$12.2
Gross Output ($billions)	$16.3	$22.2	$38.5
Investment ($billions)	$0.8	$1.4	$2.3
TOTAL			
Employment (000s of employees)	146	208	355
Labor Income ($billions)	$7.2	$11.2	$18.4
Gross Output ($billions)	$24.3	$33.8	$58.1
Investment ($billions)	$1.3	$2.2	$3.6

Source: EY analysis; Based on IRS Statistics of Income data and the IMPLAN economic model.

Proposals 1, 2, & 3: Combined Economic Impact

The combined effect of all three proposals is greater than the sum of the effects of each individual proposal because of the interactions amongst the policies, as shown below in Table 6.[31] Together these three policy proposals would result in 623,000 jobs, $36.3 billion per year in wages, benefits and other labor income, and increase annual gross economic output by $101.1 billion in affected companies. The R&D Partnership Structures Proposals and Section 382 Net Operating Loss Reform Proposals are focused on qualifying R&D-intensive companies. In contrast, the Section 1202 Capital Gains Proposal broadly impacts qualifying small businesses.

This report also finds that, if enacted together, these three proposals would increase total private sector R&D spending by 6% in the long-run. In today's economy, this amounts to an additional $15.3 billion in research spending by qualifying companies annually.[32]

Table 6: Combined economic impact of proposals 1, 2, & 3

	Direct	Indirect & Induced	Total
Employment (000s of employees)	226	396	623
Labor income ($billions)	$15.7	$20.6	$36.3
Gross output ($billions)	$39.5	$61.6	$101.1
Investment ($billions)	$16.5	$4.1	$20.6

Source: EY analysis; Based on IRS Statistics of Income data and the IMPLAN economic model.

IV. Limitations of the analysis

The estimates of the economic impacts of these proposals on the US economy presented in this report are based on estimates of the change in the cost of capital, the responsiveness of research investment to its tax cost, an input-output model of the US economy, as well as the data and assumptions described throughout this report. Readers should be aware of the following limitations of the modeling approach and limitations specific to this analysis:

- **Estimates are limited by available public information.** The analysis relies on information reported by federal government agencies (primarily IRS, BLS, and Census), financial data for publicly-traded firms (from Compustat), and financial data for venture capital-backed start-ups (from VentureOne). The analysis did not attempt to verify or validate this information using sources other than those described in the report.

- **Certain data is not available for privately-owned companies.** Many companies that could meet the R&D-intensity tests required by some of the proposals discussed in this report are not required to publicly report their financial information, including their R&D spending. The share of employment in qualifying private companies had to be estimated based on available public information.

- **Usage of the RDLP special purpose entity is based on historical relationships.** Only limited data is available on RDLPs after the Tax Reform Act of 1986, making it difficult to estimate the responsiveness of this type of special purpose entity to changes in its tax treatment. This report assumes that RDLPs would be used to fund R&D projects with roughly the same frequency as they were prior to 1986 if their pre-1986 tax treatment was restored. However, many features of the US economy have changed since 1986 in ways that might affect the relative attractiveness of the RDLP. These changes include changes to accounting standards, capital markets, intellectual property laws, and other parts of the Code not directly related to RDLPs.

- **Estimates are based on static production relationships.** The input-output modeling approach taken by this report assumes that there are no potential changes to the composition of intermediate inputs, the use of labor and capital, or other production characteristics as a result of enactment of the proposals.

V. Summary

This report analyzes the economic impact of three legislative proposals designed to help enable small R&D-intensive start-up companies and other small businesses to make greater use of existing tax provisions, such as the R&D credit and expensing of research spending, intended to promote R&D-related investments. These types of firms and their investors, which are often in a pre-revenue phase for an extended period of time, are typically unable to fully benefit from these provisions.

The proposals would encourage additional R&D-related investment in three ways: i) modify the passive activity loss rules to promote the creation of R&D partnership structures, ii) allow R&D-intensive start-ups to raise successive rounds of financing or change ownership without triggering Section 382 limits on use of their net operating losses (NOLs), and iii) permanently extend and expand the 100% exclusion on capital gains from the sale of QSBS for qualifying companies with up to $150 million in assets and organized as pass-through businesses.

These proposals are found to have a significant positive impact on investment in R&D-intensive start-ups by improving their ability to use existing tax incentives for R&D. If enacted together the three proposals would directly increase investment by $16.5 billion and add 226,000 jobs in eligible companies. Including indirect and induced economic effects, total investment would increase by $20.6 billion and total employment would increase by over 623,000 additional jobs in affected companies.

The proposals would also have a significant impact on investment and employment when considered separately:

- The R&D Partnership Structures Proposal would increase investment by $10.3 billion per year and result in 156,000 additional jobs in affected companies.
- The reform of Section 382 would increase investment by $5.5 billion per year and result in 85,000 additional jobs in affected companies.
- The expansion of the Section 1202 Capital Gains Proposal would increase investment by $3.6 billion and result in 355,000 additional jobs in affected companies.

Appendix A. Technical details

Modeling economic impact through IMPLAN

The economic impact of the above policies were estimated using detailed input-output models for the United States, identifying the complex flows from producers to intermediate and final consumers within a region. The model uses data describing purchases of commodities and services by industries, compensation paid to employees, total value added by economic activity in the United States, and imports into the country.

The regional economic multipliers in this study were estimated using the 2010 IMPLAN input-output model. IMPLAN is used by more than 500 universities and government agencies to estimate the economic and fiscal impacts of new investments and changes in demand, employment, and industry output. Unlike other economic models, IMPLAN includes the interaction of over 400 industry sectors, thus identifying the interaction of specific industries that relate to the industries in which companies operate.

Total impacts presented in this report include direct, indirect, and induced effects. Direct effects are production changes associated with the immediate effects or final demand changes. For example, direct effects include employment and spending by proposal-qualifying businesses. Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly affected industries. Indirect effects are attributable to the input purchases of proposal-qualifying businesses from domestic suppliers. Induced effects are the changes in household spending patterns caused by changes in household income generated from the direct and indirect effects and are included in the estimated impacts presented in this study. Induced effects are attributable to spending by proposal-qualifying business and supplier employees, based on household spending patterns for different levels of income.

Indirect and induced effects are driven by (1) input purchases by proposal-qualifying businesses and suppliers, (2) the percentage of each type of commodity that is purchased from within the United States, and (3) household consumption profiles for proposal-qualifying business and supplier employees. Industries producing goods and services for final demand purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakage (imports and value added) stops the cycle. These indirect and induced effects (the effects of household spending) can be mathematically derived. The resulting sets of multipliers describe the change of output for each and every industry caused by a one-dollar change in final demand for any given industry.

Estimating changes in investment from the cost of capital framework

The change in an investment's cost of capital was calculated using the framework first formalized by Hall and Jorgenson (1967) and later refined by Fullerton and King (1984) and described in detail by Gravelle (1994) and Mackie (2002).[33] The cost of capital (net of depreciation) is given by:

$$c = \frac{(r + \delta - \pi)(1 - uz)}{1 - u} - \delta$$

where c denotes the cost of capital, r is the firm's nominal after-tax discount rate, δ is the rate at which the asset depreciates, π is the rate of inflation, u is the corporate income tax rates, and z is the present value of depreciation allowances. The present value of depreciation, z, reflects the discount rate, the tax life of an asset, the depreciation schedules, and other elements of the depreciation system. The values of δ and z vary by type of asset as depreciation allowances for equipment are typically accelerated as compared to their economic lives.

Investor-level taxes and the deductibility of interest are accounted for by assuming that a firm can arbitrage between debt and real capital following Fullerton, Gillette, and Mackie (1987).[34] Investments are frequently financed with both debt and equity financing. This study assumes that, for an R&D-intensive start-up, the investment is financed entirely by equity and, for an established business that an investment is financed with 35-percent debt and 65-percent equity financing. The many other assumptions of this model are based on Mackie (2002).[35]

For established businesses, a further issue involves a firm's marginal source of equity finance; that is, whether the old or new view of dividend taxes applies. This report follows Auerbach and Hassett (2003) and assumes that one-half of equity finance operates under the old view, whereby dividend taxes affect investment decisions, and the other half of firms operate under the new view, whereby firms rely on retained earnings as the marginal source of finance and dividend taxes are capitalized into firm value.[36]

The proposals analyzed in this report affect the cost of capital by accelerating when losses could be used. In some case, such as under the Section 382 limits, the losses could be, in part, lost altogether. This acceleration or use of losses that are lost altogether reduces the cost of capital by increasing the present value of the tax values of the losses relative to current law.

[1] Congressional Budget Office, "R&D and Productivity Growth: A Background Paper," June 2005.
[2] Joint Committee on Taxation, "Tax Incentives for Research, Experimentation, and Innovation," JCX-45-11, September, 16, 2011.
[3] The Internal Revenue Code refers to "research and experimentation" or "R&E" rather than the more commonly used "research and development" or "R&D." This paper treats the terms "R&D" and "R&E" as interchangeable.
[4] Based on an analysis of the R&D credit, about 9% of the research spending qualifies for the regular credit and is unlimited, 36% of research spending qualifies for the regular credit, but is subject to the 50% limit, and the remaining 55% of research spending qualifies for the alternative simplified credit. See Robert Carroll, Gerald Prante and Robin Quek, "The R&D Credit: An effective policy for promoting research spending," An EY report prepared for the R&D Credit Coalition, September 2011.
[5] See *supra* note 2.
[6] Ernst & Young LLP analysis of start-up businesses based on start-up data from the VentureOne database.
[7] See Bronwyn Hall, "Investment and R&D at the firm level: Does the source of financing matter? National Bureau of Economic Research, NBER Working Paper 4096, June 1992; James Hines, "On the Sensitivity of R&D to Delicate Tax Changes: The Behavior of U.S. Multinationals in the 1980s," *Studies in International Taxation* A. Giovannini, R.G. Hubbard, J.Slemrod, eds., (Chicago: University of Chicago Press, 1993); Sanjay, Gupta, Yuhchang Hwang and Andrew Schmidt, "An Analysis of the Availability and Incentive Effects of the R&D Tax Credit After the Omnibus Budget Reconciliation Act of 1989," mimeograph, W.P. Carey School of Business, Arizona State University, 2006; and, Nirupama Rao, "Do Tax Credits Stimulate R&D Spending? The Effect of the R&D Tax Credit in its First Decade," The Wagner School, New York University, April 2013.
[8] See Bloom, Nick, Rachel Griffith and John Van Reenen, "Do R&D Tax Credits Work? Evidence from a Panel of Countries, 1979-1997," *Journal of Public Economics,* Vol. 85. (2002), pp.1-31; Theofanis P. Mamuneas and M. Ishaq Nadiri, "Public R&D Policies and Cost Behavior of the U.S. Manufacturing Industries," *Journal of Public Economics,* Vol. 63(1). (1996), pp.57-81; Daniel J. Wilson, "Beggar Thy Neighbor? The In-State, Out-of-State, and Aggregate Effects of R&D Tax Credits," *Review of Economics and Statistics,* Vol. 91, (2011), pp. 431-436.
[9] See Robert Carroll, Gerald Prante and Robin Quek, "The R&D Credit: An effective policy for promoting research spending," An EY report prepared for the R&D Credit Coalition, September 2011.
[10] Intangibles directly used in connection with R&D and cash from follow-on rounds of investment (if such investment meets a safe harbor) would be excluded from the calculation of aggregate gross assets.
[11] The cost of capital concept used by this report reflects the additional economic income an investment would need to earn to cover taxes over its life.
[12] Estimates of the long-run economic impact are expressed in 2013; that is, in relation to the size of the US economy in 2013.
[13] Ratios were calculated using financial data from all US-headquartered public companies. The share of total annual expenditures (calculated as the difference between a company's total annual pretax income and net sales) related to research and development was calculated for companies with less than 250 employees. Information for those companies passing the employment and expenditure tests was aggregated in order to determine the average percentage of total industry employment related to research and development in qualifying companies.
[14] With RDLPs, investors could deduct losses associated with the RDLP's R&D investments against their individual tax rates, which may be higher than the top corporate rate of 35%.
[15] Anne Beatty, Philip Berger and Joseph Mgliolo, "Motives for forming research & development financing organizations," *Journal of Accounting & Economics*, vol. 19, (1995), p. 417.
[16] See US Congress Congressional Budget Office, *Federal Financial Support for High-Technology Industries,* June 1985 and US Department of Commerce, *Information and Steps Necessary to Form Research and Development Limited Partnerships*, December 1983.
[17] US Congress, Office of Technology Assessment, *Commercial Biotechnology: An International Analysis*, (Washington, D.C.: US Congress), OTA-BA-218, January 1984.
[18] Leora Schiff and Fiona Murray, "Biotechnology financing dilemmas and the role of special purpose entities," *Nature Biotechnology,* Vol 22 (3), (2004), pp. 271-277; Calvin H. Johnson, "Why Do Venture Capital Funds Burn Research and Development Deductions," *29 VA. Tax Rev. 29*, (2009).
[19] Based on an economy-wide average, 48% of the value of a pass-throughs business's losses are limited by the passive activity loss restrictions under current law.
[20] The estimate of the percentage that switch organizational form is calculated from the percent change in the grossed-up tax wedge between the two choices of organizational forms. The economic impacts use a long-run elasticity of 0.359. For more information see Robert Carroll and David Joulfaian, "Taxes and corporate choice of organization form," US Department of the Treasury, Office of Tax Analysis Working Paper No. 72, October 1997 and Austan Goolsbee, (2004), "The Impact of the Corporate Income Tax: Evidence from State Organizational Form Data," *Journal of Public Economics*, Vol. 88(11), pp. 2283-99.
[21] For the economic impacts, this study assumes a long-run research investment elasticity of -1.0. See Appendix A for additional explanation.

[22] The indirect and induced economic impacts are estimated using the IMPLAN economic model of the US economy. The IMPLAN model is a 440-sector US input-output model incorporating BEA, BLS, and other public data to derive sector-specific economic multipliers for employment, gross output, and labor income. See Appendix A for additional information.
[23] Eric James Allen, "The information content of the deferred tax valuation allowance: Evidence from venture capital backed IPO firms" USC Marshall School of Business, September 30, 2012.
[24] The ThomsonONE Private Equity Module contains over thirty years of comprehensive historical data for more than 100,000 private equity/venture capital backed companies, and tracks their information from initial financing to an ultimate liquidity event. The database is updated daily and includes detailed company profiles, financings to date, valuations, investors by round, and upcoming financings.
[25] EY used financial data from 1,700 IPOs over a ten year period to estimate the relationship between pre-IPO investment and net operating losses at the time of the company's IPO. A simple ordinary least squares regression model was estimated of venture capital investment on NOLs, finding that start-ups typically show NOLs equal to 81.5% of venture capital investment. Net operating losses over a ten year period (2003-2012) were estimated based on the total investment received by qualifying companies prior to their exit from the private equity market, generally due to a public offering or acquisition, and then adjusted by the 0.815 parameter and the average percentage of qualifying companies in order to determine the pool of net operating losses available under the Section 382 Net Operating Loss Reform proposal.
[26] See *supra* note 21.
[27] The effective individual tax rate on capital gains used in this report reflects the graduated individual income tax rate schedule for capital gains with a top statutory rate of 20%, the application of the 3.8% Medicare tax to unearned income (e.g., dividends, capital gains and interest income) for high-income taxpayers, and the limitation on itemized deductions for high-income taxpayers (the "Pease" provisions), which increases the top effective tax rate by another 1.2%. Combining these provisions, the top federal effective tax rate on capital gains is currently 25%. The effective tax rate on accrued capital gains, however, is substantially lower than this because capital gains are taxed when realized, not as they accrue and taxpayers receive step-up of basis at death under the estate tax. Additionally, some investors may be tax-exempt (e.g., corporate equities held by certain institutional investors, pension funds and within IRAs/401(k)).
[28] The cost of capital for companies qualifying for the QSBS program is significantly lower than that discussed above for the other two proposals because these companies do not, on average, face the tax disadvantages suffered by the R&D-intensive start-ups that are the focus of the previous proposals.
[29] Assumes a long-run research investment elasticity of -1.0. See Appendix A for additional explanation.
[30] The economic impact of the increase in industry investment was estimated using the IMPLAN model, assuming that the production functions of the affected industries are unaffected by the change. Activity in each sector affected by the policy is assumed to rise by the same amount as investment in the industry (1.5%). The increased investment was then translated into direct economic impacts assuming that the 1.5% increase in industry investment translates into a 1.5% change in industry activity. This estimate is consistent with a long-run impact at current levels of activity.
[31] Examples of policy interactions include: (i) Policy 1 creates an incentive for qualifying C-corps to switch to pass-through form but Policy 2 reduces the qualifying C-corps' cost of capital, reducing the incentive created by Policy 1; (ii) Policy 3 increases the effectiveness of Policy 2 because it eliminates capital gains taxes on the additional value of the NOL tax assets created by eliminating Section 382 limits on them.
[32] The R&D investment effect reported here comes from the sum of the direct investment effects of the R&D Partnership Structures Proposal and the Section 382 NOL Reform Proposal if enacted together. Those direct effects are included in the combined effects reported in Table 3, which are the sums of the effects of all three proposals discussed in this report, but are not broken out separately. This does not include all R&D investment in affected companies that would be created by the proposals discussed in this report. Part of the investment created by the Section 1202 Capital Gains Proposal would be R&D investment. A small part of the indirect and induced investment created by these three policies would also go toward increased R&D investment. However, these additional impacts on R&D investment are not included in the $15.3 billion cited here. The $15.3 billion figure can therefore be considered a conservative estimate of the R&D investment in affected companies that would be created by these proposals.
[33] See Robert E. Hall and Dale W. Jorgenson, (1967), "Tax Policy and Investment Behavior," *American Economic Review,* Vol. 57(3), 1967, pp. 391-414; Don Fullerton and Mervyn A. King, *The Taxation of Income from Capital: A Comparative Study of the United States, the United Kingdom, Sweden, and West Germany*, Chicago: University of Chicago Press, 1984; Jane Gravelle, *The Economic Effects of Taxing Capital Income*, Cambridge, MA: The MIT Press, 1994; and James B. Mackie (2002), "Unfinished Business of the 1986 Tax Reform Act: An Effective Tax Rate Analysis of Current Issues in the Taxation of Capital Income," *National Tax Journal*, Vol. 45(2) (June), pp. 293-337.
[34] See Don Fullerton, Robert Gillette and James Mackie, "Investment Incentives Under the Tax Reform Act of 1986," *Compendium of Tax Research, 1987*, US Department of the Treasury, Office of Tax Analysis (Washington, DC: 1987), pp. 31-173.
[35] See James B. Mackie (2002), "Unfinished Business of the 1986 Tax Reform Act: An Effective Tax Rate Analysis of Current Issues in the Taxation of Capital Income," *National Tax Journal*, Vol. 45(2) (June), pp. 293-337.
[36] Alan J. Auerbach and Kevin A. Hassett, (2003), "On the Marginal Source of Investment Funds," *Journal of Public Economics,* Vol. 87(1), pp. 205-232.