

Capitalize Costs of Software Development

By Calvin H. Johnson

Calvin H. Johnson is Professor of Law, University of Texas. The author wishes to thank Victor Thuronyi, Kristin Hickman, Daniel Markovits, David Cameron, Joe Mikrut, John Golden, Robert M. Brown, and Les Schneider for helpful comments on a prior draft without binding them to the conclusions.

Under current law, a taxpayer may deduct the costs of development of computer software. Software development is also eligible for a 20 percent tax credit, an exclusion of 9 percent of revenue, and expensing to purchasers of software. With all combined, an investment can lose more than 7 percent of its costs per year, with the tax subsidy making the investment justifiable. The proposal would capitalize the cost of development of computer software under section 263A of the code. It would allow recovery of the costs over 15 years but adjust basis yearly to adapt to value determined by current revenue extending over the remaining tax life. It would replace the 20 percent credit given for routine software development with a National Science Foundation prize for extraordinary development. It also recommends administrative action by giving notice that software is a separate and distinct asset and by making routine application of the computer programming skills ineligible for the credit.

The proposal is made as a part of the Shelf Project, a collaboration by tax professionals to develop and perfect proposals to help Congress when it needs to raise revenue. Shelf Project proposals are intended to raise revenue without raising tax rates, because the best systems have taxes that are unavoidable to reach the lowest feasible tax rates. Shelf Project proposals defend the tax base and improve the rationality and efficiency of the tax system. Given the calls for economic stimulus, some proposals may stay on the shelf for a while. A longer description of the Shelf Project is found at "The Shelf Project: Revenue-Raising Proposals That Defend the Tax Base," *Tax Notes*, Dec. 10, 2007, p. 1077, *Doc* 2007-22632, or 2007 TNT 238-37.

Shelf Project proposals follow the format of a congressional tax committee report in explaining current law, what is wrong with it, and how to fix it.

Copyright 2009 Calvin H. Johnson.
All rights reserved.

Under current law, a taxpayer may deduct the costs of development of computer software as soon as the costs are paid or accrued. The immediate deduction of investment costs that have continuing value means that tax does not reduce the pretax return from the project. Existing law, moreover, gives a 20 percent credit for an increase in software development costs and a deduction of 9 percent of income for production that is mostly domestic. Purchasers of software can expense the costs of purchasing software within dollar limits now at \$250,000. The tax subsidies apply to routine investments that give no external value to the public, and they induce projects that waste money in real economic terms because the real pretax demand does not justify the real pretax costs.

The proposal would capitalize costs of software development under section 263A, which already capitalizes the costs of development of film, sound recording, video tape, and similar property. Software development costs would be given a 15-year life. More basis would be deducted, however, if revenues for the current year, extrapolated for the remaining tax life, indicated that the value of the software was less than its basis determined under the 15-year schedule. Basis would be increased and the addition included in income if current year's revenues, under the same system, indicate a high value for the software.

The proposal would also replace the 20 percent credit with an award, administered by the National Science Foundation, for extraordinary contributions to the state of the art.

The proposal also recommends that the administration give the requisite notice that software is a separate and distinct asset under the intangible regulations and that nonobviousness is required to be eligible for the 20 percent credit.

A. Current Law

1. No capitalization of the investment. In 1969 the IRS ruled that the costs of developing computer software "in many respects so closely resemble the kind of research and experimental expenditures that fall within the purview of section 174 of the Internal Revenue Code of 1954 as to warrant accounting treatment similar to that accorded such costs under that section."¹ Section 174 costs generally are attributable to research "in the experimental or laboratory sense."² Under the IRS characterization,

¹Rev. Proc. 69-21; 1969-2 C.B. 303, reaffirmed by section 5 of Rev. Proc. 2000-50, 2000-2 C.B. 601, *Doc* 2000-31079, 2000 TNT 233-11.

²Reg. section 1.174-2(a)(1).

the costs of development of computer software are deducted immediately. If costs were considered to be investments or capital expenditures, the costs would create basis, which would then be deducted over the course of the life of the investment or recovered on sale or abandonment of the investment.

The software development industry in 1969 was very different than it is today. Software development was a customized service, provided by in-house computer programmers or outside service companies. IBM was the dominant player in the computer industry and the software IBM provided as a part of its mainframes was treated as a cost of the computer. The custom services provided afterward might be likened to the repair of the machine. Sale of packaged software barely existed at all. IBM provided software for its mainframe computers, before reacting to antitrust suits attacking bundling of services. Because IBM provided the major software for free, no one could make money selling software.³ Microsoft, which pioneered the mass marketing of packaged software, would not even be created for another six years.⁴ The industry of developing and selling complete software products that are usable by many customers has also become established in the 40 years since 1969. Computer software is no longer primarily the result of a customized service, but a product created by a mature industry.

Software development costs now closely resemble those that must be capitalized under section 263A, which requires the capitalization of direct and overhead costs of the development of tangible personal property produced by the taxpayer. Tangible personal property is defined in section 263A to include "film, sound recordings, video tape, or similar property,"⁵ all of which derive value from their intangible content rather than their tangible embodiments. Film, sound recordings, and video tapes are similar to computer software, except that they are the media of earlier technologies. In each case, the investment produces a master, and the content replicated from the master is sold or leased to customers.⁶ Section 263A, however, also excludes research and experimental costs

³Martin Campbell-Kelly, "From Airline Reservations to Sonic the Hedgehog: A History of the Software Industry," 99-118 (2003).

⁴Microsoft Web site, Microsoft Fast Facts: 1975, <http://www.microsoft.com/presspass/features/2000/sept00/09-0525bookff75.msp>.

⁵Section 263A(b)(2) post-(C) material.

⁶Section 263A(b)(2)(B) creates an exception for inventory if the annual revenue from sale is less than \$10 million on average over the last three years, but inventory costs, including overhead, are capitalized by section 471, even below the \$10 million threshold.

The proposal argues that the inventory accounting will have no role in computation of income from software development. The important asset in software development is the master and the legal right to sell or license it, and not the software package given to the customer. Income is rarely reflected by whether the taxpayer has many or few compact discs in storage at the end of the year, or whether the software is delivered by physical disk or on line.

under section 174 from capitalization,⁷ so that the 1969 IRS guidance comparing computer development costs to experimentation costs keeps software development costs from the scope of section 263A even if they are identical in principle to film, sound recordings, video tape, or similar property.

Software would be capitalized under the intangible investments regs if computer software were not given special exemption. Computer software now has all the attributes of a "separate and distinct asset."⁸ Reg. section 1.263(a)-4(b) generally requires that for costs to be capitalized as a separate and distinct asset, they must produce rights that are protected by property law, and the rights must be "intrinsically capable of being sold, transferred, or pledged (ignoring any restrictions imposed on assignability), separate and apart from the business or business" (as a whole).⁹ The intangibles regulations, however, treat development of computer software as a special exception, specifying that development costs will not be treated as creating a capitalized asset unless and until contrary guidance is published in the *Federal Register* or IRS Cumulative Bulletin.¹⁰

It was not clear that computer software would have qualified as a separate and distinct asset in 1969 when the Service announced that software costs could be deducted immediately, because there were considerable unresolved questions regarding whether property-right protection applied to software. Patent law was written to protect a mechanical device such as an improved gin or machine, but not to protect the computer programs that were like a set of mathematical algorithms.¹¹ A President's Commission on the Patent System in 1966 had recommended against making computer software patentable, even when embodied in a computer.¹² Copyright

⁷Section 263A(c)(2).

⁸Calvin H. Johnson, "The Expenditures Incurred by the Target Corporation in an Acquisitive Reorganization Are Dividends to the Shareholders: (Pssst, Don't Tell the Supreme Court)," *Tax Notes*, Oct. 28, 1991, p. 463, criticizes the separate and distinct asset test as a nonsense tautology. In accounting, "asset" is a conclusion, synonymous with "deferred expense," and parallel in meaning to the tax term "basis" or "capital expenditure." The term "asset" means a cost that is not deducted in the year paid or accrued, but rather carried on the balance sheet over to the future income to which it relates. For tax purposes, capital expenditures are not deducted this year but become basis to be recovered in some future period. However, the regulations requiring property right protection and salability provide a nontautological definition of separate and distinct asset.

⁹Reg. section 1.263(a)-4(b)(3)(i).

¹⁰Reg. section 1.263(a)-4(b)(3)(iv).

¹¹See, e.g., *Gottschalk v. Benson*, 409 U.S. 63, 71 (1972) (refusing to allow a patent for computer program translating numbers to binary form, but saying that that did not preclude "a patent for any program servicing a computer").

¹²Report of the President's Commission on the Patent System, "To Promote the Progress of . . . Useful Arts," at 13 (1966): Uncertainty now exists as to whether the statute permits a valid patent to be granted on programs. Direct attempts to patent programs have been rejected on the ground of nonstatutory subject matter. Indirect attempts to obtain

(Footnote continued on next page.)

also grants property rights but literally gives the holder only the exclusive "right to copy" and the copyright statute does not protect the underlying "idea, procedure, system, method of operation, concept, principle, or discovery regardless of the form in which it is described, explained, illustrated, or embodied in such work."¹³ The limited protection for copyright is relatively easy to invent around. In 1969, IBM was the dominant firm in the industry, selling 70 percent of computers, and it relied more on trade secrets, making computer code inaccessible, binding customers by contract, and copyright of the instruction manuals, than on either patent or copyright of the underlying program.¹⁴

In 1980, however, Congress included within the protection of copyright law a computer program defined as "a set of statements or instructions to be used directly or indirectly in a computer to bring about a certain result."¹⁵ Some software may also be patented, but to qualify for a patent, the software must be a novel discovery that was not obvious to a computer programmer skilled in the tools of the state of the art.¹⁶

Patents are available only by application to the patent office and last for a 20-year term from the date of application.¹⁷ A copyright on computer software arises without the need for an application. The copyright allows the holder to exclude or allow copying by others for 70 years after the death of the last coauthor.¹⁸ For anonymous works and works made for hire, copyright extends for 95 years after first publication or 120 years after its first creation, whichever comes first.¹⁹

If it were not for the special treatment as a research and experimentation expenditure, computer software development costs would be a capital expenditure under

normal tax principles. Capital expenditure is a synonym for saving or investment, and an income tax ordinarily taxes saved or invested amounts.²⁰ Software development is an investment because it is expected to produce income in future years.

Under nontax accounting theory, an asset is a deferred expense that cannot be deducted this year but is put on the balance sheet so it can be deducted against the future income with which the expenditure is matched.²¹ Under generally accepted accounting principles, investment costs with continuing value are matched against future revenues generated from those costs because matching produces a better sample of the net profits that can be expected by a firm over the long term.²² Under traditional principles of tax law, capitalized expenditures are those with substantial value beyond the end of the year.²³ Finally, as explained in the section on "Reasons for Change," deducting the cost of an investment immediately means that tax has no impact on the pretax return from an investment, whereas in general for investments other than computer software that do not qualify for expensing, tax reduces the pretax return, in principle by the statutory tax rate.

Expensing of software development costs is considered to be a tax preference under the alternative minimum tax for individuals not in the business of software development. The AMT is imposed at a rate as high as 28 percent, unless the regular tax is higher. If the taxpayer does not materially participate in the activity (that is, generally, does not spend more than a quarter of the year's time on the activity), the costs of computer development are capitalized and amortized over 10 years in computing the expanded taxable amounts subject to the AMT.²⁴

patents and avoid the rejection, by drafting claims as a process, or a machine or components thereof programmed in a given manner, rather than as a program itself, have confused the issue further and should not be permitted. . . . Reliable searches would not be feasible or economic because of the tremendous volume of prior art being generated. Without this search, the patenting of programs would be tantamount to mere registration and the presumption of validity would be all but nonexistent. . . . It is noted that the creation of programs has undergone substantial and satisfactory growth in the absence of patent protection and that copyright protection for programs is presently available.

¹³17 U.S.C. section 102(b).

¹⁴Campbell-Kelly, *supra* note 3. Under current intangibles regulations, contract protection is generally considered not to be sufficient to make a separate and distinct asset. Reg. section 1.263(a)-4((b)(3)(ii)), subject to exceptions of -4(d)(6) (2004). Contract and property are both effective protections of future value, so the exclusion of contract rights is probably a mistake, but the exceptions where capitalization is required are important.

¹⁵Computer Software Protection Act, P.L. 96-517, section 10(a) amending 17 U.S.C. section 101.

¹⁶35 USC section 103. See, e.g., *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966) (citing, e.g., long-felt but unsolved needs; and failure of others as relevant evidence of nonobviousness).

¹⁷35 U.S.C. section 154.

¹⁸17 U.S.C. section 302(a) and (b).

¹⁹17 U.S.C. section 302(c).

²⁰See, e.g., Henry Simons, *Personal Income Taxation* 50 (1938) (famously defining income by the uses to which it is put, the algebraic sum of consumption and change of value of savings).

²¹Financial Accounting Standards Board, *Financial Accounting Concepts No. 6, Elements of Financial Statements*, (1985) para. 26 (defining asset as "probable future economic benefits" for the firm), para. 172 (saying "future economic benefit is the essence of an asset").

²²For a fine judicial explanation of the accounting theory, see *NCNB Corp. v. United States* 651 F.2d 942 (4th Cir. 1981) (Murnaghan, J.) *rev'd en banc* 684 F.2d 285 (4th Cir. 1982).

²³See, e.g., *INDOPCO, Inc. v. Commissioner*, 503 U.S. 79, 84 (1992) (holding that a taxpayer's realization of benefits beyond the year in which the expenditure is incurred is undeniably important in determining whether the appropriate tax treatment is immediate deduction or capitalization); *Central Bank Block Ass'n v. Commissioner*, 19 B.T.A. 1183, 1185 (1930) (broker's fee for lease was capitalized because it was "acquisition of something from which income will be derived in the future") *aff'd* 57 F.2d 5 (5th Cir. 1932); *Lovejoy v. Commissioner*, 18 B.T.A. 1179, 1182 (1930) (up front charges for loans are assets because the costs exhausted proportionately over period of years); reg. section 1.461-1(a)(1) (capitalizing costs that have value substantially beyond the tax year) (1999); Note, "Income Tax Accounting: Business Expense or Capital Outlay," 47 *Harv. L. Rev.* 669 (1934).

²⁴Section 56(b)(2)(A) and (D); reg. section 1.469-5T(a)(1) (requiring 500 hours to qualify for material participation).

A taxpayer may also elect to capitalize research and experimental costs, including software development, and the costs are then amortized over three years.²⁵

2. Other tax preferences.

a. Credit for 20 percent of incremental cost credit. Software development also qualifies as research and development benefiting from a tax credit of 20 percent of the amount by which research and development costs increase in a year.²⁶ Credit-eligible costs must be incurred to improve the function, performance, reliability, or quality of software, but there is no requirement that the software be innovative or not obvious to an ordinary skilled professional computer programmer. The credit-eligible activity can now be just the routine application of programming skills.

In 2001, Treasury promulgated regulations requiring that credit-eligible costs be directed toward the discovery of information that went beyond the common knowledge of skilled professionals.²⁷ The Bush administration repudiated the 2001 regulations, however, and ultimately issued new regulations that allowed costs to qualify for the credit although the development was within the common knowledge of any skilled professional computer programmer.²⁸ The development costs are also credit-eligible even if there is "no uncertainty concerning the taxpayer's capability or method of achieving the desired result."²⁹ The standard is applied by taxpayers themselves but is audited with increasing rarity.³⁰ There is no competitive process for the credit, no peer review, no requirement of showing positive externalities not captured by the investor or customer, no requirement of advancement beyond the common knowledge of computer programmer, or any requirement of any other special economic merit. Software developed for internal use, however, must meet three additional requirements. The software must (1) be innovative, (2) involve significant economic risk of failure, and (3) not be available for purchase commercially off the shelf.³¹ The credit is now scheduled to expire at the end of 2009, although it has been extended frequently.³² The amount eligible for the section 174 deduction is reduced by the amount of credit taken.³³

²⁵Section 174(b); section 167(f)(1).

²⁶Section 41.

²⁷T.D. 8930, 2001-1 C.B. 433 (Jan. 3, 2001), *Doc 2001-286*, 2000 TNT 250-3.

²⁸T.D. 9104, 69 *Fed. Reg.* 22-29 (Dec. 30, 2003), *Doc 2003-27005*, 2003 TNT 247-3, which became reg. section 1.41-4(a)(3)(ii) (stating that research and experimentation "does not require that the taxpayer be seeking to obtain information that exceeds, expands, or refines the common knowledge of skilled professionals in the particular field of science or engineering in which the taxpayer is performing the research").

²⁹Reg. section 1.41-4(a)(5) added by T.D. 9104.

³⁰Transactional Records Clearing House, <http://trac.syr.edu/tracirs/highlights/current/corporations.html> (finding overall corporate audits at 1.26 percent in 2008, and decreasing IRS time spent per audit).

³¹Section 41(d)(4)(E).

³²P.L. 110-343, section 301(a) (2008), amending section 41(h).

³³Section 280C(c)(1).

b. Domestic production activities. Section 199, first adopted in 2004, allows a deduction of 9 percent of the income from the sale, license, or lease of computer software. For 2009 the deduction is only 6 percent of the income. The computer software must have been produced at least in significant part in the United States (that is, the deduction cannot exceed 50 percent of the wages of employees on domestic production of the software, counting only the wages reported as Social Security wages to the recipient).³⁴ The wage ceiling will apply if domestic wages are less than 18 percent of the cost of the development of the software. Software must be transferred to customers by lease or sale. Thus, providing Internet access to a computer or online services, customer support, telephone services, games playable through a Web site, or provider-controlled software online are considered to be services rather than the sale or lease of software.³⁵

c. Software package expensing by customers. Packaged computer software purchased by a taxpayer off the shelf is ordinarily an asset the cost of which is amortized evenly over three years.³⁶ Under section 179, however, the taxpayer may elect to immediately deduct costs for equipment and computer programs available for purchase by the general public, up to a dollar limit of \$250,000 per year in 2004 that must cover both tangible property and software. The dollar limit is phased out, for 2009, by purchases of more than \$800,000 per year.³⁷ For years that begin after 2010, the \$250,000 allowance is scheduled to drop to \$25,000 and the \$800,000 phase-out line is scheduled to drop to \$200,000.³⁸

B. Reasons for Change

The tax preferences given by the Internal Revenue Code to software development provide too much subsidy. Expensing alone makes profit from software development exempt from tax, and when combined with other benefits, amounts to a negative tax or subsidy. The subsidies favor investments that have no special merit. They also encourage a waste of capital because the investments would not be made in the absence of the tax breaks and should not be made because the real pretax demand does not cover the real pretax costs.

1. Expensing means no rate reduction. The ability to deduct an investment immediately ordinarily means that tax does not reduce the taxpayer's pretax return from the investment. This thesis is standard wisdom to tax economists but is not commonly acknowledged by tax decision-makers. Assume, for example, the \$100 investment illustrated in Table 1 below, which is subject to a one-third tax and which triples before tax in some unstated period of time:

³⁴Section 199(a)(1), (b), (c)(4)(A), and (c)(5).

³⁵Notice 2005-14, *Doc 2005-1241*, 2005 TNT 13-7, section 4.04(7)(d), 2005-1 C.B. 498.

³⁶Rev. Proc. 2000-50, section 6, 2000-2 C.B. 601, by reference to section 167(f)(1).

³⁷Section 179(d)(1)(A)(ii) added by P.L. 108-27, section 202(c) (2003).

³⁸Section 179(b)(1) and (2).

	(A) Capitalized Investment	(B) Expensed Investment
1. Income at \$100	\$100	\$100
2. Tax on row 1 at 35%	(\$35)	\$0
3. Investable amount (1-2)	\$65	\$100
4. Investment (3) triples	\$195	\$300
5. Basis	\$65	\$0
6. Taxable amount	\$130	\$300
7. Tax at 35% of 6	(\$45.50)	(\$105)
8. End result (4-7)	\$149.50	\$195

If we exempt the gain from the tripling in column A and ignore everything after row 4 (in small italics), the end result of capitalization and exemption is \$195. But the identical result appears in column B, without exempting the gain from the investment. The ability to expense the investment immediately is as valuable as the privilege of paying no tax on the gain.

The results of Table 1 can be generalized by algebra, if the tax rate at the start of the investment (row 2) is the same as at the end (row 7), if the pretax return is the same on both sides, and if the amount invested is sensitive to the upfront tax cost of column 2:

End Value	
Exempt Income (col. A)	= Expensed Investment (col. B)
$\$100 * (1 - t) * (1 + R)^n * (1 - 0)$	= $\$100 * (1 - 0) * (1 + R)^n * (1 - t)$
Where \$100 is unit investment, t is tax rate, $(1 + R)^n$ is compound growth at rate R over n, and $(1 - 0)$ denotes no tax.	

The equivalence is an application of the commutative law of multiplication, which states that the order in which $(1 - t)$ and $(1 - 0)$ appear does not matter. The equivalence is often called the Cary Brown thesis after its discoverer.³⁹

As a corollary, you can also usually deduce how much tax reduces the pretax interest or internal rate of return (IRR) by the ratio of adjusted basis to fair market value.⁴⁰ Companies like Jet Blue and Macy's have a tax basis near or above their FMV and thus they pay tax at statutory tax rates. Software development companies have a basis that is a small fraction of their value and so have modest real tax rates. The differential real tax rates warp the pretax value of an investment derived from real customer demand and shift investment to lower utility projects.

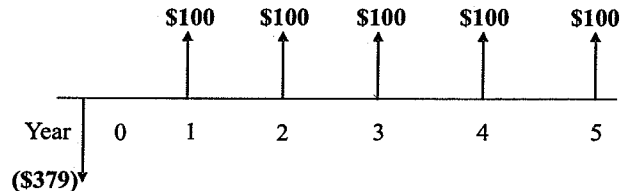
³⁹Cary Brown, "Business-Income Taxation and Investment Incentives," in *Income, Employment and Public Policy: Essays in Honor of Alvin H. Hanson* 300 (1948).

⁴⁰Johnson, "The Effective Tax Ratio and the Undertaxation of Intangibles," *Tax Notes*, Dec. 15, 2008, p. 1289, Doc 2008-24799, 2008 TNT 242-46.

The wide divergence in real tax rates means that taxes are damaging the allocation of capital unnecessarily.

2. Combined subsidies. Software development qualifying for expensing, the 9 percent deduction, and the 20 percent credit does not need to be especially meritorious. For all investments, the investor expects to find customers willing to pay for the product, but there is no requirement that the research be more valuable than what the market is willing to pay. Considering demand alone, the combined tax benefits are too large and they cause investments to be made that are not justified by real customer demand.

Assume, for example, a hypothetical investment in software development of a product we will call Doom 5. Doom 3 is a real product, a computer game, in which the player is a space marine stationed on Mars who must kill various blood-drooling monsters that appear when new technologies open the gates of Hell.⁴¹ Doom 5 will have a similar plot. People will pay for Doom 5, but assume, reasonably, that there are no external benefits from the investment beyond that reflected by customer demand. Society as a whole gets no benefit from Doom 5 for which it would be willing to pay. Doom 5 is projected to give revenue of \$100 for five years in return for development costing \$379:



The hypothetical was set up to give a 10 percent interest-like internal rate of return per year before tax, because the \$379 is the present value of the five \$100 cash flows at 10 percent under the standard formula for present value of an annuity:

$$(1) \quad (\$379) = \$100 * \frac{1 - (1 + i)^{-n}}{i}$$

using i (discount rate) of 10 percent and n (number of years) of 5.⁴²

The Cary Brown thesis that expensing is equivalent to no tax reduction of the pretax return can be restated simply from equation (1) because expensing would both reduce the after-tax cost of the \$379 investment by rate T , and the tax would also reduce the \$100 revenue by T :

⁴¹Doom 3, Wikipedia, http://en.wikipedia.org/wiki/Doom_3.

⁴²The standard annuity formula is a short cut, derived by series analysis, from the separate discounting of each \$100 for a different year, at the standard formula for present value, $\$100 / (1 + i)^n$.

	0	1	2	3	4	5
1. Pretax cash flows, set up to give 10% IRR	(\$379)	\$100	\$100	\$100	\$100	\$100
2. Less 9% deduction section 199 = taxable income		\$91	\$91	\$91	\$91	\$91
3. Tax on row 2 at 35%		(\$32)	(\$32)	(\$32)	(\$32)	(\$32)
4. Section 41 credit on row 1 at 20%	(\$76)					
5. Expensing (of rows 1 minus 4) saving tax at 35%	(\$106)					
6. After tax cash flow (row 1 less rows 3, 4, and 5)	(\$197)	\$68	\$68	\$68	\$68	\$68
7. Present value at found 21.5% IRR (row 6 / (1 + IRR) ⁿ). Row 7 sums to zero at found 21.5% discount rate	(\$197)	\$56	\$46	\$38	\$31	\$26

	0	1	2	3	4	5
1. Pretax cash flows losing 6.34% a year. Revenue is the derived figure	(\$379)	\$62	\$62	\$62	\$62	\$62
2. Less 9% deduction		\$56	\$56	\$56	\$56	\$56
3. Tax on row 2 at 35%		(\$20)	(\$20)	(\$20)	(\$20)	(\$20)
4. Credit on row 1 at 20%	(\$76)					
5. Expensing (of rows 1 minus 4) at 35%	(\$106)					
6. After tax cash flow (row 1 less rows 3, 4, and 5)	(\$197)	\$42	\$42	\$42	\$42	\$42
7. (Row 6 / (1 + IRR) ⁿ) Present value of 7 sums to zero at found 2.3% IRR	(\$197)	\$41	\$40	\$39	\$38	\$37

$$(2) \quad (\$379) * (1 - T) = \$100 * (1 - T) * \frac{1 - (1 + i)^n}{i}$$

Equation (2), the expensing case, becomes identical to the pretax situation, equation (1), when the tax of (1 - T) is factored out of both sides of equation (2). The return rate "i" is the same both pretax (equation (1)) and posttax (equation (2)).

When expensing is added to the 20 percent tax credit for increasing research and to the 9 percent of income deduction for domestic production, the tax causes the internal rate of return from Doom 5 investment to more than double from 10 percent pretax to 21.5 percent posttax. (See Table 2 above.)

Table 2 incorporates the section 199 domestic production 9 percent deduction in row 2, the 20 percent credit under section 41 in row 4, and the immediate deduction of costs (less credit) in row 5. The after-tax cash flows, in row 6, have an internal rate return of 21.5 percent, because 21.5 percent will sum the net present value of all the cash flows to zero, so that 21.5 percent is the interest on a bank account that could produce the cash flows equal to those in row 6. Tax has better than doubled the return from Doom 5 from 10 percent pretax to 21.5 percent after tax.

Table 2 is undoubtedly a temporary advantage because competitors will move in, like yellow jackets to sweet drinks, when the return rate is so high. In equilibrium, returns drop on investments in a competitive economy, so that they have an annual return after tax equal to the cost of capital. Assume a competitor can borrow at a prime rate of 3.5 percent and deduct the

interest so that the after-tax cost of interest is 3.5 percent * (1 - 35 percent) or 2.3 percent.

Table 3 above shows that given the tax benefits, the maker can lose 6.34 percent a year before tax, and the investment still covers the interest cost. The equilibrium pretax return shown in Table 3 is a loss of 6.34 percent return per year because line 1 with the derived revenues of \$62 per year has a net present value of zero at negative 6.34 percent internal rate of return or discount rate. So line 1 cash flow is like a bank account that takes away 6.34 percent of your money every year. The software costs \$379 but the total return spread out over five years is only \$310. Tax subsidies for computer development make up the difference.

Neither Table 1 nor Table 2 account for section 179. Section 179 allows customers to deduct the cost of off-the-shelf software used in business, within a \$250,000 ceiling per taxpayer that covers both software and other tangible equipment. Outside of section 179, off-the-shelf software is a three-year asset. Section 179 allows customers to pay more for software, and if we take the demand with a three-year write-off as the real market demand, then the real market demand is only \$60, which becomes \$62 in demand because of the expensing.⁴³ If the real demand is only \$60, then the software that costs \$379 to develop returns only 5 * \$60 or \$300 in real terms, which

⁴³The after-tax cost of a \$100 software product with a three-year write-off at a discount rate of 5 percent is \$100 - 35 percent * \$33.33 * (1 - (1 + 5 percent)⁻³ / 5 percent) = \$68, which is the same after-tax cost as an expensed \$104, since \$104 * (1 - 35 percent) = \$68. If \$62 represents a demand grossed by 104 percent by expensing, then real demand, measured at a five-year life, is \$62 / 104 percent or \$60.

represents a negative 7.4 percent return per year and a loss of \$79 overall. The Doom series, however, is unlikely to be used in business.

Doom 5 and its competitors are a waste of capital. The price that users are willing to pay for the software in the absence of tax represents the entertainment that buyers expect when they buy the game. Ordinarily the genius of the price system in a capitalist economy is that the price sends home those people with projects not able to cover their costs, including the market price for capital. Doom 5 might have some unexpected value to the general welfare beyond what gamers are willing to pay, but losing money in real terms is a terrible filter to use for identifying projects with merit. It is in fact fair to assume that Doom 5 gives no external benefits beyond those received by the gamers and the developer. The real (pretax) cost of Doom 5 exceeds the value of its entertainment. Projects are not meritorious *because* they lose money. The communist economies failed because they did not cut off projects unable to carry the costs of capital. This country would be better off if the capital put into Doom 5 were put into something better.

Development of Doom 5 also represents the application of the professional skills of an ordinary computer programmer. The patent system gives a subsidy to innovation by allowing the innovator to charge others for use of the innovation, but the core requirement of patentability is that the innovation must be nonobvious to a professional of ordinary skill in the state of the art. Nonobviousness is "grounded in the notion that concepts within the public grasp, or those so obvious that they readily could be, are the tools of creation [already] available to all."⁴⁴ Subsidizing a technique that is already in the public domain, or that will get there shortly through the use of ordinary skills, is a waste of public money for things already achieved.

As noted, the Clinton Treasury had promulgated regulations in 2001 requiring that research qualifying for the 20 percent credit must be directed toward innovation that went beyond the common knowledge of skilled professionals, and the Bush Treasury repudiated the requirement to allow the credit for activity within the competence of any skilled professional computer programmer.⁴⁵ The Bush administration's repudiation of the nonobviousness requirement extended the tax subsidy to wasteful investment, including, by illustration, Doom 5.

Paradoxically, the Bush administration's Federal Trade Commission (FTC) recommended a *stricter* application of the nonobviousness requirement for patents. The FTC recommended that in applying nonobviousness, it was necessary to recognize that those having ordinary skill in the art have considerable creativity and problem-solving

skills that make it possible to achieve computer software development without a subsidy.⁴⁶ The FTC's recommendation for strengthening the nonobviousness requirement is inconsistent with Treasury's abandonment of the nonobviousness requirement. The tax subsidies do not promote innovation if they are granted to development techniques that are already or soon will be in the public domain.

Public subsidy of research would be less wasteful if intelligence were applied to identify innovation worthy of the public cost. The government has often subsidized research in computer development that has led to breakthroughs. The Internet arose from a project funded by the Defense Department called Arpanet, which linked together four university computers.⁴⁷ Google was created as a result of a project at Stanford funded by the National Science Foundation on locating digital libraries and collections.⁴⁸ The National Science Foundation gave an award this year to a Stanford associate professor for cutting-edge work simulating complex motion of liquids, with many potential applications from weather to movies.⁴⁹ Total federal funding for computer and mathematics research was \$3.14 billion in fiscal 2008.⁵⁰ Alternatively, as recommended in the next section, we could shift the tax subsidies available for problem solving over to prizes given after the fact to those activities that achieve a breakthrough. We get more value for the public welfare, per dollar spent, when we try to identify cutting-edge projects than when every twaddling computer development project, like Doom 5, qualifies for a tax subsidy.

C. Explanation of the Provision

The proposal would capitalize costs of development of computer software by adding software to the list of similar older technology items in section 263A(b)(2), so that the list would read "computer software, film, sound recordings, video tape, book or similar property." The proposal would provide that all costs of development of software products would have a 15-year life but would adjust basis to value by extrapolating current revenue for the remaining tax life and using a set discount rate. If the current-revenue-derived value is lower than basis, the taxpayer would suffer a tax loss, but if the current-revenue-derived value is higher than basis, the taxpayer would bring the difference into income.

The proposal would also replace the 20 percent credit given to routine development that does not satisfy a strict nonobviousness requirement with a competitive award

⁴⁴*Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 156 (1989).

⁴⁵T.D. 9104, *supra* note 28, promulgating reg. section 1.42-4(a)(3)(ii) (saying that research and experimentation "does not require that the taxpayer be seeking to obtain information that exceeds, expands, or refines the common knowledge of skilled professionals in the particular field of science or engineering in which the taxpayer is performing the research").

⁴⁶Federal Trade Commission, "To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy," Executive Summary 11 and ch. 4, p.44 (Oct. 2003).

⁴⁷Katie Hafner and Matthew Lyon, *Where Wizards Stay Up Late: The Origins of the Internet*, 176-186 (1996).

⁴⁸National Science Foundation, Discoveries, http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=100660.

⁴⁹National Science Foundation, News, http://www.nsf.gov/news/news_summ.jsp?cntn_id=111178.

⁵⁰Melissa F. Pollak, "FY 2008 Data Show Downward Trend in Federal R&D Funding," (Jan. 2009) <http://www.nsf.gov/statistics/infbrief/nsf09309/#tab4>.

	0	1	2	3	4	5
1. Revenue with 10% IRR	(\$379)	\$100	\$100	\$100	\$100	\$100
2. Adjusted basis, also bank account balance, also net present value of future revenue at IRR	\$379	\$317	\$249	\$174	\$91	\$0
3. Interest at 10% on bank account (prior year row 2), also income		\$37.91	\$31.70	\$24.87	\$17.36	\$9.09
4. Withdrawal in excess of interest earned (aka recovery of capital or depreciation)		\$62.09	\$68.30	\$75.13	\$82.64	\$90.91
5. New bank account balance 2 less 4		\$317	\$249	\$174	\$91	\$0
6. Tax on 3 at 35%		\$13.27	\$11.09	\$8.70	\$6.07	\$3.18
7. After tax cash flow (row 1 minus 6)		\$86.73	\$88.91	\$91.30	\$93.93	\$96.82
8. Present value at found 6.5% (row 6 / (1 + 6.5%) ⁿ). Row 7 sums to zero at 6.5%	(\$379.08)	\$81.44	\$78.38	\$75.58	\$73.01	\$70.67

administered by the National Science Foundation for successful discovery of ground-breaking work.

1. Cost recovery.

a. **Reflection of income means adjusted basis equals FMV.** For tax accounting to reflect the real income from an investment, the cost must be capitalized and the adjusted basis after depreciation must describe the value of the remaining investment. The fundamental maxim that adjusted basis must equal value comes from the internal rate of return analysis. Internal rate of return is the universal yardstick by which financial economics measures and compares investments of different kinds. Internal rate of return is the interest rate on a hypothetical bank account that matches the cash flows of the investment under examination. Identification of the internal rate of return must simultaneously identify the bank account balance on the matching bank account. Tax can reduce internal rate of return as implied by the statutory tax rate, if and only if the adjusted basis describes the remaining investment at a discount rate equal to the internal rate of return. Depreciation is allowable under the logic only as net present value declines.

The logic that adjusted basis should be kept equal to value arises from economic or Samuelson depreciation.⁵¹ It is the only way to match debt-financed investments with the manner in which the debt is treated under an income tax. When debt provides the discount rate, economic or Samuelson depreciation is the only way to keep the tax rate of the investor out of the price the investor is willing to pay.

If the cash flows are known, the adjusted basis that will identify the interest-like internal rate of return income is just the net present value of future cash flows. For Doom 5, economic depreciation would appear as shown about in Table 4, row 4.

Table 4 analyzes the pretax Doom 5 investment as if it were a bank account. Each year the bank account earns interest, at the built-in 10 percent interest rate, identified in row 3. But the interest is not enough to cover the

withdrawals from the bank account (that is, the cash flow revenue in row 1), so some part of each withdrawal is a reduction of the bank account balance by the amount in row 4. The row 4 withdrawals in excess of interest reduce the bank account balance to zero at the end of the term. The bank account balance (row 2) is always net present value of remaining revenue at the 10 percent internal rate of return. Depreciation or recovery of basis is the drop in the bank account balance shown by row 4. If we tax the interest income identified in row 2, at 35 percent, the tax system will reduce the internal rate of return from 10 percent to 10 percent * (1 - 35 percent) or 6.5 percent, which is the right after-tax income implied by a 35 percent tax on 10 percent interest income. The present values of the after-tax cash flows (row 7) sum to zero showing that the investment, under the tax of row 6, is like a bank account giving an internal rate of return or interest of 6.5 percent. Different investments will have different row 1 pretax cash flows, but if the depreciation and adjusted basis describe the income from the investment, the adjusted basis will equal net present value of the future cash flows from the investment at the internal rate of return.

Economic depreciation can be calculated from net present value when future cash flows are assumed, as in Doom 5, or when there is a broad market that sets a price using estimates of fundamental value like the Table 4 analysis. Generally, however, strictly accurate models are impossible because the future cannot be known. With low audit rates, taxpayers have insufficient incentive to build responsible models of future cash flows for a software product. A convention would settle disputes beforehand.

This proposal would provide for a mandatory accounting convention intended to be the best way to replicate economic depreciation but also to settle disputes, much as the mandatory tax lives in section 168 settle disputes. The best conventions generate an adjusted basis that is as close to FMV as possible. The closer the adjusted basis under the convention is to FMV for adjusted basis, the better the convention.

b. **15-year life with adjustments according to revenue.** This proposal recommends a long tax life for the computer software, with deductible downward adjustments in basis when current revenue continued for the

⁵¹Paul Samuelson, "Tax Deductibility of Economic Depreciation to Insure Invariant Valuations," 72 *J. Pol. Econ.* 4 (1964), is the pioneering article. See also Alvin Warren, "Accelerated Capital Recovery, Debt, and Tax Arbitrage," 38 *Tax Law.* 549 (1985).

tax life implies a net present value that is lower than that remaining implied by 15-year amortization.

Copyrights on computer software last as a matter of law for 70 years after the death of the last coauthor, or for 95 years after publication when coauthors are anonymous, or 120 years after first use, whichever is shorter. Computer software development now has many authors, so that simplifying for tax purposes, we might just assume that all costs of software development will have a legal life of 100 years.

Depreciation, however, is based not on legal life but on economic life. Some computer programs last for a long time. Successful programs still going strong include, for instance, Word for Windows, Quicken, Google, and the Sims. The developer has not lost the original cost. Conversely, programs such as Atari and Lotus 123 have expired.

This proposal is for a 15-year tax life, but with annual adjustments based on current revenue. The default rule applied to intangibles is 15 years.⁵² Section 195, moreover, provides for amortization of intangibles over 15 years. There is sense in parity, under which it would not matter for tax life purposes whether the taxpayer made or bought the intangible. The 15-year life may be longer than many software packages will last, but a shorter-lived software package will show a decline in revenue before it is withdrawn from sale. All costs will be finally deducted, moreover, when the taxpayer abandons that type of software and the development costs become worthless.

For example, assume that a taxpayer invests \$760 on the expectation of making a 10 percent return per year, for an anticipated revenue of \$100 a year for 15 years. Under straight line depreciation over 15 years, the taxpayer would have depreciated basis down to \$608 after 3 years. But assume in the third year, the taxpayer has revenue of only \$30 from the software. A 12-year annuity of \$30 has a net present value of \$204, and the taxpayer would be entitled to reduce basis from \$608 down to \$204 because of the reduced revenues and would deduct the \$404 difference as a loss.

Some software products have a delayed takeoff under which revenue increases as time goes by. The proposal would thus allow no write-offs, not on the 15-year schedule, until two years after the software package is widely available on the market.

The proposal would also provide for increasing basis and taking the increase into income when subsequent increases in revenue indicate that the "bank account" that is like the software is in fact higher than the 15-year-life adjusted basis. The logic that adjusted basis must describe the bank account balance like the investment under examination, if the tax account is to reflect the interest-like income, applies symmetrically to increases in value as well as decreases. If, for example, revenues increase to \$100 when there are 10 years left of the 15-year tax life, the basis should be \$614 to reflect net present value of future cash flows. The basis thus should be

increased to \$614, and the difference between lower adjusted basis and \$614 would be brought into income.

As a part of the simplifying conventions, software should be assigned a discount rate of 120 percent of applicable federal rate across the industry.

Abandonment or sale of the software rights would allow the taxpayer to recover whatever basis has not been recovered by current revenue changes.

Computer software projects should also be defined broadly to ensure that they encompass all of the direct and indirect costs of computer programming. Section 263A capitalizes both the direct and indirect costs of development of film, video tape, and sound recordings, and the full absorption philosophy of section 263A is sound economics. Some customer has to pay for all of the taxpayer's costs, because if the customers do not pay the costs, there is no tooth fairy that will pick up the costs.

Also, the creation of computer software that is derived from the routine application of professional skills using the existing state of the art is commonly a process of trial and error. Not every error should be deducted if the overall program is successful. The costs of failed experimentation are part of the cost of the successful program. The fact that two alternatives are mutually exclusive is proof that they are part of the same overall program. The scope of capitalization can also be educated by revenue. In ascertaining the scope of capitalized costs, it should be presumed that the taxpayer is making an ordinary return and that the software will continue at its current level of revenue for the tax life. A taxpayer should be presumed to be making more than a normal return — which would imply a lower basis — only if there is a stroke of genius or discovery in the development.

c. Limit to original cost? Comments to this proposal in draft have suggested that it is impossible to raise adjusted basis higher than the original cost of development in the hypothetical. As a matter of principle, basis should describe the bank account balance that is like the software development even if the adjusted basis is increased as the bank account balance increases. For instance, if annual revenue is \$163 after five years, that implies that the adjusted basis should be raised to \$1,000, by reversing prior depreciation into income and then including another \$240 in income. An asymmetrical convention counting drops in revenue but not gains would skewer the convention to overstate expected losses, especially when revenue expectations have a broad range of possibilities. It is possible to describe values above \$760 cost as merely the result of higher discount rates, but most computer software development is just a routine application of the state of the art by skilled professionals.

Nonetheless, capitalizing the costs of software development and allowing depreciation only as the costs expire would be a great improvement in the tax accounting and would materially reduce the tax subsidy given to nonmeritorious projects. If setting the maximum adjusted basis at \$760 would make the proposal politically feasible, it is a first compromise worth making.

d. Relation to inventory accounting. Broadly speaking, the proposal resembles inventory accounting, which capitalizes the costs that the taxpayer has not lost, as determined by a count of units at the end of the tax year. Similarly, this proposal capitalizes the net present value

⁵²Reg. section 1.167-3(b)(1).

of the software, determined under the simplifying convention (assumed 15-year life and assigned discount rate), because the taxpayer has not lost the cost. The proposal is not like inventory accounting, however, in that the production of physical units has no significance to the value the taxpayer has retained in the software rights. Indeed, with online delivery of software, there is never a physical unit produced. Even when software is sold on compact discs, whether the taxpayer has many discs or none at the end of the year has no bearing on the appropriate adjusted basis of the taxpayer's software.

e. Relation to income forecast method. Under current law, a taxpayer developing motion picture films, video tapes, sound recordings, copyrights, books, and patents may elect to depreciate costs under the income forecast method. Revenue for the first 10 years is estimated and the costs are allocated equally across the revenue. In the 3rd and 10th years, there is a lookback and interest is imposed on the tax due, at risk-free federal rates, if the taxpayer's estimates are off by 10 percent.⁵³ The income forecast method is not recommended in this case because the equal allocation of costs to revenue is blind to the time value of money. For example, in the Doom 5 example of Table 4, after three years, economic depreciation that identified the real economic income from the property would be \$174, whereas the income forecast method would drop the basis to \$152. My own judgment is that the income forecast method, with lookback, is not significantly simpler than this proposal, but the income forecast method is an improvement over current law and would be an acceptable early compromise.

2. Raise the standards for 20 percent credit.

a. Within the credit framework. The 20 percent tax credit incentivizes investments that waste capital. It is not enough that the taxpayer try to make an improvement through problem-solving decisions, as allowed by the current regulatory standards. Problem solving also includes fairly mundane problems of finding a place to park a car in midtown or deciding how to transmit a manuscript, which are not worth subsidizing. Routine development of Doom 46 would qualify for the credit, for instance, although it has no external benefits not captured by the gamer who plays it.

A subsidy to research in the form of tax treatment better than the normal 35 percent tax rates is justified only because users outside of the invention get benefits that cannot be captured by the taxpayer. The product of ordinary skills is already within the public domain and need not be paid for again by the public. Routine application of computer programming skills will not teach outsiders anything they did not know. What is needed for subsidy is a discovery, not obvious to skilled programmers, that surprises and delights the profession. The Bush administration FTC recommended that the test for nonobviousness be strengthened to recognize that ordinary computer professionals have a great deal of creativity and problem-solving ability. It is recommended that the definition of research under section 41 be sub-

jected to a higher standard that either the research be basic research unlikely to yield a marketable product within three years of the cost or that the credit is awarded only retroactively to costs that successfully reach a discovery that is surprising to skilled professionals in the art of computer science.

b. Replace with a prize. The incentive to innovation now provided by expensing and the credit would be more efficiently focused on helpful innovation if human intelligence were applied to identify the merit of the research. Intelligent design of the incentives, for example, would not extend the benefits to Doom 5. Rewards for success also work better as incentives than subsidies for costs. It has been found, for instance, that football teams work harder to win if they are awarded points only for successful touchdowns and no points are awarded for a good effort or nice try. What we want to incentivize is not the spending of more money, but outcomes.

It is recommended that the 20 percent tax credit for increased research in computer design be repealed and the revenue gained be used in large part for a prize for extraordinary outcomes. The reward needs to be ample enough to give satisfaction to innovators and their financial backers.⁵⁴ Prizes for innovation have a long history.⁵⁵ Professor Michael Abramowicz recommends that the optimal design for a prize would entail delay in the prize to give some time to sort its meaning and that the agency making the award be given broad discretion to decide who gets the prize. Legal standards set beforehand cannot always capture the works of genius. He also suggests a fixed-amount for prizes instead of an open-ended budget.⁵⁶

3. Administrative initiatives. The administration can reduce wasteful allocation of capital to routine software by regulatory action. The current Treasury regs on intangibles provide that development of computer software will not be treated as creating a capitalized asset unless contrary guidance is published in the *Federal Register* or *IRS Cumulative Bulletin*.⁵⁷ It is time to give notice that software development costs are capital expenditures.

The Bush Treasury regulations under section 41, repudiating the nonobviousness requirement of the prior final regs were achieved by administrative action and apparently they can be repealed by administrative action as well. This proposal would stiffen the standards of non-obviousness and in fact replace the credit for computer development with a prize. Repeal of the Bush Treasury regulations would be an early step, coordinated with Congress and giving lawmakers full information, as a part of the overall reforms.

⁵⁴See, e.g., Michael Polanvyi, "Patent Reform," 11 *Rev. Econ. Stud.* 61, 67 (1944).

⁵⁵See, e.g., Dava Sobel, *Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time* (1995) (describing 18th century prize for seagoing watch that would allow calculation of longitude).

⁵⁶Michael Abramowicz, "Perfecting Patent Prizes," 56 *Vand. L. Rev.* 115 (2003).

⁵⁷Reg. section 1.263(a)-4(b)(3)(iv).

⁵³Section 162(g)(1) and (2).