

Cost Recovery for New Corporate Investments in 2012

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Key Findings

- Cost recovery refers to the extent to which businesses are able to deduct the full cost of their investments over time.
- Many economists argue that a system of full cost recovery would be maximally efficient. However, the current U.S. tax code requires corporations to deduct investments over time periods ranging up to 50 years, leading to limited cost recovery.
- Overall, U.S. corporations will only be able to deduct 87.14 percent of the value of investments made in 2012 over time.
- If not for bonus depreciation, corporations would only have been able to deduct 83.08 percent of the value of investments made in 2012 over time.
- The extent of cost recovery varies by industrial sector and by asset, reflecting the numerous depreciation schedules to which different industries and assets are subject.
- The current system of cost recovery prevents corporations from making investments that would otherwise be profitable under a system of full cost recovery.

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Introduction

One of the most important debates in American tax policy concerns the proper treatment of capital expenses. Over the past few years, several members of Congress have proposed sweeping changes to how businesses are allowed to deduct the cost of capital expenditures, including Dave Camp, Max Baucus, and Devin Nunes.¹ The goal of this paper is to shed additional light on the current system of tax depreciation and the incentives it creates for businesses.

In general, businesses are allowed to deduct expenses in the year that they occur. However, special rules apply to capital expenses, such as the cost of machines and buildings.² Rather than deducting capital expenses immediately, businesses are required to spread out deductions for capital expenses over time periods ranging from three to 50 years, according to a set of depreciation schedules.³

The current system of depreciation discourages businesses from making capital investments, by denying them a full deduction for these expenses.⁴ Because businesses and people value money in the present more than money in the future, a deduction spread out over many years is worth less than one taken immediately. So, requiring businesses to deduct their capital expenditures over long periods of time is equivalent to granting businesses only a partial deduction for their investments, in present value terms.

In this paper, I attempt to quantify how much the current system of depreciation prevents businesses from fully deducting their capital expenditures. Specifically, I estimate a measure of cost recovery of new corporate investments made in 2012: the extent to which businesses will be able to deduct the full cost of these investments over time.

Background on Depreciation and Cost Recovery

Introduction to Cost Recovery

Even within the field of tax policy, cost recovery can be a particularly abstract and obscure issue. Therefore, it may be useful to begin with a concrete example of how the U.S. system of cost recovery affects business decision making.

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- 1 See: Entin, Stephen J., Michael Schuyler, and William McBride. "An Economic Analysis Of The Camp Tax Reform Discussion Draft." Tax Foundation. May 2014. <http://taxfoundation.org/article/economic-analysis-camp-tax-reform-discussion-draft>; Schuyler, Michael. "Slower Growth through "Tax Reform": The Baucus Capital Cost Recovery Proposal." Tax Foundation. March 2014. <http://taxfoundation.org/article/slower-growth-through-tax-reform-baucus-capital-cost-recovery-proposal>; Schuyler, Michael. "The Growth Effects of the Nunes Plan to Reform Business Taxation." Tax Foundation. February 2015. <http://taxfoundation.org/article/growth-effects-nunes-plan-reform-business-taxation>.
 - 2 "Deducting Business Expenses." Internal Revenue Service. November 2015. <https://www.irs.gov/Businesses/Small-Businesses-&Self-Employed/Deducting-Business-Expenses>.
 - 3 "Publication 946: How to Depreciate Property." Internal Revenue Service. February 27, 2015. <https://www.irs.gov/pub/irs-pdf/p946.pdf>.
 - 4 E.g. Entin, Stephen. "The Tax Treatment of Capital Assets and Its Effect on Growth." Tax Foundation. April 2013. <http://taxfoundation.org/article-ns/tax-treatment-capital-assets-and-its-effect-growth-expensing-depreciation-and-concept-cost-recovery>.
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Let us imagine a construction company that is deciding whether to spend \$100 on a jackhammer or on postage stamps. For the purposes of this example, we will assume that the jackhammer (an investment) and the postage stamps (a business input) are equally worthwhile expenditures; the company's decision between them will be driven solely by tax considerations.

If the company decides to buy the postage stamps, it will be allowed to deduct the \$100 cost immediately. This is because postage stamps are considered an "ordinary and necessary" expense, which can be deducted in the same tax year in which it is made.⁵

On the other hand, if the company purchases the jackhammer, it will generally be required to deduct the \$100 cost over the course of six tax years. This is because a jackhammer is considered a capital expense, and the U.S. tax code requires businesses to deduct capital expenses over time. Under current U.S. tax law, a jackhammer used for construction would generally be categorized as a 5-year business asset, so the company would be required to deduct its cost over six years.⁶

No matter whether the company spends \$100 on postage stamps or a jackhammer, it will eventually receive \$100 in tax deductions.⁷ However, purchasing the postage stamps will lead to an immediate deduction, while purchasing the jackhammer will lead to a stream of deductions in the future. All else being equal, the company will prefer the immediate deduction, because economic actors generally prefer to receive money in the present rather than in the future.⁸

To put the tradeoff into numeric terms, let us assume that the company has a discount rate of 5 percent: it values a dollar received today 5 percent more than a dollar received a year from now.⁹ If this is the case, even though the company will receive \$100 in deductions over six years for the jackhammer, these deductions will be worth less than \$100 to the company today. Specifically, Table 1 shows that these deductions will only be worth \$91.83 to the company, in present value terms.

Table 1.
Depreciation Deductions for a Five-Year Asset that Costs \$100

Year	1	2	3	4	5	6	Total deduction
Nominal value of deduction	\$20.00	\$32.00	\$19.20	\$11.52	\$11.52	\$5.76	\$100.00
Present value of deduction	\$20.00	\$30.48	\$17.41	\$9.95	\$9.48	\$4.51	\$91.83

Note: These calculations assume a 5 percent discount rate. They apply to a 5-year asset depreciated under the MACRS half-year convention, which is placed into service in the same year it is purchased.

5 "Publication 535: Business Expenses." Internal Revenue Service. February 12, 2015. <https://www.irs.gov/pub/irs-pdf/p535.pdf>.

6 It is assumed that the asset is bought at mid-year, with half a year's deduction allowed in the first year and half a year's deduction allowed in the sixth year.

7 However, if the jackhammer is retired before the end of its asset life, the company will no longer be able to deduct the remainder of its original cost. If the jackhammer is sold, the company must report the excess of the resale proceeds over the remainder of the original cost as taxable "recapture."

8 See Carther, Shauna. "Understanding the Time Value of Money." Investopedia. <http://www.investopedia.com/articles/03/082703.asp>.

9 Below, for the main calculations in this paper, I use a discount rate of 4.94 percent, the yield for Baa corporate bonds across all industries in 2012. The rationale behind this rate is discussed in the "Methodology" section of the Appendix.

In other words, a company purchasing a jackhammer is only able to recover 91.83 percent of the cost of the jackhammer over time, in present value terms. If the company had decided to purchase postage stamps, it would be able to recover 100 percent of the cost, by deducting it immediately. This is a clear example of how the U.S. system of cost recovery discourages businesses from making investments, by requiring them to deduct capital expenses over time.

Economic Theory of Depreciation and Cost Recovery

From the earliest days of the U.S. corporate income tax, corporations have been required to deduct their assets over time, in a manner loosely approximating the assets' depreciation. The intellectual justification for this system of cost recovery stems from the Haig-Simons income tax framework. However, in recent decades, economists have argued that taxes based on the Haig-Simons framework are economically inefficient and distort decision-making. As enthusiasm for the Haig-Simons framework has waned, many tax policymakers have turned their focus to the ability of businesses to deduct the full cost of their capital investments.

In the 1920s, Robert Haig and Henry Simons sought to provide a coherent definition of what economic activity should be subject to income taxes.¹⁰ They arrived at the following definition:

Personal income may be defined as the algebraic sum of (1) the market value of rights exercised in consumption and (2) the change in the value of the store of property rights between the beginning and the end of the period in question.¹¹

In other words, a household's annual income is the amount it consumes in a given year, plus the change in its net wealth over the course of that year. In the case of a corporation (which, in stylized economic terms, does not consume anything), Haig-Simons income is the change in the net worth of the corporation over a time period.¹²

For the purposes of this paper, the most important aspect of the Haig-Simons definition of income is its treatment of capital expenditures. In general, a corporation calculates its Haig-Simons income by adding up its revenues and subtracting its expenditures. However, capital expenditures *cannot* be subtracted from a corporation's Haig-Simons income. This is because a capital expenditure does not cause a corporation's net worth to change; the corporation has simply shifted its wealth from cash to illiquid assets. As a result, the Haig-Simons framework treats a capital expenditure as a non-event, which has no bearing on the calculation of a corporation's income.

¹⁰ For background on the Haig-Simons definition of income, see Duff, David G. "Rethinking the Concept of Income in Tax Law and Policy" Draft. University of Toronto. http://taxprof.typepad.com/taxprof_blog/files/Duff.pdf. See also Hanna, Christopher H. "Tax Theories and Tax Reform." *Southern Methodist University Law Review* 59 (2006): 435-54. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=981026.

¹¹ Simons, Henry. *Personal Income Taxation: The Definition of Income as a Problem of Fiscal Policy*. Chicago: University of Chicago Press, 1938.

¹² However, tax systems based on the Haig-Simons framework do not generally allow corporations to deduct dividends paid, even though paying out a dividend reduces the net worth of the corporation.

However, the Haig-Simons definition of income *does* allow a corporation to subtract the amount by which its assets depreciate each year. All assets lose their value over time and eventually become obsolete. When the value of a capital asset held by a corporation declines, the net worth of the corporation declines as well. Therefore, the Haig-Simons definition of income allows corporations to subtract the depreciation of their assets from their total income.

In practice, income taxes based on the Haig-Simons framework (such as the U.S. income tax) do not allow businesses to calculate the extent to which their assets have actually depreciated over the course of the tax year.¹³ Instead, most income tax codes sort capital assets into classes with pre-determined depreciation schedules. These schedules are essentially arbitrary, because every asset depreciates at a different pace (depending on the type of asset and how intensely it is used) and policymakers rarely have the extensive resources needed to develop accurate standards.¹⁴ According to one management reference book, "it is unlikely that reported depreciation will be equal to economic depreciation."¹⁵

Beyond concerns that standardized depreciation schedules may be inaccurate, economists have become increasingly critical of the very idea that businesses should be required to spread out deductions for capital expenditures over time. This attitude has coincided with a general dissatisfaction among economists with the Haig-Simons income tax framework.¹⁶ Over the past forty years, several well-known academic papers have argued that Haig-Simons income taxes distort economic decision making and hinder overall growth by imposing higher taxes on future consumption than present consumption.¹⁷

In particular, one of the most important criticisms of the Haig-Simons framework is that it prevents corporations from making investments that would otherwise be profitable. When a corporation makes an investment, under a Haig-Simons income tax, it is unable to deduct the cost of the investment until far into the future. However, corporations discount future cash flows relative to present ones. So, in present value terms, corporations are unable to deduct the full cost of their investments under a Haig-Simons income tax, which leads them to cut back on the amount that they invest. In this way, Haig-Simons income taxes disincentivize investment relative to other expenditures, leading to macroeconomic inefficiencies.

13 See "Worldwide Tax Summaries: Corporate Taxes 2014/15." PwC. <http://www.pwc.com/taxsummaries>.

14 Lundeen, Andrew. "The Arbitrary Nature of Depreciation Asset Classes." Tax Foundation. May 2014. <http://taxfoundation.org/blog/arbitrary-nature-depreciation-asset-classes>.

15 McAuliffe, Robert E. "Economic Depreciation." *The Blackwell Encyclopedia of Management*. Edited by Cary L. Cooper. Blackwell Publishing, 2015. http://www.blackwellreference.com/public/tocnode?id=g9780631233176_chunk_g97814051006638_ss1-1.

16 For a description of the paradigm shift away from the Haig-Simons income tax framework, see Shaviro, Daniel. "Beyond the Pro-Consumption Tax Consensus" Introduction. *Stanford Law Review* 60, no. 3 (December 2007): 745-88.

17 E.g. Feldstein, Martin. "On the Theory of Tax Reform." *Journal of Public Economics* 6, no. 1-2 (1976): 77-104; Bankman, Joseph and David Weisbach. "The Superiority of an Ideal Consumption Tax over an Ideal Income Tax." *Stanford Law Review* 58, no. 5 (March 2006): 1413-1456.

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In the place of the Haig-Simons framework, many economists have begun to favor the ideal of a consumption tax base. Under a tax system with a consumption base, a household is taxed on its annual consumption but *not* on the change in its net wealth. Similarly, in the case of a corporation, the consumption tax base does not include changes in the net worth of the business.¹⁸

Under a tax system with a consumption base, businesses *are* allowed to deduct capital expenditures as they occur, rather than being required to spread them out over time. Because investments themselves are never consumed, a tax with a consumption base does not apply to them; instead, such a system taxes only the profits that are eventually realized from investments.

Proponents of consumption taxes argue that shifting to a consumption tax base would promote investment and economic growth.¹⁹ Because consumption-based taxes treat capital expenditures like any other business expense, they encourage businesses to make investments that would be unprofitable under the Haig-Simons framework, leading to long-run growth.

As part of the intellectual shift toward the consumption-based tax framework, economists writing about depreciation have increasingly advocated for full cost recovery: a tax system where businesses are able to deduct the full value of their capital expenditures.²⁰ However, even in the absence of a pure consumption-based tax system, “full expensing,” or allowing businesses to deduct capital expenditures immediately as they occur, would be a positive step toward pro-growth reform of the corporate tax.

History of Depreciation in the U.S. Federal Tax Code

When the corporate income tax was instituted in 1909, businesses were permitted to claim a “reasonable allowance for depreciation by use, wear and tear of property.”²¹ At first, businesses were generally allowed to deduct their capital expenditures according to any depreciation method they deemed reasonable.²² Then, in 1942, the Bureau of Internal Revenue released Bulletin F, which laid out depreciation schedules for nearly 5,000 types of assets; this became the *de facto* standard for deducting capital expenses. These schedules largely reflected common accounting practices rather than actual studies of asset lives, and many taxpayers complained that the depreciation periods were too long.²³

18 Under some consumption tax designs, corporations are not subject to any tax at all (e.g. national sales taxes); under others, corporations are subject to taxes on both profits and salaries paid (e.g. value added taxes). Regardless, no consumption tax design applies to changes in corporate net worth.

19 Ibid. See also Dubay, Curtis. “A Flat Consumption Tax Would Be Fair and Efficient.” Heritage Foundation. November 2015. <http://www.heritage.org/research/reports/2015/11/a-flat-consumption-tax-would-be-fair-and-efficient>.

20 E.g. Fichtner, Jason and Adam Michel, “Options for Corporate Capital Cost Recovery: Tax Rates and Depreciation.” Mercatus Center. January 2015. <http://mercatus.org/sites/default/files/Fichtner-Corporate-Capital-Cost.pdf>.

21 Corporate Tax Act of 1909 (36 Stat. 11, 112).

22 Brazell, David, Lowell Dworin, and Michael Walsh. “A History of Federal Tax Depreciation Policy.” *OTA Paper 64* (May 1989). DEPARTMENT OF THE TREASURY. <https://www.treasury.gov/resource-center/tax-policy/tax-analysis/documents/ota64.pdf>.

23 Ibid.

Between the 1950s and the early 1980s, federal tax depreciation schedules generally moved toward shorter asset lives.²⁴ In 1962, the Treasury issued new “guideline lives” that were estimated to be 32 percent shorter than those in Bulletin F.²⁵ In 1971, the Treasury adopted the Asset Depreciation Range (ADR) system, which was the first depreciation system to explicitly decouple tax schedules from estimated replacement lives.²⁶ Ten years later, Congress passed the Economic Recovery Tax Act of 1981, which replaced all existing depreciation systems with the Accelerated Cost Recovery System (ACRS), which was designed to simplify the tax code and incentivize investment.²⁷

The early 1980s saw several rapid changes to federal depreciation schedules, most of which led to longer asset lives. These changes culminated in the Tax Reform Act of 1986, which instituted the Modified Accelerated Cost Recovery System (MACRS), the basic depreciation regime today.²⁸ While MACRS asset lives are longer than those under ACRS, they are shorter than those under the ADR system.

Current Federal Law Regarding Depreciation

In general, MACRS divides business and investment property into 10 asset classes, each with a separate depreciation schedule.²⁹ The majority of business equipment is subject to 3-year, 5-year, 7-year, 10-year, 15-year, or 20-year depreciation schedules. These schedules are generally subject to the “declining balance method,” allowing businesses to take larger deductions during the earlier portion of the depreciation period.³⁰

Residential rental property is subject to a 27.5-year depreciation schedule, while commercial real property is subject to a 39-year depreciation schedule. Water utility property receives a special 25-year schedule, while certain railroad property falls under a 50-year schedule. These schedules are subject to the “straight line method,” where businesses are required to deduct the same fraction of the cost of their investment each year.

A small portion of business investment is not subject to the 10 schedules mentioned above. Property used predominantly outside of the U.S., property financed by tax exempt bonds, and certain other categories of investments are subject to the alternative depreciation system (ADS), which also uses the “straight line method.”³¹

24 *Supra*, note 4, page 8.

25 *Annual Report of the Secretary of the Treasury on the State of the Finances*. Treasury Department, 1962. 335. https://fraser.stlouisfed.org/docs/publications/treasar/AR_TREASURY_1962.pdf.

26 *Supra*, note 22, page 18.

27 *Ibid*.

28 *Supra*, note 4, page 8.

29 26 U.S.C. §168(c)

30 26 U.S.C. §168(b)

31 26 U.S.C. §168(g)



Two provisions of the U.S. tax code allow businesses to immediately deduct (or “expense”) certain investments. Section 179 allows certain businesses to deduct up to \$500,000 in qualified investments immediately.³² However, the provision is designed so that only small businesses – those with under \$2.5 million in qualified investments – can make use of it. In addition, a provision known as “bonus depreciation” allows businesses to deduct 50 percent of the cost of certain investments in equipment immediately.³³ However, in December 2015, Congress passed a bill that phases out bonus depreciation over a five-year period.³⁴

Cost Recovery for Corporate Investments Made in 2012

How far away is the U.S. tax system from full cost recovery – from allowing businesses to deduct the full cost of their investments? Some provisions of the tax code, such as bonus depreciation and section 179, allow businesses to recover the full cost of their investments. Other provisions, such as the 39-year depreciation schedule for commercial structures, allow businesses to deduct less than half of the full cost of their investments.

To provide a single summary measure of cost recovery in the United States, I use IRS data to estimate the percentage of all capital expenditures made in 2012 that corporations in the U.S. are able to deduct over time, in present value terms.³⁵ The data and methodology behind this estimate are discussed below, in the Appendix.

This measure of cost recovery is particularly useful for analyzing the economy-wide results of different proposed tax changes. For instance, in Table 3, I use the same methodology and data to estimate how the expiration of bonus depreciation would change the percentage of investments that businesses are able to deduct.

Top-Line Findings

U.S. corporations reported \$705.8 billion of investments in 2012. However, over time, in present value terms, they will only be able to claim \$615.1 billion in depreciation deductions. In total, this means that corporations will only be able to deduct 87.14 percent of investments made in 2012.

³² 26 U.S.C. §179

³³ 26 U.S.C. §168(k)

³⁴ “H.R.2029 - Consolidated Appropriations Act, 2016.” Library of Congress. <https://www.congress.gov/bill/114th-congress/house-bill/2029>.

³⁵ Here, and throughout the paper, I use “corporation” to signify C corporations and to exclude S corporations, RICs, and REITs. I use “capital expenditure,” “investment,” or “new investment” to signify business or investment property placed into service in 2012.

Table 2.
Cost Recovery for New Corporate Investments in 2012

(A)	(B)	(C)	(D)
Depreciation Schedule	Amount of New Investment Subject to Schedule, 2012	Present Value of Deductions Received over Time, as Percentage of Investment Cost	Present Value of Deductions Received over Time, in Dollars
Section 179	\$11,854,948,000	100%	\$11,854,948,000
Bonus Depreciation	\$237,039,023,000	100%	\$237,039,023,000
3-year	\$23,022,313,000	95.57%	\$22,001,430,000
5-year	\$164,917,721,000	91.92%	\$151,596,069,000
7-year	\$95,404,067,000	88.56%	\$84,488,538,000
10-year	\$6,358,581,000	83.90%	\$5,334,773,000
15-year	\$27,530,075,000	73.58%	\$20,257,915,000
20-year	\$21,093,079,000	66.95%	\$14,121,691,000
25-year	\$1,261,347,000	58.12%	\$733,060,000
27.5-year	\$6,839,082,000	55.41%	\$3,789,239,000
39-year	\$64,908,139,000	45.08%	\$29,257,611,000
50-year	\$11,785,000	37.76%	\$4,450,000
ADS 12-year	\$8,365,913,000	75.94%	\$6,353,204,000
ADS 40-year	\$3,558,644,000	44.32%	\$1,577,220,000
Other ADS	\$33,682,364,000	79.13% (see Note)	\$26,651,979,000
All Investment	\$705,847,081,000		\$615,061,150,000

Note: These calculations assume a discount rate of 4.94 percent. The present value of deductions provided by other ADS schedules is imputed, using a heuristic.

Column (A) of Table 2 shows all of the major depreciation schedules to which corporate investments in 2012 were subject. Column (B) shows the amount of new corporate investment in 2012 subject to each depreciation schedule; these figures are taken directly from data from the IRS. Column (C) shows the present value of the stream of deductions provided by each depreciation schedule, as a percentage of an investment's cost; these figures are calculated using the first equation presented in the "Methodology" section in the Appendix. Finally, Column (D) is the product of Columns (B) and (C); it represents the present value of deductions that corporations will receive over time from investments made in 2012 under each depreciation schedule.

As expected, longer depreciation schedules offer corporations a less valuable stream of deductions than shorter depreciation schedules. A significant portion of the gap between the \$705.8 billion that corporations invested and the \$615.1 billion they will be able to deduct is due to the \$64.9 billion of investments that fall under the 39-year depreciation schedule, which applies to commercial structures – the present value of which is only \$29.3 billion.

If not for bonus depreciation of equipment, U.S. corporations would deduct an even smaller fraction of their investments over time. Table 3 shows an estimate of the percentage of investments that businesses would be able to deduct if bonus depreciation were not part of the tax code. In this scenario, businesses would only be able to claim \$586.4 billion in depreciation deductions, or 83.08 percent of investments made in 2012.

Table 3.

Cost Recovery for New Corporate Investments in 2012, Assuming No Bonus Depreciation

(A) Depreciation Schedule	(B) Estimated Amount of New Investment Subject to Schedule, 2012	(C) Present Value of Deductions Received over Time, as Percentage of Investment Cost	(D) Present Value of Deductions Received over Time, in Dollars
Section 179	\$11,854,948,000	100%	\$11,854,948,000
Bonus Depreciation	\$0	100%	\$0
3-year	\$39,092,374,000	95.57%	\$37,358,892,000
5-year	\$280,033,772,000	91.92%	\$257,413,325,000
7-year	\$161,998,120,000	88.56%	\$143,463,322,000
10-year	\$10,797,005,000	83.90%	\$9,058,557,000
15-year	\$46,746,649,000	73.58%	\$34,398,368,000
20-year	\$35,816,493,000	66.95%	\$23,978,930,000
25-year	\$2,141,794,000	58.12%	\$1,244,752,000
27.5-year	\$6,839,082,000	55.41%	\$3,789,239,000
39-year	\$64,908,139,000	45.08%	\$29,257,611,000
50-year	\$11,785,000	37.76%	\$4,450,000
ADS 12-year	\$33,682,364,000	75.94%	\$26,651,979,000
ADS 40-year	\$8,365,913,000	44.32%	\$6,353,204,000
Other ADS	\$3,558,644,000	79.13% (see Note)	\$1,577,220,000
All Investment	\$705,847,081,000		\$586,404,796,000

Note: These calculations assume a discount rate of 4.94 percent. The present value of deductions provided by other ADS schedules is imputed, using a heuristic.

Breaking down these figures by industry, we see that cost recovery varies significantly across sectors of the economy.

Table 4.
Cost Recovery for New Corporate Investments, by Sector

(A)	(B)	(C)	(D)	(E)
NAICS Sector	Amount of New Investment, 2012	Cost Recovery of Investment	Cost Recovery of Investment, without Bonus Depreciation	Effect of Bonus Depreciation
All Sectors	\$705,847,081,000	87.14%	83.08%	4.06%
Agriculture, Forestry, Fishing, and Hunting	\$5,377,985,000	91.32%	89.67%	1.65%
Mining	\$50,808,149,000	89.84%	86.25%	3.59%
Utilities	\$92,628,213,000	87.05%	76.02%	11.03%
Construction	\$7,776,764,000	88.97%	86.80%	2.17%
Manufacturing	\$203,923,865,000	88.03%	84.93%	3.10%
Wholesale and Retail Trade	\$101,568,458,000	85.48%	81.83%	3.65%
Transportation and Warehousing	\$36,473,157,000	90.37%	86.70%	3.67%
Information	\$57,895,619,000	90.17%	85.64%	4.52%
Finance and Insurance	\$32,572,639,000	83.80%	81.67%	2.12%
Real Estate and Rental and Leasing	\$43,344,665,000	84.77%	81.87%	2.90%
Professional, Scientific, and Technical Services	\$13,276,791,000	88.85%	86.11%	2.75%
Management of Companies (Holding Companies)	\$24,075,353,000	87.34%	84.27%	3.07%
Administrative and Waste Management Services	\$6,126,843,000	86.25%	83.40%	2.85%
Educational Services	\$1,175,823,000	86.05%	81.38%	4.66%
Health Care and Social Assistance	\$10,837,303,000	77.37%	75.22%	2.15%
Arts, Entertainment, and Recreation	\$4,187,081,000	73.68%	71.77%	1.90%
Accommodation and Food Services	\$11,644,861,000	77.19%	74.02%	3.16%
Other Services	\$2,153,522,000	85.84%	83.31%	2.52%

Note: These calculations assume a discount rate of 4.94 percent.

Column (B) of Table 4 shows the amount of new investment in 2012 by sector; these figures are taken directly from the IRS data. Column (C) displays the percentage of new investments that businesses in each sector will be able to deduct over time; these figures are calculated using the same methodology as the first table of results. Column (D) displays the percentage of new investments that businesses in each sector would be able to deduct, in the absence of bonus depreciation; these figures are calculated using the same methodology as the second table of results. Column (E) displays the effect of bonus depreciation on cost recovery for each sector; this is the difference between the figures in Columns (C) and (D).

Looking at the table above, we see that the “Agriculture, Forestry, Fishing, and Hunting” sector has the highest cost recovery of any industry, at 91.32 percent. The “Arts, Entertainment, and Recreation” industry is able to deduct the lowest percentage of its investments over time, at 73.68 percent. This large discrepancy is purely a function of the depreciation schedules to which each sector’s investments are subject. Investments by agricultural and outdoors corporations are generally subject to shorter depreciation schedules, while investments made by arts and entertainment corporations are subject to lengthier schedules.

The table also shows that, while bonus depreciation improves cost recovery for every economic sector, it is more beneficial to some industries than others. For instance, without bonus depreciation, the “Utilities” industry would only be able to deduct 76.02 percent of its capital expenditures. With bonus depreciation, this figure rises by 11.03 percentage points, to 87.05 percent. On the other hand, bonus depreciation is not a particularly useful provision for the “Construction” sector; it only improves the industry’s cost recovery figure by 2.17 percentage points. These discrepancies stem largely from the complicated rules regarding which investments are subject to bonus depreciation.

Conclusion

Virtually all economists agree that investment is one of the main drivers of long-term economic growth.³⁶ Given this, one might think that the U.S. tax system should be designed to encourage businesses to make investments. Instead, as this paper shows, the U.S. tax code is designed in exactly the opposite manner. Businesses in the U.S. are only able to deduct 87.14 percent of the cost of their investments over time, in present value terms. As a result, the U.S. tax system discourages businesses from making investments and encourages them to spend their money on other things.

The results of this paper highlight the importance of bonus depreciation in helping businesses receive a full deduction for their investments. Without bonus depreciation, businesses would only be able to deduct 83.08 percent of their capital expenditures over time. Thus, bonus depreciation moves the U.S. tax system almost a quarter of the way toward full cost recovery. The pending expiration of bonus depreciation is very bad news for those who do not wish to see the U.S. tax code further discourage investment.

³⁶ See Solow, Robert. “A Contribution to the Theory of Economic Growth.” *The Quarterly Journal of Economics* 70 (1956): 65-94.

Ultimately, it would not be difficult for tax policymakers to move the U.S. tax code all the way to full cost recovery. Lawmakers could allow for the full expensing of capital expenditures, allowing businesses to deduct the full cost of their capital expenditures immediately, rather than requiring them to spread out the deductions over time. One study has shown that enacting full expensing would grow the U.S. economy by more than 5 percent in the long term, by encouraging additional investment.³⁷

Over the last few decades, investment in the United States has declined significantly and overall economic growth has stagnated.³⁸ If Congress hopes to mitigate these trends, it should seriously consider enacting full expensing or otherwise improving the treatment of business investment in the U.S. tax code.

37 Schuyler, Michael. "Comparing the Growth and Revenue Effects of Four Proposed Depreciation Systems: Baucus, Camp, Wyden, and Full Expensing." TAX FOUNDATION. June 2014. <http://taxfoundation.org/article/comparing-growth-and-revenue-effects-four-proposed-depreciation-systems-baucus-camp-wyden-and-full>.

38 Cole, Alan. "Losing the Future: The Decline of U.S. Saving and Investment." Tax Foundation. October 2014. <http://taxfoundation.org/article/losing-future-decline-us-saving-and-investment>.

14 Appendix: Data and Methodology

Data

The primary data for this paper are provided by the IRS Statistics of Income Division, which issues an annual summary of all depreciation and amortization claimed on Form 4562 in each tax year.³⁹ Because Form 4562 is required of every corporation that claims a depreciation deduction, the IRS dataset covers all new investment reported on the tax returns of corporations in 2012.⁴⁰

A particularly useful feature of the IRS depreciation data is that it breaks down capital expenditures by the depreciation schedule to which they are subject. Based on this data, the table below displays all of the major schedules under current federal law and the amount of new investment subject to each schedule.

Table 5.
Major Depreciation Schedules under Current Law and Investment Subject to Those Schedules, 2012

Depreciation Schedule	Line Number, Form 4562	Amount of New Investment Subject to Schedule, 2012	Percentage of New Investment Subject to Schedule, 2012
Section 179	12	\$11,854,948,000	1.7%
Bonus Depreciation	14	\$237,039,023,000	33.6%
3-year	19a	\$23,022,313,000	3.3%
5-year	19b	\$164,917,721,000	23.4%
7-year	19c	\$95,404,067,000	13.5%
10-year	19d	\$6,358,581,000	0.9%
15-year	19e	\$27,530,075,000	3.9%
20-year	19f	\$21,093,079,000	3.0%
25-year	19g	\$1,261,347,000	0.2%
27.5-year	19h	\$6,839,082,000	1.0%
39-year	19i	\$64,908,139,000	9.2%
50-year	Margin	\$11,785,000	0.0%
ADS 12-year	20a	\$8,365,913,000	4.8%
ADS 40-year	20b	\$3,558,644,000	1.2%
Other ADS	20c	\$33,682,364,000	0.5%
Total New Investment		\$705,847,081,000	

Source: *Corporation Depreciation Data*, Internal Revenue Service, 2012.

39 "SOI Tax Stats - Corporate Depreciation Data." Internal Revenue Service. 2012. <https://www.irs.gov/uac/SOI-Tax-Stats-Corporation-Depreciation-Data>.

40 "Instructions for Form 4562." Internal Revenue Service. January 8, 2016. <https://www.irs.gov/pub/irs-pdf/i4562.pdf>.

In total, corporations reported \$705.8 billion in capital expenditures in 2012. Corporations were able to deduct \$248.9 billion immediately, through section 179 and bonus depreciation.⁴¹ The majority of new corporate investment, \$411.3 billion, was subject to the MACRS general depreciation schedules. Finally, \$45.6 billion of investments were subject to ADS schedules.

In addition to the statistics presented above, which cover the entire economy, the IRS also breaks down capital expenditures by NAICS industrial sector.

There are a few small categories of corporate investment reported on Form 4562 that are excluded, by necessity, from the figures above and from the analysis below. On line 15 of Form 4562, corporations report depreciation deductions for property subject to the section 168(f)(1) election. On line 16, they report investments subject to alternate depreciation schedules, such as ACRS. On line 21, corporations report depreciation deductions for listed property, including vehicles and computers. For all three of these lines, the IRS statistics record the value of deductions taken but not the value of investments made. The statistics also do not distinguish between investments made in the current year and those made in previous years. As a result, these figures are not usable for the analysis in this paper. However, it is likely that only a very small portion of the \$41.2 billion in deductions reported on these three lines pertain to capital expenditures made in 2012, so the omission of these figures is trivial.

It is important to note that the capital expenditure totals reported on Form 4562 differ significantly from the corporate investment data measured by the Bureau of Economic Analysis. According to the BEA's Fixed Assets Accounts tables, corporate fixed asset investment in 2012 was \$1,608.6 billion, over twice as large as the \$705.8 billion derived from Form 4562. There are several explanations for this discrepancy. First, the BEA figure includes investments made by S Corporations, RICs, and REITs; the IRS data does not. Second, the BEA data may include investments that businesses do not report or do not categorize as capital expenses on their tax returns. Finally, figures derived from IRS data are often smaller than comparable BEA figures, in general.⁴²

Methodology

According to the data shown above, corporations spent \$705.8 billion on capital expenditures in 2012. In nominal terms, corporations will be able to deduct almost the entire \$705.8 billion over the 50 years following 2012.⁴³ However, converting this figure to present value terms requires a two-step calculation.

41 Because bonus depreciation in 2012 allowed 50 percent of qualified investment costs to be expensed immediately, and 33.6 percent of investment was expensed immediately through bonus depreciation, the total percentage of investment subject to bonus depreciation was $(33.6\% \times 2)$, or 67.2 percent.

42 See, e.g., Ledbetter, Mark. "Comparison of BEA Estimates of Personal Income and IRS Estimates of Adjusted Gross Income." Bureau of Economic Analysis. November 2007. http://www.bea.gov/scb/pdf/2007/11%20November/1107_pi_agi.pdf.

43 As noted above, some investments are retired before the end of their federally-designated asset lives. Investments that are retired can no longer be deducted.

In the first step, I calculate the present value of the stream of deductions provided by each depreciation schedule. Given a depreciation schedule i , with n years of length, where a business is allowed to deduct fraction f_{ti} of an investment in a given year t , and assuming a discount rate of r , the present value of the deductions (d_i) provided by the depreciation schedule is:

$$(1) \quad d_i = \sum_{t=0}^n f_{ti} * \left(\frac{1}{1+r}\right)^t$$

To illustrate this step, let us return to the example of a construction company purchasing a five-year asset. Under this depreciation schedule, the company would be required to deduct 32 percent of the cost of the asset in the first tax year after it was placed into service, 19.2 percent of the cost in the second year, and so on. In present value terms, however, the corporation would only value the first year deduction at 30.49 percent of the cost of the asset and would only value the second year deduction at 17.43 percent of the cost. All in all, the company would be able to deduct 100 percent of the cost of the jackhammer in nominal terms and 91.92 percent of the cost in present value terms.

Table 6.

Depreciation Schedule for a Five-Year Asset, under MACRS

Year:	t	0	1	2	3	4	5
Fraction of investment deducted in year t:	f_t	20.0%	32.0%	19.2%	11.5%	11.5%	5.8%
Present value of deduction received in year t:	$f_t * \left(\frac{1}{1+r}\right)^t$	20.00%	30.49%	17.43%	9.97%	9.50%	4.53%

Note: These calculations assume a discount rate of $r = 0.0495$. They also assume that the asset is depreciated under the MACRS half-year convention and is placed into service in the same tax year as it is purchased (designated above as $t = 0$).

The calculation described above (like all of the calculations in this paper) assumes a discount rate of 4.94 percent.⁴⁴ This was the yield for Baa corporate bonds across all industries in 2012, and was chosen as a proxy for the risk-adjusted rate of return on corporate investment.⁴⁵ In practice, this is actually a *lower* discount rate than many corporations use, meaning that the top-line results of the paper are likely to be overly conservative.⁴⁶

For each major depreciation schedule in the federal tax code, I calculate the present value of deductions provided, using the half-year conventions listed in Appendix A of IRS Publication 946.⁴⁷ The only major category of investment assets for which this calculation cannot be performed is the “Other ADS” category, which includes \$33.7 billion of investments. The IRS data reports these investments as an aggregate, and does not specify exactly which schedules they are subject to. Therefore, I use a heuristic: the deductions taken for

⁴⁴ The discount rate reflects businesses’ preferences for money in the present over money in the future. This stems both from expected inflation (which is included in the 4.94 percent rate) and the ability of money in the present to earn interest.

⁴⁵ “Selected Interest Rates: Historical Data.” Federal Reserve. <http://www.federalreserve.gov/releases/h15/data.htm>.

⁴⁶ See Jagannathan, Ravi, David A. Matsa, Iwan Meier, and Vefa Tarhan. “Why Do Firms Use High Discount Rates?” *Journal of Financial Economics*, forthcoming. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2412250.

⁴⁷ *Supra*, note 3.

these investments are 90 percent as valuable as those taken for non-ADS investments.⁴⁸ This means that I first calculate the present value of deductions provided for all MACRS schedules, section 179, and bonus depreciation. Then, I average these figures, weighted by the amount of investment subject to each category, and multiply by 0.90 to arrive at the imputed present value of deductions received for “Other ADS” investments.

After calculating the present values of deductions provided by each depreciation schedule (d_i), I average these values, weighted by the amount of corporate capital expenditures in 2012 subject to each schedule (k_i). The result is an economy-wide measure of the percentage of all capital expenditures that corporations are able to deduct, in present-value terms (D):

$$(2) \quad D = \frac{\sum_{i=1}^m d_i * k_i}{\sum_{i=1}^m k_i}$$

In addition to calculating an economy-wide measure of the percentage of capital expenditures that corporations are able to deduct, I also calculate separate measures for each NAICS industrial sector.

Finally, I conduct a simple estimation of the percentage of capital expenditures businesses would be able to deduct if bonus depreciation were not a part of the tax code. In other words, I imagine a world without bonus depreciation – where businesses do not change their total level of investment, but are required to deduct all of the investment that would have been subject to bonus depreciation under the 3-year to 25-year MACRS schedules.⁴⁹ To do this, I assume that all capital expenditures subject to bonus depreciation in 2012 would instead be spread out proportionally among the MACRS 3-year to 25-year schedules, according to the amount of investment subject to these schedules in 2012.

⁴⁸ This heuristic is drawn from the internal data of the Tax Foundation's *Taxes and Growth* model. The heuristic makes intuitive sense: ADS schedules are usually longer than MACRS schedules, and they require that businesses spread out depreciation deductions using the “straight line” method, rather than the “declining balance method.” Both of these considerations make deductions from ADS schedules less valuable, in present-value terms, than those from MACRS schedules.

⁴⁹ Because bonus depreciation does not generally apply to structures, I assume that in the absence of bonus depreciation, none of the investments in question would be subject to the 27.5-year and 39-year schedules.
