Incorporating Intangibles into TPC Effective Tax Rate Models

Thomas Brosy and Thornton Matheson

Introduction

To better measure investment incentives provided by the US tax code, the Tax Policy Center (TPC) has extended its effective tax rate models—the Investment and Capital Model (ICM) and the International Investment and Capital Model (IICM)[1]—to cover intangible assets. Intangible assets, which include patents, trademarks, and other intellectual property (IP), are a growing share of the US capital stock, currently accounting for as much as one-quarter of total corporate assets.[2]

The US tax code has several provisions that affect investment in intangibles, and these provisions have undergone important changes in recent years. The 2017 Tax Cuts and Jobs Act (TCJA) changed the long-standing policy of allowing most research and development (R&D) spending to be immediately deductible from taxable income (expensed) in favor of being capitalized and amortized over five years, starting in 2022. The TCJA also introduced the foreign derived intangible income (FDII) regime, which offers a reduced tax rate on income from US exports generated by domestic intangibles. Additionally, the research and experimentation (R&E) tax credit is the largest general business credit in the United States, and its revenue cost continues to grow, reflecting the growing importance of intangibles in the US economy.

Understanding the tax regime for intangible assets is integral to understanding how taxes affect US business activity. The economic literature shows extensive evidence that R&D, and the technology it generates, has positive economic spillovers that boost not only private returns but also economic growth.[3] These spillovers can justify tax incentives for IP investment—such as accelerated cost recovery and credits for research outlays—on the theory that without them, companies would underinvest in research.

IP also has important implications for the ability of countries to collect revenues from multinational corporations. In contrast to tangible assets such as machinery and buildings, intangible assets can be exploited from any location. This makes it relatively easy for companies to reduce their tax liability by locating high-value intangibles in low-tax jurisdictions. To counteract these actions and protect their revenue base, while also protecting the competitiveness of their resident companies, many countries offer reduced tax rates to income from intangible assets (so-called IP or patent boxes).

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[1] The ICM calculates the effective marginal tax rate on US domestic business investment, and the IICM calculates effective marginal and average tax rates on foreign investment in the United States.
[2] Estimate is based on Calcbench 10K data for 2021, including corporate tangible and intangible assets but excluding goodwill.
[3] See Hall et al. (2010).

In this paper, we discuss the historical and current tax treatment of R&D and intangibles, explain how they are incorporated into TPC's effective tax rate models, and provide estimates of their impact on effective marginal and average tax rates. The following section provides a synopsis of US business investment in intangible assets, including definitions and data sources. The sections that follow discuss the major tax provisions for intangibles in greater detail and provide details of TPC model revisions incorporating those tax provisions.

1. US Investment in R&D and Intangible Assets

International Financial Reporting Standards define an intangible asset as "an identifiable non-monetary asset without physical substance."[4] Similarly, Section 197 of the Internal Revenue Code refers to assets such as goodwill, skilled workforce, business books and records, operating systems and information base, formula, process, design, patents and copyright, licenses and permits granted by a governmental unit, noncompete covenants, and customer-based or supply-based intangibles.[5]

Business investment in intellectual property can take the form of R&D, which, if successful, creates an intangible asset or acquisition of an existing intangible from a third party. The Bureau of Economic Analysis (BEA) publishes detailed annual data on US business expenditures on R&D and certain other investments in intangibles[6] derived from enterprise surveys conducted by the National Science Foundation.[7] These data are reported by industrial sector and do not include acquisitions of existing intangibles or certain other intangibles, such as user data.

According to BEA data, US IP investment has grown rapidly in recent decades, rising from about one-fifth of total US business investment in 1990 to almost a third by 2020. This surge was mainly driven by R&D expenditures, which rose from 12 percent of total investment to almost 19 percent over the same period.[8,9]

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[4] https://www.ifrs.org/issued-standards/list-of-standards/ias-38-intangible-assets.

[5] "26 U.S. Code § 197 - Amortization of goodwill and certain other intangibles," Legal Information Institute at Cornell Law School, accessed 02/03/2023, https://www.law.cornell.edu/uscode/text/26/197.

[6] Other intangibles in the BEA data include entertainment, literary and artistic originals, and architectural and engineering originals.

[7] Carol E. Moylan and Sumiye Okubo, "The Evolving Treatment of R&D in the U.S. National Economic Accounts" (Washington, DC: Bureau of Economic Analysis, US Department of Commerce), https://www.bea.gov/system/files/2020-04/the-evolving-treatment-of-rd-in-the-us-national-economic-accounts.pdf (PDF).

[8] Both R&D expensing and the R&E tax credit were in place for this entire period, so it is unlikely that the growth in intangibles investment reflects any recategorization of expenses because of tax incentives. Though the FDII regime was added in 2018, it largely affects relocation and acquisition of existing R&D, which are not included in BEA data.

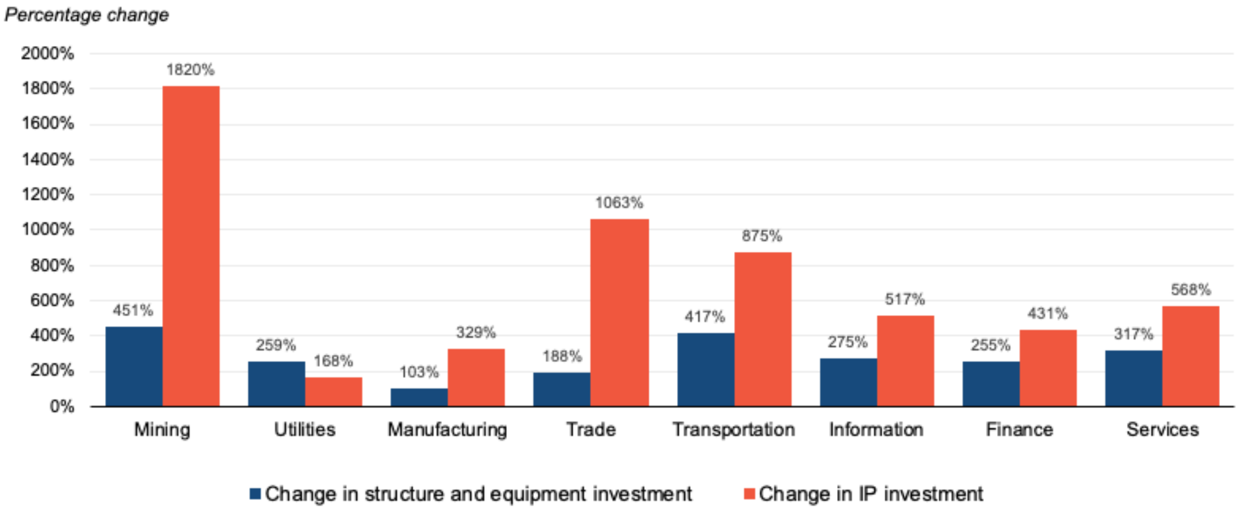
[9] Other intangibles in BEA data grew from 9 percent to 13 percent of investment. However, this is not representative of all intangibles, as BEA data only include a subset of total intangibles (R&D and literary, artistic, and entertainment originals as described above).

Figure 1 shows the change in total investment between 1990 and 2019.[10] In all industries except utilities, investment in IP grew faster than investment in structures and equipment. In wholesale and retail trade, investment in intangibles grew more than six times faster. In information and finance, it grew twice as fast. IP investment also increased more rapidly than investment in structure and equipment in smaller industries not included in figure 1, such as the administrative sector and management.

FIGURE 1

Change in structure and equipment and IP investment by industry

1990-2019



Source: Bureau of Economic Analysis

Unsurprisingly, the share of intangibles in total investment also grew over the past three decades. Growth of IP's share of total business investment varies considerably by industry (figure 2).[11] Between 1990 and 2019, IP intensity grew most rapidly in manufacturing (18.4 percentage points), wholesale and retail trade (14.1 percentage points), and information (12.3 percentage points) industries.[12] Together, these industries accounted for about 40 percent of total US business investment in 2019.

These industries also tend to have the highest share of IP investment, or IP intensity. In 2019, the largest sectors with the highest rates of IP intensity were professional services (59 percent), manufacturing (57 percent), and information (52 percent), followed by wholesale and retail trade (20 percent) and finance (19 percent). Other sectors depicted in figure 2 had an IP intensity below 5 percent.

[10] We chose to analyze industry-specific outcomes for 2019 to avoid potential distortion effects from the COVID-19 pandemic.

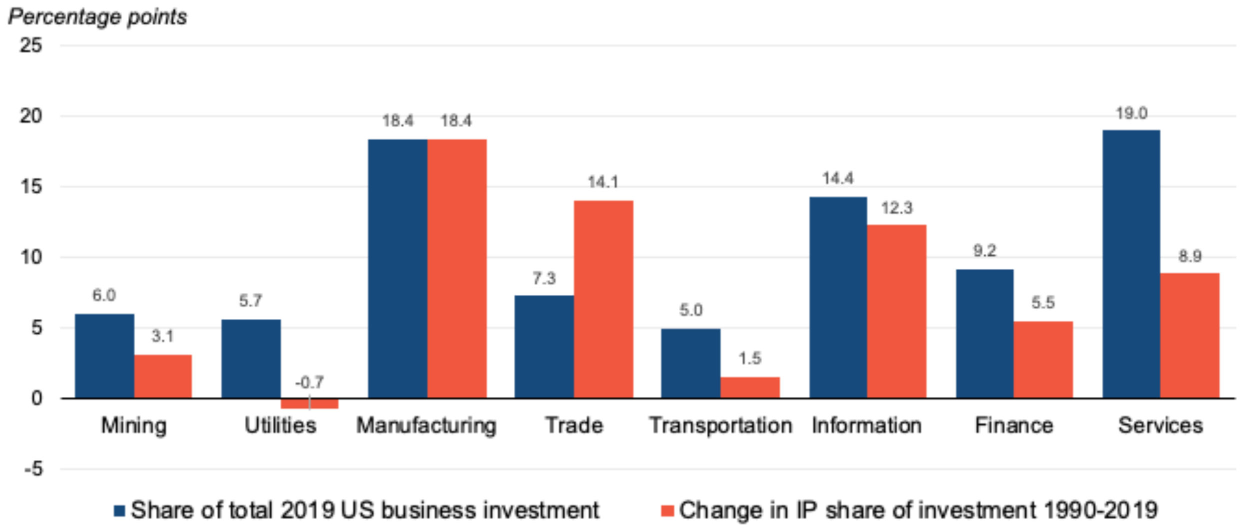
[11] The figure leaves out smaller sectors: administrative services (2.4 percent share of total investment in 2019), agriculture (2 percent), construction (2.5 percent), and management (1.5 percent). We also leave out real estate, which has a very low IP intensity overall (1.1 percent) and other services, which does not represent a particular industry.

There is little correlation between initial IP intensity and the overall increase in investment over this period. While total investment grew rapidly for services, it was much lower on average for manufacturing and wholesale and retail trade. Other IP–intensive sectors such as information and finance had average investment growth compared with that of other sectors.[13]

FIGURE 2

Industry share of investment (2019) and change in IP share of investment

1990-2019



Source: Bureau of Economic Analysis

2. Tax Treatment of R&D and Intangibles

There are three major tax provisions affecting intangible assets: cost recovery (or amortization) rules, the R&E tax credit, and the FDII regime. Sections 174[14] and 197 of the Internal Revenue Code define the rules governing cost recovery for R&D and intangible assets. Section 41[15] defines the rules governing the R&E tax credit, and Section 250[16] describes the FDII regime.

R&D Cost Recovery

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[13] Not adjusting for inflation, between 1990 and 2019, total investment increased 6-fold in professional services, 2-fold in manufacturing, 2.4-fold for wholesale and retail trade, 2.8-fold in finance, and 3.7-fold in information. Overall investment grew 3-fold over this time period.

[14] "26 U.S. Code § 174 - Amortization of research and experimental expenditures," Legal Information Institute at Cornell Law School, accessed 2/3/2023, https://www.law.cornell.edu/uscode/text/26/174.

[15] "26 U.S. Code § 41 - Credit for increasing research activities," Legal Information Institute at Cornell Law School, accessed 2/3/2023, https://www.law.cornell.edu/uscode/text/26/41.

[16] "26 U.S. Code § 250 - Foreign-derived intangible income and global intangible low-taxed income," Legal Information Institute at Cornell Law School, accessed 2/3/2023, https://www.law.cornell.edu/uscode/text/26/250.

Section 174 of the US tax code, introduced in 1954, permitted R&D expenditures to be either immediately deducted (expensed) or capitalized and amortized over a period of five years.[17] IRS regulation 1.174-2(a) states that R&D expenditures must "incur in connection with the company's trade or business and represent research and development costs in the experimental or laboratory sense" to qualify for expensing. Qualifying expenses typically include all costs incurred in the development or improvement of products. The IRS may audit and challenge companies' classifications of certain expenses as R&D.

Departing from this long-standing treatment, the 2017 TCJA required capitalization and straight-line amortization of domestic R&D investment over five years as of January 1, 2022, while setting a timeline of 15 years for foreign R&D expenditures. This provision was included as a revenue raiser, although it is mostly a timing shift. However, many businesses expect this provision to be deferred or repealed, with a retroactive provision for 2022.

The IRS does not publish statistics on total R&D expenses or acquired intangibles. The BEA reported a total investment of $488 billion—or 17.5 percent of total investment—in R&D in 2019, but its definition of intangibles is somewhat broader than that of the IRS. In 2019, BEA R&D investment exceeded expenditures reported for the R&E tax credit, which the IRS reported as $430 billion, by 13.5 percent.[18]

R&E Tax Credit

Though all expenditures qualifying for the R&E credit must also qualify as R&D expenditures, not all R&D expenditures qualify for the R&E credit. As Section 41-2 notes, "Expenses paid or incurred in connection with a trade or business within the meaning of section 174(a) (relating to the deduction for research and experimental expenses) are not necessarily paid or incurred in carrying on a trade or business for purposes of section 41." This report distinguishes the two types of expenditures by referring to Section 174 expenditures as R&D and its subset of Section 41 expenditures as R&E.[19]

Expenditures eligible for the R&E tax credit are defined as qualified research expenses (QREs), whose main categories include wages for employees engaged in in-house research, supplies and material, and contract research (figure 3). The majority of QREs come from wages, which accounted for almost 70 percent in 2018. The remainder is about evenly split between supplies

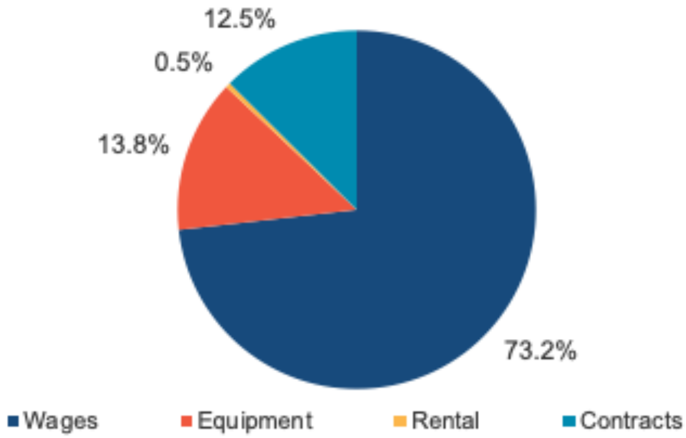
[17] Section 174 also permitted taxpayers electing to expense an annual option to capitalize and amortize R&D expenditures over 10 years.
[18] See section 3, "Incorporating Intangibles into the IICM," for more details.
[19] In addition to the Section 174 test, expenses eligible for the credit must meet other requirements such as the discovering technological information test, business component test, and process of experimentation test. See IRS guidance at "Audit Techniques Guide: Credit for Increasing Research Activities (i.e. Research Tax Credit) IRC § 41* - Qualified Research Activities," IRS, June 2005, https://www.irs.gov/businesses/audit-techniques-guide-credit-for-increasing-research-activities-i-e-research-tax-credit-irc-41-qualified-research-activities

and contracts with other companies.[20] Only 65 percent of contract research payments, which include payments to nonprofit institutions such as universities, constitute QREs.[21]

FIGURE 3

Sources of Qualified Research Expenditures (QREs)

2019



Source: IRS SOI Form 6765

Congress first introduced the "credit for increasing research activities" (commonly referred to as the R&E tax credit) in the Economic Recovery Tax Act of 1981. As its name suggests, the credit is available for QREs that exceed a measure of average historical R&E expenditures.[22] The alternative simplified credit was introduced in 2003. Originally temporary, the R&E tax credit expired and was extended 16 times before Congress made it permanent in 2015.[23]

Firms may elect either the regular R&E tax credit or the alternative simplified credit. The regular research tax credit follows a formula that depends on whether the firm is an established firm (one with gross receipts and QREs for at least three years between 1984 and 1988) or a "start-up" (any other firm). Whether it is optimal for a firm to choose the regular tax credit or the alternative simplified credit depends on its historical research intensity and expenditures.

The formula for the regular R&E credit in year t for firm i is:

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[20] These data are from the Statistics of Income (SOI) published by the IRS. Note that since only 65 percent of contract expenses qualify, this figure represents a higher amount as a share of raw expenses.

[21] The IRS provides guidance on defining QREs in its federal tax regulations. See https://www.law.cornell.edu/cfr/text/26/1.41-2.

[22] The provision originally included the "discovery rule"—which limited qualifying expenses to those deemed sufficiently novel—but that restriction was repealed in 2003. See Gary Guenther, "Federal Research Tax Credit: Federal Law and Policy Issues" (Washington, DC: Congressional Research Service, 2022), https://sgp.fas.org/crs/misc/RL31181.pdf (PDF).

[23] Lydia Austin and Eric Toder, "Expiring Provisions With Perpetual Life" (Washington, DC: Urban Institute and Brookings Institution, 2015), https://webarchive.urban.org/UploadedPDF/2000233-expiring-provisions-with-perpetual-life.pdf (PDF). One may worry that this creates an incentive for firms to cycle between low and high expenditures. However, Rao (2015) finds no evidence of such behavior. She reports that a 10 percent decrease in the user cost of capital leads to a short-run increase in research expenditures of 11 percent and an even larger increase in the long run.

$$R\&E_{it}^{reg} = 0.2 * \left[QRE_{it} - \max\left\{\alpha_{it} * \frac{\sum_{\{s=1\}}^{4} QRE_{it-s}}{4}, \frac{1}{2} * QRE_{it}\right\}\right]$$

where QRE_t is the amount of qualified research expenditures in year t; $\frac{\sum_{\{s=1\}}^{4} Q_{t-s}}{4}$ is the "base amount," equal to the average amount of QREs over the past four years; and α_{it} represents the fixed-based percentage for an individual firm.

For established firms, the fixed-based percentage is equal to ratio of the sum of QREs from 1984 to 1988 to the sum of gross receipts from 1984 to 1988, with a maximum value of 16 percent. For start-ups, the fixed-based percentage is set to 3 percent over the first five years, after which it is gradually adjusted based on the ratio of QREs to actual receipts. After 10 credit years, the fixed base equals the firm's actual total QREs to its total receipts in the fifth through the tenth tax years.[24]

The firm estimates its QREs for a given year and subtracts the maximum of the base amount deduction and half of its expenditures. Although the credit rate is 20 percent, it follows from the formula that the maximum amount of credit for an additional dollar invested is 10 percent of qualified expenditures.

The alternative credit follows the same calculation for all firms:

$$R\&E_t^{alt} = 0.14 * \left[QRE_{it} - \frac{1}{2} * \frac{1}{3} \sum_{\{s=1\}}^{3} QRE_{i,t-s}\right]$$

where $\frac{1}{3} \times \sum_{\{s=1\}}^{3} QRE_{t-s}$ is the average QRE over the three previous years. Because the baseline deduction for expenditures is based on previous years' spending, the marginal credit rate for an additional dollar invested in the current year is either 0 percent or 14 percent.[25]

The R&E tax credit does not allow "double-dipping," so companies cannot claim the R&E tax credit for the tax value of expensed investment.[26] To illustrate, if a company invests $100 in R&D and expenses the entire amount for tax purposes, it can only claim the R&E tax credit for $79 = $100*(1-0.21).

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[24] In credit year 6, the fixed-based percentage is equal to the actual ratio (QREs divided by receipts) for years 4 and 5 times 1/6. In year 7, it is the ratio for years 5 and 6 times 1/3; in year 8, the ratio for years 5 to 7 times 1/2; in year 9, it is the ratio for years 5 to 8 times 2/3; and in year 10, it is the ratio of years 5 to 9 times 5/6.

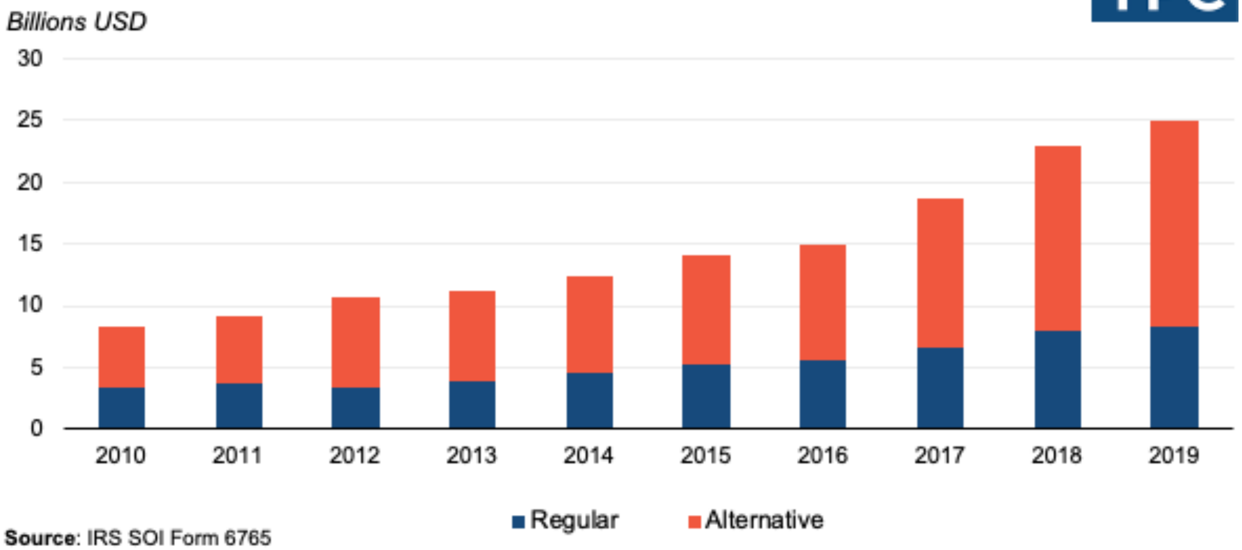
[25] Firms that experience cycles in R&D investment may benefit more from the alternative credit since the deduction is based on previous years' investment. Among the largest sectors benefiting from the credit, the alternative credit makes up 71 percent of manufacturing credits and 75 percent of wholesale, but 57 percent of information and 51 percent of professional services credits.

[26] Companies can choose to either receive a smaller credit based on the amount of R&D after removing the tax value of expensed investment or take the full credit and then expense a smaller amount. In 2014, 90 percent of companies choose the reduced credit. See p. 8 in Gary Guenther, "Federal Research Tax Credit: Federal Law and Policy Issues" (Washington, DC: Congressional Research Service, 2022), https://sgp.fas.org/crs/misc/RL31181.pdf (PDF).

The R&E tax credit is by far the largest US business tax credit. In 2019, the government issued slightly more than $25 billion in R&E tax credits, compared with $10 billion for the next-largest credit, the low-income housing tax credit. The amount of R&E tax credits awarded has more than tripled over the past decade, from about $8 billion in 2010 to $25 billion in 2019 (figure 4). Most of the increase comes from the alternative tax credit. There were about 11,400 returns claiming the alternative credit in 2019, totaling $16.7 billion, compared with about 13,400 returns claiming the regular tax credit, totaling $8.3 billion.[27]

FIGURE 4

R&E Regular Research Credits and Alternative Simplified Credits Issued



Source: IRS SOI Form 6765

FDII Regime

The FDII regime, which applies only to C-corporations, was introduced as part of the TCJA and became effective in January 2018.[28] It offers a reduced effective tax rate on the estimated return from domestic intangibles to the extent that they generate US export income. A type of "patent box" regime,[29] FDII was enacted to encourage multinational corporations to locate intangible assets in the United States rather than in offshore jurisdictions.

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[27] Estimates on the total amount of returns come from IRS Publication 5108. "SOI Tax Stats - Corporation Income Tax Returns Line Item Estimates (Publication 5108)," IRS, updated July 11, 2022, https://www.irs.gov/statistics/soi-tax-stats-corporation-income-tax-returns-line-item-estimates-publication-5108.

[28] "26 U.S. Code § 250 - Foreign-derived intangible income and global intangible low-taxed income," Legal Information Institute at Cornell Law School, accessed 2/2/2023, https://www.law.cornell.edu/uscode/text/26/250.

[29] A patent box, also called an IP regime, allows income generated from intangible assets to be taxed at a lower rate. For a list of examples, see "Intellectual Property Regimes," Organisation for Economic Cooperation, accessed 2/2/2023, https://qdd.oecd.org/data/IP_Regimes.

Under Section 250, companies can deduct 37.5 percent of qualifying FDII, which implies a statutory rate of 13.125 percent. In 2025, the deduction will be reduced to 21.875 percent, raising the effective statutory rate to 16.4 percent.[30]

FDII is domestic income that exceeds a 10 percent return on domestic tangible assets, multiplied by the share of domestic gross receipts derived from US exports. Specifically, FDII is calculated as:

$$FDII = \underbrace{\frac{FDDEI}{DEI}}_{FDR} \times [\underbrace{DEI - (10\% \times QBAI)}_{DII}] = FDR \times DII$$

where FDDEI is foreign-derived deduction eligible income, or domestic income earned from US exports; DEI is deduction-eligible income, or total domestic income; and QBAI is qualified business asset investment, or domestic tangible assets. Deemed intangible income (DII) is the excess of total domestic income over a 10 percent return on domestic tangible assets. Multiplying DII by foreign-derived revenue (FDR)—the ratio of FDDEI to DEI—determines FDII.

For example, a company's US income is $200 million, of which $50 million is from foreign sales, and has US tangible assets worth $400 million. The fraction of sales from export is 1/4, so FDII is 0.25*(200-0.1*400), or $40 million. The $40 million in FDII, taxed at the preferential rate of 13.125 percent, generates tax revenue of $5.25 million, which is $3.15 million less than if it were taxed at the standard 21 percent rate.

The IRS Statistics of Income (SOI) division reports that the total FDII reported on Form 8893 in 2018 was roughly $143 billion—almost 17 percent of DEI—implying a deduction of $52.5 billion and a revenue cost of $11.3 billion.[31]

3. Incorporating Intangibles into the IICM

TPC's effective tax rate models—the ICM and IICM—calculate US effective marginal tax rates (EMTRs) and effective average tax rates (EATRs) by asset, industry, and financing method. EMTRs, which measure tax as a share of the total return on an investment that just breaks even after taxes, determine the intensive margin or scale of investment.[32] EATRs, which measure the present value of tax as a share of the present value of total returns for an investment that yields economic profits, determine the extensive margin of investment, or market entry by businesses operating in multiple jurisdictions.[33]

[30] 21%*(1-0.375) = 13.125%, and 21%*(1-0.21875) = 16.4%

[31] "SOI Tax Stats – International Tax Studies Based Upon Provisions Introduced by the Tax Cuts and Jobs Act (TCJA) of 2017," IRS, updated September 7, 2022, https://www.irs.gov/statistics/soi-tax-stats-international-tcja-studies.

[32] Robert E. Hall and Dale W. Jorgenson, "Tax Policy and Investment Behavior: Reply and Further Results," *American Economic Review* 59 (3) (1969): 388–401

[33] Michael P. Devereux and Rachel Griffith, "Evaluating Tax Policy for Location Decisions," *International Tax and Public Finance* 10 (2003): 107–26. Following the typical practice in the EATR literature, our default assumption for EATRs is a 20 percent rate of return on investment.

The ICM calculates EMTRs for US corporate and pass-through businesses, incorporating both corporate and investor-level taxes. It focuses on measuring marginal investment incentives and disincentives imposed by the US tax code on domestic investment. The IICM calculates corporate-level EMTRs and EATRs, including US and foreign corporate income taxes and cross-border withholding taxes for US corporations owned by foreign corporate parents.[34] The EMTR is important to understand incentives for additional investment where a company already operates. On the other hand, the EATR can help us understand the tax consequences of choosing a new location to invest in.

Both models are based on detailed asset-by-industry private investment data from the BEA. The models treat all BEA data designated with an "RD" prefix as R&D. Software expenses are excluded from R&D since they rarely qualify for the designation.[35] TPC also calculates effective tax rates for acquired intangibles, which are not included in the BEA dataset.

To illustrate effective tax rate calculations, we present the IICM expanded to reflect investment tax credits, of which the US R&E credit is a specific example.[36] The IICM follows the Devereux and Griffith (2003, henceforth cited as DG) framework, in which an investment is undertaken to maximize the value of the firm, V_t:

$$V_t = \frac{\alpha D_t - N_t + V_{t+1}}{1+\beta} \qquad (1)$$

where N_t represents new equity issuances and D_t is dividends. α and β are financing parameters that can incorporate investor-level taxes. β is the corporate discount rate, which equals the nominal interest rate i multiplied by 1, minus the investor-level tax on interest income: $\beta = i(1-\tau^{int})$.[37] α reflects the after-tax relative value to investors of dividends and capital gains: $\alpha = (1-\tau^{div})/(1-\tau^{CG})$.[38] The IICM focuses only on corporate-level taxes, ignoring investor-level taxes other than taxes on foreign corporate parents. At the US corporate level, α simply equals 1 and β equals i.

Dividends equal after-tax income minus the net investment and financing charges:

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[34] These treatments are based on stylized differences between the two models' focal businesses. Although some investments by purely domestic corporations and pass-through businesses yield economic rents, above-normal returns are particularly prevalent among multinational corporations. Additionally, share ownership for multinational firms is usually widely dispersed across countries, making calculation of investor-level taxes difficult and uninformative.

[35] Software expenses fall into three categories: prepackaged software, custom software, and in-house software. Though a fraction of in-house software may qualify as R&D, we exclude such software from our analysis of R&D given the lack of data.

[36] For a full exposition of effective tax rate calculations, see Matheson (2021).

[37] We assume inflation $\pi = 2\%$ and the real interest rate $r = 5\%$, $i \cong r(1+\pi) + \pi = 7.1\%$). For foreign-owned US corporations, τ^{int} is the greater of the bilateral withholding tax on interest payments or the foreign parent's home country corporate tax rate. For details, see Matheson (2021).

[38] Where τ^{div} is the investor-level tax on dividends and τ^{CG} is the investor-level tax on capital gains. The IICM assumes corporations are buy-and-hold investors, so that τ^{CG} equals zero. For foreign-owned corporations, τ^{div} is the bilateral withholding tax on participating dividends.

$$D_t = Q(K_{t-1})(1-\tau) - I_t(1-ITC) + B_t - [1+i(1-\tau)]B_{t-1} + \tau\phi(I + K_{t-1}^T) + N_t \quad (2)$$

where $K_t$is the capital stock, $Q(K_t)$ is output, I_t is investment, τ is the corporate tax rate, ITC is the investment tax credit rate, B_t is the amount of bond issuance, and ϕ is the allowed tax depreciation rate. The R&E tax credit is a tax subsidy that reduces the cost of investment, I_t, by a fraction, ITC.

The net present value of the rent, R_t, is equal to the change in the market value of the firm:

$$R_t = dV_t = \sum_{s=0} \frac{\alpha dD_{t+s} - dN_{t+s}}{(1+\beta)^s} \quad (3)$$

The DG model evaluates the net present value of rents by a one-time perturbation in investment in period *t*, which is then sold at period *t+1*. The change in the net present value of rents from an investment can be expressed as:

$$R = -\alpha(1 - A - ITC) + \frac{\alpha}{1+\beta}\{(1+\pi)(p+\delta)(1-\tau) + (1+\pi)(1-\delta)(1-A-ITC)\} + F \quad (4)$$

The parameter *A* represents the tax benefit of depreciation allowances, τ**Z*, where τ is the income tax rate and *Z* is the present value of depreciation/amortization allowances. With full expensing, *Z* equals 1 and *A* equals τ, while slower depreciation reduces the values of Z and therefore A. δ is the rate of economic depreciation, or the rate at which an asset's productivity declines (which may differ from the rate at which is it written down for tax purposes). For intangibles, we assume an economic depreciation rate of 15 percent.[39] π is the inflation rate, which we assume equals 2 percent.[40]

F is a financing term, which equals zero for corporate investments financed out of retained earnings. For debt-financed investments:

$$F = dB_t\alpha\left[1 - \frac{1+i(1-\tau)}{(1+\beta)}\right] \quad (5)$$

where dB_t equals the amount of bonds issued, net of first-year depreciation deductions.[41] Because of interest deductibility, debt-financed investments typically have a lower marginal cost of capital than do equity-financed investments.

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39 Fifteen percent economic depreciation is traditionally assumed for a large fraction of assets, although it has been found to be a conservative estimate (see Li and Hall 2020). For R&D, we use asset-specific depreciation rates from the BEA dataset, which are either 15 percent or 20 percent.

40 Tax rates are somewhat sensitive to inflation. A higher inflation rate leads to a higher effective tax rate on equity-financed investment since firms discount future income with the nominal interest rate. On the other hand, it may make debt-financed tax rates lower, as firms get to deduct nominal interest payments against income. However, our qualitative comparison between R&D capitalization and R&D expensing—or between tangible and intangible assets—is similar when we use an inflation rate that is slightly higher, such as 5 percent or 8 percent.

41 Specifically, dB_t is $(1-\phi\tau)$, where ϕ is the first-year depreciation allowance.

The EMTR measures the tax burden on an investment that just breaks even after taxes. We can derive the marginal cost of capital by setting $R=0$ and solving equation (4) for p. The corporate-level cost of capital for a marginal investment that just breaks even after taxes is:

$$\tilde{p} = \frac{(1 - A - ITC)}{(1-\tau)(1+\pi)}(\beta + \delta(1+\pi) - \pi) - \delta - F\frac{(1+\beta)}{\alpha(1-\tau)(1+\pi)} \qquad (6)$$

The term $(1 - A - ITC)$ captures the net present value cost of investing in one unit of capital (with a pretax cost of 1) in period t. R&D capitalization affects the value of A: with full expensing, A equals τ, but straight-line R&D amortization over five years reduces its value to $0.84*\tau$. Similarly, the R&E tax credit rate (*ITC*) reduces the cost of investment by the effective tax credit rate. The impact of an investment tax credit on the cost of capital can be large because, unlike A, it is not restricted to the income tax rate. The EMTR is calculated as $\frac{\tilde{p}-r}{\tilde{p}}$, where r is the real interest rate, or 5 percent.

By contrast, the EATR measures the tax burden on an investment that yields a positive profit, p. It is calculated as the present value of all future tax liabilities to the present value of pretax income:

$$EATR = \frac{(R^* - R)}{\left[\frac{p}{(1+r)}\right]} \qquad (7)$$

where R^* is the present value of pretax income,[42] R is the present value of after-tax income, and the denominator $p/(1+r)$ is the present value of total pretax capital income.[43] We assume a pretax profit rate (p) of 20 percent.

R&D Cost Recovery

Requiring assets to be written off more slowly for tax purposes generally increases effective tax rates by lowering the present tax value of cost recovery allowances, A. Higher discount rates also reduce the net present value of depreciation allowances. For example, an investment that is amortized over five years at a discount rate of 7 percent has $Z = 0.84$; with a discount rate of 10 percent, $Z = 0.79$.

The effect of capitalization on both EMTRs and EATRs is large, and EMTRs are particularly sensitive to changes in cost recovery allowances. Figure 5 shows corporate-level EMTRs for R&D with full expensing compared with five-year amortization. Requiring five-year straight-line amortization raises the EMTR for an equity-financed investment from zero to about 15 percent.

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[42] $R^* = (p - r)/\,(1 + r)$

[43] An intuitive way to grasp the value of the EATR is as a weighted average of the EMTR and the statutory tax rate: the less profitable an investment (that is, the lower $\tilde{p}$), the closer the EATR gets to the EMTR, and the more profitable an investment, the closer the EATR gets to the statutory tax rate. See equation (9) in Matheson (2021).

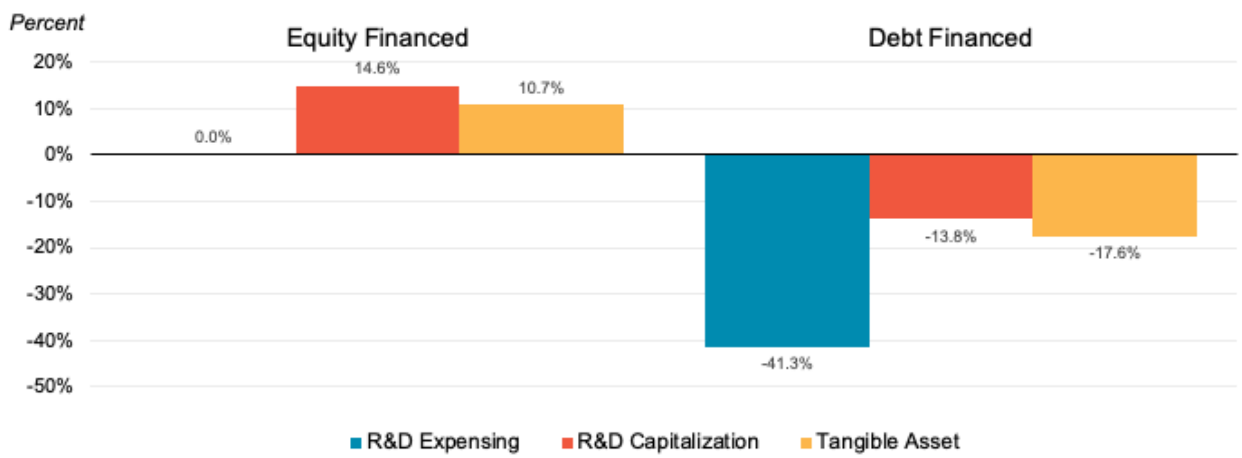
And for debt-financed investments, where expensing produces a deeply negative EMTR, capitalization raises it by almost 30 percentage points.

For comparison, we also evaluate effective tax rates for a composite tangible asset, which is a weighted average of the tangible private business assets (equipment and structures) reported by the BEA for 2019.[44] Weighted average tangible assets have an EMTR of about 11 percent for equity financing and –18 percent for debt financing.[45]

FIGURE 5

Effective marginal tax rates (EMTRs) with and without R&D capitalization

2022



EATRs are generally much higher than EMTRs, reflecting the assumption of a substantial profit rate (20 percent), and they do not react to capitalization as strongly as EMTRs. For equity-financed R&D investment, capitalization raises the EATR from about 16 percent to 19 percent. Similarly, capitalization raises the EATR for debt finance—which is positive, unlike the EMTR for debt-financed R&D—by about 3.5 percentage points. Tangible assets have EATRs intermediate between expensed and capitalized R&D for both equity and debt-financed investment.

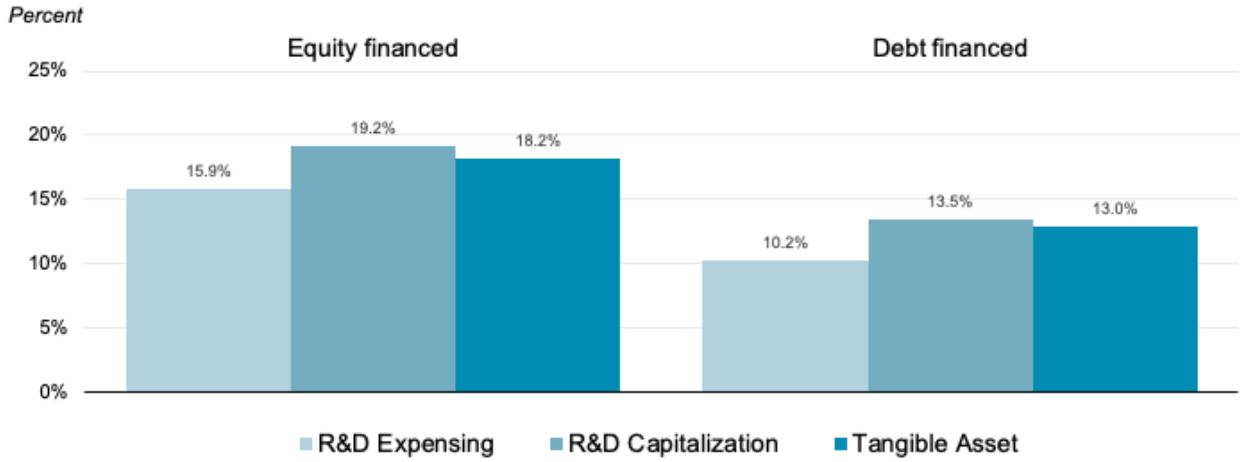
[44] We use the 2019 capital stock rather than the 2020 stock to avoid introducing distortions related to the COVID-19 pandemic.

[45] In 2022, equipment investment still benefits from bonus depreciation, lowering its effective tax to near-zero for equity finance, but inclusion of structures in the weighted average tangible asset raises the equity EMTR above zero.

FIGURE 6

Effective average tax rates (EATRs) with and without R&D capitalization

2022



R&E Tax Credit

To gauge the impact of the R&E tax credit on effective tax rates, we estimate an effective tax credit rate that reflects the actual ratio of utilized credits to R&E expenditures. Because the credit is only available for R&E expenditures that exceed a historical average, and because not all credits are utilized in the same year they are issued, the statutory credit rates of 20 percent or 14 percent are much higher than the effective credit rate.

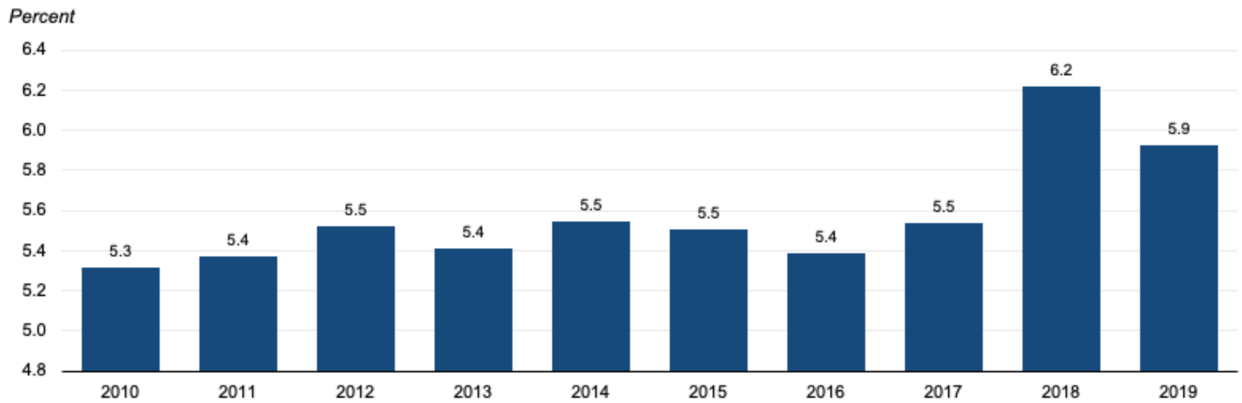
Using SOI data on R&E tax credit issuance and total QREs, we first calculate the IRS effective rate—the ratio of total credits issued (standard plus alternative) to total QREs (figure 7). From 2010 to 2017, this rate fluctuates between 5.3 percent and 5.6 percent. Post–TCJA, the rate jumps to between 5.9 percent and 6.2 percent due to the decline in the statutory corporate tax rate from 35 percent to 21 percent, which reduces the tax value of expensed R&D that is excluded from the tax credit base.[46] For years 2020 and beyond, we use the average of the 2018 and 2019 rates, 6.1 percent, as a preliminary estimate of the effective credit rate.

[46] For example, assuming $100 invested in R&D, full expensing, and a 10 percent credit rate: in 2017, the amount of credit is 10%*100*(1-0.35) = $6.50. In 2018, the amount of credit is 10%*100*(1-0.21) = $7.90.

FIGURE 7

IRS effective R&E tax credit

2010-2019



Source IRS SOI Form 6765

Two additional adjustments to this preliminary rate are necessary. First, since the R&E tax credit is not refundable, firms with insufficient tax liability cannot realize the full value of the credit in the year it is earned and must carry the credit forward for use in future years. In 2018 and 2019, credits used were roughly half of total credits issued and carried forward,[47] so we assume that each year, 50 percent of issued credits are used. We then calculate the present discounted value of a credit using the same discount rate as the model, which results in a value of \$0.92 for each \$1 credit.

Second, since not all R&D expenditures are eligible for the R&E tax credit, we use data from SOI and the BEA to estimate the ratio of QREs to total R&D expenditures. In 2018 and 2019, the average ratio of QREs to BEA R&D was 0.87, so we multiply the IRS effective credit rate by that value. The formula for the effective R&E tax credit rate is as follows:

$$Effective\ R\&E\ Tax\ Credit\ Rate_t \ = \frac{Credits_t}{QREs_t} * PV\ R\&E\ Credit * \frac{QREs_t}{BEA\ R\&D_t} \qquad (8)$$

For 2020–2021, that calculation yields $6.1\% * 0.92 * 0.87 = 4.9\%$.

The effective tax credit rate automatically increases in 2022 due to R&D capitalization, which reduces the tax value of expensing deductions. To reflect this, we adjust the effective R&E credit rate as such: we first reverse the pre-capitalization “no double-dipping” rule by dividing the effective rate by $(1 - \tau^{corp})$, and then reapply the post-capitalization “no double-dipping” rule by multiplying by $(1 - 0.2 * \tau^{corp})$.[48] This raises the effective credit rate for years after 2021 to 5.9 percent.

[47] In 2019, US Treasury Department data indicate that the share of utilized credits was 53 percent for domestic firms and 45 percent for international firms. We use an average of 50 percent.

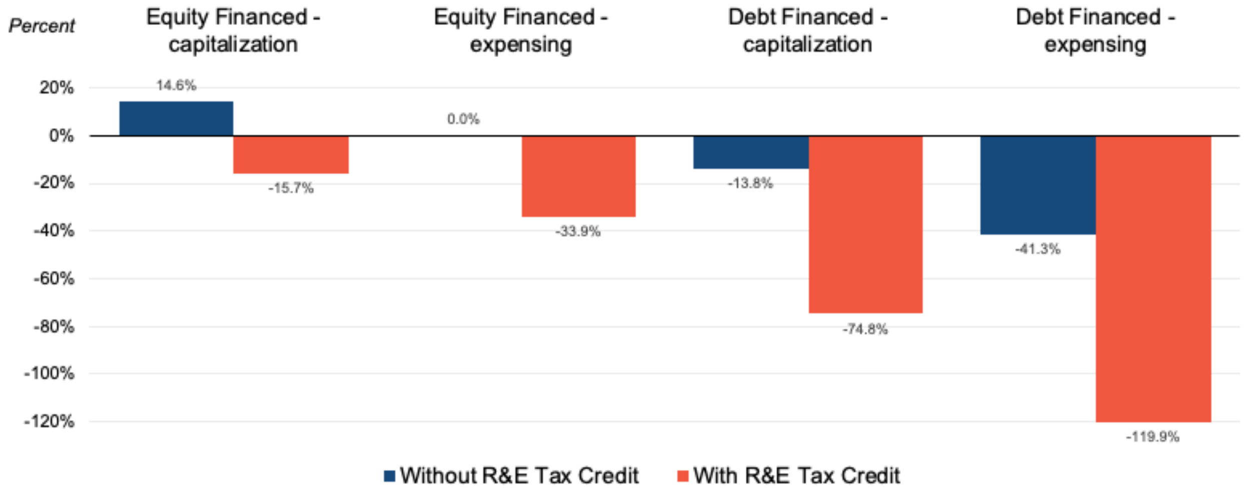
[48] The effective rate goes up by about 21 percent, or $(1 - 0.2 * \tau^{corp})/(1 - \tau^{corp})$.

Figures 8 and 9 illustrate the impact of the R&E tax credit on effective tax rates, both with and without R&D capitalization. The credit renders all EMTRs in figure 8 negative, even for equity-financed R&D. With capitalization, the equity EMTR falls from about 15 percent to –16 percent; with expensing, the rate falls from zero to less than –30 percent. The EMTRs for debt-financed investment with the R&E credit are deeply negative, although due to its risky nature, R&E tends to be equity financed.[49]

FIGURE 8

Effective marginal tax rates (EMTRs) with R&E Tax Credit

2022



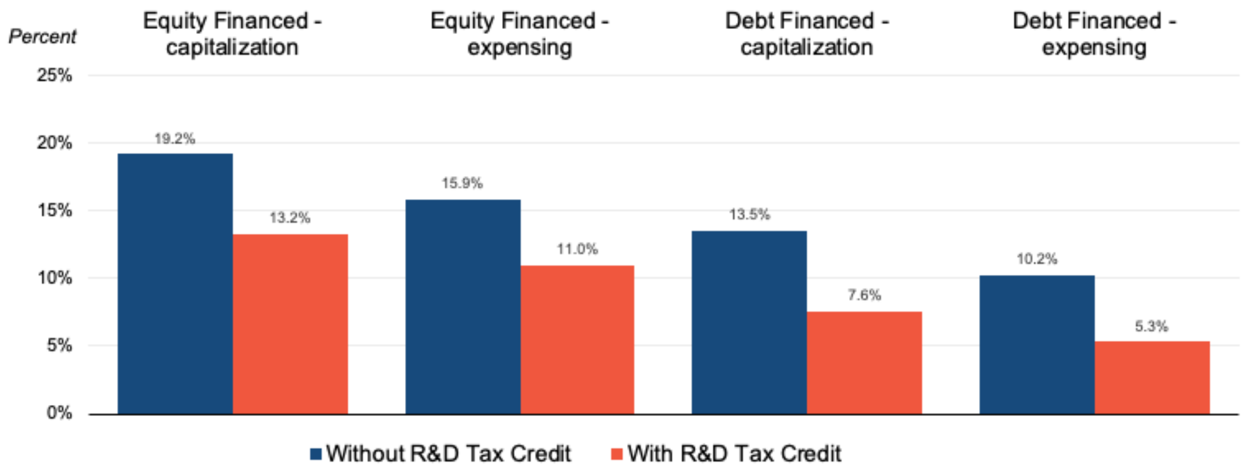
The EATRs shown in figure 9 are all positive, even for debt finance, and in general, the tax credit reduces the EATR by the amount of the credit: 4.8 percent with expensing and 5.8 percent with capitalization. Without the credit, the EATR for capitalized equity-financed investment is close to the statutory corporate tax rate, so the 5.8 percentage point reduction is significant. For debt-financed investment with expensing, the credit cuts the EATR by roughly half.

[49] For example, see Blass and Yosha (2003).

FIGURE 9

Effective average tax rates (EATRs with R&E Tax Credit

2022



FDII

As described earlier in this report, FDII—that is, domestic income from US exports that exceeds a 10 percent return on domestic tangible assets—is subject to a reduction of 37.5 percent in taxable income. This is equivalent to applying a reduced rate of 13.125 percent to FDII income. The reduced rate usually lowers effective tax rates relative to the standard regime, but it also reduces the value of amortization and interest deductions, which in some cases increases effective marginal tax rates.

Although the FDII deduction is targeted at intangible assets, it can also apply to investment in tangible assets that generate a return greater than 10 percent. Depending on the type of investment, the share of US export income, and the initial return on tangible assets, income and deductions from FDII–qualifying investments may have to be allocated between the standard and reduced rates.[50]

If the return on a firm's tangible assets is initially above 10 percent, then all income and deductions associated with an intangible investment are taxed/deducted at the FDII rate. If the initial return is below 10 percent and the new investment does not raise it above 10 percent, then all income and deductions are subject to the standard rate. However, if the initial tangible return is below 10 percent and an investment raises it above 10 percent, then income and deductions will be split between the standard and FDII rates. The first 10 percent return on an investment in tangible assets is always subject to the standard regime since it raises the FDII threshold. Table 1 summarizes the implications for effective tax rate calculation of the initial rate of asset type and initial return on tangible assets.

[50] Although firms must apply deductions proportionally to income—which we assume here—some may be able to minimize their tax liability by applying a larger fraction against their standard income. In that sense, our rates are upper bounds in terms of how deductions are applied.

Table 1: Calculation of Effective Tax Rates under FDII with Different Rates of Return

Initial Rate of Return	*Intangible Asset*	*Tangible Asset*
Greenfield investment or company has a rate of return on domestic intangibles of at least 10 percent.	FDII rate applies to income, depreciation allowances and interest deductions.	The FDII rate applies to returns above 10 percent. Deductions (interest and depreciation) are taken against a weighted average of the standard and FDII tax rates.
Company has a rate of return on domestic intangibles of less than 10 percent before and after investment.	The standard tax rate applies to income, depreciation allowances, and interest deductions.	The standard tax rate applies to income, depreciation allowances and interest deductions.
Company has rate of return below 10% before the investment and above 10% after the investment.	The FDII rate applies to returns once the company has a 10 percent return on tangible assets. Deductions (interest and amortization) are calculated using a weighted average of the FDII and standard rates.	The FDII rate applies to returns once the company has a 10 percent return on tangible assets. The EATR and EMTR for tangible assets will be higher.

The following sections demonstrate the impact of the FDII regime on effective tax rates for acquired intangibles, R&D, and tangibles. For simplicity, the analysis assumes that 100 percent of new investment income derives from exports.[51] For acquired intangibles and R&D, we present the two polar cases of all income and deductions taken either at the standard or the FDII rate. The weighted average analysis is demonstrated for the tangible asset, where it always applies.

Acquired Intangibles

Acquired intangibles for companies earning an initial yield on domestic tangibles of more than 10 percent are taxed at the reduced FDII rate, and all depreciation and interest deductions are also taken at that rate. The value of after-tax rents (equation 4) takes the following form:

$$R^{ACQ} = -\alpha(1 - A^{ACQ}) + \frac{\alpha(1+\pi)}{1+\beta}\{(p+\delta)(1-\tau^{FDII}) + (1-\delta)(1-A^{ACQ})\} + F^{FDII} \qquad (9)$$

where τ^{FDII} is the reduced FDII corporate income tax rate; A^{ACQ} is the present tax value of amortization allowances calculated using the 15-year straight-line method, and F^{FDII} is the financing effect calculated using τ^{FDII}.

Setting $R^{ACQ} = 0$ and solving for the marginal pretax profit rate $\tilde{p}^{ACQ}$ yields:

$$\tilde{p}^{ACQ} = \left[\frac{1 - A^{ACQ}}{(1-\tau^{FDII})(1+\pi)}\right]\{\beta + \delta(1+\pi) + \pi\} - \frac{F^{FDII}(1+\beta)}{\alpha(1-\tau^{FDII})(1+\pi)} - \delta \qquad (10)$$

The corresponding effective tax rates are shown in figure 10. Because economic depreciation for intangibles occurs faster than tax depreciation, the equity-financed rates are above the statutory

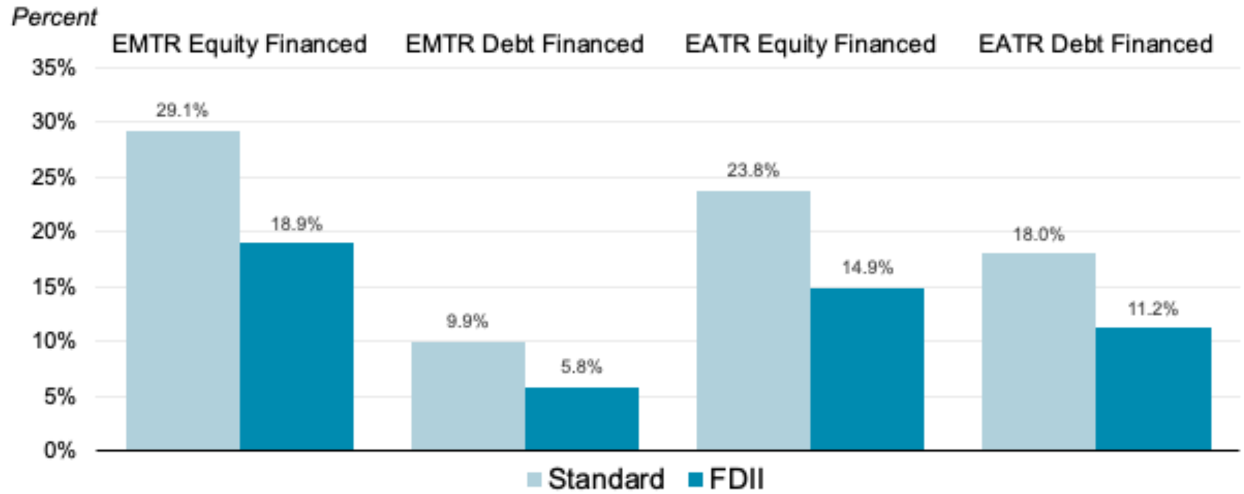
[51] If an investment was used for both exports and the domestic market, then effective rates would be different. We focus here on the lower bound (when the asset only generates export goods). The upper bound is when the output is only for the domestic market.

rate. FDII substantially lowers the EATR and EMTR. For debt-financed investments, the conservative treatment of tax depreciation generates positive EMTRs under both the standard and the FDII regime. FDII lowers both EMTR and EATR with debt-financed investments, though to a lesser degree than with equity-financed investments.

FIGURE 10

Acquired Intangible: Standard Regime vs. FDII

2022



R&D

For an investment in R&D for which the R&E tax credit is available, equation (4) becomes:

$$R^{R\&D} = -\alpha\left(1 - A^{R\&D} - ITC\right) + \frac{\alpha(1+\pi)}{1+\beta}\left\{(p+\delta)\left(1-\tau^{FDII}\right) + (1-\delta)\left(1 - A^{R\&D} - ITC\right)\right\} + F^{FDII} \quad (11)$$

where $A^{R\&D}$ is the present tax value of cost recovery allowances for R&D investments calculated using τ^{FDII}. The ETRs presented below assume the current five-year straight-line amortization regime.

For equity-financed R&D, the FDII regime reduces the EMTR by almost half without the R&E tax credit and renders it almost twice as negative with the credit (figure 11). Like the results for acquired intangibles, the FDII regime raises the negative EMTR on debt-financed R&D due to the reduced value of interest deductions.

The EATR for equity-financed R&D without the R&E tax credit is roughly equal to the FDII tax rate (figure 12). FDII reduces equity-financed EATRs by about 7 percentage points, with or without credit, and by more than 5 percentage points for debt-financed investment. In 2022, the R&E tax credit reduced the EATR by 5.9 percentage points.

FIGURE 11

R&D: Effective marginal tax rates (EMTRs) for Standard regime vs. FDII

2022

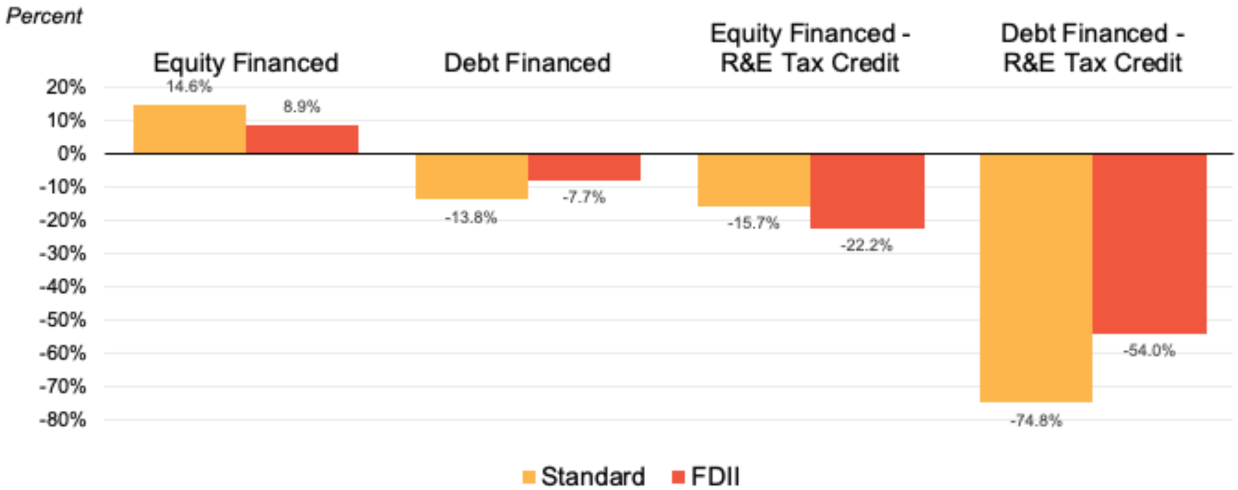
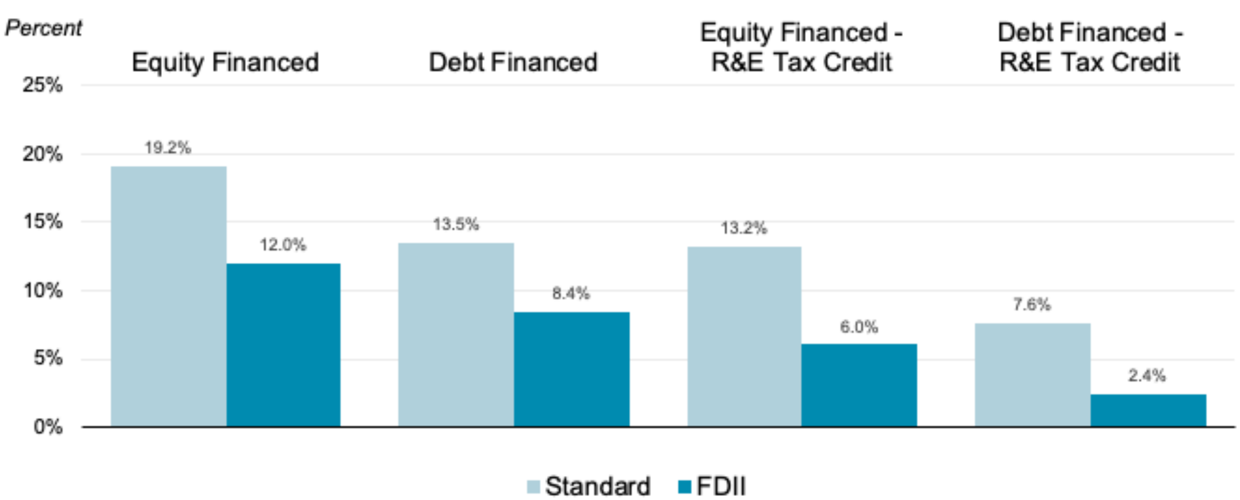


FIGURE 12

R&D: Effective average tax rates (EATRs) for Standard regime vs. FDII

2022



Tangible Asset

The first 10 percent return on a tangible investment that generates 100 percent export income is subject to the standard corporate tax rate. Above 10 percent, the FDII rate applies. Deriving the

EMTR and EATR for a tangible asset that generates FDII requires calculating somewhat different weighted averages of the standard and FDII tax rates.

To calculate the EATR, the stream of after-tax profits (equation 4) becomes:

$$R^{TANG} = -\alpha\left(1-\hat{A}\right) + \frac{\alpha(1+\pi)}{1+\beta}\left\{(p+\delta)(1-\tau^{FDII}) - 0.1(\tau-\tau^{FDII}) + (1-\delta)\left(1-\hat{A}\right)\right\} + \hat{F} \quad (12)$$

where $\hat{A}$ and $\hat{F}$ are calculated using $\hat{\tau}$, a weighted average of the standard and the FDII tax rates:

$$\hat{\tau_i} = \tau^{FDII} + \frac{0.1}{p+\delta_i}\left[\tau - \tau^{FDII}\right] \quad (13)$$

Equation 13 assumes that companies deduct expenses proportionally to asset returns. For example, if p equals 20 percent (as assumed) and $\delta_i = 10$ percent, for a total return of 30 percent, a third of deductions for an investment in a tangible asset are applied against the standard rate (to reach the 10 percent tangible asset deduction) and two-thirds against the FDII rate. Higher values of δ lead to higher overall returns, which are more likely to benefit from FDII and lowers the average $\hat{\tau}$. This implies that assets with faster depreciation rates are more likely to benefit from FDII.

We cannot, however, use $\hat{\tau}$ to calculate the EMTR, since the EMTR describes an investment that just breaks even after taxes—not one that yields economic profits, p. Setting R^{TANG} in equation (12) equal to zero and solving for $\tilde{p}^{TANG}$, as in previous instances, is therefore not possible.[52] We instead estimate an asset-specific marginal return, p_i^{STD}, based on the standard corporate tax rate to calculate $\ddot{\tau_i}$, an asset-specific weighted average effective tax rate:

$$\ddot{\tau_i} = \tau^{FDII} + \frac{0.1}{p_i^{STD}+\delta_i}\left[\tau - \tau^{FDII}\right] \quad (14)$$

This returns a lower bound for the weighted average tax rate $\ddot{\tau_i}$, $\ddot{A}$ and $\ddot{F}$, and an upper bound for the marginal cost of capital $\tilde{p}^{TANG}$.[53] Thus, the ETRs calculated using this tax weighting constitute an upper bound for tangible assets that generate exports.

Solving (12) for $R = 0$ using $\ddot{A}$ and $\ddot{F}$ determines the corresponding cost of capital for a marginal investment in a specific tangible asset:

$$\tilde{p}^{TANG} = \left[\frac{1-\ddot{A_i}}{(1-\tau^{FDII})(1+\pi)}\right]\{\beta + \delta(1+\pi) + \pi\} - \frac{\ddot{F}(1+\beta)}{\alpha(1-\tau^{FDII})(1+\pi)} + 0.1\frac{\tau-\tau^{FDII}}{(1-\tau^{FDII})} - \delta \quad (15)$$

[52] $\ddot{A}$ and $\ddot{F}$ are functions of $\tilde{p}^{TANG}$, but $\tilde{p}^{TANG}$ is itself a function of $\ddot{A}$ and $\ddot{F}$. Another way to solve this would be to pick a starting value for $\tilde{p}$ in the weighted tax rate, estimate $\ddot{A}$ and $\ddot{F}$, and then derive $\tilde{p}^{TANG}$.

[53] The marginal cost of capital increases with the tax rate. Therefore, it will be larger under the standard regime ($\tilde{p}^{STD} > \tilde{p}^{TANG}$), and it follows that the weighted tax rate is a lower bound, as are the deductions calculated with the weighted rate. Smaller deductions imply a larger tax burden and a larger cost of capital, hence the upper bound on $\tilde{p}^{TANG}$.

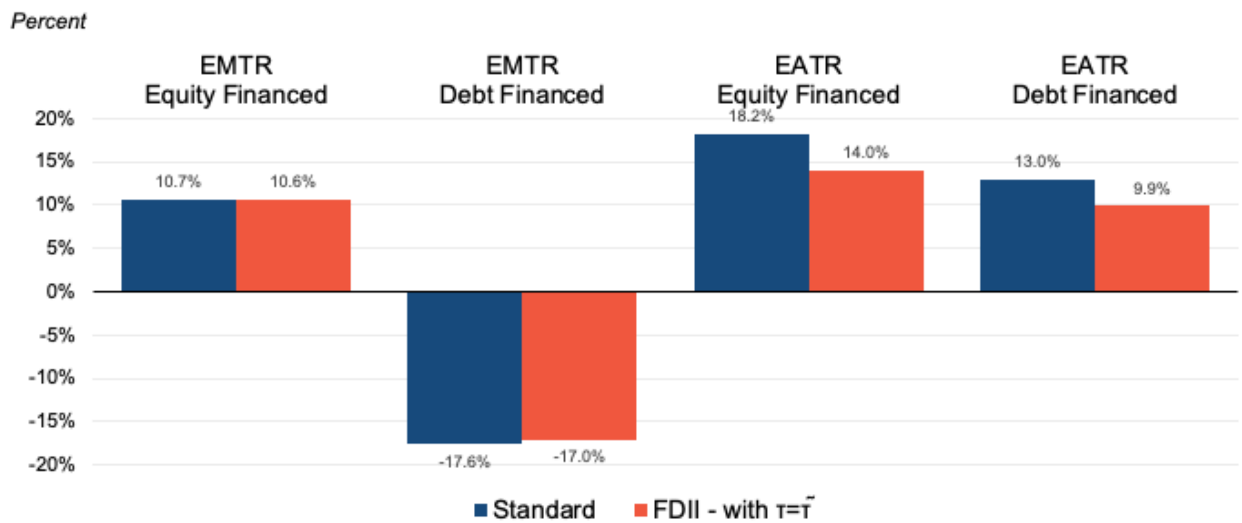
A weighted average $\tilde{p}^{TANG}$ is calculated based on BEA tangible asset stocks in 2019. As previously noted, equity-financed assets with gross returns of less than 10 percent ($(\tilde{p}^{TANG} + \delta)(1 + \pi) < 0.1$) do not benefit from FDII and are assumed to be fully taxed under the standard regime.

Relative to the standard corporate tax regime, FDII barely lowers the EMTR for equity-financed investment and slightly raises the negative EMTR for debt-financed investment (figure 13). In contrast, FDII offers more substantial benefits to highly profitable investments. The EATR for equity-financed investment falls by more than 4 percentage points, and the EATR for debt-financed investment falls by more than 3 percentage points.

FIGURE 13

Tangible Asset: Effective tax rates (ETRs) for Standard regime vs. FDII

2022



4. Incorporating Intangibles into the ICM

R&D capitalization and the R&E tax credit are incorporated into the ICM in the same manner as for the IICM. That is, we adjust the present value of tax amortization for R&D for both the corporate and pass-through sectors. We apply an effective R&E tax credit to the corporate sector only, since only about 2 percent of R&E credits go to pass-through companies.

We incorporate FDII into the ICM slightly differently—following a procedure similar to that of section 3, with some differences—because the ICM is based on a slightly different framework.[54]

[54] The ICM uses the Hall and Jorgenson (1967) cost of capital formula to determine the marginal cost of capital with taxes that breaks even for the firm. See Don Fullerton, "Marginal Effective Tax Rate," *The Encyclopedia of Taxation and Tax Policy* (Washington, DC: Urban Institute Press, 1999), https://webarchive.urban.org/UploadedPDF/1000538.pdf (PDF).

The ICM derives the effective marginal tax rate based on the cost of capital formula from Hall and Jorgenson (1967):

$$\rho = \frac{i' - \pi + \delta}{1 - \tau} * (1 - A - ITC) - \delta \qquad (16)$$

where i' is the nominal after-tax discount rate, and other parameters are the same as for the IICM.[55] We evaluate the impact of FDII by estimating equation (16) using a weighted tax rate $\ddot{\tau_i}$ like the one presented in equation (14). That is, the weighted tax rate is evaluated using the marginal after-tax return of an asset under the standard regime.[56]

The EMTR is equal to $(\rho - s)/\rho$, where s is the corporate real discount rate. We estimate ρ^{STD} using the standard income tax regime, and ρ^{FDII} using the weighted tax rate $\widehat{\tau_i}$, where $\widehat{i'}$ and $\hat{A}$ are also estimated with $\widehat{\tau_i}$. For R&D and other intangibles, the weighted tax rate is simply $\widehat{\tau_i} = 0.13125$, the FDII rate, since FDII applies to all returns.[57]

The marginal cost of capital under the standard regime, ρ^{STD}, applies to investments that generate income in the United States, while ρ^{FDII} applies to investments that generate exports. In SOI data, the 2018 FDR is 20.4 percent. We therefore estimate a weighted average cost of capital ρ_a for asset a, equal to:

$$\rho_a = (1 - FDR) \times \rho^{STD} + FDR \times \rho^{FDII}$$

We then estimate a weighted EMTR for debt and equity-financed assets with ρ_a, where the weights are 2019 asset stock shares from the BEA. While the ICM calculates ETRs for both corporations and pass-throughs, pass-through ETRs are unaffected since FDII only applies to C-corporations.

Tangible assets are unlikely to be affected by FDII when deriving marginal effective tax rates. Structures have low returns at the margin, making them unlikely to benefit from FDII, and equipment, which benefits from bonus depreciation, already has very low EMTRs. With full expensing, the effective marginal tax rate is zero, regardless of the statutory rate. Even without expensing, equipment benefits from accelerated depreciation, and many assets have marginal overall returns just above 10 percent.

Figure 14 highlights the evolution of the ICM economywide EMTR since 2011. The model assumes 40 percent financing with debt and 60 percent with equity. Based on BEA and SOI data

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[55] The discount rate in the ICM depends on the relative amount of debt and equity financing for the firm. It is equal to $\gamma * (i * (1 - \lambda\tau) - \pi) + (1 - \gamma) * E$, where γ is the fraction of investments financed with debt, λ is the fraction of deductible interest expenses, and E is the expected return on equity by shareholders. In 2022, $\gamma = 0.4$ for C-corps and 0.3 for pass-throughs, $\lambda = .82$, and $E = 6.5\%$. Effectively, the ICM model has two discount rates: one for C-corporations and one for pass-throughs. They can vary by year if the parameters change.

[56] As in section 3, this is an upper bound of the marginal rate of return under FDII, since a lower statutory rate leads to a lower cost of capital. However, given the small fraction of assets benefiting from FDII, this is a very close approximation.

[57] For assets that do not generate a high enough return at the margin to benefit from FDII, $\rho^{FDII} = \rho^{STD}$. It is the same condition as in section 3. FDII applies to assets with $(\rho^{FDII} + \delta_i)(1 + \pi) > 0.1$.

on investment by legal form, 75 percent of investment is made by C-corporations and 25 percent by pass-throughs.

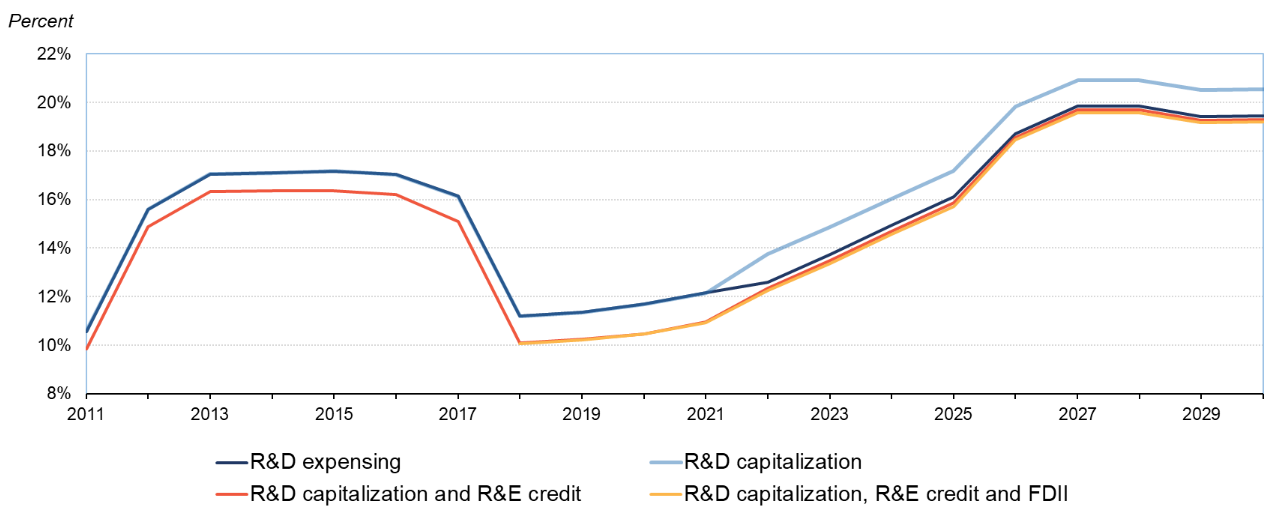
Incorporating R&D capitalization into the model beginning in 2022 increases the EMTR by roughly 1.2 percentage points. Conversely, incorporating the R&E tax credit lowers the aggregate EMTR by an amount that increases over time. From 2011 to 2016, the credit lowers the EMTR by about 0.7 to 0.8 percentage points, and that wedge grows to a 1-point difference by 2017 due to both higher R&D investment and higher tax credit usage. The gap widens further in 2018, to about 1.4 percentage points, as the credit value increases following the reduction in the statutory corporate tax rate.

FDII has only a minor impact on the EMTR, lowering it by about 0.1 percentage point. This is unsurprising since FDII only applies to corporate exports, and as noted above, many tangible assets see little or no benefit from FDII at the margin. Also, while EMTRs for equity-financed investment are lower under FDII, EMTRs for debt-financed investment are slightly higher. This minor impact is consistent with the regime's policy objective: FDII was introduced to attract intangibles and infra-marginal investments into the United States, not to encourage marginal investments.

FIGURE 14

ICM: Economy-wide EMTR

2006-2030



Conclusions

Investment in intangible assets, including R&D, is an increasingly important driver of economic growth and productivity. TPC has therefore improved its ICM and IICM to reflect R&D capitalization, the R&E tax credit, and the FDII regime. These refinements will enable us to better gauge how US investment incentives affect macroeconomic variables such as aggregate investment, employment, and growth. They will also allow TPC to conduct empirical studies of how US tax policies affect intangible investment and IP location.

Provisions of the US tax code affecting intangible investment can have a substantial impact on investment incentives. Switching from expensing to five-year amortization raises the EMTR on equity-financed R&D by 15 percentage points, and the R&E tax credit lowers that EMTR by more than 30 percentage points. The FDII regime lowers the EATR on equity-financed acquired intangibles by almost 9 percentage points.

Economywide, current tax provisions for intangible investment largely offset each other. While R&D capitalization raises the average EMTR by more than 1 percentage point, the R&E tax credit and FDII lower the EMTR by a similar amount. The net effect is a slightly lower average EMTR, indicating a slight increase in marginal incentives for business investment.

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