HAVE EXCESS RETURNS TO CORPORATIONS BEEN INCREASING OVER TIME?

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This paper examines the difference between a corporate income tax base and a corporate consumption tax base over time. Using a micro-data panel of tax returns of C corporations from 1992 to 2013, we estimate the fraction of the tax base attributable to the risk-free return in each year, and show that it has gradually declined over time, averaging 40 percent from 1992–2002 and 25 percent from 2003–2013. This decrease means that the difference between an income tax base and a consumption tax base has also declined, and suggests that "excess" returns are becoming more important to the tax base.

I. INTRODUCTION

Have excess returns to corporations been increasing over time? The evidence presented in this paper suggests that they have. The distinction among types of returns to capital (e.g., risk-free, risk-adjusted, windfalls attributable to good luck, etc.) frequently arises in economic theory and policy, and several researches have attempted to measure these different types of returns (Auerbach, 1993; Gentry and Hubbard, 1997; Toder and Rueben, 2007). The risk-free return is particularly relevant for tax policy formulation, because the risk-free return is treated differently under an income tax than under a consumption tax. Specifically, an income tax includes the risk-free return to capital in the tax base, thereby distorting taxpayers' decisions, whereas a consumption tax does not.[1] If the majority of the current tax base is attributable to returns in excess of the risk-free rate, then the difference between a consumption tax base and the current income tax base is relatively small. This small difference means that most

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[1] The U.S. income tax, which has incentives such as accelerated depreciation, is actually a hybrid between a pure income tax and a consumption tax. Therefore, it already exempts part of the risk-free return from tax.

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of the current tax base would still be taxed under a consumption tax. Further, if returns in excess of the risk-free rate have been increasing as a fraction of corporate income, then the difference between the current income tax base and a consumption tax base has been declining over time.

We begin with a brief literature review and then discuss our methodology for measuring the risk-free return. Next, we present the results from applying that methodology separately for all C corporations and multinational corporations (MNCs). Then, we present estimates of the risk-free return by industry and discuss the special cases of the financial and real estate sectors. We also discuss an alternative to the basic methodology. Finally, we conclude with a discussion of the implications of our results.

II. LITERATURE REVIEW

A variety of papers discuss and estimate the composition of an income tax base versus a consumption tax base, as well as describe the distributional and revenue implications of these different tax bases. Using 1989 stock market data, Gentry and Hubbard (1997) estimate that the risk-free return is approximately 40 percent of the return to corporate capital. They categorize the components of the corporate return into four categories: the marginal (risk-free) return, infra-marginal returns (economic profits), the risk premium, and ex-post luck. They argue convincingly that an income tax captures the marginal (risk-free) return, while a consumption tax does not, but that both taxes treat all other types of returns the same. Therefore, in order to determine how the relationship between a consumption tax base and an income tax base has been changing over time, we focus on measuring the risk-free return to capital. We refer to all returns in excess of this risk-free rate (including returns to risk, entrepreneurial labor, increasing returns to scale, market power, good luck, etc.) as excess returns.

Gordon and Slemrod (1988), Gentry and Hubbard (1997), and Toder and Rueben (2007) all estimate the change in the tax base that results from changing the current tax system, which taxes the risk-free return to capital, to a consumption-based tax system, which exempts the risk-free return to capital. Because of the unique properties of the financial sector, they confine their analysis to the nonfinancial sector. For 2004, Toder and Rueben estimate that the ratio of this change to the taxable income base is 32 percent. They attribute that fraction of the tax base to the normal return to capital.[2] Cronin et al. (2013) use a similar methodology and perform the estimates for five separate years to obtain an average ratio of 37 percent.[3]

III. METHODOLOGY

We refine the Cronin et al. methodology and extend the time horizon back 21 years in order to determine how the fraction of the return attributable to the risk-free return

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[2] Cronin et al. (2013) provide a detailed literature review.

[3] Cronin et al. (2013) include additional details regarding the distinction between the Toder and Rueben (2007) methodology and their own.

changes over time. We present an overview of the methodology here and report the details in the Appendix. For our analysis, we use the Internal Revenue Service (IRS) Statistics of Income (SOI) Corporation tax files from 1992–2013. We make several changes to this dataset. We remove all financial income from the tax base to create a real income tax base, or R base.[4] We then convert that R base from one that includes depreciation and capitalization of assets and inventories to one that expenses these assets.[5] The total change in the R base from the move to expensing divided by the R base itself provides an estimate of the fraction of the R base attributable to the risk-free return. Thus, the expensing of tangible capital, intangible capital, and inventories serve as a proxy for eliminating the tax on the risk-free return to capital.

We estimate the change from tangible capital depreciation to expensing in each year by differencing each year's reported value of current law depreciation deductions (after adjusting the deductions to remove the impact of bonus depreciation) from the current year value of investment. Then, to compute the difference between inventory capitalization and expensing, we compute the difference between the file value for the cost of goods sold (COGS) deduction and the file value for COGS investment. Next, to estimate the difference between expensing and amortization of §197 intangibles (which are acquired intangibles that include goodwill, workforce in place, patents, copyrights, licenses, permits, franchises, trademarks, customer-based intangibles, and supplier-based intangibles), we create a conservative estimate of investment in such intangibles by grossing up the amortization amount by 15.[6] Finally, we add these three changes together and compare them to the R base to compute the fraction of the tax base attributable to the risk-free return (the appendix contains additional details).

IV. AGGREGATE RESULTS

We present the results of this analysis for all C corporations, as well as separately for MNCs and domestic corporations, in Figure 1.[7] MNCs are a subset of C corporations that in recent years earned about 80 percent of total corporate taxable income. MNCs tend to be much larger, more profitable, and more intangible-intensive than domestic corporations. Therefore, we report their results separately in order to observe whether

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[4] Note that our initial R base is a real income base because it ignores financial transactions, but this "baseline" R base continues to depreciate rather than expense capital expenditures. Therefore, our R base only becomes equivalent with the consumption-base R Base discussed under many consumption tax reforms when we also allow immediate expensing of all capital expenditures. The difference in these two bases is one component of our risk-free return measure (Institute for Fiscal Studies, 1978).

[5] Cronin et al. (2013) provide a detailed description of the conversion to a real base (R base).

[6] The estimate is conservative because some taxpayers use a half-year convention when taking the first year deduction, which would imply that the appropriate gross up would actually be 30. Because §197 intangibles constitute a small fraction of capital assets, the impact of this portion of the estimate on the risk-free return to capital is small.

[7] Note that MNCs are defined as corporations that file Form 5471 (indicating foreign subsidiary ownership) or have foreign dividends (from an 80 percent or 100 percent owned foreign corporation) greater than a million dollars. Domestic corporations are all remaining C corporations that are not MNCs. This is only one of various possible definitions of multinational versus domestic corporations.

Figure 1

Fraction of the Corporate Tax Base Attributable to the Risk-Free Return, Based on Corporate Tax Return Data, for All C Corporations, Multinational Corporations, and Domestic Corporations
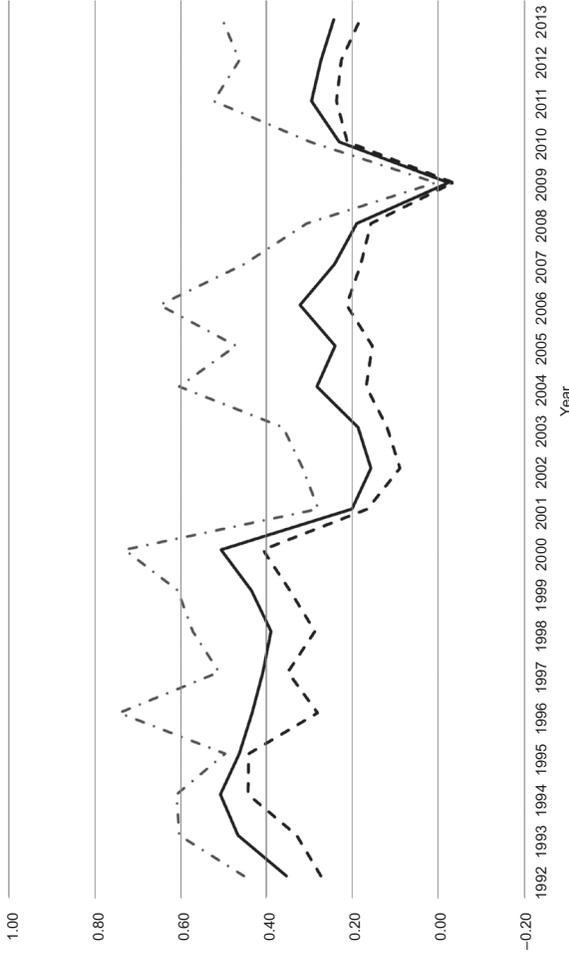
Source: Authors' computations using the Internal Revenue Service (IRS) Statistics of Income division's (SOI) corporation file

the time series returns of MNCs and domestic firms differ noticeably from the overall average including both.[8]

Over time, the pattern of the risk-free return of all C corporations and MNCs is similar, which is not totally unexpected, since MNCs comprise a large fraction of total corporate income. Domestic corporations have a higher and somewhat more volatile risk-free return pattern over time. All three groups exhibit some cyclical fluctuation, which results in part from the countercyclical nature of COGS inventory accounting relative to inventory expensing. This fluctuation is particularly evident in 2009, when the ratio became negative due to the large negative effect of inventory expensing.[9] For all three groups, the risk-free return fraction is higher in the first half of the time period studied in our analysis than in the second half. The risk-free component of the tax base of all C corporations averages close to 40 percent in the first half of this time period and around 25 percent in the second half. MNCs have a somewhat lower fraction of their tax base attributable to risk-free returns, and exhibit a slightly more dramatic declining pattern (around 30 percent in the first half and 15 percent in the second half). Domestic corporations have the highest risk-free return fraction, averaging about 55 percent in the first half of the time period and 40 percent in the second half.

Therefore, for all C corporations, for MNCs, and even for domestic corporations, a significant portion of the tax base is attributable to excess returns, and the fraction attributable to excess returns has been increasing over time. This suggests that the difference between an income tax base and a consumption tax base has declined, and that much of the current tax base would continue to be taxed under a consumption tax. This trend is somewhat more evident for MNCs. Although we cannot conclusively establish why excess returns have become more prominent, we can hypothesize that intangible assets might play an increasingly important role in generating corporate profits. Intangible assets such as patents and brand names can provide temporary monopoly power that creates excess returns. If these types of assets are becoming an increasingly important

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[8] Note that MNCs, by definition, have affiliates overseas, which provide them with a variety of opportunities to shift U.S. profits out of the U.S. tax base. This is particularly problematic with intangible returns because the true return to intangible assets can be difficult to determine. This valuation difficulty allows intangibles to be mispriced in order to shift income out of the United States and avoid the statutory U.S. rate. Our estimates do not take such shifted U.S. income into account. If the shifted profits were actually reported as part of the U.S. tax base, the fraction of the tax base attributable to the risk-free return would have been even smaller. We perform rough estimates of the change to the risk-free return that occurs if this shifted income is included in the tax base. We assume that a small fraction of the overseas income of U.S. MNCs actually is generated in the United States. The fraction is based on the Heckemeyer and Overesch (2013) elasticity (0.8) and an average difference between U.S. and overseas tax rates. The income assumed to belong to the U.S. tax base is then added to the taxable income denominator to generate a new risk-free return fraction that accounts for this shifted income. Based on this very rough estimate, the risk-free return fraction is lower over this period by roughly 5 to 10 percent.

[9] In particular, the depletion of inventories during the recession implies that expensing of inventory investment is *smaller* than the COGS deduction, causing a negative numerator for the normal return fraction. This issue is examined further in the PDV analysis below and in the Appendix.

source of overall profitability, then the fraction of the tax base attributable to the risk-free return could decline over time. Certain industries are known for having significant intangibles, so an industry analysis could shed some light on this issue.

V. INDUSTRY ANALYSIS

In order to get a sense of how the fraction of the tax base attributable to the risk-free return varies by industry, we calculate three-year averages (2011–2013) of the risk-free return. We also report the 2013 fraction of Schedule M-3 reported worldwide book income by industry. The Schedule M-3 reconciles a company's worldwide book income to its taxable income. Worldwide income reveals each industry's global profitability and overall size, abstracting from the effect of tax preferences and global profit shifting which differentially impact industries' reported taxable income. These figures are reported in Table 1.

Table 1

Three-Year Average Fraction of the Corporate Tax Base Attributable to the Risk-Free Return, by Industry (Excludes Finance, Rental, and Real Estate)

Industry	Fraction Risk-Free Return	Fraction Worldwide Income
Mining	0.44	0.03
Utilities	0.85	0.03
Construction	0.71	0.01
Nondurable manufacturing	0.15	0.08
Fossil fuel	0.06	0.09
Chemical manufacturing	0.10	0.13
Technology	0.16	0.11
Metal and machinery manufacturing	0.45	0.15
Wholesale and retail trade	0.40	0.15
Transportation and warehousing	0.25	0.03
Information	0.08	0.15
Service	0.16	0.05
Minor industries		
Pharmaceuticals	0.10	
Software	0.09	

Source: Authors' computations using Statistics of Income (SOI) microeconomic cross sectional tax files from 2011–2013

The risk-free fraction varies substantially by industry. Utilities, construction, and mining all have very high risk-free return fractions (approximately 60 percent). Several industries such as transportation, wholesale and retail trade, and metal manufacturing have risk-free fractions which are about average (roughly 30 to 40 percent). But a few industries, including information, technology/software, nondurable manufacturing, and chemical manufacturing (including pharmaceuticals) all exhibit very low risk-free fractions (roughly 10 to 20 percent). Interestingly, most of these industries are characterized by significant intangible assets. The calculations therefore suggest that industries that hold intangible assets seem to earn higher than average excess returns. The fossil fuel industry also has an unusually low risk-free return fraction. While this industry is not known for holding intangibles, it arguably has some degree of monopoly power.

The financial sector is an unusual case, so we exclude it from the aggregate and industry analyses. Net interest income and other financial items, which are removed in the computation of the R base, heavily influence the taxable income base of the financial sector. Unlike other industries, interest income is active income for the finance industry. Therefore, an alternative definition of the risk-free return needs to be devised for this industry. Although beyond the scope of this paper, this definition could perhaps be modelled somewhat after the Gentry and Hubbard (1997) definition, by comparing the financial industry's rate of return with the risk-free rate of return.

The real estate and rental industries are also excluded from the industry analysis. These industries hold large amounts of physical structures, so the expensing of tangible capital produces huge changes in the tax base. This change leads to difficult to interpret risk-free return ratios greater than one. While again beyond the scope of this paper, further examination of this industry, and a possible alternative definition of the risk-free return for the real estate and rental industries, is warranted. These new definitions would be especially useful for an analysis of partnerships, since finance and real estate are both very important industries in the partnership sector.

VI. SENSITIVITY ANALYSIS

Toder and Rueben (2007), Cronin et al. (2013), and our analysis all rely on the assumption that the economy is in a steady state and therefore current law deductions across vintages can accurately proxy the present discounted value (PDV) of the current vintage's investment. Similarly, they rely on the assumption that the current law COGS deduction is a good proxy for the steady state value of the current law COGS deduction. Because inventories are cyclical, this might not be true. In the original runs, we spend a lot of time adjusting the data to remove, to the extent possible, the effects of temporary policy provisions like bonus depreciation in order to get a time consistent comparison (the Appendix provides additional details). We also use the Treasury Depreciation Model to compute an alternative risk-free return estimate. In particular, we difference the PDV of the current law depreciation deductions associated with each year's investment from expensing of that same investment. Because this method compares the value of different depreciation methods for a single vintage of investment, it abstracts from variable

investment growth and cyclical factors that are inherent in reported deductions across vintages. We discount the figures using the nominal 10-year Treasury bond rate, which is often equated with a pure risk-free rate. We compute an alternative estimate of the change in COGS by building a simple model to compute the PDV of the current law COGS deduction. We then subtract this PDV from each year's COGS investment (the Appendix provides additional detail). We again use the nominal Treasury 10-year bond rate to proxy a risk-free discount rate. We add these PDV estimates to the amortization estimate and compare the total to the R base to get a PDV estimate of the fraction of the tax base attributable to the risk-free return.[10] The results of this PDV exercise for C corporations are shown in Figure 2.

The PDV comparison smooths some of the volatility over the business cycle, so the estimates of the risk-free return fraction are smaller than they are using the Toder and Rueben (2007) methodology. Overall, though, the results are similar to the original estimates. The fraction of the tax base attributable to the risk-free return declines slowly over time, with the average for the first half of the period around 35 percent and the average for the second half around 20 percent (both slightly lower). The difference in pattern over the business cycle between the PDV estimates and the Toder and Rueben estimates results from the cyclicality of the reported COGS deduction. The PDV calculations lessen the impact of cyclicality and hence result in a slightly different pattern.[11]

Taxpayers are not completely certain that they will recover all depreciation deductions; for example, a taxpayer could go bankrupt and not be able to use the deductions. Therefore, as an alternative to the Treasury 10-year bond rate, we discount deductions using a slightly higher rate that reflects the possibility that deductions will never be used.[12] The higher rate chosen was the nominal Moody's Baa corporate bond yield.[13] These estimates are also presented in Figure 2, and, as expected, the estimates are larger using the corporate bond rate as the discount rate, but otherwise look quite similar.

Both nominal and real interest rates fell substantially over this period, and this decrease contributes to the decline in the PDV estimate over time. To the extent the interest rate

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[10] For uniformity, we should also have computed the PDV of amortization of §197 intangibles, but because of data limitations and the small magnitude of the investment, we left this field as computed in the Toder and Rueben (2007) methodology.

[11] During economic downturns, the COGS deduction across vintages is often more generous than expensing of COGS investment, seemingly because inventories are depleted. This results in a negative adjustment in the risk-free return fraction, and hence reduces the fraction during downturns. The PDV calculations compare COGS depreciation relative to expensing of COGS investment for each vintage of investment. The COGS deduction for a single vintage can never exceed 100 percent of COGS investment, hence when considering a single vintage, the deduction always represents slower (or equal) cost recovery relative to expensing. A more sophisticated PDV model might assume time variant differences in the inventory sales pattern. This would smooth the PDV pattern further. Appendix provides additional details.

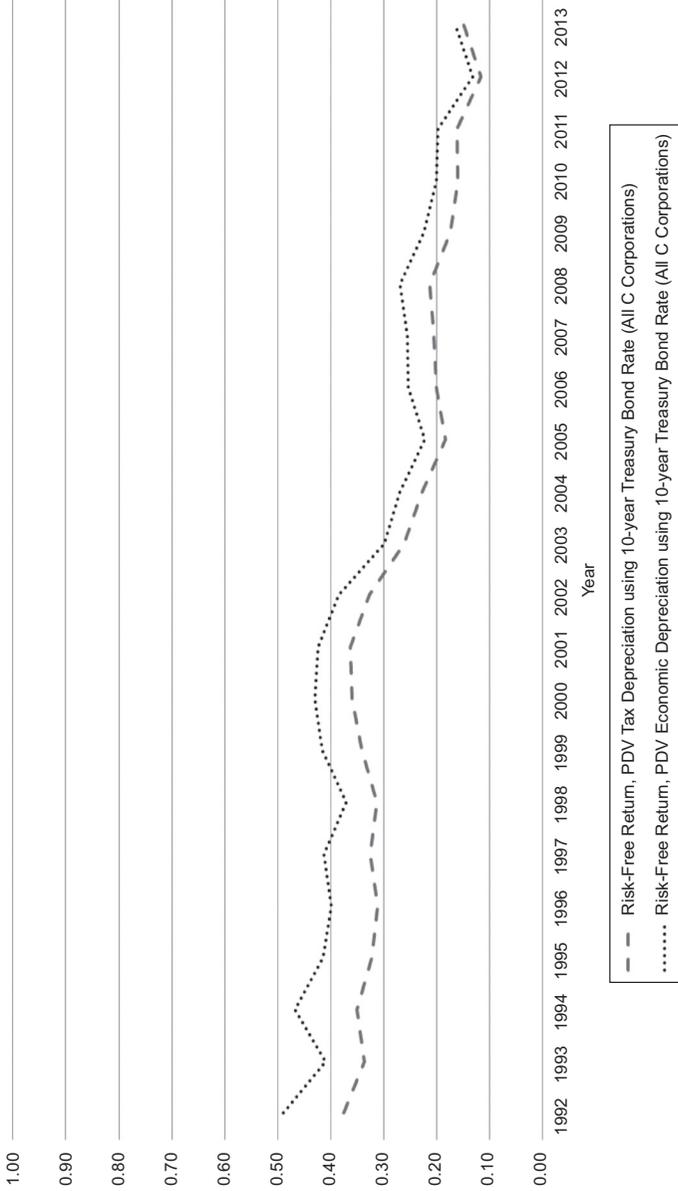[12] This discount rate therefore incorporates some but not all forms of risk.

[13] We also use the Bank of America Merrill Lynch effective yield for U.S. Corporations with a BBB index. These data are only available for 1997 forward, but for these years the results are quite similar to the Moody's Baa results.

Figure 2

Fraction of the Corporate Tax Base Attributable to the Risk-Free Return, Based on the Present Discounted Value (PDV) of Tax Depreciation versus Tax Return Data
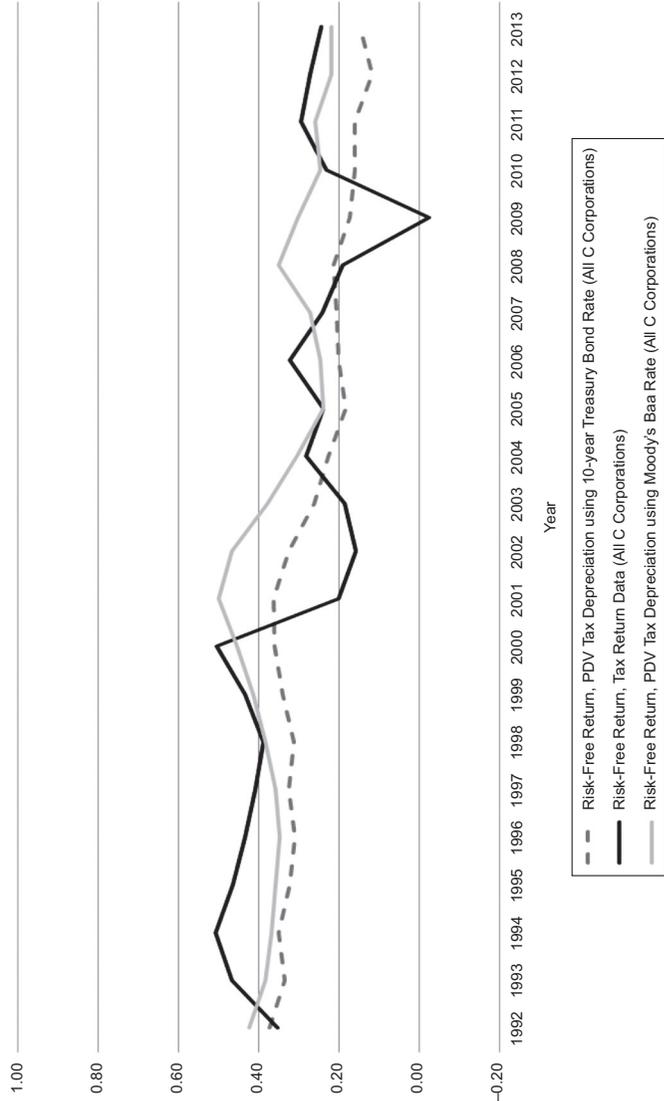
Source: Authors' computations using the Internal Revenue Service (IRS) Statistics of Income division's (SOI) corporation file

Figure 3

Fraction of the Corporate Tax Base Attributable to the Risk-Free Return, Based on the Present Discounted Value (PDV) of Economic Depreciation versus Tax Depreciation

- – – Risk-Free Return, PDV Tax Depreciation using 10-year Treasury Bond Rate (All C Corporations)
- ······· Risk-Free Return, PDV Economic Depreciation using 10-year Treasury Bond Rate (All C Corporations)

Source: Authors' computations using the Internal Revenue Service (IRS) Statistics of Income division's (SOI) corporation file

decrease is due to falling inflation, some of the decline in the measured risk-free return is associated with the decline in inflation. The decrease in real interest rates, potentially resulting from factors such as weak global demand and excess savings, suggests that the return to waiting has declined over time. Overall, falling interest rates potentially explain about half of the decrease in our PDV estimate of the risk-free return.[14]

Finally, we attempt to adjust the change in depreciation for the fact that tax depreciation is accelerated and therefore some of the risk-free return is already excluded from the income tax base (Auerbach and Poterba, 1987). We use the Treasury Depreciation Model to compute the PDV (discounted using the 10-year Treasury bond rate) of economic depreciation deductions. We then difference this PDV from expensing for each vintage of investment. The purpose is to demonstrate that the difference between the current income tax base and a consumption tax base is smaller than it would be if the current tax base incorporated economic depreciation rather than accelerated depreciation. The results of this exercise are presented in Figure 3.

As expected, the estimated risk-free return is somewhat larger when our calculation is based on economic depreciation rather than tax depreciation. This demonstrates that the current income tax system, with its accelerated tax depreciation, is really a hybrid between a pure income tax and a pure consumption tax. Overall, the risk-free return fraction based on economic depreciation averages 40 percent during the first half of the time period studied in our analysis and around 25 percent in the second half.[15] Therefore, the estimated risk-free return based on economic depreciation is roughly 5 percentage points or 20 percent higher than estimated risk-free return based on tax depreciation, but it still exhibits a similar downward trend over time.

VII. CONCLUSION

In this analysis, we study the time series pattern of the fraction of the C corporation tax base attributable to the risk-free return. Our computations suggest that the risk-free fraction declined over time for all C corporations, and for multinational corporations domestic corporations separately. This suggests that the difference between an income tax base and a consumption tax base has decreased, and it also suggests that excess returns have become a relatively larger component of the tax base. Weak global demand and the excess savings associated with declining interest rates potentially contributed to the decline in the estimated risk-free return over time, and therefore to the increased relative importance of excess returns. Our industry calculations demonstrate that the fraction of the tax base attributable to excess returns is higher in industries known to

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[14] We approximate the decline in our PDV estimate that is attributable to declining interest rates by discounting with a constant interest rate across all years of the panel rather than using the nominal annual interest rate. We use the average interest rate across all years as the constant rate. Slightly more than half of the decline in the risk-free rate over time disappears when using a constant interest rate.

[15] Coincidentally, these percentages are the same as those estimated using the tax return data; however, the tax return data are obviously based on tax depreciation rather than economic depreciation.

have large amounts of intangible assets. This suggests that excess returns attributable to intangible assets could also explain some of the increased importance of excess returns.

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DISCLOSURES

The authors have no financial arrangements that might give rise to conflicts of interest with respect to the research reported in this paper.

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APPENDIX

This appendix provides details of the methodologies we use in this paper to compute risk-free and excess returns. As described above, we use the Statistics of Income (SOI) micro-data tax files from 1992–2013. We first limit the data to nonfinancial C corporations, although ultimately we hope to devise a methodology that would allow us to compute the risk-free return for financial corporations as well. Following Cronin et al. (2013), we convert the tax base into a real income base (R base) by eliminating capital gains, dividends, and net interest (i.e., subtracting interest income from the tax base and adding interest deductions back into the tax base).

Our estimates of the change in the tax base attributable to the risk-free return are comprised of three elements. The first element is the change in the tax base that would result from replacing the current law cost of goods sold (COGS) deduction with expensing of inventory costs. We compute this change by summing the cost of labor, purchases, §263 (a) costs (uniform capitalization costs), and other costs from Schedule A of the corporate tax return, and subtracting this sum from reported COGS.

For the second element, we replace the current law (modified accelerated cost recovery system (MACRS)) depreciation deductions with expensing of tangible investment. During this time, Congress periodically enacted an important temporary bonus depreciation provision, which allowed either 30 percent, 50 percent, or 100 percent (depending on the year) of tangible capital expensing for equipment. This change significantly affects the value of the depreciation deductions reported in affected years. Therefore, to get a time consistent comparison, we recalculate the reported current law depreciation deductions so that bonus depreciation does not apply. We calculate these figures by substituting the value of MACRS depreciation on bonus investment for the reported bonus depreciation deduction in the current law depreciation deductions. Therefore, we take the value of equipment investment expensed under bonus depreciation, compute the stream of depreciation deductions associated with that investment, and then add those deductions back into the year in which they would have been taken in the absence of bonus depreciation.[16] This calculation reduces current law depreciation deductions in years in which the temporary bonus depreciation provisions are in effect. However, it increases current law depreciation deductions in years following the expiration of the provision, because deductions associated with expensed investment are added to the year in which they would have taken place in the absence of bonus depreciation. The difference between this adjusted current law depreciation and 100 percent expensing of tangible capital equipment then comprises the second element of the fraction of the tax base attributable to a risk-free return.

This bonus adjustment differs from the bonus adjustment used by Cronin et al. (2013). They approximate the value of such deductions with a single estimated aggregate gross up factor. The methodology we use is more accurate, because it actually computes what depreciation would have been taken in the absence of bonus depreciation and adds it back to the appropriate year.

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[16] Mechanically we add the depreciation deductions in by adjusting each year's prior year deductions by an appropriate amount.

The result is that the total depreciation deductions estimates using the current methodology are somewhat lower than the ones in Cronin et al. (2013).[17]

The third element is the change in the tax base that would result from replacing amortization of §197 intangibles (which are acquired intangibles that include goodwill, workforce in place, patents, copyrights, licenses, permits, franchises, trademarks, customer-based intangibles, and supplier-based intangibles) with expensing of these intangibles. Such intangibles are only a small subset of all intangibles. Most self-created intangibles, however, are already expensed in the computation of taxable income and therefore they are not part of the tax base. We create a proxy for the amortization of §197 intangibles to expensing by first estimating the value of current year investment in them. We do this calculation by grossing up the amortization deduction for each year's investment by 15 (since §197 intangibles are amortized over 15 years). We then take the difference between current year amortization and the current year expensing of this proxy amount.

Finally, we add all three of these components together and compare them to the R based real taxable income (computed as described in Cronin et al. (2013)). This ratio represents the fraction of the tax base that is attributable to the risk-free return to capital in each year.

As mentioned above, the accuracy of the Toder and Rueben (2007) methodology depends on the extent to which file values of COGS depreciation and tangible capital depreciation are good proxies of steady state values. Therefore, we try an alternative methodology to test the robustness of their results. In particular, we substitute the present discounted value (PDV) of the depreciation deduction associated with each year's tangible capital investment and the PDV of the COGS depreciation deduction associated with each year's COGS investment. For the tangible capital estimates, we use the Treasury Depreciation Model, which has detailed BEA investment data by industry, asset, tax depreciation class, and vintage, from 1900 to present. Using this model, we compute the PDV of tax depreciation deductions for each year's investment (not including investment in the financial industry). We verify that total nonfinancial investment from the Treasury Depreciation Model is consistent with total nonfinancial investment from the tax return data. We also try two alternative discount rates. We first use the nominal 10-year Treasury bond rate in each year (as a proxy for a risk-free return) and we then use the nominal Baa Moody's corporate bond rating (to account for some types of risk). We subtract the PDV from each year's investment to obtain an estimate of the change in the tax base from moving to expensing.

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[17] There are two additional differences between this methodology and the Cronin et al. (2013) methodology. First, they add software expensing to total expensing. They approximate it by estimating the fraction of the depreciation deductions reported in the category "Accelerated Cost Recovery System (ACRS) and other depreciation" which are attributable to software deductions, and then approximate software investment from software deductions. In order to estimate the fraction of ACRS depreciation attributable to software, they had to estimate how much pre-1986 depreciation might remain. Attempting to do this estimate in a time consistent time series way is beyond the scope of this analysis; hence, we do not include expensing of software in our expensing estimate. This exclusion results in a somewhat lower expensing estimate than Cronin et al. (2013). However, any software investment included in §179 (which provides for small business expensing) will be included in our expensing estimates and our PDV estimates fully account for software in all years because they include all types of investment. The PDV estimates also account for depreciation versus expensing of §179 investment, though we also test undoing such expensing in a manner similar to bonus depreciation. The results are nearly identical. However, these differences, as well as the use of the micro-data files versus the micro-simulation model Cronin et al. (2013) use, cause our estimated risk-free return fractions in 2004 and 2007 to differ somewhat from those reported in Cronin et al. (2013).

For the COGS estimates, we also create a proxy for the PDV of COGS inventory account-ing.[18] Based on a comparison of the rate of sales to current year inventories, we estimate that on average about 90 percent of goods are sold in the year in which they are created. We assume the rest are sold the following year. We then estimate the PDV of each year's COGS investment over two years using the same discount rates as for discounting of tangible capital. In actuality, however, it appears that the fraction of inventories sold in a given year varies over time. This suggests that our 90 percent/10 percent split perhaps should change depending on whether the economy is growing or shrinking. If we assume a higher fraction of inventories are sold during recession years (e.g., 95 percent/5 percent), this reduces the fraction of the tax base attributable to the risk-free return in these years and further smooths the PDV estimates. However, we do not have accurate information on how the sales of a fraction of a given vintage's inventory changed over time. For this reason, we use the 90 percent/10 percent fraction and hold it constant over time in our baseline. We test the sensitivity of the results to different assumed fractions and the results generally look similar, with less fluctuation around recessions.

Because MACRS depreciation is actually accelerated relative to economic depreciation, part of the risk-free return to capital is already excluded from the tax base. We test to see how the estimate of the risk-free return would differ if the tax system were based on economic deprecia-tion rather than accelerated depreciation. To do this test, we again use the Treasury Depreciation Model. We compute, for each year's investment, the PDV of the stream of economic depreciation deductions, alternatively using both of the discount rates described above. The Treasury model uses Hulten and Wykoff (1981) economic depreciation rates and uses historical inflation rates for the computation of economic depreciation. We then add the PDV of economic depreciation deduc-tions to the PDV of the COGS deduction to the difference between expensing and amortization of §197 intangibles in order to derive the numerator of the fraction. Next, we adjust reported R based taxable income to reflect the increase that would result from (lower) economic deprecia-tion deductions (relative to MACRS tax depreciation deductions). The ratio of the two estimates tells what the risk-free return fraction would be if the tax system used economic depreciation instead of tax depreciation.

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[18] In order to better proxy a steady state, this methodology focuses on the current versus proposed law treat-ment of current year cost of goods purchases and ignores the treatment of existing inventory as a transition issue.