The Effects of the Tax Cuts & Jobs Act of 2017 on Defined Benefit Pension Contributions

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Abstract: This study examines the effect of the Tax Cuts & Jobs Act of 2017 (TCJA) on corporate defined benefit pension contributions. The TCJA is the most significant tax reform since 1986. One of the most significant changes is the decrease of the corporate tax rate from 35 percent in 2017 to 21 percent in 2018. This change incentivizes firms to increase 2017 pension contributions to take advantage of tax deductions at a higher rate. Consistent with this incentive, we find firms increase defined benefit pension contributions by an average of 27 percent in 2017 compared to earlier years. We also find that taxpaying firms are the primary contributors, consistent with the rate reduction driving our results. Further, taxpaying firms with high levels of deferred tax assets contribute over four times as much as taxpaying firms with low levels of deferred tax assets. We also find that firms with greater financial reporting pressure drive this result. This suggests the re-valuation of deferred tax assets is an important factor in the decision to contribute in 2017. Additional evidence suggests the increase in pension contributions in 2017 represents an acceleration of future contributions rather than a permanent increase in pension funding.

Keywords: pension, tax incentives, tax reform, deferred tax

JEL Classification: H26, H71, H72

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I. INTRODUCTION

This study examines how the "Tax Cuts & Jobs Act of 2017" (hereafter, "TCJA" or "the Act") affects defined benefit (DB) pension contributions in 2017 and, by implication, the funding status of DB pensions. The TCJA is the most far-reaching tax legislation since the Tax Reform Act of 1986. The Act makes fundamental changes to both the personal and corporate tax codes, with the vast majority of changes taking effect in 2018. One of the most significant changes is the corporate tax rate reduction from 35 percent in 2017 to 21 percent in 2018 and thereafter. As a result, firms have an incentive to accelerate tax deductions into the 2017 tax year, such as contributions to DB pension plans, as deductions for 2017 will be deducted at a higher tax rate.

Numerous popular press articles and pension newsletters discuss the potential tax benefits of increasing pension contributions in 2017 (Schumsky 2018; Goldman Sachs 2018; Thornton 2018). Indeed, several firms disclosed increases in DB contributions in 2017 in response to the TCJA. For example, 3M, Inc. contributed $600 million to its pension fund in 2017, citing the benefits of making these contributions in 2017 due to the drop in the corporate tax rate in 2018.[1] Although accelerating contributions is appealing from a tax perspective, practitioner newsletters also caution firms to assess their cash needs before making additional contributions to avoid sacrificing potential investment opportunities (Prudential 2017; Plan Sponsor 2018). Tax rules make re-purposing pension assets extremely costly (Thomas 1988). Thus, significant non-tax costs could prevent firms from increasing pension contributions in 2017. In this same spirit, prior academic studies document a negative association between mandatory pension contributions and capital expenditures due to internal financing constraints (Rauh 2006; Campbell, Dhaliwal, and

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[1] See http://www.pionline.com/article/20180125/ONLINE/180129906/4-companies-disclose-31-billion-in-pension-contributions-in-fourth-quarter. Other examples include Caterpillar Inc., Raytheon Co., and Northrop Grumman Corp.

Schwartz, Jr. 2012). Furthermore, pension contributions made by September 15th, 2018 can be deducted at the 35 percent rate on the 2017 tax return. Thus, firms can wait until 2018 to make their contributions and still realize the benefits of the deduction at the 35 percent tax rate. However, there is a financial reporting incentive to make these contributions by December 31st, 2017 to avoid deferred tax asset write-downs. Ultimately, the extent to which firms increase pension contributions in 2017 and firms' responses to financial reporting incentives related to the corporate rate reduction are open empirical questions.

We use a panel of 408 calendar-year, non-financial U.S. firms from 2014 to 2017 with pension liabilities, to examine whether firms increase pension contributions in 2017.[2] To proxy for increases in pension contributions, we examine unexpected pension contributions. Under U.S. GAAP, firms must disclose expected pension contributions for the following year in the annual 10-K per ASC 715 (FASB 2011). We calculate unexpected pension contributions as the difference between actual pension contributions and the corresponding expected contribution amount disclosed in the prior-year 10-K. Because the 2017 estimates of expected pension contributions are made prior to most events that led to TCJA passage, our measure helps identify the effect of the TCJA on DB contributions.

After plotting univariate trends in pension contributions over time, we find that unexpected contributions increase significantly in 2017. In multivariate tests, we include covariate effects for funded status, size, sales growth, leverage, capital intensity, and return on assets. We also control for either industry or firm fixed effects. Our results show that unexpected

[2] Because our effect of interest is partially a time series effect, we focus on contributions rather than funded status. Pension contributions are less sensitive to increasing equity prices in 2017 than funded status because funded status is a function of both contributions and returns on pension assets. Importantly, by examining pension contributions in 2017, we avoid several potential confounding effects related to market returns. We note that higher returns on pension assets in 2017 should incentivize firms to make *lower* pension contributions, the opposite of our prediction.

pension contributions increase by approximately $17.5 million in 2017, on average. Interpreted at the pre-TCJA mean contribution in our sample, this estimate implies an increase of 26.7 percent. Aggregated over our full sample, we find firms make unexpected contributions of $7.1 billion in 2017. Overall, our results suggest an economically significant increase in unexpected pension contributions in 2017, consistent with tax incentives from the corporate rate reduction incentivizing firms to contribute more to their DB pension plans.

To further identify the tax incentive effect on contributions, we examine the association between TCJA enactment and unexpected pension contributions separately for taxpaying and non-taxpaying firms. Since firms can deduct pension contributions from their taxable income, firms with positive federal taxable income stand to benefit the most from these deductions. While prior literature typically uses net operating losses (NOLs) or simulated marginal tax rates to proxy for tax incentives, Thomas (1988) cautions researchers against using tax incentive proxies based on worldwide NOLs in the pension setting.[3] In the same spirit of Mills, Newberry, and Novack (2003), we use current federal income tax expense before pension contributions to identify firm taxpaying status. We find that taxpaying firms make greater unexpected pension contributions in 2017, while non-taxpaying firms do not. This result helps us rule out alternative explanations and attribute the increase in contributions to the reduction in the corporate tax rate.

We also examine how financial reporting incentives from the reduction in the corporate tax rate affect our results. As previously discussed, firms can make 2017 tax deductible contributions up until September 15th, 2018. However, GAAP accounting rules require firms to value deferred tax assets (DTAs) and liabilities (DTLs) at the enacted rate for the period of

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[3] As Thomas (1988) explains, NOLs include many carryforwards relating to foreign operations or domestic subsidiaries not consolidated for U.S. tax purposes. We only expect firms paying U.S. tax to increase their contributions in response to the corporate tax rate reduction.

expected reversal. After the passage of the TCJA, firms must revalue their DTAs and DTLs, both of which were previously valued at a 35 percent, at the new corporate tax rate of 21 percent. As a result, firms must write down their DTAs at the balance sheet date of December 31, 2017, which results in a one-time increase in tax expense in 2017. Because pension obligations are one of the largest drivers of DTAs (Hanlon 2005), we expect firms with large DTAs to avoid this one-time write-down by increasing contributions before the balance sheet revaluation date of December 31, 2017.[4] Consistent with this incentive, we find taxpaying firms with large DTAs make the largest unexpected pension contributions in 2017. Specifically, taxpaying firms with high levels of deferred tax assets contribute over four times as much as taxpaying firms with low levels of deferred tax assets. We also find that firms with greater financial reporting pressure drive this result. While prior literature focuses on the effect of the *tax savings incentive* related to pensions (e.g., Francis and Reiter 1987; Thomas 1988), our findings indicate a strong tax-related *financial reporting incentive* to avoid DTA write-downs.

While our cross-sectional results and our use of unexpected pension contributions mitigate concerns of alternative explanations for our findings, we perform additional testing to strengthen the validity of our results. We show our results are not due to expected increases in pension insurance rates or a general time trend in pension contributions. In additional analyses, we also examine 2018 expected contributions to evaluate whether the increase in 2017 pension contributions represents an acceleration or a permanent increase of pension contributions. We find firms disclose lower expected pension contributions in 2018 relative to actual contributions in 2017, indicating firms do not expect to maintain 2017 contribution levels. This finding implies a shift of future pension contributions into 2017 rather than a permanent increase in pension

[4] Our results are understated to the extent firms wait until calendar 2018 to make additional contributions.

funding. Finally, we examine potential sources of funds for the observed increase in pension contributions in 2017. We find that firms finance additional contributions in 2017 with internal sources of funds rather than issuing debt or equity.

Our study contributes to the literature by providing early evidence on the corporate effects of the TCJA. In this sense, we answer the call from Joel Slemrod at the 2018 American Taxation Association meeting for research on the anticipatory effects of the TCJA (Slemrod 2018). Most of the uncertainty following the TCJA's passage relates to how firms will respond to the new legislation (Morgan Stanley 2018; The Economist 2017; Bloomberg 2017; Hanlon, Hoopes and Slemrod 2018). We also contribute to the literature on inter-period income shifting by documenting one tool firms use when facing lower future tax rates: accelerating pension contributions. Our findings are consistent with the hierarchy of behavioral responses to taxation (Slemrod 1992), where at the top of the hierarchy is the timing of economic transactions (Auerbach and Slemrod 1997). Although prior research examines income shifting around tax rate changes, we provide new evidence that financial reporting incentives are an important driver to timing economic transactions in response to changing tax laws. To our knowledge, we are one of the first to show that avoiding DTA write-downs is an important factor in the corporate response to tax rate decreases.

Pension contributions provide a good setting to examine how firms alter the timing of transactions in response to the TCJA. Firms do not need additional infrastructure to increase pension contributions. This makes the costs of additional contributions relatively low compared to other transactions that would also shift income, such as increasing research and development or increasing capital expenditures.[5] Furthermore, unlike other expenditures, pension contributions do not reduce book income and will actually lead to a reduction in future pension expense (FASB 2011). Another benefit of our setting is that firms are incentivized to respond to the TCJA *before* it takes effect. This is especially true for firms with the financial reporting incentive to avoid DTA write-downs. One of the challenges with studies that examine the effect of major tax reform, such as the TCJA, is that multiple aspects of the tax code change simultaneously (Auerbach and Slemrod 1997). Our setting mitigates this problem to some extent by examining pension contributions in 2017 before many of the provisions of the TCJA take effect, allowing for insight into the anticipatory corporate response to the TCJA.

The TCJA includes the largest reduction in the corporate tax rate since the U.S.'s corporate income tax creation in 1909. As such, we believe the study of its effect on corporate pensions should be of interest to academics, pension regulators, and lawmakers. Particularly, our findings suggest the reduction in the corporate tax rate incentivized firms to accelerate pension contributions into 2017, resulting in an earlier wealth transfer from capital to labor. From a labor perspective, the acceleration of pension contributions ensures an additional year of returns on accelerated pension assets. Importantly, this does come at a cost. Based on our estimates U.S. government tax collections will be reduced by $994 million due to this acceleration ($7.1 billion in unexpected contributions multiplied by 14 percent rate differential). The remainder of the paper proceeds as follows, Section II develops our hypotheses, Section III discusses our research design, Section IV describes our data, Section V presents our results, and Section VI concludes.

[5] Many of the most significant expense categories are difficult to accelerate in a single period. For instance, because inventory costs are capitalized, any additional investment in inventory must be sold before it becomes deductible. Likewise, long-lived depreciable assets are capitalized and depreciated over time. Although short-lived depreciable assets are 100 percent deductible under the TCJA, the Act requires these assets to be placed in service by the end of the year. Big 4 practitioners stated that the requirement to place these assets in service is a barrier to accelerating capital expenditure deductions into 2017.

II. HYPOTHESIS DEVELOPMENT

DB plans represent a key element of the U.S. retirement system; whereby firms promise a defined benefit to employees upon retirement. Therefore, firms must set aside sufficient assets to pay for these pension obligations in the future. The popularity of DB plans grew sharply in the 1940s and 1950s, before fading in favor of defined contribution (DC) plans (Franzoni and Merin 2006; Chapman and Naughton 2016). Despite this shift, close to 24,000 DB plans exist in the U.S. today that cover nearly 40 million workers, retirees, and beneficiaries in the private sector (PBGC 2017). In fact, a recent report by Russell Investments (Owens and Barbash 2014) claims that DB plan assets were at an all-time high with $3.1 trillion as of 2014, having tripled over the past 25 years. The report affirms that while the DB "boom" may have occurred one or two generations ago, these plans still maintain a significant foothold in the U.S. economy.

To counter firm incentives to underfund DB pension plans, Congress enacted the Employee Retirement Income Security Act (ERISA) in 1974. Among other provisions, ERISA established the Pension Benefit Guaranty Corporation (PBGC), which required firms to commit to a plan of 90 percent funding over 30 years (PBGC 2017). Despite this change, DB plans continued to run large deficits. In response to this continued pervasive underfunding and several high profile DB pension defaults, lawmakers enacted the Pension Protection Act (PPA) in 2006 (PPA 2006; Campbell Dhaliwal, and Schwartz 2010; Campbell, Goldman, and Li 2018). The PPA requires firms to commit to a plan of 100 percent funding over 7 years. Finally, in July of 2012, Congress provided pension relief by enacting the Moving Ahead for Progress in the 21st Century Act (MAP 21), which significantly lowered pension liabilities and increased corporate liquidity (Kubick, Lockhart, and Robinson 2017).[6] Despite legislative action on pensions, many firms continue to have large DB pension deficits with few funding incentives (Naughton 2015; Milliman 2018). Specifically, as of 2016, aggregate U.S. Compustat pension liabilities equal $2.50 trillion, with corresponding pension assets of $2.01 trillion.

A subset of the pension literature examines the relation between tax incentives and pension funding.[7] The earliest papers linking pension funding and tax incentives document a weak relation between funding policy and taxpaying status (Friedman 1982; Bodie, Light, Morck, and Taggert Jr. 1985; and Francis and Reiter 1987). Thomas (1988) re-examines the link between pension funding and taxes after making research design improvements (i.e., using a refined measure of taxpaying status) and finds evidence that taxpaying firms make greater pension contributions. These studies, however, do not examine the effects of changes in the tax rate on pension contributions or financial reporting incentives around these changes.

Prior research examines how tax rate changes affect inter-period income shifting. Scholes, Wilson, and Wolfson (1992) find that firms shift income in response to the enactment of the Tax Reform Act of 1986 (TRA), which reduced the corporate tax rate from 46 percent in 1986 to 34 percent beginning in 1987.[8,9] The authors examine changes in fourth quarter gross profit and selling, general, and administrative expenses around the TRA and find results

[6] Specifically, MAP 21 allows firms to use a 25-year average interest rate to discount their pension liability. This discount rate is significantly higher than the previously required two-year average. This change led to lower pension liabilities and funding requirements (MAP 21).

[7] IRC Section 404 allows firms to deduct cash contributions made to defined benefit pension plans equal to the sum of 1) the funding target for the plan year, 2) the target normal cost for the plan year, and 3) the cushion amount for the plan year. Pension contributions during our sample period are deductible up to the point where the pension is 150 percent funded (Campbell et al. 2012).

[8] Similarly, Guenther (1994) documents income shifting around the TRA through accruals management. Maydew (1997) expands on this finding by showing that NOL firms shifted income by both deferring income and accelerating deductions to maximize their NOL carrybacks.

[9] The TRA of 1986 decreased the top marginal rate from 46 percent to 34 percent, a 26 percent decrease. The TCJA decreased the top marginal rate from 35 percent to 21 percent, a 40 percent decrease.

consistent with income shifting. Their analysis suggests firms defer revenue into 1987 and accelerate expenses into 1986. Due to data constraints, the authors conjecture, but do not test, that increasing pension contributions in 1986 is one mechanism that firms could use to shift income into the lower tax rate period. Furthermore, prior research on inter-period income shifting does not examine the effects of financial reporting incentives to avoid DTA write-downs as a driver of this relation.

In our setting, the reduction in the corporate tax rate from 35 percent to 21 percent affects tax years beginning after December 31st, 2017. This provides firms an incentive to increase pension contributions in the 2017 tax year, as these contributions generate tax deductions that will be deducted at a higher tax rate (Scholes, Wolfson, Erickson, Hanlon, Maydew, and Shevlin 2015). Contributing one dollar to a DB pension plan in the 2017 tax year saves a firm $0.215 relative to making that same contribution in the 2018 tax year or beyond [i.e., $1.00*(1 - 0.21) = $1.215*(1 - 0.35)].[10] Additionally, in contrast to other tax deductible expenditures that would also decrease book income in 2017, pension contributions do not decrease book income as they do not increase GAAP pension expense (FASB 2011). In fact, 2017 pension contributions increase the plan asset balance, which is used to calculate expected returns and will *decrease* future pension expense. We predict this incentive will lead firms to make pension contributions in 2017 that are greater than their expected contribution, which was disclosed in their 2016 10-K released in February or March of 2017. We state our hypothesis in the alternative form as follows:

H1: Firms increase unexpected pension contributions in 2017.

[10] A pension actuary confirmed it is indeed possible for firms to accelerate their pension contributions.

To mitigate the possibility that results supporting H1 are due to non-tax reasons, we must demonstrate that firms with a greater incentive to reduce taxes drive any increase in DB contributions in 2017 (Auerbach and Slemrod 1997). In theory, firms with a higher marginal tax rate in 2017 stand to benefit more by increasing pension contributions (Scholes et al. 2015). However, due to the difficulties inherent in estimating marginal tax rates in a pension setting (Thomas 1988), we examine cross-sectional variation in U.S. taxpaying status to examine whether firms increase pension contributions in response to changing tax incentives (Mills et al. 2003). We expect firms with positive current federal taxable income before pension contributions (taxpaying firms) to face a higher federal marginal tax rate and make greater unexpected pension contributions in 2017 relative to firms with non-positive current federal taxable income before pension contributions (non-taxpaying firms). We state our second hypothesis in the alternative form as follows:

H2: Taxpaying firms increase unexpected pension contributions in 2017 more than non-taxpaying firms.

Even if firms have taxable income to offset, Section 404 of the Internal Revenue Code allows C-corporations to make deductible pension contributions up to 8.5 months after the end of the plan year. This means all firms in our study (i.e., calendar year-end firms) are able to make 2017 tax return deductible pension contributions up until September 15, 2018. Hence, even if firms choose to accelerate their pension deductions into the 2017 *tax year*, they may not do so in the 2017 *calendar year*.

However, there is a financial reporting incentive to contribute in 2017. Specifically, ASC 740 requires firms to value the book-tax differences generating deferred tax assets/liabilities at the enacted rate at which they will reverse. Prior to the passage of TCJA, book-tax differences were valued at the 35 percent corporate tax rate. The enactment of TCJA requires all firms to revalue these book tax differences at 21 percent at the balance sheet date of December 31, 2017. This revaluation will result in a write-down of DTAs that generates a one-time increase in tax expense and effective tax rates (ETRs) in 2017.[11]

Due to these write-downs, firms with large DTA balances can experience large increases in tax expense. Consistent with the market reacting to these potential write-downs, Wagner, Zeckhauser, and Ziegler (2018) find that firms with large DTAs experience negative stock market returns on dates where the probability of a corporate tax rate reduction increases. Prior literature shows that DB pensions are one of the largest sources of DTAs, as pension expense calculated under U.S. GAAP is oftentimes much lower than actual contributions (Hanlon 2005). Therefore, firms with large pension-related DTAs have an added incentive to make their pension contributions in 2017 to avoid writing-down these DTAs to the lower corporate tax rate.

We provide a numerical example of this incentive in appendix B. In this example, we assume two companies have identical pre-tax income of $250 and a beginning pension DTA of $35 due to book-basis pension expense exceeding tax-deductible pension contributions by $100 in previous years. Company A makes a $100 pension contribution during the calendar year 2017, which reverses the $35 DTA. By doing so, the company avoids the write-down of the pension DTA due to the newly enacted 21 percent tax rate. This results in an effective tax rate in 2017 equal to 35 percent (i.e., the statutory rate). Company B chooses to wait until 2018 to make its pension contribution and is required to revalue the DTA at 21 percent at December 31, 2017.

[11] We acknowledge that an alternative way to avoid a write-down of the pension related DTA is to make a pledge to contribute by September 15th, 2018 at the balance sheet date of December 31st, 2017. We believe this biases against detecting results for actual 2017 contributions. Furthermore, discussions with Big 4 practitioners suggest that some firms were unwilling to make this commitment due the increased risk of restatement if the firm did not make this contribution by September 15th, 2018.

This results in a write-down of the DTA from \$35 to \$21 and a corresponding increase in tax expense of \$14. This write-down decreases Company B's net income and increases its ETR to 40.6 percent in 2017. This simplified example illustrates the financial reporting benefits of accelerating the contributing into calendar year 2017.

Given this incentive is most present for taxpaying firms with high levels of pension-related DTAs, we hypothesize that taxpaying firms with large DTAs will make greater pension contributions in 2017 than taxpaying firms with small DTAs to avoid these write-downs.[12]

H3: Taxpaying firms with high levels of DTAs increase unexpected pension contributions in 2017 more than taxpaying firms with low levels of DTAs.

III. RESEARCH DESIGN

To test H1 we examine the relation between unexpected pension contributions and the enactment of the TCJA using the following OLS regression model:

$$UnexpContrib_{i,t} = \alpha TCJA_t + \sum_k \beta_k Controls_{i,t} + Industry\ or\ Firm\ Effects + \varepsilon_{i,t} \qquad (1)$$

Equation (1) models unexpected contributions as a function of the *TCJA* (α), a set of firm characteristics measured yearly (β_k), either industry or firm fixed effects, and a residual ($\varepsilon_{i,t}$).

Our objective in this paper is to study how the TCJA affects firms' pension contributions in 2017. Because the amount of additional contributions related to the TCJA is unobservable, our identification strategy relies on accounting rules that require firms to disclose their expected

[12] While only pension-related DTAs create the incentive to contribute in 2017, machine-readable data is only available for total DTAs. Therefore, our approach captures pension and non-pension related DTAs, which likely biases our tests against our prediction. In untabulated robustness tests, we estimate a rough proxy for the pension-related DTA using the accrued/prepaid pension variable (Compustat: *pcppao*) multiplied by 35 percent, Inferences remain unchanged when we use this alternative approach to determining high- and low-DTA related incentives.

pension contributions for the upcoming year (FASB 2011).[13] Because we restrict our sample to calendar-year firms, all of our firms estimate their 2017 pension contributions prior to most events leading to enactment of the TCJA.[14] We capitalize on these disclosures to measure unexpected contributions (*UnexpContrib*) as the total annual pension contribution minus the corresponding expected contribution reported in the prior year's financial statements, scaled by the lagged book value of assets.[15] While all expected contributions in our sample are set prior to the enactment of tax reform, actual contributions in 2017 are potentially affected by the TCJA. As such, our primary variable of interest is *TCJA*, which is equal to one in the year of the enactment of the Tax Cuts & Jobs Act (i.e., 2017) and zero otherwise. A positive and significant coefficient on *TCJA* indicates an increase in unexpected pension contributions in 2017.

Beyond controlling for numerous firm and pension characteristics by examining actual contributions over the firm's own expectations, our analysis controls for a number of additional firm characteristics.[16] We control for the funded status of the pension liability (*FundStatus*), which is equal to the fair value of plan assets before pension contributions divided by pension benefit obligations. Firms with underfunded pension liabilities are subject to PBGC pension liability insurance payments. Therefore, firms with underfunded pensions have additional incentives to make higher pension contributions to reduce their pension liability insurance payments. A negative and significant coefficient on *FundStatus* would be consistent with firms with greater pension deficits making greater pension contributions. We also control for the

[13] Kubick et al. (2017) discuss in detail the advantages of using expected pension contribution disclosures over mandatory contribution estimates produced from IRS form 5500 disclosures.

[14] Financial statements for our firms are generally filed in February or March. While momentum for tax reform began with the election of President Trump (Wagner, Zeckhauser, and Ziegler 2018), most events leading to the passage of TCJA began after April 26, 2017, when the President released his set of tax principles. After a series of developments, the final bill was signed by President Trump on December 22, 2017.

[15] We scale all variables by lagged book assets, following Campbell et al. (2012). Our inferences remain unchanged if we use log transformations.

[16] We include definitions for all variables in appendix A.

following firm characteristics: size (*Size*); leverage (*Lev*); property, plant, and equipment (*PPE*); one-year change in sales (*SalesGrowth*); and return on assets (*ROA*). All control variables are computed at the firm-year level at year-end (i.e., time t). We also include either Fama-French 12 industry or firm fixed effects to control for time invariant industry (γ_{ind}) or firm characteristics (μ_i). Our analysis employs robust standard errors clustered at the firm-level to address serial correlation in the residuals resulting from having multiple observations per firm.[17]

Our second hypothesis predicts that taxpaying firms are more likely to respond to the change in the corporate tax rate by increasing unexpected pension contributions. To test H2, we partition our sample on U.S. taxpaying status before pension contributions, consistent with Thomas (1988), who cautions against the use of worldwide tax incentive variables in the pension setting. Because pension contributions directly affect federal tax expense, we adjust current federal tax expense by adding back the tax deduction for pension contributions, estimated as pension contributions ($pbec_t$) multiplied by the top statutory tax rate (i.e., 35 percent) to determine taxpaying status. We estimate equation (1) separately for subsamples of taxpaying and non-taxpaying firms.[18] If firms increase pension contributions in 2017 in response to new tax incentives, we expect taxpaying firms to make larger contributions than non-taxpaying firms.

Finally, our third hypothesis predicts that due to the financial reporting incentive to avoid DTA write-downs, taxpaying firms with high levels of DTAs should increase their contributions more than taxpaying firms with low levels of DTAs. To test H3, we first partition our sample on taxpaying status and then on DTA levels (i.e., the yearly-median pre-pension contribution DTA

[17] Inferences remain unchanged if we cluster by year or employ robust standard errors.

[18] We use U.S. tax incentives rather than NOLs because Compustat NOLs are worldwide numbers, while corporate pension funding is largely a U.S. issue (Thomas 1988). Because simulated marginal tax rates are based on Compustat NOLs (Graham 2000, Blouin, Core, and Guay 2010), they are equally inappropriate for our setting as they will also be less relevant to current year tax-related decisions on pension contributions.

(*txndba*) at *t* scaled by total book assets at *t - 1*).[19] If firms consider DTA write-downs in their contribution decision, then we expect taxpaying firms with high levels of DTAs to make greater unexpected pension contributions in 2017.

IV. DATA

Sample Selection

Our sample period begins in 2014, to avoid confounding effects from MAP 21 (Kubick et al. 2017), and ends in 2017.[20] To ensure the appropriate timeline of tax incentives we eliminate non-calendar-year-end firms. We eliminate firms in the financial sector (i.e., SIC codes 6000-6999), due to their unique regulatory environment. We further restrict our analysis to firms with positive beginning-year pension liabilities and to those with available data. We also require our sample firms to have available data in 2017 (our treatment year) and 2016 (the nearest control). Our final sample includes 1,545 firm-year observations across 408 unique firms.[21]

Trends in Pension Contributions

We begin our analysis by examining the trend in pension contributions over our sample period. Figure 1 plots the average expected and actual contributions across 2014-2017 for our full sample. The figure shows expected and actual contributions are relatively stable from 2014 to 2016 with actual contributions somewhat exceeding expected contributions on average. In 2017, we observe a large increase in actual contributions relative to expected contributions. This

[19] The pre-pension DTA balance is calculated using the year-end DTA balance and backing out the pension contribution effect. For years 2014-2016 the calculation is [($txndba_t$ + ($pbec_t$*0.35)) / at_{t-1}]. For 2017, we also take into account the write-down of the DTAs by calculating the pre-pension and pre-TCJA DTA as [(($txndba_t$ / 0.21)*0.35 + ($pbec_t$ * 0.35)) / at_{t-1}]. Our results are robust to using unadjusted DTA values.
[20] MAP 21's effects on pension contributions were most significant in 2012 and 2013. See https://www.towerswatson.com/en-US/Insights/Newsletters/Americas/insider/2012/pension-plan-funding-obligations-under-map-21 for details.
[21] We trim our sample at the 1st and 99th percentiles by year to mitigate the impact of outliers. Inferences are unchanged if we winsorize and are stronger if we use unmodified data. We download Compustat data as of June 12, 2018.

result provides preliminary evidence of an increase in unexpected pension contributions in 2017, consistent with H1.

[INSERT FIGURE 1 HERE]

Figure 2 partitions our sample by taxpaying status. If the increase in 2017 pension contributions is a result of a change in tax incentives, then we should observe that the increase in unexpected contributions is greater in taxpaying firms, as these firms stand to benefit more from an increase in tax deductions in 2017. In support of H2, we observe an increase in average unexpected contributions for taxpaying firms in 2017, but do not observe an increase for non-taxpaying firms.

[INSERT FIGURE 2 HERE]

Figure 3 plots average unexpected contributions, partitioned by taxpaying status and level of DTAs. The figure shows stable average unexpected contributions across all four categories of firms from 2014-2016. However, Figure 3 shows a sharp increase in unexpected contributions for taxpaying firms with large DTAs in 2017, while showing stable trends for the other three categories of firms in 2017. Overall, these figures provide initial visual evidence of an increase in unexpected pension contributions in 2017, consistent with H1, H2, and H3.

[INSERT FIGURE 3 HERE]

V. EMPIRICAL RESULTS

Descriptive Statistics and Correlations

Table 1 displays descriptive statistics for our full sample. Firms in our sample make average pension contributions of $74.95 million a year (*TotContrib unscaled*). We also find that firms make average unexpected pension contributions equal to $23.57 million

(*TotUnexpContrib*) over the full sample period, while the median is close to zero ($0.17 million). Finally, consistent with regulator concerns, plan assets equal only 75 percent of pension liabilities in our sample (*FundStatus*). Table 2 tabulates Pearson correlation coefficients among our key variables in our sample. We find that the unscaled measures of actual contributions and expected contributions are highly correlated (correlation = 0.6519; p-value <0.01). In untabulated, analyses we find that the correlation between these variables is greater than 0.800 in the years 2014-2016 and equal to 0.512 in 2017. Our measure of unexpected contributions (*UnexpContrib*) is positively correlated with *TCJA* (correlation = 0.1295; p-value <0.05), providing univariate support for H1. The remaining correlations suggest multicollinearity is not a concern.

[INSERT TABLE 1 & TABLE 2 HERE]

Multivariate Results

In Table 3, we present multivariate tests of H1. Column (1) presents results without fixed effects, column (2) presents results including industry fixed effects, and column (3) presents results including firm fixed effects. Across all columns, we find a positive and significant coefficient on *TCJA* (p-value < 0.01).[22] The coefficient estimate for the treatment effect of the TCJA is stable across all specifications and indicates firms increase unexpected pension contributions by about 0.12 percent of total assets. Interpreted at the mean value of assets ($14.58 billion), this result implies a $17.5 million increase in unexpected pension contributions in 2017. This corresponds to a 26.7 percent increase relative to pre-TCJA average contributions

[22] Multivariate results for H1, H2, and H3 are robust to specifying the dependent variable as actual contributions scaled by lagged book assets ($pbec_t$ / at_{t-1}). They are also robust to using scaled actual contributions and including expected contributions ($pbece_{t-1}$ / at_{t-2}) as an additional control variable (p-value < 0.01) or using prior year scaled actual contributions as an additional control variable (p-value < 0.01). Finally, they are robust to using a balanced panel consisting of only 2016 and 2017 observations or requiring firms to have observations for all years 2014-2017.

in our sample ($65.6 million).[23] Compared to the pre-TCJA average pension deficit of our sample of firms in 2016 ($537 million), this constitutes a 3.3 percent increase in the funded status of the DB pension plans in our sample.[24] In aggregate, our results suggest firms made about $7.14 billion in unexpected contributions in 2017.[25]

[INSERT TABLE 3 HERE]

Table 4 presents multivariate tests of H2. Columns (1), (3), and (5) estimate equation (1) for taxpaying firms; while columns (2), (4), and (6) do so for non-taxpaying firms. Table 4 also estimates several variations of equation (1), which include specifications with no fixed effects (columns 1 and 2), industry fixed effects (columns 3 and 4), and firm fixed effects (columns 5 and 6). Consistent with H2, we find that *TCJA* is positive and significant only for taxpaying firms (columns 1, 3, 5 coefficients; p-values < 0.01). This result varies little with the inclusion of fixed effects. In terms of economic significance, we find that taxpaying firms make unexpected pension contributions in 2017 that are six to fourteen times larger relative to non-taxpaying firms. These differences between taxpaying and non-taxpaying firms are also statistically significant in every instance (p-values <0.01).[26] Overall, our results suggest firms that stand to benefit the most from an increase in pension contributions in 2017 drive our primary result of higher unexpected pension contributions in 2017. Importantly, these results improve our ability to attribute the increase in 2017 unexpected pension contributions to the reduction in the

[23] 26.7 percent = $17.5 million average unexpected contribution estimate / $65.6 million 2014-2016 average contribution.
[24] 3.3 percent = $17.5 million average unexpected contribution estimate / $537 million 2014-2016 average pension deficit.
[25] $7.14 billion = $17.5 million average unexpected contribution estimate x 408 firms in our sample.
[26] We use seemingly unrelated regressions to test for differences in the coefficients across our models. Results are unchanged if we estimate differences in a pooled model with interaction terms for different groups.

corporate tax rate by demonstrating that the firms that are most affected by the corporate tax rate change are the primary drivers for our results (Auerbach and Slemrod 1997).

[INSERT TABLE 4 HERE]

Table 5 presents multivariate results of H3. In this table, we estimate the relation between *UnexpContrib* and *TCJA* by taxpaying status and level of DTAs. For brevity, we only report specifications that include industry fixed effects but note the results are similar if we omit industry fixed effects or include firm fixed effects. Column (1) presents results for taxpaying firms with large DTAs, column (2) for taxpaying firms with small DTAs, column (3) for non-taxpaying firms with large DTAs, and column (4) for non-taxpaying firms with small DTAs. Table 5 shows our results for H1 and H2 are concentrated in taxpaying firms with high DTAs (i.e., column 1 coefficient = 0.0023; p-value <0.01), consistent with H3. This suggests firms increase their pension contributions in 2017 to avoid the write-down of DTAs that would increase tax expense for the year. Although, taxpaying firms with low DTAs still make statistically significant unexpected contributions in 2017 (column 2 *TCJA* coefficient = 0.0005; p-value <0.05), taxpaying firms with large DTAs contribute over four times more than taxpaying firms with small DTAs in 2017 (test of difference in coefficient p-value < 0.01). While we use total DTAs to maximize an already limited sample, in untabulated robustness tests we estimate a rough proxy of pension-related DTAs using the accrued/prepaid pension variable (Compustat: *pcppao*) multiplied by 35 percent. Inferences remain unchanged when we use this alternative approach to determining high- and low-DTA related incentives.

[INSERT TABLE 5 HERE]

In Table 6 we examine if the observed effects for high DTA firms vary according to financial reporting pressure. Specifically, we examine the interaction between our primary variable of interest (*TCJA*) and the number of analysts following the firm. Higher analyst following implies higher financial reporting pressure (Dichev, Graham, Harvey, and Rajgopal 2013). In column 1 for our full sample, we find a positive and significant interaction between *TCJA* and a continuous analyst following variable (*Analysts*). Next, we examine the same interaction in the high DTA (column 2) versus low DTA (column 3) subsamples. We find a positive and significant coefficient in the high DTA subsample (p-value < 0.01) but not in the low DTA subsample (p-value > 0.10) (test of difference in the coefficients: p-value = 0.026). Finally, we bifurcate the high DTA subsample into the yearly above the median analyst following (column 4) versus below the yearly median analyst following (column 5), and find that the TCJA indicator only loads in the above the median analyst following subsample (column 4: p-value < 0.01). A test of the difference in the size of the coefficient across these two subsamples is also statistically significant (p-value = 0.011). Combined these results suggests that firms with greater financial reporting pressure make greater contributions in 2017 and that the association for firms with large DTAs is driven by firms with greater financial reporting pressure.

[INSERT TABLE 6 HERE]

Alternative Explanations

Changes in Pension Insurance Premiums

It is possible that recent changes in pension liability premiums could partially explain our H1 results. The PBGC announced in 2015 that it is increasing the insurance premiums on underfunded pension liabilities from 3.4 percent in 2017 to 3.8 percent in 2018 and to at least 4.1 percent in 2019 (Prudential 2017, Goldman Sachs 2018). Because these premiums only apply to the underfunded portion of pension liabilities, it is possible that firms will increase their pension contributions in response to these higher premiums. While we mitigate this possibility by examining unexpected pension contributions (i.e., the premium increases were passed in 2015 would be captured in expected contributions) and control for plan funded status (*FundStatus*), we further address this possibility.

The PBGC assess pension insurance premiums on the total amount of plan underfunding. If firms are responding to the pension insurance incentive, then we would expect firms with greater underfunding to increase pension contributions in 2017. We test this conjecture by separately estimating equation (1) for firms with pension deficits above and below the median deficit for the year. Table 7 presents estimates of equation (1) for these two subsamples. We find that the main effect of *TCJA* is positive and significant in all specifications. Tests of differences between the above the median and below the median *FundStatus* groups are not statistically significant in any specification.[27] This result suggests firms with greater amounts of underfunding do not make greater pension contributions in 2017, providing some comfort that our H1 results are not due to recent changes in pension insurance premiums.

[INSERT TABLE 7 HERE]

General Time Trends

Another potential concern is that our results are due to a general time trend in unexpected contributions for our sample firms. Our figures provide comfort that this is not the case. However, to address this concern in a multivariate setting, we perform a placebo analysis of H1, H2, and H3, where we define the treatment year as an alternative year in our sample (i.e., 2014 through 2016). Throughout these tests, we fail to detect a positive and significant effect for any of our hypotheses when we define our treatment year as a different year in our sample

[27] We omit the control for *FundStatus* in these specifications, but inferences remain unchanged if this control is included. Additionally, results are robust to splitting the sample at the median funded status of all plans in the taxpayer versus non-taxpayer subsamples (untabulated).

(untabulated). Overall, our placebo analysis is consistent with our figures, which together help rule out a general time trend in unexpected pension contributions for our sample.

Acceleration vs. Permanent Increase

Our results suggest firms significantly increase pension contributions in 2017. We next explore if this is a permanent increase in pension funding or a temporary shift of future contributions to take advantage of the deduction at the 35 percent rate. Absent constraints, firms should accelerate future contributions into the 2017 tax year. We note, however, that firms can still make deductible contributions for the 2017 tax year well into the 2018 financial reporting year (i.e., 9/15/2018). Therefore, a full decrease in future contributions might not be observable until the 2019 fiscal year and would not be available to researchers until 2020. However, while we do not currently have access to future actual pension contributions, we are able to observe the disclosure of expected 2018 pension contributions.

To examine whether firms plan to maintain 2017 levels of pension funding, we construct the variable *DiffContrib*. *DiffContrib* is equal to the difference between expected future contributions for time *t+1* less the actual contribution at time *t*, both reported at time *t*. Lower values of *DiffContrib* indicate that the following year's expected contribution is less than the current year contribution. If firms plan to maintain 2017 levels of pension funding, we expect no time trend in *DiffContrib*. However, a one-time increase in contributions would result in a decrease in *DiffContrib*. We plot the mean of *DiffContrib* in Figure 4 for our full sample. We observe a relatively flat pattern for the years 2015-2017 and a dramatic drop in *DiffContrib* in 2018. This pattern suggests firms do not expect to maintain 2017 levels of contributions in 2018, consistent with an acceleration of future contributions into 2017.

[INSERT FIGURE 4 HERE]

To investigate this trend in a multivariate setting we replace the dependent variable in equation (1) with *DiffContrib*. If firms expect to maintain 2017 levels of pension contributions, then we expect the coefficient on *TCJA* to be zero. A negative coefficient suggests firms plan to decrease their 2018 contributions relative to 2017. We tabulate results for these tests in Table 8 for our full sample (column 1), taxpaying versus non-taxpaying firms (columns 2 and 3), and across our four DTA subsamples (columns 4-7). We find a negative and significant coefficient on *TCJA* using our full sample (coefficient = -0.0009; p-value < 0.01). We also find that this result is driven by taxpaying firms (column 2) and taxpaying firms with high DTA balances (column 4).

[INSERT TABLE 8 HERE]

We also examine the trend in raw expected contributions. Figure 5 plots the mean value of expected contributions and shows that expected contributions in 2018 are somewhat lower than in prior years. Also, in untabulated multivariate analyses, we modify equation (1) by modeling expected contributions scaled by lagged total assets as the dependent variable and include *UnexpContrib* and *UnexpContrib*TCJA* as additional explanatory variables. We find a negative and statistically significant coefficient (p-value <0.10) on *UnexpContrib*TCJA*. This suggests firms making large unexpected contributions in 2017 decrease the disclosed amount of expected contributions in 2018 compared to prior years' disclosed expectations. Overall, our results for expected future contributions are consistent with firms accelerating future pension contributions into 2017 and not a permanent increase in contributions.

[INSERT FIGURE 5 HERE]

Sources of Additional Pension Contributions

We next examine how firms finance increases in pension contributions in 2017. Practitioner articles suggest firms could use short-term debt or even issue equity to finance the increase in contributions (Prudential 2017). However, pecking order theory suggests firms prefer to use internal funds before raising external capital and also prefer debt over equity financing when internal funds are insufficient (Myers 1984; Shyam-Sunder and Myers 1999). We examine pension financing in 2017 by interacting *TCJA* with three financing variables: 1) Free cash flow (*AdjFCF*: internal financing); 2) Net change in debt financing (*NetDebtFin*: external financing); 3) Net change in equity financing (*NetEqFin*: external financing).[28]

We tabulate results for these tests in Table 9. We find a positive and significant coefficient on the interaction of *TCJA* and free cash flow (column 1 p-value < 0.05). This suggests firms with greater internal funds accelerate future pension contributions to a greater extent. In contrast, we fail to detect a positive and significant coefficient on the debt financing (column 2) or equity financing (column 3) interactions, respectively.[29] Taken together, these results suggest firms that increase contributions in 2017 use internal sources of funds to finance their contributions. Given the passage of the TCJA was very late in the 2017 calendar year, it might be difficult for firms to raise external funds to finance pension contributions, which could explain the use of internal sources of funds.[30]

[INSERT TABLE 9 HERE]

[28] Measures of net change in debt financing $[(DLTIS_t - DLTR_t + DLCCH_t)/AT_{t-1}]$ and net change in equity financing $[(SSTK_t - PRSTKC_t - DV_t)/AT_{t-1}]$ follow measures from Faurel, Soliman, Watkins, and Yohn (2018). Free cash flow is defined as $[(OANCF_t - CAPEX_t + PBEC_t)/AT_{t-1}]$. Results are qualitatively similar if we use cash scaled by lagged total assets as a measure of internal resources available.

[29] The interaction of *TCJA*NetEqFin* is actually negative and marginally significant (p-value < 0.10).

[30] In untabulated analyses we also examine if firms that have access to large amounts of previously trapped foreign cash due to the TCJA's deemed repatriation provisions make larger pension contributions. We find no evidence that multinational firms or firms with income shifting incentives make larger pension contributions in 2017.

VI. CONCLUSION

DB pension funding continues to be an important topic for regulators and lawmakers. Despite attempts to increase funding of these plans, we continue to see significant underfunding of DB pensions (Naughton 2015; Milliman 2018). In this study, we document an increase in unexpected pension contributions in 2017 for taxpaying firms with large DTA balances, consistent with the corporate rate reduction from 35 percent to 21 percent incentivizing firms to increase pension contributions. We observe that firms, on average, make unexpected pension contributions of $17.5 million in 2017, which results in a 3.3 percent increase in funded status within our sample. Although our analyses of expected future contributions suggests this is a temporary increase in funding, our results indicate an economically significant increase in the short-term funded status of DB pensions. This increase in pension assets allows these assets to generate returns at least one year sooner than they otherwise would have. This increase does not come without a cost, we estimate the additional pension tax deductions will decrease corporate tax collections by $994 million for our sample of firms, which represents 0.3% of the estimated $327 billion of corporate tax collections in 2016 (U.S. BEA 2018).

The TCJA of 2017 fundamentally changed the corporate tax law. Given that the majority of changes affect the 2018 tax year, we believe our study is one of the first to document an anticipatory effect of the TCJA on firm behavior. Prior work on changes in the corporate tax rate document anticipatory effects and posit that the increase of pension contributions is one way to shift income to lower tax rate periods (Scholes et al. 1992). However, due to data constraints, prior literature not examine pension contributions. We extend this literature by documenting an economically significant increase of pension contributions in 2017. Additionally, we document that the financial reporting incentives to avoid DTA write-downs is a key element of how the tax rate reduction affects firm behavior.

We note that while we examine disclosed expected contributions for 2018, actual pension contributions for 2018 are not currently available. Furthermore, because firms can deduct pension contributions on their 2017 tax return that are made well into 2018, any actual decrease in contributions would not be detected until the 2019 fiscal year and would not be available to researchers until 2020. We look forward to future studies that use a longer data time series. Despite these limitations, we believe that our study makes a significant contribution to the literature by documenting an economically significant effect of the TCJA on firm behavior.

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APPENDIX A

VARIABLE	DEFINITION	COMPUSTAT REFERENCE
UnexpContrib	Unexpected pension contributions: current contribution less expected contribution from prior year financial statements	$(pbec_t - pbece_{t-1}) / at_{t-1}$
DiffContrib	Expected future contributions less current year contributions: Expected pension contributions at time t+1 less actual pension contributions at time t.	$(pbece_{t+1} - pbec_t) / at_{t-1}$
FundStatus	Funded status measure: the percent of pension benefit obligation covered by the fair value of pension assets	$((pplao_t + pplau_t) - pbec_t)) / (pbpro_t + pbpru_t)$
TCJA	2017 calendar year: indicator variable if year is equal to 2017, else 0.	
Size	Firm size	$\log(at_{t-1})$
PPE	Property, plant, and equipment	$ppent_t / at_{t-1}$
Lev	Leverage	$(dltt_t+dlc_t) / at_{t-1}$
ROA	Return on assets	pi_t / at_{t-1}
SalesGrowth	One-year change in sales	$(sale_t - sale_{t-1}) / at_{t-1}$
Taxpayer	Pre-contribution tax incentive: Equal to 1 if Federal tax expense plus tax effected pension contribution is greater than zero, 0 otherwise. Missing tax data completed following Dyreng and Lindsey [2009]	$txfed_t + (pbec_t * 0.35)$
High DTA (Low DTA)	Equal to 1 if firm has a pre-pension contribution DTA balance above (below) the yearly-median pre-pension contribution DTA balance. Calculated as DTA at year-end plus the tax-effected pension contribution. For 2017, the calculation accounts for the revaluation of DTAs at the newly enacted 21 percent statutory tax rate.	$(txndba_t + (pbec_t * 0.35)) / at_{t-1}$ for years 2014-2016; $(((txndba_t / 0.21) * 0.35) + (pbec_t * 0.35)) / at_{t-1}$ for year 2017;
Analysts	Number of equity analysts for year t. Missing values set to zero. Source: IBES.	N/A
BVA	Book value of assets: scalar used for variables, lagged total assets	at_{t-1}

APPENDIX B

Financial Reporting Incentives of TCJA

<u>Company A - Make Contribution in 2017</u>

Facts

Pre-tax Book Income = $250
Pension expense exceeded contributions by $100 in prior years.
Beginning DTA-Pension = $35 (Cumulative Book-tax Difference of $100*35%).

2017 Reconciliation from book income to taxable income

2017 Pre-tax Book Income:	$250
2017 Contribute $100 over pension expense - reverse DTA:	($100)
2017 Taxable Income:	$150
Tax Rate:	35%
Current Tax Expense ($150*35%)	$52.5
Deferred Tax Expense ($100*35%)	$35
Total Tax Expense	$87.5

*No need to record tax expense for DTA write-down as fully reversed in 2017.

2017 Net Income ($250 – $87.5)	$162.5
2017 Effective Tax Rate ($87.5/$250)	35%

(Continued)

APPENDIX B, Continued

Financial Reporting Incentives of TCJA

Company B - Wait until 2018 to make Contribution

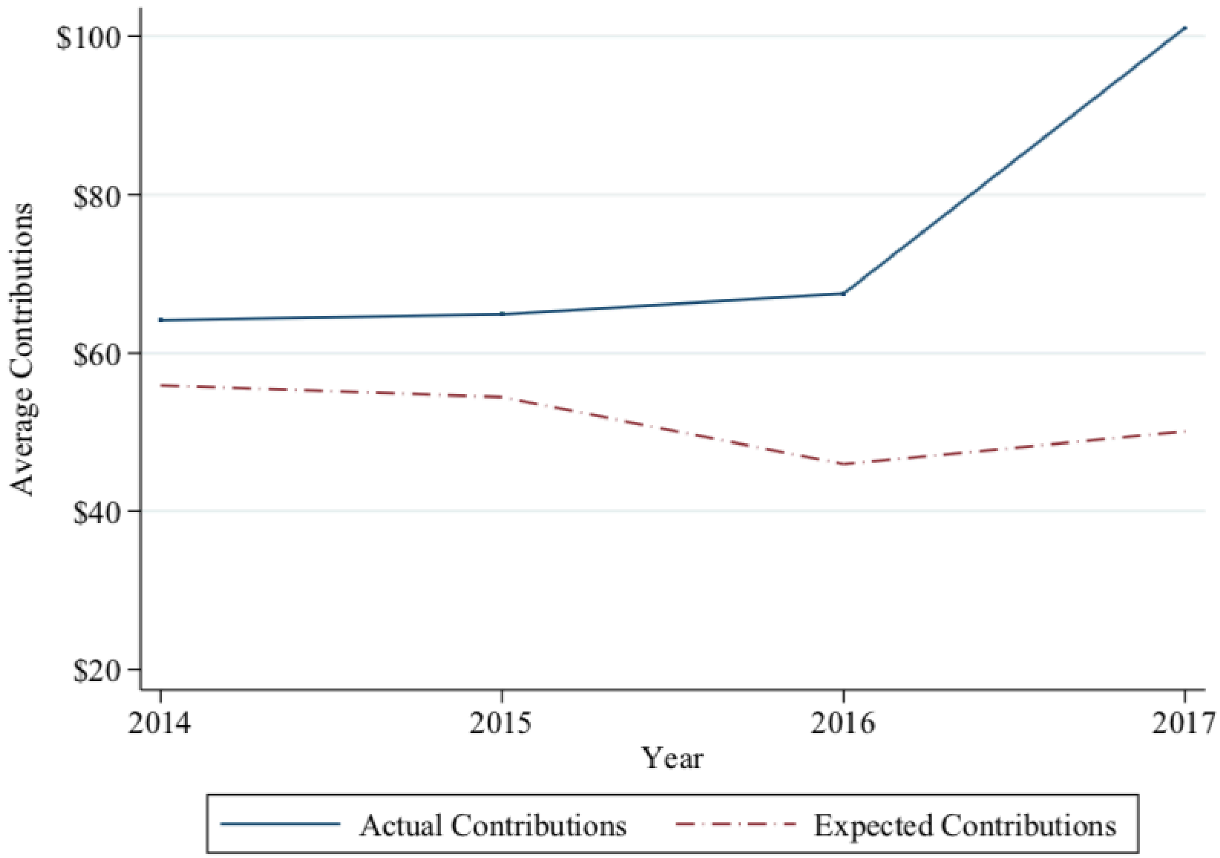
Facts

Pre-tax Book Income = $250
Pension expense exceeded contributions by $100 in prior years.
Beginning DTA-Pension = $35 ((Cumulative Book-tax Difference of $100*35%).

2017 Reconciliation from book income to taxable income

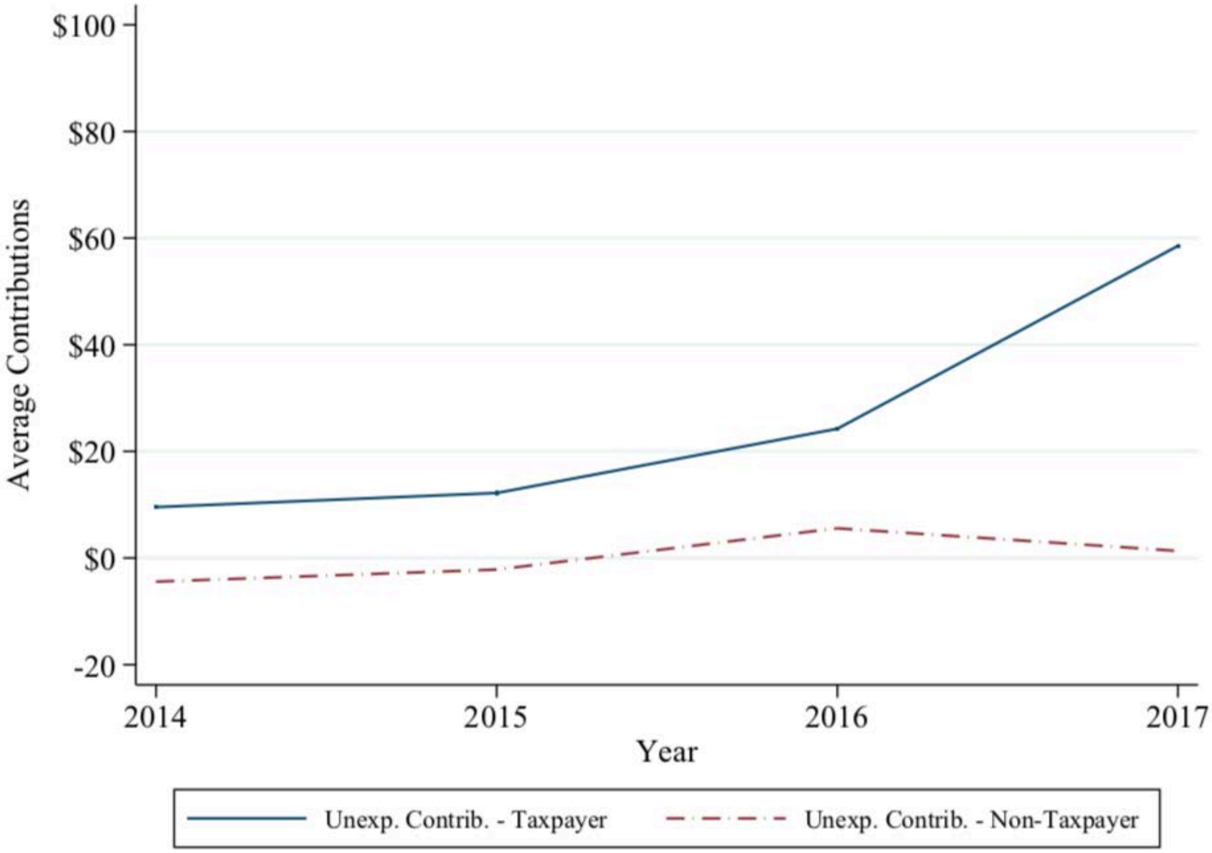
2017 Pre-tax Book Income:	$250
Wait to contribute until 2018	0
2017 Taxable Income:	$250
Tax Rate:	35%
Current Tax Expense ($250*35%)	$87.5
Deferred Tax Expense ($100*(35%-21%))	$14
Total Tax Expense	$101.5
2017 Net Income ($250 – $101.5)	$148.5
2017 Effective Tax Rate ($101.5/$250)	40.6%

FIGURE 1
Total and Expected Average Annual Pension Contributions (in millions)



This graph depicts the trends in the average actual and average expected pension contributions by year for our full sample. Actual contributions are measured using Compustat variable *pbec* for each fiscal year. Expected contributions (Compustat variable *pbece*) are as reported in the firms' prior year financial statements. Therefore, the 2017 expected contribution amount in the graph is the expectation as reported by the firms in their 2016 financial statements.

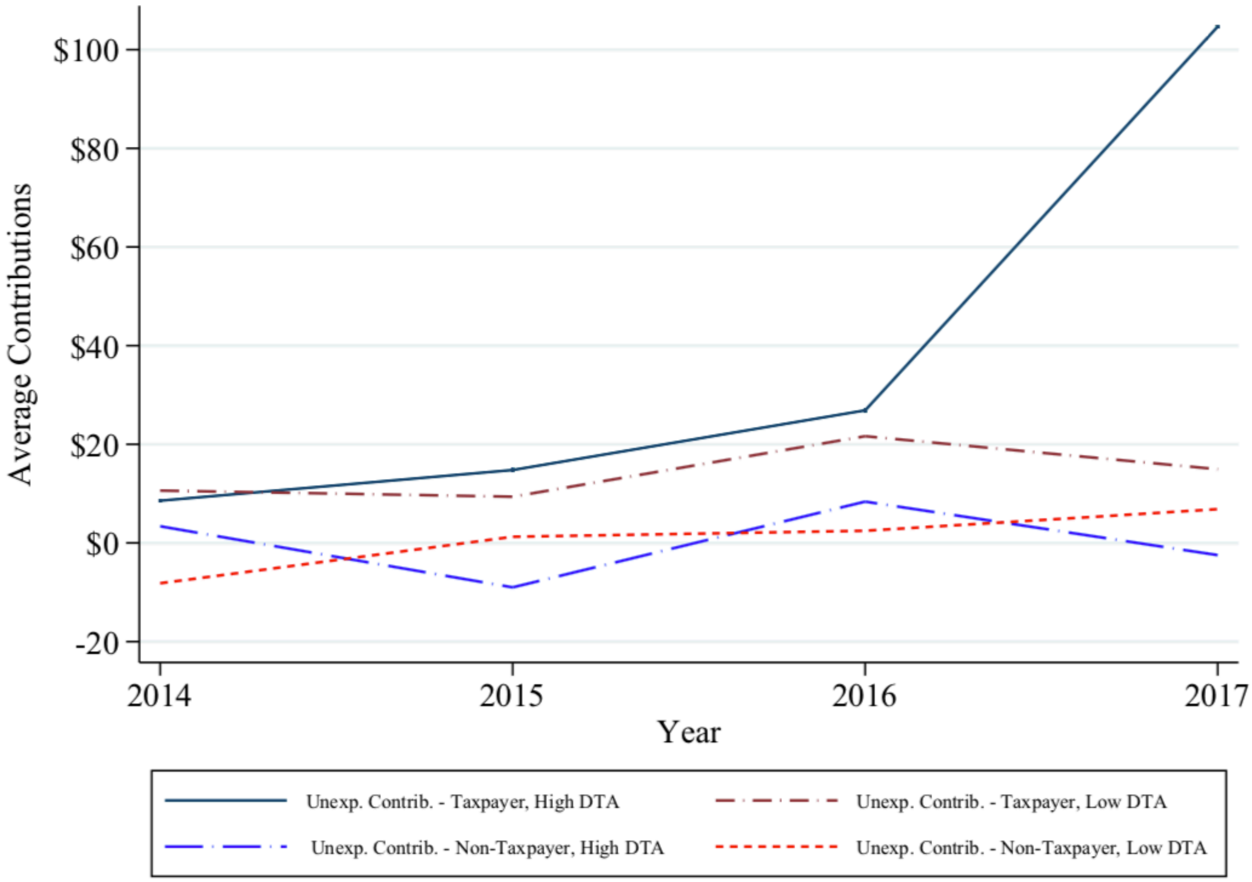
FIGURE 2
Average Unexpected Contributions by Taxpaying Status (in millions)



This graph depicts the trends in the average unexpected pension contributions by year for our full sample for taxpaying firms and non-taxpaying firms (see appendix A for variable definitions). Unexpected contributions are measured using Compustat variable *pbec* for each fiscal year less expected contributions disclosed for that year (Compustat variable *pbece*), as reported in the firms' prior year financial statements. Therefore, the 2017 unexpected contribution amount in the graph is the total 2017 contribution less the expectation as reported by the firms in their 2016 financial statements.

FIGURE 3

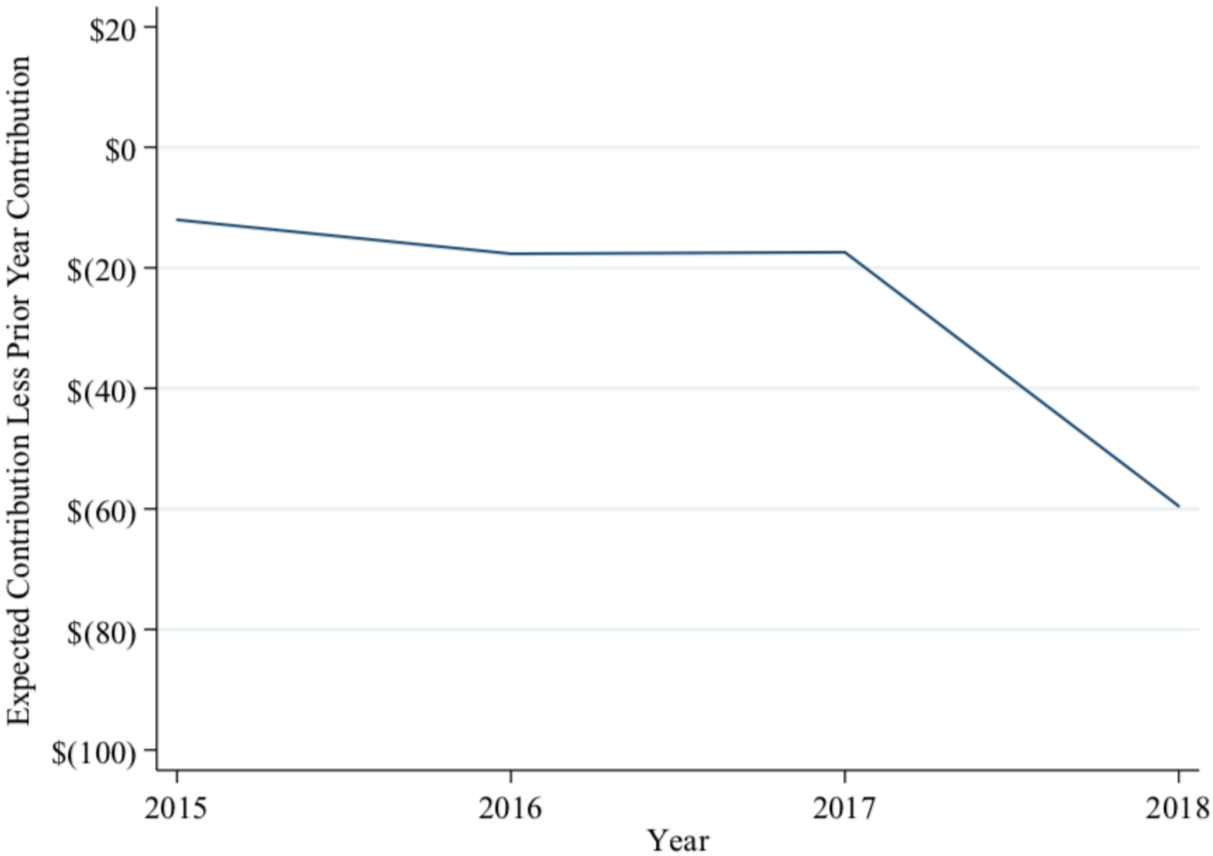
Average Unexpected Contributions by Taxpaying Status and DTA Levels (in millions)



This graph depicts the trends in the average unexpected pension contributions by year for our full sample for taxpaying firms and non-taxpaying firms with pre-pension deferred tax asset (DTA) balances above the yearly-median (high DTAs) and firms with DTA balances below the yearly-median (low DTAs). Pre-pension DTA balance is calculated using the year-end DTA balance and backing out the pension contribution effect. For years 2014-2016 the calculation is $[(txndba_t + (pbec_t * 0.35)) / at_{t-1}]$. For 2017, we also take into account the write-down of the DTAs by calculating the pre-pension and pre-TCJA DTA as $[((txndba_t / 0.21) * 0.35 + (pbec_t * 0.35)) / at_{t-1}]$. Unexpected contributions are measured using Compustat variable *pbec* for each fiscal year less expected contributions disclosed for that year (Compustat variable *pbece*), as reported in the firms' prior year financial statements. Therefore, the 2017 unexpected contribution amount in the graph is the total 2017 contribution less the expectation as reported by the firms in their 2016 financial statements.

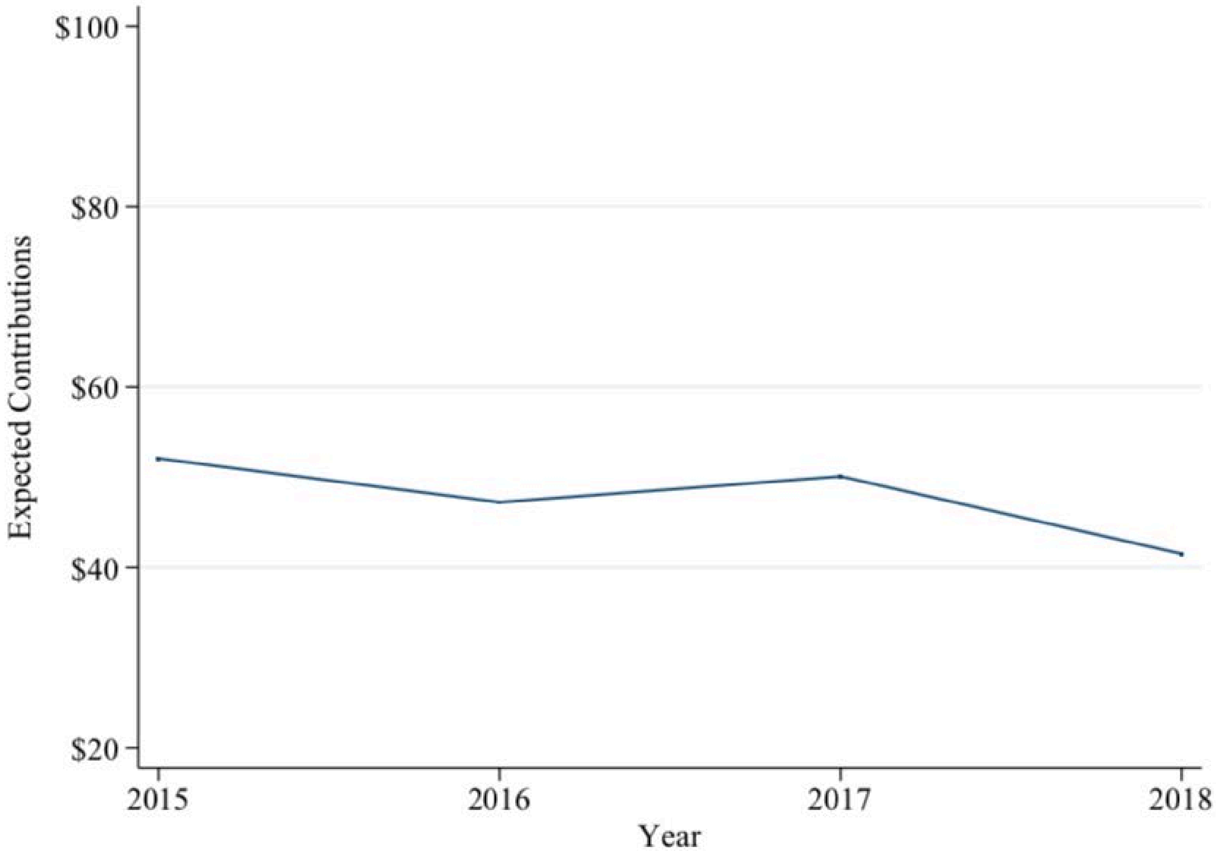
FIGURE 4

Average Expected Contribution less Prior Year Contribution (in millions)



This graph depicts the trends in the average expected pension contribution less the prior year pension contribution as reported in the firms' financial statements. (Compustat: $pbece_t - pbec_t$). Therefore, the 2018 amount in the graph is the 2018 expected contribution less the 2017 actual contribution, both as disclosed in the 2017 financial statements.

FIGURE 5
Average Expected Contributions (in millions)



This graph depicts the trends in the average expected pension contributions by year for our full sample, including the expectation for calendar year 2018. Expected contributions (Compustat variable *pbece*) are as reported in the firms' prior year financial statements. Therefore, the 2018 expected contribution amount in the graph is the expectation as reported by the firms in their 2017 financial statements.

TABLE 1
Descriptive Statistics

	N	Mean	SD	p25	p50	p75
TotContrib (unscaled)	1,545	74.948	250.439	3.092	12.000	43.800
TotExpContrib(unscaled)	1,545	47.601	140.790	1.800	8.543	33.000
TotUnexpContrib (unscaled)	1,545	23.565	164.928	-0.386	0.166	5.150
UnexpContrib	1,545	0.001	0.004	0.000	0.000	0.001
DiffContrib	1,545	-0.001	0.005	-0.002	0.000	0.000
TCJA	1,545	0.264	0.441	0	0	1
FundStatus	1,545	0.753	0.168	0.671	0.762	0.854
Size ($ millions)	1,545	14,581	27,661	1,821	4,408	13,424
Lev	1,545	0.346	0.178	0.233	0.326	0.429
PPE	1,545	0.392	0.278	0.142	0.314	0.666
SalesGrowth	1,545	0.009	0.112	-0.029	0.009	0.050
ROA	1,545	0.058	0.071	0.030	0.053	0.094

This table presents descriptive statistics including mean, standard deviation, 25^{th} percentile, median, and 75^{th} percentile. The sample in this table includes U.S. calendar-year, non-financial firms with sufficient data to calculate the presented variables as defined in appendix A. *TotContrib*, *TotExpContrib*, and *TotUnexpContrib* are Compustat variables $pbec_t$, $pbece_t$, and $pbec_t$-$pbece_{t-1}$, respectively. Size is presented unscaled to support our calculations of economic significance and impact as described in the body of the paper.

TABLE 2
Correlations

	TotContrib (unscaled)	*TotExpContrib (unscaled)*	*Unexp Contrib*	*Diff Contrib*	*TCJA*	*Fund Status*	*Size*	*Lev*	*PPE*	*Sales Growth*
TotContrib (unscaled)	1									
TotExpContrib(unscaled)	0.6519*	1								
UnexpContrib	0.3990*	0.0912*	1							
DiffContrib	-0.3828*	-0.0058	-0.7525*	1						
TCJA	0.0625*	-0.0259	0.1295*	-0.0778*	1					
FundStatus	0.0445	0.0498	-0.0131	-0.0196	0.0780*	1				
Size	0.4279*	0.4643*	0.0851*	-0.0576*	0.0121	0.1670*	1			
Lev	0.0077	0.0111	-0.0308	0.0229	0.0622*	-0.0197	0.0971*	1		
PPE	-0.0702*	-0.0617*	-0.0613*	0.0630*	0.0143	0.0937*	0.1684*	0.0991*	1	
SalesGrowth	-0.018	-0.0319	0.0272	0.0162	0.1989*	-0.0358	-0.1160*	0.1352*	0.0078	1
ROA	0.0421	0.0197	0.1062*	-0.0859*	0.0151	0.0445	-0.0159	-0.0156	-0.1922*	0.1985*

This table presents Pearson correlations among all variables in the primary analysis. The sample in this table includes U.S. calendar-year, non-financial firms with sufficient data to calculate the presented variables as defined in appendix A. * $p<0.05$ (two-tailed) for tests of statistical significance.

TABLE 3

H1: Pension Contributions with the Enactment of the TCJA

VARIABLES	(1) *UnexpContrib*	(2) *UnexpContrib*	(3) *UnexpContrib*
TCJA	0.0012***	0.0012***	0.0015***
	(4.223)	(4.167)	(4.037)
FundStatus	-0.0010*	-0.0013**	-0.0108***
	(-1.785)	(-2.317)	(-2.866)
Size	0.0003***	0.0003***	-0.0007
	(3.062)	(3.636)	(-0.800)
Lev	-0.0009	-0.0010*	-0.0008
	(-1.633)	(-1.796)	(-0.643)
PPE	-0.0008*	-0.0002	0.0017
	(-1.899)	(-0.334)	(0.684)
SalesGrowth	-0.0001	0.0004	0.0001
	(-0.064)	(0.386)	(0.056)
ROA	0.0053***	0.0049***	-0.0016
	(3.966)	(3.411)	(-0.598)
Constant	-0.0005	-0.0009	0.0141*
	(-0.699)	(-1.175)	(1.822)
Observations	1,545	1,545	1,545
R-squared	0.042	0.052	0.418
Industry FE	No	Yes	No
Firm FE	No	No	Yes
Clustered SE by Firm	Yes	Yes	Yes

This table presents estimates of equation (1). See appendix A for variable definitions. Columns (1) includes no fixed effects; Column (2) includes Fama-French 12 industry fixed effects, and Column (3) includes firm-level fixed effects. Coefficients are reported with *t*-statistics in parenthesis. ***, **, and * denote significance at a 1, 5, and 10 percent level for two-tailed tests.

TABLE 4

H2: Pensions Contributions by Taxpaying Status

	Taxpayer	Non-Taxpayer	Taxpayer	Non-Taxpayer	Taxpayer	Non-Taxpayer
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*
TCJA	0.0014***	0.0001	0.0013***	0.0002	0.0017***	0.0002
	(4.296)	(0.347)	(4.278)	(0.743)	(3.834)	(0.356)
FundStatus	-0.0008	-0.0011	-0.0011*	-0.0018*	-0.0124***	-0.0013
	(-1.305)	(-1.432)	(-1.842)	(-1.749)	(-2.651)	(-0.333)
Size	0.0003***	-0.0000	0.0004***	-0.0000	-0.0009	-0.0007
	(3.106)	(-0.027)	(3.699)	(-0.379)	(-1.077)	(-0.357)
Lev	-0.0011*	-0.0004	-0.0012*	-0.0007	-0.0007	0.0025
	(-1.696)	(-0.661)	(-1.829)	(-0.835)	(-0.484)	(0.404)
PPE	-0.0006	-0.0007	0.0002	-0.0015	0.0018	-0.0022
	(-1.248)	(-0.817)	(0.261)	(-1.284)	(0.594)	(-0.920)
SalesGrowth	-0.0005	0.0025**	-0.0001	0.0027*	-0.0001	0.0013
	(-0.451)	(2.103)	(-0.072)	(1.914)	(-0.069)	(0.767)
ROA	0.0051***	0.0035*	0.0045***	0.0045**	-0.0017	-0.0001
	(3.145)	(1.864)	(2.617)	(2.155)	(-0.483)	(-0.035)
Constant	-0.0009	0.0017*	-0.0014	0.0030**	0.0177**	0.0076
	(-1.118)	(1.891)	(-1.600)	(2.099)	(2.080)	(0.561)
Difference in Coefficients	*Chi2 =*	*9.28*	*Chi2 =*	*8.42*	*Chi2 =*	*10.97*
	P-Value =	*0.0023*	*P-Value =*	*0.0037*	*P-Value =*	*0.0009*
Observations	1,353	192	1,353	192	1,353	192
R-squared	0.043	0.044	0.054	0.156	0.444	0.911
Industry FE	No	No	Yes	Yes	No	No
Firm FE	No	No	No	No	Yes	Yes
Clustered SE by Firm	Yes	Yes	Yes	Yes	Yes	Yes

This table presents estimates of equation (1) for taxpaying and non-taxpaying firms, as defined in appendix A. See appendix A for all variable definitions. Columns (1) & (2) include no fixed effects; Columns (3) & (4) include Fama-French 12 industry fixed effects, and Columns (5) & (6) include firm-level fixed effects. Chi2 tests of differences in the TCJA coefficient across Taxpayers and Non-Taxpayers are computed using seemingly unrelated regression (suest Stata command with two-tailed p-values). Coefficients are reported with *t*-statistics in parenthesis. ***, **, and * denote significance at a 1, 5, and 10 percent level for two-tailed tests.

TABLE 5

H3: Pensions Contributions by Taxpaying Status and DTA Balances

	Taxpayer High DTA	Taxpayer Low DTA	Non-Taxpayer High DTA	Non-Taxpayer Low DTA
	(1)	(2)	(3)	(4)
VARIABLES	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*
TCJA	0.0023***	0.0005**	0.0002	0.0004
	(3.854)	(2.285)	(0.287)	(1.312)
FundStatus	-0.0024*	-0.0004	-0.0026*	-0.0019
	(-1.879)	(-0.827)	(-1.726)	(-1.160)
Size	0.0006***	0.0001	-0.0001	0.0001
	(4.005)	(1.036)	(-0.304)	(0.786)
Lev	-0.0015	-0.0015**	-0.0019	-0.0008
	(-1.470)	(-1.985)	(-1.221)	(-1.141)
PPE	-0.0003	0.0004	-0.0003	-0.0002
	(-0.236)	(0.493)	(-0.219)	(-0.245)
SalesGrowth	0.0007	-0.0005	0.0074	0.0018
	(0.374)	(-0.753)	(1.531)	(1.132)
ROA	0.0031	0.0058**	0.0095*	0.0034
	(1.203)	(2.595)	(1.740)	(1.487)
Constant	-0.0022	-0.0000	0.0035*	0.0013
	(-1.514)	(-0.050)	(1.770)	(0.896)
Difference in Coefficients	*Chi2 =*	*7.66*		
	P-Value =	*0.0056*		
Observations	683	670	89	103
R-squared	0.085	0.047	0.317	0.182
Industry FE	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No
Clustered SE by Firm	Yes	Yes	Yes	Yes

This table presents estimates of equation (1) for taxpaying and non-taxpaying (as defined in appendix A) firms bifurcated by whether the firm-year has a pre-pension deferred tax asset (DTA) balance that is above or below the yearly-median value. Pre-pension DTA balance is calculated using the year-end DTA balance and backing out the pension contribution effect. For years 2014-2016 the calculation is $[(txndba_t + (pbec_t * 0.35)) / at_{t-1}]$. For 2017, we also take into account the write-down of the DTAs by calculating the pre-pension and pre-TCJA DTA as $[((txndba_t / 0.21) * 0.35 + (pbec_t * 0.35)) / at_{t-1}]$. See appendix A for variable definitions. Chi2 test of differences in the *TCJA* coefficient across the columns (1) and (2) are computed using seemingly unrelated regression (suest Stata command with two-tailed p-values). Coefficients are reported with *t*-statistics in parenthesis. ***, **, and * denote significance at a 1, 5, and 10 percent level for two-tailed tests.

TABLE 6
Financial Reporting Incentives: Analyst Following

				High DTA Only	
	Full Sample	High DTA	Low DTA	Above Median Analyst Following	Below Median Analyst Following
	(1)	(2)	(3)	(4)	(5)
VARIABLES	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*
TCJA	0.0003	0.0002	0.0003	**0.0034*** **	**0.0008**
	(0.661)	(0.350)	(0.792)	**(3.814)**	**(1.246)**
Analysts	-0.0000*	-0.0001	-0.0000		
	(-1.673)	(-1.171)	(-0.893)		
*TCJA*Analysts*	**0.0002** **	**0.0003*** **	**0.0000**		
	(2.524)	**(2.700)**	**(0.851)**		
Difference in Coefficients		*Chi2 =*	4.94	*Chi2 =*	6.47
		P-Value =	0.0263	*P-Value =*	0.0110
Observations	1545	772	773	387	385
R-squared	0.060	0.095	0.050	0.147	0.031
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No
Clustered SE by Firm	Yes	Yes	Yes	Yes	Yes

This table presents estimates of equation (1) for both taxpaying and non-taxpaying firms, as defined in appendix A. See appendix A for all variable definitions. Columns (2)-(3) are split based on annual DTA and Columns (4)-(5) bifurcate the High DTA subsample by the median number of analysts following the firm. Median analyst following is calculated by year. All columns include industry fixed effects and standard errors clustered by firm. Coefficients are reported with *t*-statistics in parenthesis. ***, **, and * denote significance at a 1, 5, and 10 percent level for two-tailed tests.

TABLE 7

Pension Contributions by Plan Funded Status

	Above Median *FundStatus*	Below Median *FundStatus*	Above Median *FundStatus*	Below Median *FundStatus*	Above Median *FundStatus*	Below Median *FundStatus*
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*	*UnexpContrib*
TCJA	0.0013***	0.0011**	0.0013***	0.0010**	0.0013***	0.0014**
	(3.609)	(2.469)	(3.561)	(2.381)	(2.710)	(2.481)
Difference in Coefficients	*Chi2 =*	0.16	*Chi2 =*	*0.22*	*Chi2 =*	*0.03*
	P-Value =	0.6881	*P-Value =*	*0.6369*	*P-Value =*	*0.8672*
Observations	780	765	780	765	780	765
R-squared	0.051	0.049	0.067	0.069	0.474	0.545
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes	No	No
Firm FE	No	No	No	No	Yes	Yes
Clustered SE by Firm	Yes	Yes	Yes	Yes	Yes	Yes

This table presents estimates of equation (1) excluding *FundStatus* for firms with values of *FundStatus* above and below the yearly-median. The dependent variable is *UnexpContrib* and the primary variable of interest is *TCJA*. See appendix A for all variable definitions. Columns (1) & (2) include no fixed effects; Columns (3) & (4) include Fama-French 12 industry fixed effects, and Columns (5) & (6) include firm-level fixed effects. Chi2 tests of differences in the TCJA coefficient across taxpayers and non-taxpayers are computed using seemingly unrelated regression (*suest* Stata command with two-tailed p-values). Coefficients are reported with *t*-statistics in parenthesis. ***, **, and * denote significance at a 1, 5, and 10 percent level for two-tailed tests.

TABLE 8

Acceleration versus Permanent Increase

	Full Sample	Taxpayer	Non-Taxpayer	Taxpayer High DTA	Taxpayer Low DTA	Non-Taxpayer High DTA	Non-Taxpayer Low DTA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	*DiffContrib*	*DiffContrib*	*DiffContrib*	*DiffContrib*	*DiffContrib*	*DiffContrib*	*DiffContrib*
TCJA	-0.0009***	-0.0011***	0.0003	-0.0018***	-0.0005	0.0001	0.0003
	(-2.705)	(-2.939)	(0.777)	(-2.625)	(-1.643)	(0.307)	(0.529)
Difference in Coefficients		*Chi2 =*	7.67	*Chi2 =*	2.87		
		P-Value =	0.0056	*P-Value =*	0.0902		
Observations	1,545	1,353	192	683	670	89	103
R-squared	0.032	0.031	0.189	0.045	0.037	0.391	0.106
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No	No	No
Clustered SE by Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table presents estimates of a model where the dependent variable is equal to the difference between the disclosed expected contribution for time *t+1* and the contribution in the current period scaled by lagged assets (*DiffContrib*). The primary variable of interest is *TCJA*. See appendix A for all variable definitions. Chi2 tests of differences in the TCJA coefficient are computed using seemingly unrelated regression (*suest* Stata command with two-tailed p-values). Coefficients are reported with *t*-statistics in parenthesis. ***, **, and * denote significance at a 1, 5, and 10 percent level for two-tailed tests.

TABLE 9

Financing of Pension Contributions in 2017

VARIABLES	(1) *UnexpContrib*	(2) *UnexpContrib*	(3) *UnexpContrib*
TCJA	0.0006*	0.0012***	0.0007**
	(1.893)	(3.695)	(2.267)
AdjFCF	0.0022		
	(0.640)		
*AdjFCF*TCJA*	0.0127**		
	(2.182)		
NetDebtFin		-0.0002	
		(-0.189)	
*NetDebtFin *TCJA*		-0.0006	
		(-0.151)	
NetEqFin			0.0008
			(0.383)
*NetEqFin *TCJA*			-0.0150*
			(-1.713)
Observations	1,545	1,545	1,545
R-squared	0.063	0.052	0.050
Controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Firm FE	No	No	No
Clustered SE by Firm	Yes	Yes	Yes

This table presents results from unexpected pension contribution financing tests. *AdjFCF* is computed as $(oancf_t - capx_t + pbec_t) / at_{t-1}$. *NetDebtFin* is defined as in Faurel, Soliman, Watkins, and Yohn 2018 as net debt financing, measured as the cash proceeds from the issuance of long-term debt less cash payments for long-term debt reductions plus the net changes in current debt, scaled by beginning-of-year total assets $(dltis_t - dltr_t + dlcch_t) / at_{t-1}$, winsorized at the 1st and 99th percentile by year. *NetEqFin* is defined as in Faurel et al. (2018) as cash proceeds from the sale of common and preferred stock less cash payments for the purchase of common and preferred stock less cash payments for dividends, scaled by beginning-of-year total assets $(sstk_t - prstkc_t - dv_t) / at_{t-1}$, winsorized at the 1st and 99th percentile by year. Coefficients are reported with *t*-statistics in parenthesis. ***, **, and * denote significance at a 1, 5, and 10 percent level for two-tailed tests.