The real effects of accounting standards: Evidence from pension expense smoothing

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Abstract

Pension experts have long conjectured that pension accounting rules encourage firms to invest pension assets in risky asset classes (Zion and Carcache 2003, Gold 2005). The recent passage of IAS 19 *Employee Benefits (Revised)* ("IAS 19R") marks a fundamental shift in pension accounting on the income statement, by removing the use of the expected rate of return (ERR) on plan assets to determine a "smoothed" pension expense. We exploit the quasi-experimental setting created by this shift in a difference-in-differences research design. We demonstrate that a sample of Canadian firms affected by IAS 19R reduces risk-taking in pension investments post-IAS 19R, both over time, and compared to a control sample of U.S. firms unaffected by IAS 19R. We also find within Canadian firms that firms expected to be relatively more impacted – namely those with more economically substantial pension plans – engage in more risk-reduction post-IAS 19R. Accounting regimes relying on expected returns to calculate pension expense allow sponsors to recognize in income the benefits of higher risk (via a higher ERR, which reduces pension expense) while not recognizing the costs (of higher volatility in actual returns). Overall, we provide evidence that such accounting regimes could tilt plan sponsors towards more risk-taking in pension investment. It also suggests that an ERR-based expense smoothing regime – the norm under current U.S. GAAP – could be a driver of pension asset allocation.

Keywords: Pension accounting, pension smoothing, pension asset allocation, IAS 19

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I. INTRODUCTION

Accounting standards govern the measurement, recognition, and presentation of accrual accounting assets, liabilities, and income, and do not have direct effects on cash flows. However, accounting standards can alter firms' incentives to engage in transactions or alter the parameters of those transactions, thereby indirectly affecting underlying cash flows. One area of accounting with enormous potential for such 'real' effects is the accounting for defined-benefit pension plans, especially given how economically substantial these plans are on corporate financial statements, and how important they are as a source of retirement income for beneficiaries.[1] Defined-benefit (DB) pensions promise a certain, "defined" benefit to employees when they retire, and the company sponsoring the plan (the "plan sponsor") becomes responsible for ensuring that sufficient assets are set aside in a trust to pay those benefits as they fall due. In this study, we examine the real effects of one of the most controversial aspects of pension accounting – the smoothing of pension expense on the income statement.

While pension assets and liabilities are now marked-to-market on corporate balance sheets (since SFAS 158 under US GAAP and IAS 19 under IFRS), pension expense on the income statement still does not reflect the entire change in these assets and liabilities over the course of the year, but is instead smoothed. This means that the

[1] Defined benefit pension plans in the U.S. are economically important. While 26% of U.S. firms on Compustat have defined benefit plans in fiscal year 2013, the aggregate market capitalization for these firms comprise 62% of the aggregate market capitalization of all firms on Compustat with nonzero sales and total assets. In 2013, the aggregate dollar amount of defined benefit pension obligations (pension assets) is $2.3 trillion ($2.1 trillion). The pension obligations (pension assets) represent on average 13.8% (11.7%) of the total assets of sponsoring companies. Furthermore, for the 300 firms with the largest pension liabilities, the pension obligations (pension assets) represent on average 27.6% (23.9%) of the total assets of sponsoring companies. From an employee perspective, forty million private sector employees and retirees rely on one of the 26,000 defined-benefit plans sponsored by the Pension Benefit Guaranty Corporation (PBGC) for retirement income.

expense is shielded from two key sources of change in pension assets and liabilities: first, changes in pension liabilities arising from differences between actual and expected discount rates, salary growth rates, mortality rates, etc., are not reflected in current pension expense but passed through other comprehensive income. Second, pension expense is offset not by actual returns but by *expected* returns on pension assets, estimated as the expected rate of return (ERR) on pension assets multiplied by the fair value of those assets. [2]

The use of expected rather than actual returns has some key consequences. On one hand, it allows plan sponsors to recognize in net income the benefits of investing in equities versus bonds (or any higher-risk versus lower-risk asset class), as the ERR is higher by the equity risk premium, reducing pension expense and thus boosting net income. On the other hand, however, the use of expected returns shields net income from the costs of investing in those equities, as the higher expected volatility in actual returns is not reflected in pension expense. Therefore, pension accounting on the income statement reflects the benefits of equity-investing (or risk-taking, more generally) while not fully reflecting its costs. This asymmetry in the accounting regime could incentivize plan sponsors to engage in more risk-taking than they otherwise would, in the absence of such a smoothing mechanism. Investigating whether the ERR-based expense smoothing regime leads plan sponsors to increase portfolio investments in risky assets is the objective of this study.

[2] Management is charged with developing the ERR assumption every year, based on long-term expectations of capital market performance and the firm's targeted asset classes. Prior studies suggest that firms increase asset allocations to equity securities to justify higher ERR assumptions (Bergstresser, Desai, and Rauh 2006 and Chuk 2013.)

This prediction, while intuitive, is remarkably difficult to test empirically, as ERR-based smoothing applies across U.S. GAAP, U.K. GAAP, and IFRS, leaving no readily identifiable control sample of firms unaffected by such a regime. Furthermore, for affected firms alone, describing the asset allocations that sponsors would have chosen in the absence of any accounting-induced incentives is conceptually difficult. As a result, testing any real effects of ERR-based expense smoothing would involve a mandated shift away from such a regime; observing the consequences of such a shift for pension investment strategies could allow us to infer whether expense smoothing induces specific investment behaviors. The passage of *IAS 19R*, a revision of *IAS 19 Employee Benefits*, effective for fiscal years starting from Jan 1, 2013, provides a natural quasi-experiment that can be used to answer this question.

IAS 19R, amongst other provisions, mandates a fundamental change in the way in which pension expense is determined. First, it eliminates the ERR as a separate assumption determined by managerial judgment; managers no longer need to determine a long-term ERR assumption. Second, it effectively replaces the ERR with the discount rate assumption, which has historically been determined as the yield on a portfolio of high-quality corporate bonds whose coupons and maturities match the expected benefit payments of the plan. Whereas pension expense was previously offset by the *ERR*fair value of plan assets*, it is now offset by the *discount rate*fair value of plan assets* after IAS 19R. Hence, by eliminating the ERR, IAS 19R no longer allows income statement recognition of the benefits of investing in risky assets that have high expected returns without recognition of the costs. If such asymmetric recognition of costs and benefits previously encouraged plan sponsors to invest more in risky assets, this leads us to the

prediction that the IAS 19R shift away from ERR-based smoothing will result in plan sponsors reducing allocations to risky assets.

IAS19R removes the asymmetric treatment of the costs and benefits of investing in risky assets, by replacing the ERR with the discount rate, which is unrelated to the investment profile of the plan – thereby removing both costs and benefits of risk-taking from net income. An alternative way to remove the asymmetry would be to replace the expected return with actual returns, which would then expose net income to both costs and benefits of investing in higher-risk assets. It is important to note that IAS 19R does not replace expected return with actual return. However, our prediction that an ERR-based regime leads to higher risk-taking hinges crucially on its *asymmetry* in recognizing the costs and benefits of higher-risk assets; as IAS 19R removes this asymmetry, we expect risk-taking to be lower after the change.[3]

To examine the research question, we adopt a difference-in-differences research design where we compare shifts in asset allocation between the pre- and post-IAS 19R periods for Canadian firms, to a matched control sample of U.S. firms. Canada adopted IFRS as the dominant accounting standard starting in 2011, resulting in Canadian firms being affected by IAS 19R, whereas U.S. firms in comparison are unaffected. We choose Canada as our setting for several reasons. First, Canada's institutions are very similar to the U.S. in terms of reporting environment and enforcement mechanisms, allowing for easier comparisons to and generalization to the U.S. (Burnett, Gordon, Jorgensen, and

[3] One potential concern with the shift offered by IAS 19R is that it simply replaces ERR-based smoothing with discount rate-based smoothing. The ERR is a long-term expectation, which typically does not change very frequently, thus leading to the smoothing effect. The discount rate, on the other hand, is a point-in-time rate determined using the yields of high-quality corporate bonds as of the fiscal year-end date. It is therefore not smooth by definition and does fluctuate considerably from year to year, due to changes in prevailing bond yields as well as changes in the duration of each pension plan.

Linthicum 2013). Second, Canada offers an important advantage over another potential setting: the United Kingdom. U.K. plans have been in a steady trend of de-risking asset allocations over the 2004-2014 period (Prudential Insurance 2012, Mercer 2014), making it difficult to disentangle IAS 19R effects from longer, more secular trends over time.[4] In contrast, Canadian plans have been slow to engage in de-risking practices (Financier Worldwide 2013, Law Times 2013, European Pensions Magazine 2015).[5] Finally, European plans differ significantly from North American plans in terms of funding and investment regulation, again making comparisons difficult.

We run tests on 105 Canadian pension sponsors for the last fiscal year pre-IAS 19R and the first fiscal year post-IAS 19R, matched to US sponsors using propensity-score matching. We first examine the response to IAS 19R within Canadian firms alone. After controlling comprehensively for determinants of asset allocation, we find that Canadian plan sponsors reduce equity allocations significantly following IAS 19R. Cross-sectionally, we expect some Canadian firms to be particularly impacted by the change – firms with economically substantial pensions, and firms with relatively high

[4] A comparative study of U.K. and U.S. pension plans by Prudential Insurance (2012) concludes that in 2006-2011, the U.S. lagged significantly behind the U.K. in pension de-risking activity. In this period, they report that U.K. plans engaged in four times as many pension risk transfer actions (lump-sum transfers, buy-outs, buy-ins, etc.) as U.S. plans. The study points out two main factors driving the increased de-risking activity in the U.K. First, U.K. plans were subject to tightened funding requirements in 2004, which allowed only three to five years to fill funding gaps. While U.S. plans were subject to similar requirements via the Pension Protection Act (2006), funding relief enacted twice after the financial crisis has delayed full implementation of the Act to 2015. Second and perhaps more important, U.K. plans have a heightened awareness of longevity risk – i.e., the fact that pension liabilities will increase as life expectancies rise - compared to U.S. plans. This is because U.K. plans are required to incorporate up-to-date longevity assumptions while projecting pension liabilities, whereas many U.S. plans are still projecting liabilities based on obsolete longevity assumptions developed using data from the 1980s-1990s. However, pension de-risking activities are slowly becoming more common in the U.S.

[5] For example, the Law Times (2013) commented that "Many of the more innovative measures to remove or reduce the risks associated with employer pension plans have been relative slow to take off in Canada". Potential reasons for this include (i) the U.K. and U.S. have larger and more sophisticated insurance and banking markets, which have given rise to more readily available and diverse financial products with which to manage pension risk; (ii) specific permissions are required in each case from Canadian pensions regulators to implement risk-transfer strategies such as lump-sum transfers, buy-outs or buy-ins.

ERRs in the old regime. In cross-sectional tests, we find that the decrease in equity allocations post-IAS 19R is significantly more pronounced for Canadian firms with economically substantial pensions. This evidence examining Canadian firms alone suggests that these firms respond in a manner consistent with IAS 19R reducing the incentive induced by accounting rules to invest in higher-risk assets.

We then test the IAS 19R effects more rigorously with a difference-in-difference (DD) specification, where we examine how equity allocations of Canadian firms shift post-IAS 19R, *relative to* equity allocations of unaffected U.S. firms over the same period. This model documents that Canadian firms affected by IAS 19R, on average, reduce allocations to equity significantly more than U.S. firms that are similar to them along observable criteria but differ primarily in that they are unaffected by IAS 19R.

Overall, these results provide evidence that Canadian firms respond to IAS 19R in a manner consistent with it reducing their incentive to invest in equities. This in turn suggests that ERR-based expense smoothing induced real effects on investment behavior, by encouraging plan sponsors to engage in more risk-taking than they might otherwise have. We stress here that our tests only predict and find evidence consistent with IAS 19R bringing about a *decrease* in risky asset allocation. Whether this decreased risk moves asset allocations towards (or away from) an optimal level of risk-taking, while an interesting and important question, is beyond the scope of our tests.

Our study makes several contributions. First, we provide some of the first empirical evidence on the economic consequences of the ERR-based expense smoothing regime in pension accounting. Though smoothing mechanisms are one of the most controversial aspects of pension accounting, smoothing still prevails on the income

statement under U.S. GAAP, and it does offer some advantages in terms of reporting quality. For instance, Hann, Heflin, and Subramanyam (2006) compare the smoothing regime of extant U.S. GAAP (pre-SFAS 158 under U.S. GAAP, when both the balance sheet and the income statement were subject to smoothing) to a hypothetical, researcher-constructed full fair-value model, where both income statement and balance sheet mark-to-market all changes in pension assets and liabilities. They document that when compared to the fair-value model, the smoothing model provides numbers that have higher value relevance and credit relevance. However, smoothing could also induce unintended economic consequences on managerial behavior. We document one such important consequence of using the ERR – on asset allocation.[6]

Understanding the economic consequences of the current pension accounting regime is important for at least two reasons. First, even though DB plans are increasingly being replaced by defined-contribution plans, DB plans are still a tremendously important economic force, making their accounting a key topic of interest for financial statement issuers, users, and standard-setters. Second, the pros and cons of pension expense smoothing have long been debated in the U.S., which still relies on an ERR-based model for pension expense. [7] The promulgation of IAS 19R now makes pension accounting on the income statement a major area of divergence between U.S. GAAP and IFRS, even

[6] Our work also complements research in the public (governmental) plan arena, that documents another unintended consequence of using the ERR but in a different context – as the discount rate for valuing plan liabilities, per the Governmental Accounting Standards Board's rules. Andonov, Bauers, and Cremer (2013) find that U.S. public plans, which alone have this accounting feature, invest in risky assets to a significantly greater extent compared to a control sample comprised of U.S. corporate plans as well as public and corporate plans across Canada and Europe. They attribute this finding to the fact that U.S. public plans have an added incentive to invest in risky assets because by so doing, they can assume a higher ERR, and so discount the plan's projected benefit outflows at a higher rate, which then lowers the estimate of the plan liability and improves reported funding status.

[7] Published minutes of FASB deliberations describe the use of expected rather than actual returns as one of the "compromises" made in pension accounting to reduce earnings volatility (http://www.fasb.org/resources/ccurl/898/695/11-10-05_pensions.pdf).

though the FASB and IASB identified postretirement benefits accounting as a focus area for convergence in 2004. As Canada has a regime that is in many ways similar to the U.S. in terms of institutions, the economic consequences of moving away from ERR-based smoothing in Canada could inform the debate on pension expense smoothing under U.S. GAAP.

Second, by demonstrating that the accounting regime can be a driver of pension investment decisions, we contribute to the multi-disciplinary literature on the determinants of pension asset allocation. Over the years, many theories of pension investment have been proposed: the put option theory that Pension Benefit Guaranty Corporation (PBGC) insurance encourages plan sponsors to engage in excessive risk-taking as they approach distress (Sharpe 1976), the tax arbitrage theory which predicts that the tax-sheltered nature of pensions should induce tax-paying firms to invest pension assets in bonds (Black 1980, Tepper 1981), and the theory that incentives to avoid contribution volatility will lead very underfunded and very overfunded plans to invest more in bonds (Bader 1991, Amir and Benartzi 1999). Many of these theories, however, have received mixed empirical support. Rauh (2009) also points out that substantial variation in asset allocation still remains unexplained, implying that there exist other factors that drive asset allocation choices. We propose and provide empirical support for another factor that contributes to higher investments in equities: the smoothing mechanisms in pension accounting rules.

Finally, we contribute to the burgeoning literature on the "real effects" of accounting standards, postulating that the way in which accountants measure and report economic transactions can impact firms' operating and financing decisions (Kanodia

2006). The empirical evidence on real effects has so far spanned a wide spectrum of accounting areas.[8] The pensions area has some prominent examples of accounting rules inducing real effects – e.g., Mittelstaedt, Nichols, and Regier (1995) find evidence consistent with the introduction of SFAS 106 - which required recognition of other post-employment benefits - reducing employers' willingness to provide these benefits in the first place. Similar effects have been purported to arise from changes in pension accounting rules that have brought pension assets and liabilities fully on to corporate balance sheets.[9]

Section II describes the accounting regime shift under IAS 19R and develops hypotheses. Section III describes the sample selection and research design. Section IV presents the empirical results. Section V presents additional findings and discussion, and Section VI concludes.

II. BACKGROUND AND HYPOTHESES

Pension accounting regimes under US GAAP and (pre-IAS 19R) IFRS

US GAAP and IFRS in the pre-IAS 19R regime are broadly consistent in pension accounting rules, with some differences in the details. Under the FASB's SFAS 158, pension accounting on the balance sheet is fully marked-to-market, i.e., plan sponsors are required to recognize the net funded status - the plan projected benefit obligations (PBO)

[8] For example, Horwitz and Kolodny (1980) find that firms reduce R&D spending after SFAS 2 required R&D to be expensed. Imhoff and Thomas (1988) find a substitution from capital leases to operating leases after SFAS 13 required capital leases to be recognized on the balance sheet. Bens and Monahan (2008) show that accounting rules requiring consolidation of variable interest entities reduce firms' willingness to sponsor these entities. Choudhary, Rajgopal, and Venkatachalam (2008) find that firms accelerate the vesting of employee stock options to avoid recognizing unvested option grants at fair value after SFAS 123R. Graham, Hanlon, and Shevlin (2011) show that the desire to reduce accounting income tax expense (as opposed to simply reduce cash taxes paid) affects firms' decisions on where to locate foreign operations and whether to repatriate foreign earnings; Chen, Tan, and Wang (2013) show that fair value measurement affects managers' decisions on hedging risk. Graham, Harvey and Rajgopal (2005) provide extensive survey evidence to the effect that managers take real actions to meet earnings goals.

[9] Kiosse and Peasnell (2011) review the academic evidence on the extent to which changes in pension accounting rules have affected pension provision.

less the fair value of plan assets - on the balance sheet, with overfunded (underfunded) plans reflected as a net asset (liability). Under both SFAS 158 and IAS 19, however, effects of marking pension plan assets and liabilities to market are not fully recognized in current net income, and the income statement does not articulate to the balance sheet. That is, all changes in PBO and fair value of plan assets over the fiscal period do not flow through the income statement. Instead, pension expense for a period is composed of the plan's service cost and interest cost offset by an *expected return* on plan assets, as opposed to the actual return earned by assets during that period. The fact that pension expense reflects an expected return on plan assets, derived from a long-term estimate of expected rate of return (ERR) multiplied by the fair value of plan assets, introduces an element of smoothing into the determination of pension expense, by shielding the income statement from year-to-year fluctuations in actual returns, which could deviate substantially from the ERR in any given period.

Under both SFAS 158 and IAS 19, differences between expected and actual returns are recognized in other comprehensive income (OCI) in each period. These amounts, which are recognized in OCI but unrecognized in net income, accumulate in a pool that also includes differences between actuals and estimates of other actuarial assumptions, which could potentially move in offsetting directions. If this pool of accumulated unrecognized gains and losses exceeds a threshold or "corridor" (currently 10% of the larger of the PBO and fair value of plan assets), U.S. GAAP requires it to be amortized into net income (or "recycled") over the remaining average expected service life of beneficiaries. As a result, the recycling and eventual recognition of *actual* return in net income happens only at a "glacial" pace (Picconi, 2006) for U.S. companies. IAS 19

takes an even more extreme position on these actuarial gains and losses, by requiring their recognition only in OCI, with no requirements to be subsequently recycled through net income - thereby shielding net income permanently from actual returns. Appendix A provides a comprehensive explanation of pension accounting under IAS 19 (pre-IAS 19R) and current U.S. GAAP.

The implications of expense smoothing for risk-taking in pension investment

The use of a long-term ERR as opposed to the actual return on plan assets is a fundamental feature of extant accounting regimes for pensions – both in current U.S. GAAP, as well as in the former IFRS regime. ERRs are intended to be estimates of the long-term earning potential of the assets in the pension trust, with "long-term" typically understood to be at least ten years (Zion and Carcache 2002). As a result, these rates do not fluctuate in the short-term, resulting in an expected return component of pension expense that is very smooth. Actual returns, on the other hand, are not smooth, and could fluctuate significantly from year to year, especially if plans are heavily invested in equities or other high-risk asset classes. The use of an expected rather than actual return, therefore, shields net income from the period-to-period volatility caused by capital market movements.

Investing in equities versus bonds (or more broadly, in higher-risk versus lower-risk assets) brings both risks and rewards. The benefit of investing in equities is that they are expected to yield higher returns over the long-term, which in turn reduces the cash that plan sponsors are required to contribute to plans, allowing sponsors to provide benefits more cheaply and efficiently. The cost of investing in equities is that returns are more volatile from period to period, and sponsors must bear the burden of that volatility,

which could move plans from being well-funded in one period to substantially underfunded in a subsequent period, necessitating unpredictable cash contributions.

The extant accounting regime for pensions that we describe above, however, does not reflect these costs and benefits symmetrically. By basing pension expense on an expected return, the accounting regime allows plan sponsors to recognize the benefits of investing in equities (or higher-risk assets), because the expected risk premium on equities gets reflected in the correspondingly higher ERR that sponsors will choose. However, the fact that actual returns are only reflected in net income much later (that too, at a very slow pace) or not at all implies that the income statement is, at least for the foreseeable future, shielded from any correspondingly greater volatility of investing in those higher-risk assets. The accounting regime, therefore, recognizes the costs and benefits of risk-taking in an asymmetric fashion – it recognizes the expected benefits of risk-taking in income, while shielding it from the costs.

If income statement considerations affect asset allocation strategies even to some extent, then we predict that this accounting regime could induce plan sponsors to engage in more risk-taking in pension investments than they would otherwise have undertaken in in the absence of a smoothing regime. This argument has long been advanced by pension experts such as Zion and Carcache (2003, 2005). Gold (2005) notes that pension assets are invested much more in equities than is predicted by modern financial theory, and posits that the accounting regime may drive this behavior, as "*corporate financial officers enjoy the benefit of the equity premium while avoiding much of the concomitant risk*". While we cannot hypothesize whether equity allocations under the extant accounting

regime were “too” high, this argument echoes ours to the extent to which it predicts that the accounting regime provides an added incentive to invest in higher-risk assets.

The accounting regime shift under IAS 19R

IAS 19 Employee Benefits (Revised) or “IAS 19R”, issued on June 16, 2011 and effective for fiscal years beginning January 1, 2013 and after, brings about a fundamental shift in the determination of pension expense, by removing the concept of smoothing through the ERR. Pension expense previously consisted of service cost and interest cost, offset by the expected return on plan assets, estimated as the *ERR*fair value of plan assets*. IAS 19R replaces this with the service cost and a net “finance cost”. This finance cost is composed of the *discount rate** (*PBO – fair value of plan assets*). As the *discount rate* PBO* is equivalent to the interest cost, pension expense effectively becomes service cost + interest cost - *discount rate*fair value of plan assets*. The *discount rate*fair value of plan assets* component replaces the *ERR*fair value of plan assets* component from the pre-IAS 19R regime. Appendix B illustrates the determination of pension expense pre- and post-IAS 19R.

IAS 19R eliminates the concept of a long-term ERR on plan assets as a separate assumption, and instead effectively requires plan sponsors to use the discount rate (DR) used in determining the PBO as the ERR. Whereas the ERR is determined by the expected riskiness of the pension assets, the discount rate does not depend on asset allocation but is intended to primarily reflect the time value of money. Per existing guidelines, the discount rate should be based on the yields of high-quality corporate

bonds (typically, rated AA or higher) of similar maturity as the cash outflows of the pension obligation. IAS 19R did not change the definition of the discount rate. [10]

Implications of the IAS 19R shift for risk-taking in pension investment

The effective substitution of the ERR for the prevailing yield on high-quality corporate bonds of similar duration as pension outflows implies two related consequences for plan sponsors. First, they can no longer build in the expected risk premium on equities (or any asset class that is higher-risk, higher-return than high-quality corporate bonds) into the ERR, and thus are unable to anticipate or recognize immediately in net income the expected rewards to risk-seeking investment strategies. Second, while the ERR was a smooth, long-term estimate that changed only infrequently, the discount rate is derived from spot rates at a particular moment in time, resulting in more volatility than previously, although this volatility is still unrelated to volatility in actual plan returns, and instead reflects macroeconomic factors that cause fluctuation in high-quality bond yields.

Therefore, whereas the erstwhile smoothing-based accounting regime recognized the expected benefits to risk-taking in income while shielding it from any correspondingly greater volatility, the new accounting regime under IAS 19R removes this particular asymmetry, by ensuring that the benefits to risk-taking are no longer reflected in net income. To the extent to which boosting net income through higher ERRs

[10] The Board's rationale for effectively replacing the ERR with the discount rate is that a net defined benefit liability (PBO – fair value of plan assets) is equivalent to a financing amount owed by the plan sponsor to the plan or its beneficiaries. The economic cost of that financing is the finance cost, calculated as above (hence the name). Similarly, a net defined-benefit asset is an amount owed by the plan to the plan sponsor, and the sponsor should account for the present value of economic benefits that it expects to receive from the plan in the form of reduced future contributions. Therefore, the net finance cost yields an expense for an underfunded plan, and income for overfunded plans. Stated differently, the interest cost (as previously defined) reflects the cost that arises from the passage of time. Therefore, it should be matched on the income statement by that part of the change in plan assets that also arises from the passage of time. IAS 19R also stipulates that all differences between actual plan returns and the *discount rate*fair value of plan assets* should be immediately recognized in OCI as a "remeasurement".

was a driver of plan sponsors' investment decisions, the income statement benefits available under the smoothing regime could have encouraged a higher level of risk-taking than what plan sponsors would otherwise have engaged in. If this is indeed the case, we should expect to see risk-taking in pension investments decrease after the implementation of IAS 19R.

Several commenters to the IAS 19R Exposure Draft make related predictions. For example, the Actuarial Profession of the UK predicts that the new regime may lead to "*different behaviors – e.g., better-matched investment strategies, as the accounting no longer has an in-built bias towards equity over bond investment*" (The Actuarial Profession of the U.K., 2010). The American Academy of Actuaries posits that the new regime "*may allow plan sponsors to base decisions about asset allocation purely on economic and risk management grounds, without adversely affecting P&L. In fact, removing the immediate benefit of risk-taking from the income statement may reduce the willingness of plan sponsors to take that risk.*" (American Academy of Actuaries, 2010).

While these commenters imply that asset allocations will become "better" after IAS 19R (e.g., go from "excessively" high to a more optimal level of risk-taking), we stress here that we do not make or test any predictions on optimality. Our objective, more simply, is to test whether the smoothing-based accounting regime tilted plan sponsors towards more risk-taking. This implies in turn that the removal of smoothing leads to a *decrease* in risk-taking, without normative judgments on how optimal either the old (pre-IAS 19R) or new (post-IAS 19R) levels of risk-taking are.

Hypotheses

From the arguments developed above, we expect IAS 19R to lead to a reduction in risk-taking in asset allocations for affected plan sponsors. This is our main prediction, embodied in Hypothesis 1:

Hypothesis 1 (H1)*: Firms affected by IAS 19R will reduce risk-taking in pension asset allocations following the adoption of IAS 19R.*

There are reasons to believe that our results might not support H1. First, our prediction hinges on the assumption that ERRs have to be closely aligned with actual asset allocation. If managers have the ability to choose ERRs that are upward-biased, i.e., to assume high ERRs without actually investing in risky assets, then the fact that the accounting regime no longer allows the use of an ERR need not lead to any re-alignments in asset allocation. Prior literature documents some mixed evidence on the extent to which ERRs are tied to asset allocations. For instance, Amir and Benartzi (1988) document with data from 1989-1994 that the ERR and asset allocation are only "weakly" correlated. However, more recent work by Bergstresser, Desai, and Rauh (2006) shows not only that managers boost ERRs opportunistically but also that they increase equity allocations to rationalize the higher ERRs, suggesting that managers are not entirely free to assume ERRs that are not supported by actual asset allocations. Similarly, Chuk (2013) shows that firms increase equity allocations to justify high ERRs after asset allocations were required to be disclosed in financial statements for the first time. This again suggests that ERRs have to be supported by actual allocations at least to some degree.

Second, our prediction also relies on the assumption that managers believe they have the ability to influence investors' perceptions by boosting net income as reported under an ERR-based accounting regime. In contrast, if managers believe that investors

can and do "unravel" ERR-based pension accounting and replace expected with actual returns (the fact that actual returns are disclosed makes this possible conceptually), then an ERR-based accounting regime might not drive managerial behavior in any particular direction, since managers would not attempt to boost earnings through the ERR in the first place. Again, prior evidence on investors' ability to "see through" pension accounting rules is quite mixed, leaving this an open issue. For example, a stream of research documents on one hand that capital markets perceived pension obligations as economic liabilities of the firm even when accounting rules did not require their recognition on-balance sheet (Dhaliwal 1986, Landsman 1986, Gopalakrishnan and Sugrue 1994). On the other hand, Picconi (2006) finds that equity analysts – widely believed to be sophisticated users of financial statements – routinely fail to understand the implications of disclosed pension numbers for future earnings. [11,]

Third, we might not observe an immediate response to IAS 19R because asset allocations take time to adjust. Plan sponsors typically do not change asset allocation policies very frequently. Especially given that IAS 19R removes from net income the benefits of higher-risk investments (as opposed to exposing net income to the costs of higher-risk investments), its immediate impact might not be stark enough to justify the transaction costs of re-allocating investments. For all these reasons, whether firms indeed reduce investments in risky pension assets after IAS 19R is an empirical question.

[11] Notwithstanding investors' perceptions, managers could view reported income as important if (reported, or unadjusted) net income is used as an input to contracting, e.g., compensation contracting decisions (Comprix and Muller 2006). Anecdotal evidence also suggests that managers view higher income as a key benefit of pension risk-taking: many corporations and industry groups responded to the IAS 19R exposure draft arguing that equity investing strategies would become less attractive if there were no income statement benefits from those strategies. For example, the Canadian Bankers Association (2010), an industry group comprised of commercial banks operating in Canada, argues that the new approach "*provides less incentive to hold an appropriate mix of higher yielding assets as net income would not benefit from the expectation of higher returns on these investments*".

While our prediction in H1 is an empirical question, we expect that we are more likely to observe effects consistent with H1 for those plan sponsors that are more affected by IAS 19R's change in the determination of pension expense. Accordingly, we expect the net income effects of switching from a managerially determined ERR assumption to a typically lower and less discretionary discount rate assumption to be greater for sponsors (i) whose ERRs were high originally, causing a greater drop to the discount rate in the post-IAS 19R period, and (ii) whose pension plans are economically substantial and hence for whom any given shift in pension expense results in relatively large net income impacts. We test both these expectations as Hypotheses 2 and 3:

Hypothesis 2 (H2)*: The reduction in risk-taking through pension asset allocations resulting from IAS 19R will be more pronounced for firms whose ERRs in the pre-IAS 19R period are relatively high.*

Hypothesis 3 (H3)*: The reduction in risk-taking through pension asset allocations resulting from IAS 19R will be more pronounced for firms with relatively large pension plans.*

III. SAMPLE, DATA, AND RESEARCH DESIGN

Selecting the sample of Canadian firms affected by IAS 19R

The Canadian Accounting Standards Board (CASB) required all publicly accountable enterprises to adopt IFRS for fiscal years beginning Jan 1, 2011 and after. As IAS 19R was effective for fiscal years beginning Jan 1, 2013 and after, for most Canadian firms this leaves us with at most two fiscal periods where they reported under IFRS but under the original IAS 19, and one fiscal period under IAS 19R.

Table 1 outlines the sample selection process. We start by identifying all Canadian firms with DB pension plans that are represented in Compustat North America for the last fiscal period pre-IAS 19R and the first fiscal period of IAS 19R implementation. We obtain annual report filings for these firms from Canada's on-line repository of public company filings, SEDAR (supplemented by company websites), giving us an initial sample of 170 firms. While the CASB mandated IFRS starting in 2011, the provincial securities regulators, who have authority over the application of accounting standards, allowed (i) Canadian companies cross-listed in the U.S. to choose either U.S. GAAP or IFRS, and (ii) other firms to petition for special permission to use U.S. GAAP without cross-listing (Burnett et al. 2013). As a result, some Canadian firms (27 in total) use U.S. GAAP for the post-IFRS period. As these firms are presumably unaffected by IAS 19R, we exclude them from the treatment sample.[12] We further remove two Canadian firms using IFRS that had voluntarily eliminated the use of the ERR prior to IAS 19R. These two firms use actual returns in the computation of pension expense. As these firms are shifting from the actual rate of return to the discount rate, the same prediction on risk-reduction does not necessarily apply.

We hand-collect from Canadian annual reports a number of pension variables such as detailed pension asset allocations, ERRs, and discount rates, for the two-year time period extending from the last fiscal period pre-adoption of IAS 19R to the first fiscal period post-adoption. We lose 14 firms due to missing data for these variables and

[12] Canadian firms opting to use U.S. GAAP are another potential control sample, offering the advantage of an entirely within-Canada research design. However, we decide not to use this sample as it is so small that testing power is low, and it is highly self-selected. Burnett et al. (2013) document that out of all Canadian firms on Compustat, 7% chose U.S. GAAP while the rest chose IFRS. However, further analysis shows that practically all the firms that voluntarily chose U.S. GAAP over IFRS in 2011 were firms cross-listed in the U.S.. As cross-listed firms differ widely from domestic-only listed firms in many fundamental and reporting characteristics, the disadvantages of this potential control group could outweigh the advantages.

another 20 due to missing data for control variables. Finally, plan sponsors have shown an increasing trend over time of disclosing investments in an opaque category simply labeled "Other", with no supporting description of what the underlying asset class is. As the risk/return profile of these assets cannot be assessed, we exclude firms that disclose more than 50% of plan assets as being invested in opaque "Other" categories (2 firms). This leaves us with 105 Canadian firms (210 firm-years) in the "treatment" sample. We convert all numbers from CAD to USD using the exchange rate at the fiscal year-end.

Selecting the matched control sample of U.S. firms

To make reliable inferences about the effects of IAS 19R and separate these effects out from other macroeconomic or over-time influences, we choose a control sample of U.S. pension sponsors that are presumably unaffected by IAS 19R. We rely on U.S. firms for the control sample due to their geographic proximity and similarity in financial reporting. We identify a control sample of U.S. listed firms with a propensity-score-matching (PSM) procedure. We run the following logit model of differences in plan and sponsor characteristics across U.S. and Canadian pension plan sponsors:

$$CANADA = \beta_0 + \beta_1 SIZE + \beta_2 LEVERAGE + \beta_3 SDCF + \beta_4 TAX + \beta_5 DIVIDENDS + \beta_6 PBO + \beta_7 FVPA + \beta_8 FUNDING + \beta_9 FUNDING^2 + \varepsilon$$

CANADA is an indicator variable set to one for Canadian firms, and to zero for U.S. firms. We include in the model a number of variables that reflect plan characteristics – the size of the pension (measured by the pension liability PBO, and the fair value of plan assets FVPA), the plan's funding ratio (FUNDING, measured as FVPA / PBO), and also include the square of the funding ratio, to accommodate the possibility of a nonlinear relation between funding ratios and asset allocation. We also include in the model a

number of plan sponsor characteristics that have been shown to affect pension funding and investing behavior – firm size (the log of market value of equity, SIZE), leverage (long-term debt divided by the sum of long-term debt and market capitalization, LEVERAGE), operating risk (measured using the five-year standard deviation of the ratio of operating cash flows to book value of equity, SDCF), effective tax rate (measured as tax expense / pre-tax income, TAX), and dividend-paying status (dividends scaled by total assets, DIVIDENDS). In the next sub-section, we discuss the motivation for including each of these variables, which are controls in our main multivariate tests.

We estimate this model using (i) all Canadian firms with sufficient data for the explanatory variables and (ii) the universe of all U.S. pension sponsors with sufficient data on Compustat for both pre- and post-IAS 19R periods. For each of these firms, we only estimate the model on the last fiscal period pre-IAS 19R, because we want to match treatment firms to control firms using pre-treatment characteristics. We then match, without replacement, each Canada firm to a U.S. firm that has the closest predicted value from the model, but within a maximum distance of 3%. With this caliper distance, we match all 105 Canadian firms to similar U.S. firms, using pre-IAS 19R data. We then bring in the post-IAS 19R observations for these matched U.S. firms to compose a time-series of observations that includes both pre- and post-IAS 19R periods for the control sample as well (210 U.S. firm-years matched to 210 Canadian firm-years, for a total sample of 410 firm-years). In our multivariate analyses of the effects of IAS 19R, we continue to include many explanatory variables from the PSM model as controls, to control for any remaining characteristic imbalance across the treatment and control groups, following Lawrence, Minutti-Meza, and Zhang (2011).

Specifications to test the consequences of IAS 19R

We test our hypotheses by first examining the Canadian sample alone. As an initial test of H1, we examine whether Canadian plan sponsors reduce equity allocations following IAS 19R (i.e., over time). We employ the following specification:

$$\%EQUITIES = \beta_0 + \beta_1 POST + \Sigma Controls + \varepsilon \quad \text{(Equation 1)}$$

As we include a number of controls for cross-sectional determinants of asset allocations, the coefficient on the POST indicator provides an estimate of the effect of IAS 19R, after controlling for other known determinants. However, this within-Canada, over-time analysis suffers from a reduced ability to cleanly separate the overall effects of IAS 19R from the effects of macroeconomic or other time trends, as it lacks a control group of unaffected firms.

We overcome this limitation in two ways. First, we analyze differences *within* the sample of Canadian firms in their response to IAS 19R, i.e., does the response to IAS 19R differ by the cross-sectional characteristics of ERRs (H2) and pension plan size (H3). Here, we identify the effects of IAS 19R more specifically by separating Canadian firms out into those expected to be relatively *less* affected versus relatively *more* affected by the specific accounting change it introduces. We employ the following specifications for these tests:

$$\%EQUITIES = \beta_0 + \beta_1 POST + \beta_2 HIGH\_ERR + \beta_3 POST*HIGH\_ERR + \Sigma Controls + \varepsilon \quad \text{(Equation 2A)}$$

$$\%EQUITIES = \beta_0 + \beta_1 POST + \beta_2 HIGH\_PBO + \beta_3 POST*HIGH\_PBO + \Sigma Controls + \varepsilon \quad \text{(Equation 2B)}$$

$$\%EQUITIES = \beta_0 + \beta_1 POST + \beta_2 HIGH\_FVPA + \beta_3 POST*HIGH\_FVPA + \Sigma Controls + \varepsilon \quad \text{(Equation 2C)}$$

HIGH_ERR is a firm-level indicator that identifies firms with an above-the-median ERR in the year immediately before IAS 19R. Similarly, HIGH_PBO (HIGH_FVPA) is a firm-level indicator that identifies firms with a higher-than-median ratio of PBO/firm total assets (FVPA/firm total assets) in the year immediately before IAS 19R.

Second, we identify the overall effect of IAS 19R more rigorously, with a difference-in-differences (DD) specification. This specification compares pre- and post-IAS 19R shifts in asset allocation of Canadian firms affected by IAS 19R, to shifts over the same points in time in asset allocations of matched U.S. control firms. We implement this test with the following specification, with CANADA being a firm-level indicator that identifies Canadian firms:

$$\%EQUITIES = \beta_0 + \beta_1 POST + \beta_2 CANADA + \beta_3 POST*CANADA + \Sigma Controls + \varepsilon$$

(Equation 3)

Our control variables are motivated from Amir, Guan, and Oswald (2010). We control for plan sponsor size (SIZE) as larger sponsors could have different or wider investment opportunities. Firms with tighter debt covenants have stronger incentives to minimize volatility in plan returns and consequently in funded status, so as to avoid breaching covenants, leading to the inclusion of leverage (LEVERAGE) as a control variable. Similarly, firms with a tradition of paying dividends have stronger incentives to minimize plan return volatility, in order to manage the volatility in cash contributions required into their plans, leading to dividend-paying status (DIVIDENDS) as a control. Firms with high inherent volatility of operating cash flows would also have an incentive to minimize volatility in plan returns (and consequently in required contributions), necessitating the inclusion of cash flow volatility (SDCF) as a control. Black (1980) and Tepper (1981) argue that tax-paying firms have an incentive to borrow on the corporate

balance sheet, fund their plans and invest plan assets in the most highly taxed securities - bonds. Companies can maximize shareholder value by deducting interest off the corporate tax return but accruing interest tax-free on the bonds held inside the pension trust. This "tax arbitrage" argument suggests that high tax-paying firms invest more in bonds, necessitating effective tax rate (TAX) as a control.

Amongst plan-level characteristics, we control for funding ratio (FUNDING) and the square thereof ($FUNDING^2$), following prior literature showing that very overfunded and very underfunded plans – in an attempt to minimize contribution volatility – are more likely to invest in bonds, while moderately funded plans increase equity investments to earn their way out of underfunding (Bader 1991, Amir and Benartzi 1999). We also control for plan horizon (HORIZON, the natural logarithm of PBO/service cost), as longer-horizon plans (with younger beneficiaries) invest more in equities, because equities offer a more effective hedge against salary increases, which plans with younger beneficiaries are more concerned about.

Finally, some differences in asset allocation arise from differing capital market performance across countries, assuming that not all plan sponsors rebalance exactly to target allocations period-by-period. These differences are important as we are making cross-country comparisons in asset allocation; hence, we incorporate a control for broad equity market returns in the domestic market (which is the S&P Broad Market Index for U.S. firms, and the Toronto Stock Exchange Composite Index for Canadian firms, DOMESTIC RETURNS). We also control for returns to the S&P Global Broad Market Index for global equities (GLOBAL RETURNS), as many plans have international equity investments. We run all models with standard errors clustered by firm.

IV. DESCRIPTIVE STATISTICS AND EMPIRICAL RESULTS

Descriptive statistics of model variables for the Canadian sample

Table 2 describes model variables, with Panel A (Panel B) describing the Canada (U.S.) sample. Canadian plans are invested in equities as the largest category on average, with the proportion of plan assets invested in equities having an interquartile range of 42-61%, with a mean (median) of 51% (54%). Mean (median) investment in fixed income securities (%FIXED INCOME) is 39% (38%). Mean (median) investment in real estate is 2% (0%) and in "other" asset categories is 9% (3%). Firms have a mean (median) ERR of 5.89% (6.00%) pre-IAS 19R. The discount rate (DISC RATE) has a mean (median) of 4.36% (4.40%). The market value of firm equity has a mean (median) of $6.7bn ($1.5bn), and size of plans in terms of fair value of plan assets is $1.2bn ($100m). The mean (median) plan is underfunded with a funding level of 84% (85%) of the PBO. Mean (median) leverage is 30% (25%), dividends are 2% (1%) of total assets, standard deviation of cash flows is 20% (9%), and effective tax rates are 23% (24%). Untabulated statistics show as expected that the median pension expense for Canadian firms increases from $3.1m (0.24% of revenues) in the pre-IAS 19R period to $4.2m (0.35% of revenues) in the post-IAS 19R period, presumably due to the lower offset to service cost and interest cost from return on plan assets.

Descriptive statistics of model variables for the U.S. sample

Panel B of Table 2 describe the U.S. sample. %EQUITY has an interquartile range of 38%-63%, with a mean (median) of 49% (54%). %FIXED INCOME has a mean (median) of 41% (38%), and real estate and other categories are broadly similar to Canada. ERRs in the U.S., interestingly, are at least 100 basis points higher than in

Canada, at 7.21% (7.5%). Discount rates, which are based on high-quality corporate bonds rates, mirror Canadian rates, at 4.38% (4.39%). As the U.S. sample is selected by matching on firm and plan fundamentals, the U.S. firms, while larger on average in terms of firm and plan size, are broadly similar to Canadian firms in plan funding status and firm fundamentals.

Univariate correlations

Table 3 displays univariate correlations between model variables, with Panel A (B) representing the Canadian (U.S.) sample. In Spearman correlations for the Canadian sample, smaller, highly leveraged firms invest in more equities. High-tax paying firms invest less in equities, consistent with theory, and equity allocations are higher when recent domestic equity markets perform well, indicating some inertia in rebalancing portfolios, consistent with Rauh (2009). Plans with greater equity allocation also tend to have higher ERRs as expected, and strong domestic equity market performance correlates positively with ERRs, again consistent with expectation because plan sponsors typically consider current and past returns when determining ERRs. Global equity market returns are negatively associated with ERRs, contrary to expectation. Larger firms have higher ERRs, consistent with their benefiting from economies of scale in investment management or better investment opportunities. Discount rates are strongly associated with contemporaneous AA bond yields, as expected. Higher equity market returns associate strongly with improved funding.

Amongst notable correlations for the U.S. sample, discount rates associate negatively with pension funding, suggesting that firms with poor funding choose higher

discount rates in an effort to improve reported funding status (e.g., Amir and Gordon 1996, Asthana 1999). Larger plan sponsors with more stable cash flows are better funded.

Examining the IAS 19R response within the Canadian sample

We first examine the 210 firm-years belonging to the Canadian sample. Table 4 presents results of Equation (1). The coefficient on POST is negative and strongly significant at the <0.01 level, consistent with Canadian firms reducing equity allocations in the wake of IAS 19R. The coefficient of -0.182 on POST implies that after IAS 19R, firms reduced their equity allocation by 18.2%, after controlling for other determinants of asset allocation. This reduction is equivalent to 18.2% / 15.6% = 1.2 standard deviations of %EQUITIES (where 15.6% is the untabulated standard deviation of %EQUITIES in the pre-period for Canada), an economically significant shift. While the univariate change in %EQUITIES for Canadian firms after IAS 19R is less than 1% (untabulated), the impact of IAS 19R is much larger (18.2%) after controlling for other determinants of asset allocation, potentially due to concurrent trends in other control variables that are predicted to lead to increases rather than decreases in %EQUITIES. For instance, untabulated univariate analyses for Canadian firms show that after IAS 19R, LEVERAGE decreases, TAX decreases, FUNDING increases, and both DOMESTIC RETURNS and GLOBAL RETURNS are positive. For reasons explained in Section III, theory would predict that these directional changes for these variables could lead to increases in %EQUITIES after IAS 19R. Therefore, these univariate trends could potentially obscure the effects of IAS 19R, further highlighting the importance of controlling for other determinants of asset allocation in the multivariate tests.

Amongst control variables, high tax-paying firms are marginally less likely to invest in equities, consistent with expectation. Domestic equity returns are not significantly associated with %EQUITIES but global equity returns are positively associated, indicating some inertia in rebalancing asset allocations to target.

The results in Table 4 show that Canadian firms reduce equity allocations post-IAS 19R, consistent with H1. However, we cannot conclusively attribute the coefficient on POST to IAS 19R alone, as opposed to macroeconomic or other factors that could have shifted contemporaneously to induce asset allocation changes. To identify more specifically the effects of IAS 19R, we present in Table 5 tests of Equation (2), comparing changes in asset allocation across Canadian firms expected to be more versus less affected by IAS 19R's accounting change. In Panel A, we tabulate results of Eq (2A), partitioning the Canadian sample by HIGH_ERR. Panel B (C) tabulates results of Eq (2B) and (2C), partitioning on HIGH_PBO and HIGH_FVPA respectively.

POST remains negative and significant across all three panels, consistent with Table 4. Meanwhile, in Panel A, HIGH_ERR is positive and significant, consistent with expectations that high ERR firms tend to have greater equity investment on average. While our coefficient of interest, HIGH_ERR*POST, is negative as expected, it is not significant at conventional levels. The coefficient on HIGH_PBO*POST (Panel B) is negative and significant at <0.05 level, and the coefficient on HIGH_FVPA*POST (Panel C) is negative and significant with a p-value of 0.053, indicating that Canadian firms tend to reduce equity allocations post-IAS 19R more when pension plans are economically significant. Hence, while we fail to find evidence consistent with H2, Table 5 shows strong evidence consistent with H3.

Any income impacts of the ERR-to-discount rate shift of IAS 19R are magnified for firms with large pension plans, for which any drop in the rate of return used to offset pension expense translates into a larger total reduction in pension expense. Hence, these results show that the reduction in equity allocation is predictably stronger for firms expected to experience a stronger impact from IAS 19R. Next, we turn to differences-in-differences tests comparing Canadian firms to a control sample unaffected by IAS 19R, to more rigorously identify the effect of the accounting change.

Difference-in-differences tests of the effect of IAS 19R

Table 6 presents results of the DD specification with Canadian and U.S. firms, pre- and post-IAS 19R. Panel A presents estimations of Equation (3). As shown, the coefficient on POST is insignificant, and the dummy for CANADA is negative but also insignificant. However, the main coefficient of interest POST*CANADA, is negative and significant at the <0.05 level. This indicates that Canadian firms, on average, reduce equity allocations post-IAS 19R more than U.S. firms, which are unaffected by IAS 19R, providing more direct evidence consistent with H1 that IAS 19R engenders risk reduction in affected firms. The effect of IAS 19R in this comparison is also economically significant. The coefficient of -0.147 on POST*CANADA implies that treatment firms reduce equity allocations by 14.7% more than control firms, after controlling for other determinants of asset allocation. This incremental reduction for Canadian firms is equivalent to a shift of 14.7% / 15.6% = 0.9 standard deviations of %EQUITIES. Amongst control variables, while GLOBAL RETURNS is positive and significant as expected, other controls are insignificant, potentially reflecting the fact that Canadian and U.S. firms are closely matched (or balanced) along these metrics, via the PSM procedure.

In Panel B, we present results of a modified version of Eq (3), run as a fully interacted or "stacked" model – i.e., where not only POST but also all control variables are interacted with the CANADA indicator. While the Panel A specification constrains coefficients on control variables to be identical across U.S. and Canadian firms, the stacked model allows these coefficients to also vary. While most interactions of control variables with CANADA are insignificant, the POST*CANADA interaction remains negative and highly significant, consistent with H1.

V. ADDITIONAL ANALYSIS AND DISCUSSION

The effect of IAS 19R on discount rate assumptions

Tables 4-6 document one key consequence of IAS 19R's removal of ERR-based expense smoothing – when the benefits to risk-taking cannot be recognized in net income without the costs, plan sponsors have less incentive to engage in that risk-taking. Another related consequence of IAS 19R is that for most firms, it leads to higher pension expense, as ERRs are typically higher than discount rates and provide a greater offset to pension service costs and interest costs. It is conceivable that plan sponsors faced with such an increase in pension expense would try to contain it to the extent possible. As the discount rate assumption takes on added importance post-IAS 19R, one potential way to minimize pension expense is to strategically manage discount rates.

As pension expense under IAS 19R is now *service cost + finance cost*, equating to *service cost + discount rate*(PBO – fair value of plan assets)*, the finance cost is a net expense if PBO > plan assets, i.e., for underfunded plans, and net income if PBO < plan assets, i.e., for overfunded plans. Lowering the discount rate minimizes the net expense, and raising it maximizes net income. Therefore, plan sponsors looking to minimize

pension expense in the new regime might have an added incentive to lower (raise) discount rates when underfunded (overfunded). We test these conjectures in Table 7.

Panel A of Table 7 presents results of the following DD model comparing the change in discount rates post-IAS 19R of Canadian firms to U.S. firms:

$$\text{DISC RATE} = \beta_0 + \beta_1 \text{POST} + \beta_2 \text{CANADA} + \beta_3 \text{POST*CANADA} + \Sigma \text{ Controls} + \varepsilon$$

(Equation 4)

To isolate discretionary variation in discount rates, we incorporate controls for the two key economic drivers of discount rates: prevailing high-quality corporate bond yields and plan duration. We do so by including the relevant country's AA corporate bond yield (AA BOND YIELD), to account for over-time changes in discount rates arising from movements in these yields, and plan horizon (HORIZON) as a crude proxy for plan duration.[13] We also include firm size (SIZE) as an additional control. In Panel A, the AA bond yield is positive and strongly significant, HORIZON is insignificant, and SIZE is positively significant. The POST*CANADA interaction is negative and strongly significant, showing evidence consistent with our conjecture, as Table 2 indicates that most plans are underfunded.

We test the differing conjectures on under- and overfunded plans more specifically with the following model, tabulated in Panel B:

$$\begin{aligned}\text{DISC RATE} = {} & \beta_0 + \beta_1 \text{POST} + \beta_2 \text{CANADA} + \beta_3 \text{POST*CANADA} \\ & + \beta_4 \text{UNDERFUND} + \beta_5 \text{POST*UNDERFUND} + \beta_6 \text{CANADA*UNDERFUND} \\ & + \beta_7 \text{POST*CANADA*UNDERFUND} + \Sigma \text{ Controls} + \varepsilon\end{aligned}$$

(Equation 5)

[13] Plan duration is not a required disclosure on financial statements or regulatory filings, and can only be captured approximately using other related items that are required to be disclosed.

Panel B shows that POST*CANADA remains negative and significant, while POST*CANADA* UNDERFUND is negative but insignificant. The lack of significance on the interaction with UNDERFUND could be attributable to lack of testing power, as virtually all our sample firms (95% for Canada, 91% for U.S.) are underfunded in the pre-IAS 19R period, and very many (76% for Canada, 75% for U.S.) remain underfunded in the post-IAS 19R period. Therefore, we conclude that there is some suggestive evidence, albeit incomplete, implying that plan sponsors strategically manage discount rates in an attempt to contain post-IAS 19R pension expense.

The scope and limitations of the IAS 19R quasi-experiment

We note that IAS 19R does not replace the earlier pension smoothing regime with one where pension expense is based on actual returns to plan assets. Such a shift would expose net income to both costs and benefits of risk-taking in pension investment, rather than just the benefits. Instead, the IAS 19R shift has a somewhat different effect – it *removes* from net income both costs and benefits of risk-taking in pension investment, by divorcing the ERR from the actual asset allocation of the plan. The prediction of lower risk-taking, however, hinges crucially on the point that the ERR-based smoothing regime recognizes the costs and benefits of risk-taking asymmetrically. As this asymmetry in recognition of costs and benefits no longer exists under IAS 19R, our expectation of reduced risk-taking post-IAS 19R still applies.

The IAS 19R shift has other consequences for the relevance and reliability of pension accounting numbers. While it reduces sponsors' ability to boost net income by raising ERRs, thus improving reliability, it could make pension expense less relevant, because the underlying economic profile of assets – represented by the asset allocation

strategy – is not reflected in pension expense anymore.[14] Even though these are important issues, neither the theoretical correctness of using the discount rate as the ERR nor its effect on relevance, reliability, representational faithfulness or comparability are the focus of this study.

VI. CONCLUSION

IAS 19 Employee Benefits (Revised) brings about a fundamental change in determination of pension expense on corporate income statements, doing away with the expected rate of return (ERR) on pension assets, and requiring plan sponsors to effectively replace it with the discount rate. This change removes plan sponsors' erstwhile ability to recognize in income the benefits of risk-taking in pension investments (via a higher ERR) while not recognizing the costs (of higher volatility in actual return). We predict, and find, for a sample of Canadian firms applying IAS 19R, that risk-taking in pension investment goes down after IAS 19R implementation, suggesting that the earlier ERR-based accounting regime encouraged more risk-taking in pension investments than sponsors might have undertaken in the absence of such a regime.

The ERR-based expensing regime removed by IAS 19R is still the norm for U.S. GAAP, and the IFRS shift therefore has the potential to inform debate on likely consequences of mandating similar changes in the U.S. Our results must however be generalized to the U.S. context with caution, as there are differences between the two countries in economic and cultural factors and in pension regulation. For example, U.S.

[14] It also creates a situation where two plans with similar funding but different investment profiles – e.g., one plan 100% invested in bonds but the other 100% invested in equities – have the same finance charge in net income. While removing management judgment from ERRs could improve comparability in one sense, the fact that unlike events and transactions (in this case, unlike investment strategies) are presented identically in net income could distort genuine comparability. The IASB Framework states specifically that "*the need for comparability should not be confused with mere uniformity*".

pensions are insured by the PBGC, creating the potential for excessive risk-taking in pension funding and investment, whereas Canada lacks a federal pensions guarantor (but has a Pension Benefits Guarantee Fund for only the province of Ontario). These differences notwithstanding, Canada and the U.S. are very similar in their capital markets, reporting, and enforcement environment, allowing some generalization.[15]

While we demonstrate one economic consequence of IAS 19R, we are unable to comment on whether this consequence – the move away from equities – is ultimately to the benefit of plan sponsors or beneficiaries. Pension sponsors' erstwhile preference for equities has been justified on the basis that equities outperform bonds over the long term, allowing benefits to be provided more cheaply. Any move away from equities could result in plans requiring more cash contributions on an ongoing basis. If plan sponsors respond by increasing cash contributions and investing this cash in lower-risk, fixed-income instruments that match benefit payments, this could result in greater benefit security for retirees. From the sponsor's perspective, though, it reduces cash available to invest in other, positive-NPV projects. On the other hand, if more sponsors decide to freeze their plans as a result of their becoming too expensive to maintain, this outcome erodes benefit security for retirees. Commenting on these consequences is outside the scope of our study, but the importance of these issues to academics, regulators, and retirees makes them a promising and worthwhile area for future research.

[15] To the extent we can expect U.S. plan sponsors to react similarly when faced with the removal of pension expense smoothing, there could even be consequences for equity markets faced with widespread unwinding of equity positions by one of its most significant groups of institutional investors.

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Appendix A: Summary of the accounting options available in IFRS under pre-IAS 19R pension accounting

Pension accounting under IFRS in the pre-IAS 19R period was broadly similar to U.S. GAAP, but with more choices available to plan sponsors on how to report actuarial gains and losses. Appendix A summarizes the three reporting options available in the pre-IAS 19R regime, which we label Options 1, 2, and 3 (Frost, Gordon, and Sun (2011) provide a detailed explanation of these alternatives). Option 1 is most similar to current U.S. GAAP, in that the balance sheet reflects the full funded status whereas the income statement reflects a smoothed pension expense derived through an ERR, with differences between actual and expected return (along with other actuarial gains/losses) recognized in OCI. This option differs from U.S. GAAP only in that accumulated unrecognized actuarial gains/losses do not eventually have to be amortized through net income.

Option 2 also reflects a smoothed pension expense through an ERR on plan assets, but differs from Option 1 with respect to the balance sheet, which only recognizes a smoothed number that equals the excess (deficit) of cumulative cash contributions relative to cumulative pension expense as an accrued pension asset (liability), rather than the true funding status. Under this option, unrecognized actuarial gains/losses remain entirely off-balance sheet unless they exceed a threshold, or "corridor", defined as 10% of the greater of the plan's projected benefit obligation (PBO) or fair value of plan assets, in which case they are amortized through net income. This option most closely resembles the accounting regime that existed in the U.S. prior to SFAS 158. Under both options 1 and 2, pension expense incorporates the long-term ERR rather than actual returns.

Option 3 is similar to Option 1, except that pension expense reflects the actual return rather than expected return. Therefore, pension expense is not smoothed with

respect to changes in the fair value of plan assets. Other actuarial gains/losses, arising due to differences between actuals and estimates of other assumptions (discount rate, salary growth rate, etc.) are still passed through OCI, leaving some element of smoothing in pension expense. The balance sheet reflects the full funded status.

	IFRS GAAP in the pre-IAS 19R period (based on IAS 19, revised December 2004)			Current U.S. GAAP (applicable for fiscal years ending after December 15, 2006)
	Option 1	Option 2	Option 3	
Defining feature of each option	Recognize all actuarial gains / losses as they occur, in each period, through OCI.	Recognize some actuarial gains / losses through the Income Statement. The two options differ in that:		Recognize all actuarial gains / losses as they occur, in each period, through OCI.
		Recognize actuarial gains / losses in the Income Statement only when they exceed 10% of the larger of PBO and fair value of plan assets, by amortizing over remaining expected service life of beneficiaries.	Recognize actual return on plan assets each period through the Income Statement. All other actuarial gains /losses (arising from differences between actuals and estimates of other assumptions – discount rate, mortality rates, etc.) recognized in each period through OCI.	When accumulated actuarial gains/losses recognized through OCI exceed 10% of the larger of PBO and fair value of plan assets, recognize in the Income Statement (or 'recycle' to net income) by amortizing over the remaining expected service life of beneficiaries.
What does it imply for the balance sheet?	Balance sheet reflects the true funded status of	Balance sheet does not reflect the true funded	Balance sheet reflects the true funded status of	Balance sheet reflects the true funded status of

	the plan.	status of the plan, because accumulated unrecognized actuarial gains /losses are off the books.	the plan.	the plan.
What does it imply for the income statement?	Income statement only reflects smoothed pension expense. Pension expense calculation requires expected rate of return on plan assets.	Income statement only reflects smoothed pension expense. Pension expense calculation requires expected rate of return on plan assets.	Income statement is "unsmoothed" with respect to actual returns on plan assets. Pension expense calculation does not require expected rate of return on plan assets. However, other actuarial gains/losses are still recognized through OCI, so there is some element of smoothing in the income statement.	Income statement only reflects smoothed pension expense. Pension expense calculation requires expected rate of return on plan assets.

IAS 19R eliminates the ability of plan sponsors to choose from the three options on how to treat actuarial gains and losses. It requires plan sponsors to recognize all actuarial gains/losses through OCI in the period in which they occur, effectively requiring the recognition of the full funded status on the balance sheet. Therefore, Option 2 and 3 are no longer available, and Option 1 becomes the norm.

Appendix B: Determination of pension expense before and after IAS 19R

	Pension expense under IAS 19	**Pension expense under IAS 19R**
Basic components of pension expense: recognized in net income	Service cost +Interest cost -Expected return on plan assets *Which translates into:* Service cost +Discount rate*PBO -Expected rate of return*Fair value of plan assets	Service cost +/- Net finance expense/income *Which translates into:* Service cost +Discount rate*(PBO-Fair value of plan assets) *Which translates into:* Service cost +Discount rate*PBO -Discount rate*Fair value of plan assets Note that for net finance expense/income, discount rate is determined at the start of the reporting period, as well as the opening PBO and fair value of plan assets, but after taking into account actual contributions and benefits paid during the reporting period.
Other components of pension expense: recognized in net income	+/- Vested prior service costs +/- Amortization of unvested prior service costs +/- Amortization of actuarial gains/losses using corridor approach (Option 2 firms only)	+/- Vested prior service costs +/- Unvested prior service costs
Components recognized in OCI	Current period actuarial gains/losses (Option 1 & 3 only)	Current period actuarial gains/losses

Appendix C
Description of Variables

CANADA	An indicator variable set equal to one for Canadian firms, and set equal to zero for US firms.
POST	For Canadian firms, POST is an indicator variable set equal to one in years after the firm adopts IAS19 Revised, and set equal to zero in years before the firm adopts IAS19 Revised. For US firms, POST is an indicator variable set equal to one in fiscal years beginning on or after 1/1/13, and zero for fiscal years beginning before 1/1/13.
%EQUITIES	The percentage of pension assets invested in equity securities.
%FIXED INCOME	The percentage of pension assets invested in fixed income securities.
%REAL ESTATE	The percentage of pension assets invested in real estate.
%OTHER	The percentage of pension assets invested in other securities and investments.
ERR	The expected rate of return on pension plan assets.
DISC RATE	The discount rate used to compute pension expense.
SIZE	The natural log of market capitalization.
LEVERAGE	Financial leverage, measured as long-term debt, divided by the sum of long-term debt and market capitalization of equity.
DIVIDENDS	Dividends divided by total assets.
SDCF	Operating risk, measured as the standard deviation of the ratio of operation cash flows to book value of equity for 5 years, ending in the current year.
TAX	Tax rate, measured as tax expense divided by pre-tax income. If pre-tax income is negative, we measure the tax rate as tax expense divided by the average of pre-tax income from 3 years, ending in the current year. If pre-tax income is negative and the average of the pre-tax income from 3 years ending in the current year is negative, we measure the tax rate as zero, because recurring pre-tax losses indicate a zero tax rate.
FUNDING	Funding ratio, measured as the fair value of pension plan assets, divided by the projected benefit obligation.
$FUNDING^2$	Funding ratio squared.
HORIZON	Investment horizon, measured as the natural log of the ratio of PBO to current service cost. If PBO and/or current service cost is zero, we set the investment horizon to missing.
DOMESTIC RETURNS	Domestic equity market returns, measured as 12-month returns to the Toronto Stock Exchange Composite Index for Canadian firms (obtained from the S&P website: http://us.spindices.com/indices/equity/sp-tsx-composite-index), and measured as 12-month returns to the S&P US Broad Market Index for US firms (obtained from the S&P website: http://us.spindices.com/indices/equity/sp-united-states-bmi-us-dollar).
GLOBAL RETURNS	12-month returns to the S&P Global Broad Market Index for global equities (obtained from the S&P website: http://us.spindices.com/indices/equity/sp-global-bmi-us-dollar).
AA BOND YIELD	The AA corporate bond yield, measured as the redemption yield to Bank of America Merrill Lynch Corporate AA Canadian Bond Index for Canadian firms, and measured as the redemption yield to Bank of America Merrill Lynch Corporate AA US Bond Index for US firms.
FVPA	The fair value of pension plan assets.
PBO	The projected benefit obligation.
MVE	Market capitalization.
HIGH ERR	An indicator variable set equal to one for firms with a high ERR in the year immediately before IAS19 Revised, where a high ERR is defined as an ERR above the median ERR. We define the median ERR in separately for Canadian and US firms.
HIGH PBO	An indicator variable set equal to one for firms with a high ratio of PBO to total assets in the year immediately before IAS19 Revised, where a high ratio of PBO to total assets is defined as a ratio of PBO to total assets above the median ratio of PBO to total assets. We define the median ratio of PBO to total assets separately for Canadian and US firms.
HIGH FVPA	An indicator variable set equal to one for firms with a high ratio of FVPA to total assets in the year immediately before IAS19 Revised, where a high ratio of FVPA to total assets is defined as a ratio of FVPA to total assets above the median ratio of FVPA to total assets. We define the median ratio of FVPA to total assets separately for Canadian and US firms.
UNDERFUND	An indicator variable set equal to one for firms with the fair value of plan assets less than the PBO.

Table 1
Sample Selection

	# Observations
Canadian firms on Compustat North America that sponsor a defined benefit pension plan with data available for the last fiscal year before IAS19 Revised and for the first fiscal year after IAS19 Revised	179
Less: Canadian firms with no annual report on SEDAR or firm website	(9)
Less: Canadian firms using US GAAP	(27)
Less: Canadian firms using IFRS that immediately recognize actual returns in net income	(2)
Less: Canadian firms without available asset allocation and discount rate data	(14)
Less: Canadian firms without available data for control variables	(20)
Less: Canadian firms with more than 50% invested in "OTHER"	(2)
Number of Canadian firms in treatment sample	105
+ US firms (control sample) matched by Propensity Score Matching	105
Number of firms in combined Canadian (treatment) and US (control) sample	210
× 2 years (one year before IAS19 Revised and one year after IAS19 Revised)	× 2
Number of firm-years in combined Canadian (treatment) and US (control) sample	420

Table 2
Descriptive Statistics

Panel A: Canada Sample

	P5	P25	P50	P75	P95	Mean	Std
%EQUITIES	22.00%	41.80%	53.51%	61.13%	72.10%	50.60%	16.22%
%FIXED INCOME	11.00%	31.96%	38.22%	47.10%	65.00%	38.73%	14.80%
%REAL ESTATE	0.00%	0.00%	0.00%	0.00%	11.18%	1.53%	4.04%
%OTHER	0.00%	1.00%	3.15%	7.73%	44.94%	8.97%	16.46%
ERR (Pre-IAS19R)	3.90%	5.40%	6.00%	6.64%	7.25%	5.89%	1.34%
DISC RATE	3.63%	4.00%	4.40%	4.60%	5.20%	4.36%	0.52%
LEVERAGE	0.00	0.15	0.25	0.41	0.70	0.30	0.21
DIVIDENDS	0.00	0.00	0.01	0.03	0.08	0.02	0.03
SDCF	0.03	0.05	0.09	0.18	0.54	0.20	0.48
TAX	-0.03	0.13	0.24	0.28	0.70	0.23	0.27
FUNDING	0.54	0.74	0.85	0.95	1.07	0.84	0.20
$FUNDING^2$	0.29	0.55	0.72	0.91	1.14	0.75	0.35
HORIZON	2.76	3.37	3.67	4.23	6.29	3.96	1.25
DOMESTIC RETURNS	0.03	0.06	0.08	0.10	0.13	0.08	0.04
GLOBAL RETURNS	0.08	0.15	0.15	0.22	0.22	0.17	0.05
AA BOND YIELD	0.02	0.02	0.02	0.03	0.03	0.02	0.00
FVPA	1	31	100	811	6,446	1,182	2,844
PBO	3	39	114	936	6,667	1,313	3,122
MVE	45	421	1,492	7,619	33,364	6,696	12,538

Panel B: USA Sample

	P5	P25	P50	P75	P95	Mean	Std
%EQUITIES	11.10%	38.00%	54.00%	62.50%	70.00%	49.02%	18.20%
%FIXED INCOME	15.80%	30.00%	38.00%	49.50%	78.00%	41.39%	18.14%
%REAL ESTATE	0.00%	0.00%	0.00%	0.00%	6.20%	1.16%	2.42%
%OTHER	0.00%	0.00%	1.00%	11.00%	39.00%	8.36%	15.37%
ERR	5.43%	6.75%	7.50%	7.85%	8.25%	7.21%	0.87%
DISC RATE	3.65%	4.00%	4.35%	4.68%	5.13%	4.38%	0.48%
LEVERAGE	0.00	0.17	0.30	0.45	0.67	0.31	0.20
DIVIDENDS	0.00	0.00	0.01	0.02	0.04	0.01	0.03
SDCF	0.02	0.03	0.06	0.11	0.46	0.14	0.33
TAX	-0.09	0.17	0.28	0.36	0.45	0.22	0.37
FUNDING	0.60	0.74	0.83	0.94	1.19	0.85	0.19
$FUNDING^2$	0.36	0.54	0.69	0.89	1.43	0.77	0.38
HORIZON	2.92	3.47	4.01	4.96	6.25	4.30	1.16
DOMESTIC RETURNS	0.14	0.14	0.18	0.33	0.33	0.23	0.10
GLOBAL RETURNS	0.13	0.15	0.15	0.22	0.22	0.18	0.04
AA BOND YIELD	0.02	0.02	0.02	0.03	0.03	0.02	0.00
FVPA	7	67	235	1,164	7,754	1,310	2,690
PBO	9	85	292	1,384	7,510	1,488	2,951
MVE	97	431	1,467	4,511	38,246	7,737	17,977

Notes: All variables are defined in Appendix C.

Table 3
Correlation Matrix

Panel A: Canada Sample

	%EQUITIES	ERR	DISC RATE	SIZE	LEVERAGE	DIVIDENDS	SDCF	TAX	FUNDING	FUNDING^2	HORIZON	DOMESTIC RETURNS	GLOBAL RETURNS	AA BOND YIELD
%EQUITIES		0.3880 ***	0.0868 *	-0.0504	0.1707 ***	0.0420	0.0117	-0.0807 *	0.2471 ***	0.2026 ***	0.0237	0.0398	0.0346	-0.0060
ERR	0.2700 ***		0.2999 ***	0.2038 ***	0.1261 **	-0.1994 ***	0.0385	-0.1093 **	0.1039 **	0.0023	0.0039	0.0339	-0.0608	0.2026 ***
DISC RATE	0.0614	0.2881 ***		0.0320	-0.0330	-0.0155	-0.1161 **	-0.0285	0.0023	-0.0131	-0.0087	-0.0297 ***	-0.4066 ***	0.8225
SIZE	-0.0918 **	0.2231 ***	0.0128		-0.3394 ***	-0.0110	-0.2024 ***	0.0506	-0.0764 *	-0.0849 *	-0.1587 ***	0.0419	0.0410	-0.0151
LEVERAGE	0.1335 ***	0.0256	-0.0084	-0.2600 ***		-0.1152 **	0.1344 ***	-0.0662	0.0311	0.0311	0.0227	-0.0521	-0.0173	-0.0485
DIVIDENDS	0.0870 *	0.0443	-0.0248	0.1748 ***	-0.2012 ***		-0.0127	0.0485	-0.0261	-0.0314	0.1054 **	0.0137	0.0128	-0.0265
SDCF	-0.0157	-0.0433	-0.0154	-0.1451 ***	-0.0045	-0.0458		-0.0175	-0.0309	-0.0309	-0.0529	-0.0062	0.0278	-0.0705
TAX	-0.0802 *	-0.0836	0.0231	0.1127 **	-0.1567 ***	0.1516 ***	0.0474		-0.0184	-0.0184	-0.0412	0.0028	-0.0027	0.0112
FUNDING	-0.0014	-0.0420	-0.0348	-0.0056	0.0922 **	-0.1043 **	-0.1529 ***	-0.0162		0.9525 ***	0.0916 **	0.1794 ***	0.1743 ***	-0.0873 *
FUNDING^2	-0.0014	-0.0420	-0.0348	-0.0056	0.0895 *	-0.1043 **	-0.1017 **	-0.0034	1.0000 ***		0.1055 **	0.1833 ***	0.1813 ***	-0.0934 **
HORIZON	-0.0610	0.0760	-0.0043	-0.0480	-0.0007	-0.1448 ***	0.0131	-0.0374	0.0719	0.0719		-0.0109	-0.0363	0.0473
DOMESTIC RETURNS	0.0783 *	0.1159 **	0.1216 ***	0.0430	-0.0822 *	-0.0203	-0.0379	-0.0319	0.2921 ***	0.2921 ***	-0.0241		0.8919 ***	-0.2483 ***
GLOBAL RETURNS	0.0439	-0.1331 ***	-0.6921 ***	0.0486	0.0059	0.0260	-0.0438	-0.0370	0.2181 ***	0.2181 ***	-0.1070 **	0.4591 ***		-0.6577 ***
AA BOND YIELD	0.0019	0.2390 ***	0.8618 ***	-0.0228	-0.0512	-0.0580	0.0142	0.0304	-0.1108 **	-0.1108 **	0.0966 **	0.1244 ***	-0.7979 ***	

Notes: All variables are defined in Appendix C.

*, **, *** indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

Pearson correlation coefficients appear above the diagonal, and Spearman correlation coefficients appear below the diagonal.

Table 3 (Continued)
Correlation Matrix

Panel B: USA Sample

	%EQUITIES	ERR	DISC RATE	SIZE	LEVERAGE	DIVIDENDS	SDCF	TAX	FUNDING	FUNDING^2	HORIZON	DOMESTIC RETURNS	GLOBAL RETURNS	AA BOND YIELD
%EQUITIES		0.3815 ***	0.1113 ***	0.0077	0.0665	0.0973 **	0.0159	0.0189	-0.0219	-0.0405	-0.0673	-0.0071	0.0035	0.0910 **
ERR	0.3553 ***		0.3881 ***	0.0923 **	0.2000 ***	0.0137	-0.0425	0.0801 **	0.0630	0.0318	-0.0156	-0.1677 ***	-0.1440 ***	0.2699 ***
DISC RATE	0.1405 ***	0.3740 ***		-0.0120	0.0933 **	-0.0007	-0.0202	0.0498	-0.0786 *	-0.0891 **	-0.0520	-0.4977 ***	-0.4177 ***	0.7801 ***
SIZE	-0.0413	0.0561	-0.0258		-0.1376 ***	0.1042 **	-0.0830 *	0.0605	0.0823 *	0.0734 *	-0.0690	0.0714 *	0.0536	-0.0466
LEVERAGE	0.0465	0.1564 ***	0.0920 **	-0.1252 ***		-0.1156 ***	0.2624 ***	0.0235	-0.0506	-0.0506	0.0630	-0.1008 **	-0.0917 **	0.0760 *
DIVIDENDS	0.1138 ***	0.1492 ***	0.0427	0.2511 ***	-0.2268 **		-0.0020	-0.0390	-0.0318	-0.0500	-0.1963 **	0.0240	0.0127	-0.0282
SDCF	-0.0123	-0.0405	0.0039	-0.0419	0.0809 *	-0.3055 ***		-0.0410	-0.1693 ***	-0.1693 ***	0.1062 **	-0.0535	-0.0284	0.0516
TAX	0.0450	0.1270 ***	0.0588	0.1085 **	0.0263	0.2264 ***	-0.1482 ***		-0.0773 *	-0.0773 *	0.0756 *	-0.0062	0.0061	0.0342
FUNDING	0.0192	-0.0349	-0.1165 ***	0.1283 ***	0.0107	0.0371	-0.1548 ***	-0.0398		0.9819 ***	-0.1580 ***	0.3004 ***	0.2304 ***	-0.2043 ***
FUNDING^2	0.0192	-0.0349	-0.1165 ***	0.1283 ***	0.0086	0.0371	-0.1517 ***	-0.0508	1.0000 ***		-0.1631 ***	0.3000 ***	0.2305 ***	-0.2063 ***
HORIZON	-0.0817 *	-0.0366	-0.0584	-0.0144	0.0582	-0.1912 ***	0.0729 *	0.0141	-0.1219 ***	-0.1219 ***		-0.0019	0.0024	-0.0309
DOMESTIC RETURNS	0.0407	-0.1237 ***	-0.3456 ***	0.0722 *	-0.1096 **	0.0122	-0.0660	-0.0186	0.3474 ***	0.3474 ***	-0.0338		0.9388 ***	-0.5646 ***
GLOBAL RETURNS	-0.0220	-0.2329 ***	-0.6109 ***	0.0616	-0.1005 **	0.0170	-0.0545	-0.0057	0.2763 ***	0.2763 ***	0.0058	0.8334 ***		-0.3765 ***
AA BOND YIELD	0.0974 **	0.3071 ***	0.8365 ***	-0.0522	0.0683	-0.0458	0.0306	-0.0133	-0.2192 ***	-0.2192 ***	-0.0333	-0.4158 ***	-0.6887 ***	

Notes: All variables are defined in Appendix C.

*, **, *** indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

Pearson correlation coefficients appear above the diagonal, and Spearman correlation coefficients appear below the diagonal.

Table 4
Regression of %EQUITIES Using Sample of Canadian Firms

Eq (1) $\%EQUITIES = a0 + a1\ POST + \sum\ CONTROLS$

	Predicted Sign	Coefficient	Std Error	T-Stat	P-Value	
Intercept		-0.107	0.351	-0.300	0.761	
POST	–	-0.182	0.050	-3.640	0.0002	***
SIZE		-0.002	0.008	-0.290	0.772	
LEVERAGE	–	0.078	0.074	1.050	0.853	
DIVIDENDS	–	0.973	0.396	2.460	0.992	
SDCF	–	0.013	0.016	0.860	0.805	
TAX	–	-0.067	0.045	-1.510	0.067	*
FUNDING		0.248	0.381	0.650	0.516	
$FUNDING^2$		-0.003	0.192	-0.020	0.986	
HORIZON	+	0.004	0.009	0.460	0.323	
DOMESTIC RETURNS	+	-7.700	3.511	-2.190	0.985	
GLOBAL RETURNS	+	6.443	2.581	2.500	0.007	***
N		210				
R^2		18.6%				

Notes: All variables are defined in Appendix C. Standard errors are clustered by firm.
*, **, *** indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.
Reported p-values are one-tailed when there are predicted signs.

Table 5
Regressions of %EQUITIES on POST and Various Measures of the Importance of Pensions Using Canada Sample

Eq (2A) %EQUITIES = a0 + a1 POST + a2 HIGH ERR + a3 HIGH ERR * POST + ∑ CONTROLS
Eq (2B) %EQUITIES = a0 + a1 POST + a2 HIGH PBO + a3 HIGH PBO * POST + ∑ CONTROLS
Eq (2C) %EQUITIES = a0 + a1 POST + a2 HIGH FVPA + a3 HIGH FVPA * POST + ∑ CONTROLS

		Panel A: Eq (2A)				Panel B: Eq (2B)				Panel C: Eq (2C)			
	Predicted Sign	Coefficient	Std Error	T-Stat	P-Value	Coefficient	Std Error	T-Stat	P-Value	Coefficient	Std Error	T-Stat	P-Value
Intercept		-0.121	0.342	-0.350	0.724	-0.123	0.348	-0.350	0.362	-0.122	0.350	-0.350	0.729
POST	−	-0.191	0.048	-3.990	0.0001 ***	-0.164	0.053	-3.120	0.001 ***	-0.166	0.053	-3.140	0.001 ***
HIGH ERR	+	0.066	0.025	2.630	0.005 ***								
HIGH ERR * POST	−	-0.007	0.025	-0.280	0.390								
HIGH PBO						0.003	0.027	0.100	0.923				
HIGH PBO * POST	−					-0.045	0.023	-1.970	0.025 **				
HIGH FVPA										0.007	0.028	0.260	0.795
HIGH FVPA * POST	−									-0.038	0.023	-1.630	0.053 *
SIZE		-0.006	0.008	-0.710	0.479	-0.003	0.008	-0.410	0.683	-0.003	0.008	-0.350	0.728
LEVERAGE	−	0.117	0.071	1.650	0.949	0.078	0.074	1.050	0.851	0.078	0.075	1.050	0.851
DIVIDENDS	−	1.085	0.374	2.900	0.998	0.970	0.396	2.450	0.992	0.981	0.404	2.430	0.992
SDCF	−	0.021	0.013	1.640	0.948	0.012	0.016	0.770	0.778	0.013	0.016	0.790	0.785
TAX	−	-0.0683	0.050	-1.370	0.087 *	-0.066	0.045	-1.460	0.074 *	-0.068	0.046	-1.490	0.069 *
FUNDING		0.269	0.363	0.740	0.461	0.275	0.386	0.710	0.477	0.261	0.389	0.670	0.504
$FUNDING^2$		-0.013	0.180	-0.070	0.942	-0.016	0.195	-0.080	0.934	-0.008	0.196	-0.040	0.967
HORIZON	+	-0.0002	0.009	-0.020	0.508	0.005	0.009	0.570	0.286	0.005	0.009	0.510	0.307
DOMESTIC RETURNS	+	-8.946	3.425	-2.610	0.995	-8.073	3.441	-2.350	0.990	-7.976	3.453	-2.310	0.989
GLOBAL RETURNS	+	7.335	2.497	2.940	0.002 ***	6.724	2.535	2.650	0.005 **	6.643	2.542	2.610	0.005 ***
N		210				210				210			
R^2		25.2%				19.4%				19.0%			

Notes: All variables are defined in Appendix C. Standard errors are clustered by firm.
*, **, *** indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.
Reported p-values are one-tailed when there are predicted signs.

Table 6
Difference-In-Difference Regressions of %EQUITIES Using Sample of Canadian and US Firms

Eq (3) $\%EQUITIES = a0 + a1\ POST + a2\ CANADA + a3\ POST * CANADA + \sum CONTROLS$

Panel A: Difference-In-Difference Model

	Predicted Sign	Coefficient	Std Error	T-Stat	P-Value	
Intercept		0.312	0.218	1.430	0.153	
POST		0.055	0.075	0.730	0.465	
CANADA		-0.069	0.054	-1.270	0.204	
POST * CANADA	–	-0.147	0.078	-1.880	0.030	**
SIZE		0.000	0.006	-0.080	0.939	
LEVERAGE	–	0.037	0.056	0.660	0.745	
DIVIDENDS	–	0.824	0.396	2.080	0.981	
SDCF	–	0.001	0.025	0.040	0.517	
TAX	–	-0.022	0.023	-0.990	0.161	
FUNDING		0.153	0.369	0.420	0.678	
$FUNDING^2$		-0.005	0.205	-0.030	0.979	
HORIZON	+	-0.001	0.008	-0.160	0.565	
DOMESTIC RETURNS	+	-1.135	0.627	-1.810	0.964	
GLOBAL RETURNS	+	1.601	0.418	3.830	0.0001	***
N		420				
R^2		6.2%				

Panel B: Difference-In-Difference Model With Stacked Regression

	Predicted Sign	Coefficient	Std Error	T-Stat	P-Value	
Intercept		0.404	0.336	1.200	0.231	
POST		-0.0003	0.050	-0.010	0.994	
CANADA		-0.485	0.501	-0.970	0.335	
POST * CANADA	–	-0.170	0.070	-2.440	0.008	***
SIZE		0.003	0.008	0.350	0.727	
LEVERAGE	–	-0.026	0.088	-0.290	0.384	
DIVIDENDS	–	0.434	0.655	0.660	0.746	
SDCF	–	-0.010	0.025	-0.400	0.344	
TAX	–	-0.005	0.028	-0.170	0.434	
FUNDING		0.004	0.602	0.010	0.497	
$FUNDING^2$		0.030	0.319	0.090	0.463	
HORIZON	+	-0.012	0.013	-0.920	0.821	
DOMESTIC RETURNS	+	-0.428	0.586	-0.730	0.767	
GLOBAL RETURNS	+	0.873	1.437	0.610	0.272	
CANADA * SIZE		-0.006	0.012	-0.470	0.636	
CANADA * LEVERAGE		0.111	0.116	0.950	0.341	
CANADA * DIVIDENDS		0.573	0.787	0.730	0.467	
CANADA * SDCF		0.025	0.045	0.560	0.579	
CANADA * TAX		-0.038	0.046	-0.820	0.412	
CANADA * FUNDING		0.226	0.751	0.300	0.764	
CANADA * $FUNDING^2$		-0.030	0.409	-0.070	0.942	
CANADA * HORIZON		0.018	0.016	1.080	0.279	
CANADA * DOMESTIC RETURNS		-6.783	3.637	-1.870	0.968	
CANADA * GLOBAL RETURNS		5.201	2.997	1.740	0.084	*
N		420				
R^2		8.8%				

Notes: All variables are defined in Appendix C. Standard errors are clustered by firm.
*, **, *** indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.
Reported p-values are one-tailed when there are predicted signs.

Table 7
Regressions of %DISCOUNT RATE Using Sample of Canadian and US Firms

Panel A: Difference-In-Difference Model

Eq (4) DISC RATE = a0 + a1 POST + a2 CANADA + a3 POST * CANADA + ∑ CONTROLS

	Predicted Sign	Coefficient	Std Error	T-Stat	P-Value	
Intercept		0.006	0.013	0.460	0.643	
POST		0.006	0.004	1.770	0.079	*
CANADA		0.005	0.002	2.850	0.005	***
POST * CANADA	–	-0.008	0.003	-3.240	0.001	***
AA BOND YIELD	+	1.189	0.372	3.200	0.001	***
HORIZON	+	-0.0001	0.0003	-0.550	0.708	
SIZE		0.0003	0.0002	1.720	0.043	*
N		420				
R^2		23.1%				

Panel B: Difference-In-Difference-Difference Model

Eq (5) DISC RATE = a0 + a1 POST + a2 CANADA + a3 POST * CANADA + a4 UNDERFUND + a5 UNDERFUND * CANADA + a6 UNDERFUND * POST + a7 UNDERFUND * POST * CANADA+ ∑ CONTROLS

	Predicted Sign	Coefficient	Std Error	T-Stat	P-Value	
Intercept		0.007	0.013	0.570	0.567	
POST		0.005	0.004	1.310	0.192	
CANADA		0.004	0.002	1.550	0.124	
POST * CANADA	–	-0.007	0.003	-2.370	0.009	***
UNDERFUND	+	-0.001	0.002	-0.820	0.207	
UNDERFUND * CANADA		0.001	0.002	0.520	0.601	
UNDERFUND * POST		0.001	0.002	0.650	0.514	
UNDERFUND * POST * CANADA	–	-0.001	0.002	-0.520	0.303	
AA BOND YIELD	+	1.179	0.375	3.150	0.001	***
HORIZON	+	-0.0001	0.0003	-0.510	0.693	
SIZE		0.0003	0.0002	1.760	0.080	*
N		420				
R^2		23.3%				

Notes: All variables are defined in Appendix C. Standard errors are clustered by firm.
*, **, *** indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.
Reported p-values are one-tailed when there are predicted signs.