Real Effects of Recognizing Fair Value Changes in Net Income on Firms' Investment Choices[*]

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Abstract

We study the impact of recognizing fair value changes in net income rather than in other comprehensive income on risk taking in firms' investment portfolios. As our setting, we use the adoption of Accounting Standards Update 2016-01, which requires that changes in the fair values of equity securities be recognized in net income but does not require changes to fair value measurements. Using a sample of property and casualty insurers, we find that public firms adopting the new standard decreased the riskiness of their equity portfolios and had lower unrealized gain and loss volatility after adoption compared to private firms that did not adopt the new standard. Importantly, this effect occurs in the absence of an effect on regulatory capital, as ASU 2016-01 was not adopted for statutory accounting principles used to determine regulatory capital. We examine three channels through which recognizing fair value changes in net income could motivate managers to reduce risk in their equity portfolios. Our evidence suggests that a disciplining effect is more likely to drive our results than concerns about investor risk perceptions or manager compensation, as we find that the decrease in volatility is associated with improved equity portfolio performance.

1. Introduction

Accountants have long debated the merits of measuring assets and liabilities at fair value in periodic financial reports. While the relevance and reliability of fair value measurements is often at issue when comparing fair value to other bases of measurement, another issue frequently discussed is whether changes in fair values should be included in or excluded from reported net income. Prior studies show that measuring investment securities at fair value and including fair value changes in other comprehensive income ("OCI") can affect banks' investment choices through its impact on regulatory capital (Beatty 1995, Hodder, Kohlbeck and McAnally 2002, Chircop and Novotny-Farkas 2016). In this paper, we examine whether including fair value changes in net income rather than OCI affects firms' investment choices in a setting with no change in fair value measurements and no effect on regulatory capital.

We examine our research question using a difference-in-differences analysis around the adoption of Accounting Standards Update (ASU) 2016-01: *Recognition and Measurement of Financial Assets and Financial Liabilities*. ASU 2016-01 requires that changes in the fair values of equity securities be reported in net income rather than in OCI. We examine changes in investment choices of public property and casualty ("P&C") insurers compared to private P&C insurers. This setting has several empirical advantages that help us identify a treatment effect. First, regulatory capital for our sample firms is determined using Statutory Accounting Principles ("SAP"), which was not affected by ASU 2016-01. As a consequence, insurance companies with publicly traded parents that must report under U.S. GAAP are affected by ASU 2016-01, while insurance companies without a publicly traded parent are not. Second, unlike prior studies

examining the adoption of SFAS 115,[1] ASU 2016-01 does not affect fair value measurements. Instead, it affects only where fair value changes for equity securities are reported in the financial statements. Third, insurance companies are required to disclose information about their investment portfolios at an individual security level. This granularity allows us to construct daily equity security portfolios for sample firms and examine changes in portfolio risk and performance surrounding the adoption of ASU 2016-01 in ways not possible in other settings, such as banking.

A priori, the impact of the adoption of ASU 2016-01 on firms' investment decisions is unclear. Because insurance companies' investments are a key part of their earnings and risk-management strategies, ASU 2016-01 may have no effect if changes to the investment portfolio result in a non-optimal level of risk and return. However, we theorize that there are at least three potential channels through which including fair value changes in net income could affect firms' investment choices in the absence of an effect on regulatory capital. The first channel predicts that including fair value changes in net income encourages managers to engage in better risk management in the equity portfolio. For example, Zhang (2009) finds that the requirement to carry derivatives at fair value and report the ineffective portion of cash flow hedges in earnings prompted better risk management by firms that had been engaging in speculative derivative trading. We refer to this as the "disciplining channel."[2] The next two channels predict that managers will act myopically, taking costly actions to avoid earnings volatility. The second channel, which we refer to as the "risk-perception channel," operates through managers' preference for smooth earnings (Dichev, et al. 2012) and concerns that increased net income volatility will increase investors' perceptions about firm risk (e.g., Kanodia and Venugopalan (2023)). Several firms made

[1] See, for example, Beatty (1995), Hodder et al. (2002), and Khan (2019). SFAS 115 was adopted in 1993 and required firms to classify investment securities as trading, available-for-sale, or held-to-maturity, with trading and available-for-sale securities re-valued to fair value each quarter. See Section 2.1 for a more detailed discussion.
[2] We thank the associate editor and reviewer for suggesting this channel.

statements consistent with the risk-perception channel in comment letters opposing ASU 2016-01, cautioning that increased earnings volatility resulting from recognizing fair value changes in net income is not useful to investors and could lead them to alter their investment portfolios.[3,4] The third channel is through the impact that including fair value changes in net income has on managers' compensation or performance evaluations (e.g., Maines and McDaniel (2000)), which we refer to as the "compensation channel." This channel predicts that managers make less-optimal investment choices in order to shield their compensation from market volatility.

Our main finding is that public P&C insurers decrease the volatility of returns in their equity security portfolios relative to private P&C insurers after the adoption of ASU 2016-01, consistent with a decrease in portfolio risk. We also find that public insurers exhibit a relative decrease in the volatility of end-of-quarter net unrealized gains and losses and quarterly fair value changes for equity securities. These results appear to be economically significant, with a decrease in portfolio return volatility of 6.4% relative to the pre-period and decreases in the volatility of unrealized gains and losses and quarterly fair value changes of 12.9% and 29.4%, respectively.

We conduct several analyses to shed light on which channel is most likely to explain the reduction in equity portfolio volatility we document. Drawing from the literature on evaluating mutual fund performance, we examine changes in measures of portfolio performance, including Sharpe ratios, information ratios, returns, and portfolio alphas, as well as changes in exposure to systematic risk and idiosyncratic risk. Consistent with the disciplining channel but inconsistent

[3] For example, pharmaceutical company Eli Lilly stated in a comment letter, "We believe the proposed change regarding readily marketable equity securities will not result in more useful, transparent or relevant information to financial statement users and could have the unintended consequence of leading entities to invest in other types of investments that may not suit their objectives as well in an effort to avoid the volatility in earnings."

[4] The recent regional banking crisis that began with the failure of Silicon Valley Bank (SVB) is also consistent with the risk-perception channel, as bank depositors did not run on the bank until the recognition of unrealized losses on securities in earnings, despite substantial unrealized losses on both available-for-sale and held-to-maturity securities previously being reported on the balance sheet and in the footnotes to the financial statements, respectively.

with the risk-perception and compensation channels, we find that equity portfolio performance improves in the post period for treatment firms. Specifically, we find no change in portfolio returns which, combined with decreased volatility, results in higher equity portfolio Sharpe ratios. This suggests that firms are able to lower volatility without sacrificing returns. We also find a decrease in exposure to systematic market risk factors, including market betas, as well as a decrease in idiosyncratic risk, consistent with improved portfolio diversification. Taken together, these results suggest that affected firms improve risk management of their equity portfolios after ASU 2016-01.

Although we find overall support for the disciplining channel rather than the risk-perception or compensation channels, these channels are not mutually exclusive. We thus conduct several cross-sectional analyses to more directly test for the existence of each channel. Taken together, these tests continue to suggest that the disciplining channel is more likely to explain the reduction in equity portfolio volatility and provide little support for the risk-perception or compensation channels. Specifically, we find that our results are stronger for firms that manage their equity portfolios in-house rather than outsource management to a third-party and for firms with relatively smaller equity portfolios, for which risk-perception concerns are likely to be lower. For firms that manage their portfolios in-house and those with smaller portfolios, the decreases in volatility are 17.3% and 13.3% relative to the pre-period mean, respectively. For firms that manage their portfolios in-house, we find improvement in portfolio Sharpe ratios, better diversification, and lower exposure to systematic risks, consistent with disciplining. We also find some evidence of better diversification and improved portfolio performance for firms that were more likely to be engaging in selective security sales in the pre-period and better diversification for firms that had riskier portfolios in the pre-period.

In contrast, we do not find evidence that the decrease in volatility is stronger for firms

subject to greater capital market pressure. If concerns about investor risk perceptions prompted managers to reduce the volatility in their equity portfolios, the results should be stronger in firms with relatively larger equity portfolios, for which unrealized gain and loss volatility would likely be more significant. However, as noted above, we find that changes in portfolio volatility and Sharpe ratios are concentrated in firms with smaller, rather than larger, equity portfolios. One possible explanation is that managers of firms with larger equity portfolios already manage their portfolios more optimally. We also examine cross-sectional variation in our results for public firms based on the level of dedicated institutional ownership and analyst following, as low dedicated ownership (Bushee 1998, Bushee 2001) and higher analyst following are likely to be associated with greater capital market pressure. We do not find evidence that our results are associated with analyst following, and our results for dedicated institutional ownership suggest that firms under greater capital market pressure improve portfolio performance and have greater diversification in the post period, again inconsistent with costly actions and more consistent with a disciplining effect.

We also find no support for the compensation channel. Based on an examination of treatment firms' annual proxy statements in our sample period, we find that many firms amend the income-based performance targets in their compensation plans to explicitly exclude unrealized gains and losses on equity securities after ASU 2016-01. We find no evidence that changes in equity portfolio performance are stronger for firms that continue to include changes in the fair values of equity securities in their income-based performance targets in the post period.

We perform several additional analyses. First, we take advantage of the security-level granularity of insurance company data to perform a falsification test and find that volatility of equity securities for treatment firms would not have declined significantly if they had continued to hold the same equity securities in their portfolios that they held just prior to adoption, bolstering

our conclusion that firms changed the level of risk in their equity portfolios in response to the requirement to report unrealized gains and losses in net income. Second, we corroborate that our results are not driven by the effect of ASU 2016-01 on regulatory capital, as we find that the decrease in volatility is not significantly different for firms with low regulatory capital.

Finally, we examine whether the decrease in risk taking in the equity security portfolio has spillover effects in other areas of adopting firms' businesses. Coordinated risk management theory (Schrand and Unal 2002) suggests that firms are likely to allocate risk among multiple risk sources in order to achieve an overall desired risk level. To the extent that reducing risk in the equity portfolio reduces a firm's overall level of risk and return below a desired level, they may compensate by increasing risk in other areas of their business. However, while we find a decrease in the risk of the equity portfolio, we do not find a decrease in return, making the question of whether we should expect any compensating spillover effects unclear. Nevertheless, we test for changes in underwriting and operational activities as well as changes in other areas of the investment portfolio. We find no evidence of spillover effects.

This paper makes several contributions that should be of interest to standard setters, preparers, regulators, and academics. First, it contributes to the long-running debate about whether fair value changes should be included in net income by showing that doing so can have real effects on firms' investment choices. While prior accounting research has examined the effect of fair value measurements on firms' investment choices (Beatty 1995, Hodder, Kohlbeck and McAnally 2002), we contribute to this literature by examining the effect of recognizing fair value changes in net income versus outside net income in a setting where assets are *already* reported at fair value rather than a setting where there is also a change in measurement basis, such as around the adoption of SFAS 115. Further, prior studies in banking suggest that the effect of recognizing financial assets

at fair value on investment choices operates through the impact of changes in fair value on regulatory capital (Beatty 1995, Hodder, Kohlbeck and McAnally 2002, Chircop and Novotny-Farkas 2016, Khan 2019). Because the treatment of fair value changes in regulatory capital does not change in SAP, we provide evidence on the effect of reporting fair value changes in net income in the *absence* of a regulatory capital channel.

Second, while there is debate about whether standard setters should consider the real effects of accounting standards or consider only decision-usefulness (Leisenring 1990), Beatty (2007) notes that studies on real effects struggle to provide evidence on whether these effects are desirable or undesirable. We provide not only evidence of the existence of real effects, but our results for tests of the risk-perception channel, compensation channel, and disciplining channel also suggest that ASU 2016-01 had a disciplining (i.e., desirable) effect on equity portfolio management among some affected firms. This result contrasts with experimental and analytical findings in other studies on the effect of recognizing fair value changes in net income that suggest that managers will make sub-optimal decisions to mitigate the effect of income volatility resulting from recognizing fair value changes in income (e.g., Chen, Tan, and Wang (2013), Kanodia and Venugopalan (2023)). Further, our paper answers the call of Kanodia and Venugopalan (2023) for empirical research examining "changes in a firm's investments and risk management activities following new accounting mandates that increase the volatility of income."

Third, our paper contributes to a growing stream of research using the ASU 2016-01 setting (McGregor 2021, Campbell, et al. 2022, Amornsiripanitch, et al. 2022, Kim, et al. 2024). These studies focus primarily on capital market consequences and the decision-usefulness of earnings after adoption, and Amornsiripanitch et al. (2022) and Kim et al. (2024) also examine changes in equity portfolio levels. We contribute to this literature by leveraging security-level data for

insurance companies to construct measures of equity investment risk and performance at the portfolio level in order to study changes in investment choices as well as the mechanism for these changes. Kim et al. (2024), who study only public firms, conclude that firms with larger equity portfolios increased risk-taking after ASU 2016-01 adoption. In contrast, our tests of the disciplining channel suggest that this is likely driven by a decrease in risk-taking by public firms with smaller equity portfolios rather than an increase in risk-taking by firms with larger portfolios.

We believe that the results of our study have implications for a broad range of standard setting issues where the question of whether items should be included or excluded from net income is debated. For instance, the recent regional banking crisis has again raised the question of the appropriateness of allowing firms to either not recognize changes in the fair values of securities or recognize them outside of the income statement.[5,6] While standard setters and academics have argued that including fair value changes could make financial statements better reflect underlying economics, preparers have repeatedly pushed back against efforts to include fair value changes in net income, arguing that they result in "unnecessary" volatility. We do not address the decision-usefulness of including fair value changes in earnings and therefore do not argue that it is always preferable. However, our results suggest that doing so can have beneficial real effects.

The paper proceeds as follows. Section 2 provides background and develops our hypotheses. Section 3 describes our research design and empirical setting. Section 4 discusses our results. Section 5 provides additional analysis. Section 6 concludes.

[5] https://tax.thomsonreuters.com/news/silicon-valley-banks-failure-sparks-speculation-that-fasb-accounting-rules-for-held-to-maturity-debt-securities-should-be-revised/

[6] Also demonstrating that the question of what should and should not be included in net income is likely to recur in the future, participants in a roundtable conducted as part of the FASB's post-implementation review process for the Current Expected Credit Loss Standard questioned whether the new model resulted in decision-useful volatility in net income or whether some portion of credit loss allowance estimates should be recorded outside the income statement in OCI. Similarly, at a May 4, 2022 FASB Board Meeting, the board debated whether goodwill amortization should be included in net income or OCI.

2. Background and Hypothesis Development

2.1 THE DEBATE ABOUT HOW TO REPORT FAIR VALUE CHANGES

The extent to which assets and liabilities should be measured (or re-measured) at fair value has long been an area of discussion and debate amongst accountants (Laux and Leuz 2009). An important part of this debate has been how to account for *changes* in the fair values of assets and liabilities that are periodically re-measured at fair value. For roughly the first four decades of its existence, the SEC strongly opposed upward revaluations of assets from cost basis due to a belief that inflated asset values had contributed to overvaluation of stocks in the 1920's and the subsequent stock market crash of 1929 (Zeff 2007). This anti-fair value sentiment persisted until the 1970's, when high levels of inflation caused the SEC and others in the accounting profession to question the usefulness of historical costs during times of unstable prices.

Over the last several decades, the SEC and standard setting bodies have pushed for greater use of fair value measurements, particularly for financial assets and liabilities, contending that fair values provide more decision-useful information to financial statement users (Hodder, Hopkins and Schipper 2013). SFAS 115, issued by the FASB in 1993 in the wake of the savings and loan crisis of the late 1980's and early 1990's, created three categories of securities—trading, available-for-sale ("AFS"), and held-to-maturity ("HTM")—that required classification of securities based on management's intent regarding each security's disposition rather than based on its characteristics.[7,8] HTM securities were measured at cost, with downside re-measurement required only in the event that a decline in fair value was deemed to be "other-than-temporary" (OTTI).

[7] SFAS 12, issued in 1975, required that marketable securities be carried at the lower of cost or market value. However, this standard did not apply to all investment securities (e.g., debt securities) and did not allow for upward re-valuations in the event market values exceeded cost. Downward revisions were recorded against stockholders' equity and not included in net income unless a decline in value was deemed to be other-than-temporary. Similarly, SFAS 65 required mortgage loans and mortgage-backed securities held for sale to be carried at the lower of cost or market.
[8] SFAS 107, issued in 1991, required *disclosure* of fair values of financial instruments but not recognition.

Both trading and AFS securities were measured at fair value at each measurement date, however the treatment of changes in fair values differed between the two categories. Changes in the value of trading securities were recognized in net income while changes in fair values of available-for-sale securities were recognized equity via OCI.

The different treatments of changes in the fair values of securities classified as trading *versus* those classified as available-for-sale highlight one of the key concerns consistently expressed by financial statement preparers about recognizing changes in fair values in net income. Specifically, preparers often argue that including fair value changes in net income creates volatility in net income that is not useful to investors and other capital providers that are interested in understanding and forecasting a firm's "core" earnings.[9] During the financial crisis of 2007-2009, the FASB responded to concerns that OTTI charges recorded in net income contained large liquidity discounts by issuing EITF SFAS 115-2, which permitted firms to record the non-credit component of an OTTI charge in OCI rather than net income.

Since the financial crisis, the FASB has proposed new standards that would increase the use of fair value measurements in financial reporting. In 2013, the FASB in 2013 issued an exposure draft regarding the accounting for financial instruments that ultimately resulted in the issuance in January 2016 of ASU 2016-1, *Financial Instruments—Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities*. For public business entities (PBEs), this update became effective for fiscal years beginning after December 15, 2017. ASU 2016-1 requires, among other things, that equity investments (except those accounted for under the equity method of accounting or those that result in consolidation of the investee) be measured at fair value with changes in fair value recognized in net income. This guidance

[9] Further, banks argued that reporting fair value changes of only certain assets in income but not related liabilities resulted in net income volatility that did not reflect actual economic volatility. See paragraph 55 of SFAS 115.

supersedes SFAS 115.

The FASB argued that, because the value of available-for-sale equity investments will ultimately be realized through sale of the investments, recognizing changes in fair value in net income provides users with more relevant and decision-useful information. In contrast, the value of debt instruments can be realized through collection of interest and principal. The FASB has received industry resistance to the requirement to recognize fair value changes in net income. In a high-profile example, Warren Buffett, CEO of conglomerate Berkshire Hathaway, described net income after the adoption of ASU 2016-01 as "worse-than-useless" in his letter to shareholders discussing results for 2023, noting the extreme volatility in earnings resulting from changes in the values of equity securities.[10] In comment letters received prior to issuance of ASU 2016-01, some stakeholders favored allowing an entity's investment strategy and its plan on how to realize value from an equity security to determine whether the changes in the fair value of the investment should be presented in net income or in OCI. For example, a comment letter from The Hartford Financial Services Group states that:

> *"the model can be improved by allowing entities to align the recognition and measurement of financial assets in a way that better reflects the way the assets fit within the asset and liability management of and overall accounting for the entity."*

Similarly, Allstate argues that:

> *"We believe the business model should be the determining factor for [classification and measurement] so that financial assets managed under the same business model are accounted for consistently. For example, Allstate does not manage equity securities through a trading portfolio; rather, they are managed to mirror an index where securities are infrequently removed from the*

[10] https://www.berkshirehathaway.com/letters/2023ltr.pdf

index and thus we do not believe the business model used to manage equities would be faithfully represented if all equities are reported at FV-NI. Also, given periodic market trends, equity volatility could be as large as 10%-20% in any given quarter. We do not see the relevance to an investor of reporting periodic mark to market changes in earnings when financial instruments are not managed under a business model whose objective is to capture short-term changes in value."

2.2. PRIOR RESEARCH ON FAIR VALUE MEASUREMENTS

As discussed above, opposition to the use of fair value measurements has typically been on the grounds that (1) fair values are not relevant for assets an entity does not intend to sell, (2) fair values in some cases cannot be measured with sufficient reliability, and (3) re-measurement of certain financial assets and liabilities results in uninformative volatility in net income when changes must be recorded in earnings. The debate about the merits of fair value as a measurement basis has spurred a large literature in accounting.[11] Most studies focus on the first two concerns expressed by opponents of measuring assets at fair value: relevance and reliability. Most closely related to our study, several prior studies find that the fair values of investment securities are significantly associated with firm market values, implying that fair values, at least of investment securities, are relevant and sufficiently reliable (Barth 1994, Barth, Beaver and Landsman 1996, Eccher, Ramesh and Thiagarajan 1996, Nelson 1996).

Fewer studies focus on the third criticism of fair value measurements: that including fair value changes in net income results in "excessive" volatility in net income. Those that do generally focus on whether reporting fair value changes in net income vs. OCI improves or degrades net income as a summary performance measure. For instance, Dhaliwal, Subramanyam, and Trezevant

[11] The bulk of the pre-financial crisis of 2007-2009 literature is surveyed by Holthausen and Watts (2001) and Barth, Beaver, and Landsman (2001), while Laux and Leuz (2009) discuss the debate about the use of fair value measurements that arose during the financial crisis.

(1999), conclude that income including changes in the fair value of marketable securities better summarizes firm performance than income excluding such adjustments. Experimentally, Hirst, Hopkins, and Wahlen (2004) find that including fair value changes of financial instruments in net income helps bank equity analysts distinguish banks based on their level of interest rate risk. Hodder, Hopkins, and Wahlen (2006) find that "full-fair-value income" (which includes changes in the fair values of all financial instruments), while significantly more volatile, reflects the effects of value-relevant risk factors that are not fully captured by net income or comprehensive income. They conclude that full-fair-value income may better reflect the risk profile of banks.

A number of studies examine how carrying assets and liabilities at fair value affects firms' investment decisions. Focusing on the accounting for derivatives, some studies suggest desirable effects of reporting assets at fair value, while others suggest undesirable effects. For example, Zhang (2009) finds that the requirement to carry derivatives at fair value and report the ineffective portion of cash flow hedges in earnings prompted better risk management by firms that had been engaging in speculative derivate trading. Conversely, Lins, Servaes, and Tamayo (2011) surveyed a sample of international CFOs and find that the requirement to include derivative instruments on the balance sheet and report them at fair value affected their decision to engage in hedging activity.[12] In an experimental setting, Chen, Tan, and Wang (2013) find that reporting changes in the fair value of derivatives instruments used in hedging activities in net income results in managers making suboptimal hedging decisions. Their second experiment is related to our research question, as they find that suboptimal hedging decisions are mitigated when net income excludes fair value changes of derivative instruments.

[12] While this study informs the debate on the effects of fair value accounting, it is an examination of the effects of not merely reporting derivatives at fair value but reporting them in the financial statements at all. Similarly, Amir, Guan, and Oswald (2010) find that recognizing pension liabilities on the balance sheet with changes reported in OCI prompts firms to shift investment holdings away from equity securities toward debt securities.

Focusing on the banking industry, Beatty (1995) studies changes in banks' investment portfolios after the adoption of SFAS 115 and finds that banks decreased their holdings of investment securities and decreased the average duration of their investment portfolios.[13] Similarly, Hodder, Kohlbeck, and McAnally (2002) find that banks with lower regulatory capital levels reduced the size and riskiness of their investment portfolios. Moreover, banks classified too few securities as available-for-sale in order to mitigate the impact of SFAS 115 on the volatility of their regulatory capital. While these studies suggest that measuring assets at fair value versus historical cost can affect firms' investment choices, they find this in a setting where the accounting change affects regulatory capital. Whether firms adjust their investment choices in the *absence* of an effect on regulatory capital remains an empirical question.

2.3 HYPOTHESIS DEVELOPMENT

The industry resistance to ASU 2016-01 shows that preparers were concerned with a potential increase in the volatility of net income driven by the recognition of fair value changes of equity securities. However, it is an empirical question as to whether these concerns are significant enough that they would lead firm managers to modify their investment choices. On the one hand, recognizing fair value changes in net income rather than in OCI does not fundamentally change the economics of a firm, and deviations from prior investing and operating strategies may be costly. In comment letters, preparers opposed to recognizing fair value changes in income often cited the use of equity investments as part of their long-term risk management strategy. Thus, managers may not do anything in response to the requirement to recognize fair value changes in net income.

On the other hand, there are reasons why recognizing fair value changes in income could

[13] Beatty (1995) also finds that banks that have previously sold securities to manage earnings and regulatory capital classify a higher proportion of securities as AFS after adoption of SFAS 115, consistent with a desire to continue engaging in selective security sales. However, her results do not address whether prior excess security sales explain the change in portfolio holdings in terms of level and average duration.

affect firms' operational or investment decisions even in the absence of an effect on regulatory capital. We discuss three potential channels: a disciplining channel, a risk-perception channel, and a compensation channel.

The disciplining channel predicts that including unrealized gains and losses in net income causes managers to more closely manage the risk in their equity portfolios, resulting in improved performance. It is often said that "what gets measured gets managed."[14] The inclusion in "bottom-line" net income of changes in the fair values of equity securities could make the volatility of these investments more salient to firm managers. This could lead managers to place greater focus on equity investment volatility and result in more careful management of the equity portfolio. For example, Zhang (2009) finds that firms purchasing derivatives for speculative purposes "engage[d] in more prudent risk-management activities" after adoption SFAS 133, which required the ineffective portion of hedge instruments to be recognized in net income. Similarly, including fair value changes in net income could have a disciplining effect on management.

The next two channels both predict that managers make costly, value-reducing investment choices in order to reduce the volatility in reported net income. That is, a desire to reduce volatility causes managers to behave myopically. Regarding the risk-perception channel, while prior research finds that unrealized gains and losses are associated with stock returns after being disclosed pursuant to SFAS 130 (Chambers, et al. 2007, Jones and Smith 2011), prior research also suggests that financial statement presentation can affect investors' responses to and perceptions of the persistence of earnings components (e.g., Atwood and Reynolds (2008); Bartov and Mohanram (2014); Luo, Shao and Zhang (2018)). Including fair value changes of equity securities in net income may cause investors to overestimate their persistence and thus overreact

[14] This saying is often attributed to former NYU and Claremont professor of management Dr. Peter Drucker.

to them, consistent with the findings of Amornsiripanitch et al. (2022). The notion that managers may wish to limit earnings volatility is also supported by the survey evidence in Dichev, Graham, Harvey, and Rajgopal (2012), who find that CFOs have a strong preference for reporting "sustainable" accounting earnings. Further, while some argue that volatility resulting from recognizing changes in fair values reflects economic (or "inherent") volatility that should be reflected in financial statements (Barth 2004, Hodder, Hopkins and Wahlen 2006), managers may view this as volatility that obscures "true" or sustainable underlying performance and make it more difficult to investors to forecast a firm's future cash flows. Barth (2004) discusses (but does not endorse) this concern of opponents of fair value measurements, who contend that the market price of assets with high inherent volatility on a particular date may not be predictive of their future value and hence could mislead financial statement users by creating "artificial" volatility.

For the risk-perception channel, it is not critical that including fair value changes in net income *actually* results in increased risk perceptions of investors or investors overestimating the persistence of these changes. It is only necessary that managers are concerned that these things *could* happen. A recent analytical study by Kanodia and Venugopalan (2023), however, argues that managerial concerns about accounting-induced volatility in income could be justified because, even if it is decision-useful to outsiders, increased volatility could magnify the volatility of a firms fundamentals. In their model, an *ex post* requirement to provide information about a risky asset will affect an outsider's decision (e.g., an investor or customer) to purchase from a firm, which in turn increases the *ex ante* volatility of the firm's wealth. This is due to the two-way interaction between firms and outsiders that can make increases in risk perceptions self-fulfilling. In our setting, recognizing fair value changes in net income could make net income more decision useful

but also increase the *ex ante* volatility of firms' underlying fundamentals.[15] To mitigate this, managers may respond by decreasing the riskiness of the assets they hold.

Regarding the compensation channel, managers may be concerned that including fair value changes in net income will affect their performance assessments and potentially their compensation. For instance, Maines and McDaniel (2000) find, in an experimental setting, that financial statement presentation of fair value changes of AFS securities can affect non-professional investors' judgments about management performance. Specifically, they find that including these changes in a performance statement causes investors to weight them more heavily than if they are included in the statement of stockholders' equity, though it does not affect whether they acquire information about the changes. Managers may be concerned that including fair value changes in net income will affect perceptions of their performance.

Further, net-income-based measures are often used as benchmarks in management compensation contracts, and the usefulness of earnings components in setting CEO compensation and evaluating management performance may be affected by their persistence and controllability. A large literature finds that accounting earnings play an important role in determining executives' cash compensation (e.g., Natarajan (1996); Gaver and Gaver (1998); Baber, Kang and Kumar (1998)). Sloan (1993) suggests that earnings are used in compensation contracts of top executives because the use of equity compensation alone would expose their compensation to market-wide volatility that is beyond their control. Arya and Nagar (2021) find that the persistence and controllability of different earnings components affect their weighting by compensation

[15] Kanodia and Venugopalan (2023) show that this effect is stronger when (a) the public information is more precise and (b) when outsiders have a greater need to assess a firm's wealth. In our setting, the increased volatility is highly precise, as it relates to the fair value of equity securities, and understanding the financial health of insurance companies is important to assessing their ability to pay current and future claims.

committees in setting management compensation contracts but that CEOs are only shielded from income-decreasing earnings components in the case of extraordinary items.[16] While fair value changes may be less persistent than other earnings components and are, at least partially, uncontrollable,[17] managers for whom fair value changes affect performance benchmarks may have an incentive to decrease the riskiness of their equity portfolios for fear that volatility related to uncontrollable fair value changes may harm their performance compensation.

While it is plausible that the issuance of ASU 2016-01 had no effect on firms' investment choices as noted above, we expect that firms will take actions consistent with their opposition in the standard setting process, as was the case around SFAS 115. Thus, to decrease the impact of ASU 2016-01 on earnings volatility resulting from the recognition of fair value changes of equity investments in net income, we expect firms to reduce the riskiness of their portfolio of equity investments. This leads to our hypotheses:

H1: After adoption of ASU 2016-01, affected firms decrease the risk of their equity security portfolios.

H2: After adoption of ASU 2016-01, affected firms have lower volatility in unrealized gains and losses in their equity security portfolios.

3. Research Design

3.1 SETTING

To test our hypotheses, we examine changes in the equity investment portfolios of P&C insurance companies after the implementation of ASU 2016-01, which became effective for fiscal years beginning after December 15, 2017. Despite the FASB's passage of ASU 2016-01, the NAIC,

[16] Similarly, Dechow, Huson, and Sloan (1994) find that executive compensation is shielded from restructuring charges even when such charges are not specifically addressed in compensation contracts.

[17] While managers can control the extent of fair value changes *ex ante* by their selection of assets, they cannot control fair value changes *ex post*. Further, even prudent *ex ante* investment decisions can result in poor outcomes.

which sets Statutory Accounting Principles (SAP) for all insurance companies, rejected adoption of the provisions of ASU 2016-01, including the requirement to record changes in the market value of equity securities in net income, into SAP. Thus, both publicly traded insurance companies (including insurers with publicly traded parents) and private insurers (including insurers with privately held parents) continue to recognize changes in the value of equity securities directly in equity for regulatory reporting purposes, including the determination of regulatory capital. However, publicly traded insurance companies also include changes in the fair value of equity securities in net income in their GAAP financial statements after the adoption of ASU 2016-01.[18] This is a key feature of our research setting.

Our set of treatment firms thus consists of P&C insurance companies that are part of a group with a publicly held parent company subject to reporting under U.S. GAAP in addition to SAP, and our set of control firms consists of insurance companies that are part of a group with a privately held parent company that is subject only to SAP and not U.S. GAAP. Unlike previous studies in the banking industry after the adoption of SFAS 115, neither the use of fair value accounting nor the treatment of fair value changes of equity investments for regulatory capital purposes changes from the pre- to post-period or between treatment and control firms. This setting helps us to isolate the effect of reporting fair value changes in income absent other confounding factors. We focus on P&C insurers because these firms hold relatively large equity security portfolios relative to other types of insurers. For instance, a report by the NAIC at the end of 2015

[18] We consider the possibility that some P&C insurers without a publicly traded parent may voluntarily produce financial statements following U.S. GAAP. While we believe that such firms would have less incentive to reduce income volatility due to an absence of scrutiny by outside shareholders and thus would still be valid controls, we examine the audit reports for a sample of our control firms to determine the basis used to prepare their financial statements. We find that a small subset of our control firms, primarily risk retention groups (RRGs) prepare U.S. GAAP financial statements. In untabulated analysis, we find that our results are robust to excluding such firms.

showed that the average P&C insurer held unaffiliated common stock portfolios making up 13% of cash and invested assets compared to 1% for life insurance companies and 4% for health insurance companies.[19] We believe this provides the most powerful setting for our tests.

3.3 RESEARCH DESIGN

Because we hypothesize that a decrease in the riskiness of equity security portfolios is driven by a desire to mitigate increased net income volatility due to recognizing fair value changes of equity securities in income, our primary measure of the riskiness of an insurer's common stock portfolio is overall portfolio return volatility (*Vol*). Specifically, we calculate the portfolio return volatility of insurer *i*'s common stock portfolio in quarter *q* as:

$$Vol_{iq} = \sqrt{\frac{\sum_d (PortfolioRet_{idq} - \overline{PortfolioRet_{idq}})^2}{Trading\ Days_q}} \quad (1)$$

$Trading\ Days_q$ is the number of trading days in quarter q. $PortfolioRet_{idq}$ represents the daily portfolio return for insurer *i* on day *d* in quarter *q*, which is calculated as:

$$PortfolioRet_{idq} = \frac{\sum_j Ret_{ijdq} \times MarketValue_{ijdq}}{\sum_j MarketValue_{ijdq}} \quad (2)$$

Daily return (*Ret*) is collected from CRSP for each stock *j*. To obtain the daily market value of each stock in an insurer's portfolio (*MarketValue*), we begin with stock holding data from the end of the prior quarter and use daily transaction information to construct insurers' daily common stock portfolio holdings. We then calculate *MarketValue* as the daily closing price multiplied by shares held by the insurer on that day. At least 30 daily observations are required in the estimation of *Vol*. Affiliated common stocks are excluded from our analysis because these investments are likely accounted for under equity method or consolidation and hence are not

[19] https://content.naic.org/sites/default/files/capital-markets-special-report-exposure-common-stock-2015.pdf

subject to ASU 2016-01.

We employ a difference-in-difference model to examine our hypotheses. To test H1, we estimate the following regression:

$$Vol_{iq} = \beta_0 + \beta_1 Treat \times Post + \sum_2^n \beta_n Control_{iq}$$

$$+ FirmFE + YearQuarterFE + \varepsilon_{iq} \quad (3)$$

In this regression, the treatment variable *Treat* is an indicator variable that equals one if an insurer itself or at least one of its direct or indirect parent firms is a public firm listed on NYSE, NASDAQ, or AMEX. *Post* equals one for observations in years after the adoption of ASU 2016-01 and zero otherwise.[20] The variable of interest is the interaction term *Treat*×*Post*, which captures the difference in the change of the common stock portfolio riskiness around the adoption of ASU 2016-01 between treatment and control insurers. We include firm and year-quarter fixed effects to control for time-invariant insurer characteristics and time-varying factors affecting all firms, such as overall market conditions, and hence the variable *Post* is omitted from the regression.

We follow prior literature to control for several insurer-level characteristics that are likely to be associated with insurers' investment risk (Che and Liebenberg 2017, Che, Liebenberg and Lynch 2021, Ge and Weisbach 2021). We control for the natural logarithm of total net admitted assets (*Size*). We include *ROA* to control for insurers' performance, which is the net income divided by total net admitted assets. We control for insolvency risk using the risk-based capital

[20] Recent research suggests that, after their passage, firms may not wait until their effective date to adopt new regulations such as accounting standards (Hendricks, et al. 2023). While early adoption may prevent firms from continuing to benefit from the existing regime, it can also allow firms to spread adjustment costs over time. However, we argue that early adoption of ASU 2016-01 is less likely than most other new accounting standards because it involved minimal adjustment costs. For instance, unlike standards such as the new lease accounting standard and current expected credit loss model, ASU 2016-01 required no significant change to accounting systems, and lowering equity portfolio risk could be done as part of relatively routine portfolio rebalancing. Nevertheless, we note that any potential anticipatory effects would bias against our finding significant results after adoption in Q1 2018.

ratio (*RBC*), which equals total adjusted capital divided by the authorized control level risk-based capital. Finally, we control for insurers' operating risks using three measures. *GeoCon* captures geographic concentration, which is calculated as the Herfindahl index of direct premiums written across 58 states and territories. *LineCon* denotes the Herfindahl Index of direct premiums written across business lines. *Long_tail* equals the percentage of direct premiums written on long-tail lines. To avoid extreme values affecting our results, we winsorize all continuous variables at the 1% and 99% levels. We estimate *t*-statistics using robust standard errors clustered at the group level (Ge and Weisbach 2021) to take into account the fact that investment decisions may not be independent within a group of affiliated insurers.

To more specifically examine the impact of ASU 2016-01 on net income volatility (H2), we calculate two measures of unrealized gain and loss volatility and compare the volatility of unrealized gains and losses on equity securities in the eight quarters pre- and post-adoption. The first measure is the volatility of the level of net unrealized gains and losses at the end of each quarter. We first calculate the unrealized gain or loss for each common stock as the difference between the quarter-end market value (i.e., the stock price obtained from CRSP multiplied by shares) and the cost of that stock investment. Next, we construct a variable *URGL* equal to the sum of unrealized gains and losses for all stocks held by a firm at quarter end divided by the total cost for all stocks and calculate *URGLVol* as the volatility of *URGL* in the eight quarters pre- and post-adoption.[21] We then keep one observation for each firm before and after the adoption of ASU 2016-01. The second is the volatility of fair value changes of equity securities (i.e., changes that would be included in earnings under ASU 2016-01) in both the pre-period and post-period. Quarterly fair value changes are not included in regulatory net income, but we estimate these fair

[21] Thus, in this test we exclude observations with missing quarters over the pre- or post-adoption period.

value changes as the sum each quarter of daily portfolio fair value changes, calculated as the daily portfolio return multiplied by the size of the equity portfolio at the beginning of each day. This dollar estimate of the quarterly fair value change, denoted *FVChange*, is then scaled by the portfolio size at the beginning of the quarter. We then calculate *FVChangeVol* as the volatility of *FVChange* in the eight quarters pre- and post-adoption. As we do for *URGLVol*, we keep one observation for each firm before and after the adoption of ASU 2016-01.

Using each measure of unrealized gain and loss volatility, we estimate the following regression:

$$FVVol = \beta_0 + \beta_1 Treat \times Post + \beta_2 Post + \sum_3^n \beta_n Control_i + Firm\ FE + \varepsilon_i \quad (4)$$

where *FVVol* is either *URGLVol* or *FVChangeVol*. We aggregate the control variables included in Equation (4) by calculating the mean of these variables in the pre- and post-adoption periods. We include firm fixed effects. We estimate t-statistics using robust standard errors clustered at the group level. A negative coefficient on the interaction term (β_1) is consistent with H2 that treated insurers decrease the volatility of unrealized gains and losses on common stocks after the adoption of ASU 2016-01. The definitions of variables are detailed in Appendix 1.

4. Results

4.1 DATA, SAMPLE SELECTION, AND SUMMARY STATISTICS

We obtain insurers' quarterly and annual statutory filing data from the Standard & Poor's Global Market Intelligence database (SPGMI). Specifically, we collect quarter-end and year-end stock holding information from SPGMI Insurance Investment Holdings Database and transaction data from SPGMI Insurance Investment Transactions Database. Financial information is from SPGMI Insurance Statutory Financials Database. We identify insurers' public status using the

detailed ownership information provided by Schedule Y of annual statements. We obtain data on stocks' daily return and price information from the Center for Research in Security Prices (CRSP) Database. Daily market return and risk-free rate are from WRDS Fama-French Portfolios and Factors Database. For the channel tests and additional analyses, we obtained institutional ownership data from Thomson/Refinitiv Institutional (13f) Holdings, analyst following data from I/B/E/S, bond characteristics and ratings from Mergent FISD, and bond returns from the Bond Return by WRDS database.

Our sample period spans the eight quarters before and after the adoption of ASU 2016-01 from the first quarter of 2016 to the fourth quarter of 2019. To construct our sample, we begin with all insurer-quarter observations for P&C insurers in SPGMI Insurance Statutory Financials Database and delete observations with missing values for independent variables in Equation (3). Next, to avoid insures' choice of going public or delisting confounding our result, we exclude insurers that change their public status during our sample period. Based on this sample, we retain observations holding at least one unaffiliated public common stock at the end of a quarter[22] and with at least 30 days of common stock portfolio returns in the quarter. We also delete insurers that only file annual financial statements because the information on quarterly stock holdings and transactions is unavailable. Bonacchi, Marra, and Zarowin (2019) suggest that private firms can be organized as a standalone entity or as a business group while public firms are de facto groups.[23]

[22] In untabulated analysis, we find that the observations without public common stock holdings tend to be less significant members of their insurance group. Specifically, 80.5 percent of these observations belong to a group, and the average total assets are $245,257 for these observations compared to $1,227,364 for insurers with public common stock holdings. Moreover, more than two thirds of the insurance groups that the non-holding insurers are affiliated with have at least one other group member holding public stocks in a quarter and remain in the sample after this step. These findings suggest that eliminating insurers without common stock holdings likely do not reduce the representativeness of our sample.

[23] Consistent with Bonacchi, Marra, and Zarowin (2019), we find that about 52.2% of the insurer-quarter observations without a public parent belong to an insurance group while nearly 98.5% of insurer-quarter observations with public parents belong to a group throughout the sample period.

Thus, to reduce heterogeneity in ownership structures between treatment and control firms, we exclude insurers that are not part of a group throughout the sample period. Finally, we drop insurers with only one observation throughout the sample period. Panel A of Table 1 describes the detailed sample selection process, and Panel B of Table 1 reports the distribution of the number of observations over our sample period. Our main sample contains 8,791 insurer-quarter observations. The number of observations in the channel tests and additional analyses may vary depending on the availability of additional data.

Panel A of Table 2 provides a comparison between the descriptive statistics of the treatment and control firms. On average, treatment firms tend to hold riskier stocks than control firms. Specifically, the mean (median) *Vol* of treatment firms is 0.99% (0.86%), greater than that of control firms, which is 0.81% (0.71%). In terms of other firm-level characteristics, treatment firms tend to be larger and more profitable. The mean *RBC* is higher for treatment firms, suggesting that these insurers have lower financial distress risks. In addition, treatment firms tend to be less concentrated in specific states or lines of business, indicating that treatment firms tend to have lower underwriting risks. Panel B of Table 2 provides the correlations of these variables.

4.3 HYPOTHESIS TESTS

Table 3 presents the results of tests of H1 from estimating Eq. (3). Columns (1) and (2) report results without firm fixed effects, excluding and including control variables, while fixed effects are included in Columns (3) and (4), again excluding and then including control variables. In all four columns, the coefficient on the interaction term *Treat*×*Post* is negative and statistically significant ($p<0.05$), supporting H1. The relative decrease in portfolio return volatility is 6.4 percent of the pre-period mean of 0.93% for treatment firms and thus also appears to be economically significant. Further, prior research suggests that stock market volatility changes over

time (e.g., Schwert (1989)). Because ASU 2016-01 was adopted during a time of relatively low market volatility,[24] the decrease in volatility we document may tend to understate the impact that these equity portfolio changes could have on portfolio return volatility (and the related impact on net income) during times of higher overall market volatility.

In Figure 1, we extend this analysis and assess the parallel trends assumption underlying difference-in-differences designs by plotting the coefficients from a model where we replace the *Post* indicator variable in the interaction term of Eq. (3) with quarterly indicator variables equal to one if the observation belongs to that quarter and zero otherwise on the interaction terms between *Treat* and the quarterly indicators. We find that six of seven coefficients for differences in portfolio return volatility are insignificant in the pre-period, including the five quarters prior to Q4 2017. In the post-period, we observe a shift downward in coefficients, with all eight being negative and six of eight being significant at the 10% level. Taken together, these results support H1 and indicate that, relative to the control firms, the portfolio volatility of the treatment firms decreases after the adoption relative to control firms.

The results of our test of H2 are presented in Table 4, both with and without control variables. In all columns, the coefficient on *Treat*×*Post* is negative and significant at the $p<0.05$ level, indicating that treatment firms exhibit significantly lower volatility of unrealized gains and losses on equity securities after the adoption. The relative decrease in *URGLVol* is 12.9 percent of the pre-period mean of 19.49% for treatment firms, and the relative decrease in *FVChangeVol* is 29.4 percent of the pre-period mean of 5.44% for treatment firms.[25] These results support H2 and

[24] In untabulated analysis, we find that the mean quarterly volatility of daily returns on the CRSP value-weighted index during our sample period of 0.74% was the lowest of any four-year period from 2008 to 2022. Volatility was 1.60% from 2008 to 2011, 0.78% from 2012 to 2015, and 1.26% from 2020 to 2023.

[25] The decrease in *FVChangeVol* translates into roughly 25% of pre-tax income, calculated by multiplying the coefficient on *Treat* × *Post* (0.016) by the average pre-period portfolio size for treatment firms ($650.51 million,

are consistent with these firms mitigating increased net income volatility due to recognizing fair value changes in earnings by decreasing their equity portfolio risks.

The descriptive statistics in Table 2 suggest that the treatment and control insurers differ on various firm-level characteristics. While we include control variables in all our analyses to account for these differences, we also find that our results for tests of H1 and H2 are robust to an entropy balancing approach (Hainmueller 2012) that balances the means of our control variables between treatment and control firms.

Overall, these results support our hypotheses that affected firms decrease the risk of their equity portfolio after the adoption of ASU 2016-01, thereby reducing the volatility of unrealized gains and losses on equity securities that flow through net income in the post period.

4.4 CHANNEL TESTS

In Section 2.3, we discuss three potential channels through which ASU 2016-01 could motivate managers to decrease the riskiness of their equity portfolios: a disciplining channel, a risk-perception channel, and a compensation channel. While all these channels could exist simultaneously, in this section, we examine several dimensions of portfolio performance and conduct cross-sectional analyses to try to provide insight on which are most likely to drive the decrease in volatility we find for treatment firms after the adoption of ASU 2016-01.

We begin by examining changes in several measures of portfolio performance as well as changes in measures of systematic and idiosyncratic risk. The disciplining channel predicts that inclusion of unrealized gains and losses in earnings motivates managers to better and more carefully manage their equity portfolios, resulting in improved portfolio performance. The risk-

untabulated) and dividing by average pre-tax income for treatment firms in the pre-period ($42.33 million, untabulated).

perception and compensation channels, on the other hand, theorize that managers will make costly, myopic investment decisions in order to reduce net income volatility, resulting in portfolios with either a less-optimal level of risk and return or potentially less-efficient portfolio performance.

To measure performance, we begin with portfolio Sharpe ratios (Sharpe 1966), calculated as the ratio of a portfolio's mean return to its standard deviation. A higher (lower) Sharpe ratio indicates higher (lower) return relative to the level of volatility. Next, we examine changes in the information ratio, calculated as the alpha from the Fama-French five-factor model (Fama and French 2015) relative to the standard deviation of the model residuals. Information ratios are used in evaluating active mutual fund managers by comparing a portfolio's average excess returns relative to a benchmark portfolio to the volatility of those excess returns, with higher information ratios suggesting better stock selection (Goodwin 1998). We also examine changes in portfolio returns and portfolio alphas estimated from the Fama-French five-factor model.

To examine changes in systematic and idiosyncratic risk, we estimate market betas as well as betas for the factors in the Fama-French five-factor model. Because factor betas reflect exposure to long-short portfolios and can be therefore be positive or negative, we examine changes in their absolute values. An increase (decrease) in the absolute value of the factor beta indicates more (less) exposure to that factor.[26] To measure idiosyncratic risk, we use the volatility of the residuals from the five-factor model as well as two measures of portfolio diversification—normalized variance, calculated as the ratio of the variance of daily returns of the quarter-end portfolio to the average variance of the daily returns of individual stocks in the quarter-end portfolio, and squared portfolio weights, calculated as the sum of the squared weights of each portfolio stock (Goetzmann and

[26] For example, a portfolio heavily invested in large-cap stocks would have a negative SMB beta, and greater diversification by investing in small caps would decrease exposure to this risk factor and drive the beta closer to zero.

Kumar 2008). Lower values of these measures indicate *greater* diversification and thus lower idiosyncratic risk.

The results of our tests of portfolio performance, exposure to systematic risks, and idiosyncratic risk are presented in Table 5. For the full sample, we find a marginal increase in the Sharpe ratios of treatment firms relative to controls firms in the post period, as well as reduced exposure to both systematic and idiosyncratic risks. Results of five-factor betas show a significant decrease in market betas as well as exposure to the size and profitability risk factors. The decrease in overall volatility found in Table 3 combined with no significant change in portfolio returns, resulting in higher Sharpe ratios, suggests that rather than making less-optimal investment decisions in response to recognizing unrealized gains and losses in earnings, firms are making better investment decisions, consistent with the disciplining channel and inconsistent with the risk-perception and compensation channels.

In Table 6 through Table 8, we perform cross-sectional analyses intended to get more directly at the disciplining, risk perception, and compensation channels.

4.4.1 The Disciplining Channel

The disciplining channel predicts that recognition of unrealized gains and losses on equity securities in net income promotes more prudent risk management in the equity portfolio. If the disciplining channel explains changes in managers' investment choices, then we would expect our results to be stronger in firms that manage their own equity portfolios rather than outsourcing management to a third-party as well as in firms that were taking greater risks in their portfolios prior to adoption of ASU 2016-01, when changes flowed through OCI.

We first examine how our results vary based on whether portfolio management is conducted in-house versus outsourced to a third-party investment manager. A 2019 report by the

NAIC's Capital Markets Bureau found that 51% of insurers outsource management of at least a portion of their investment portfolios. Of these, 60% were P&C insurers. According to the report, "U.S. insurers have been seeking yield pick-up in nontraditional investments due to the continued low yields on fixed income investments. The complexity of these nontraditional investments has caused some U.S. insurers to consider outsourcing all or some of their investment management capabilities."[27] Kim, Leverty and Schmit (2018) examine the use of investment advisers in the life insurance industry and find that insurers experience improved investment returns after switching from in-house management to external management. We conjecture that if ASU 2016-01 affects investment choices through a disciplining channel, then the effect is likely to be stronger for firms that manage their portfolios in-house than for firms that pay external managers for their portfolio management expertise.

To test whether in-house or outsourced management affects our results, we take advantage of data on outsourced investment management from the "General Interrogatories" section of insurers' annual statutory filings available on SPGMI. We create an indicator variable, *InHouse*, that we set equal to one if an insurer indicates "No" for the question whether the company outsources management of at least 10% of their assets to unaffiliated third parties in the 2017 filing, and zero otherwise. The results for tests of in-house investment management are presented in Panel A of Table 6 and provide support for the disciplining channel. We find that the decrease in volatility in the post period is concentrated among firms that manage their portfolios in-house. The coefficient on the interaction term *Treat* × *Post* × *InHouse* indicates a 17.3% decrease in volatility from the pre-period mean of 0.98% for these firms (untabulated).[28] We find that the decrease in

[27] https://content.naic.org/sites/default/files/capital-markets-special-reports-IM-Outsourcing-YE2020.pdf

[28] For comparison, the volatility of the value-weighted index on CRSP (as measured by the standard deviation of daily returns) increased 26% in the three months after compared to the three months before the onset of COVID-19 lockdowns in the U.S. on March 15, 2020, an event that created a substantial amount of market uncertainty.

volatility is driven by a reduction in both systematic risk exposures and idiosyncratic risk through greater portfolio diversification. We also find that the increase in Sharpe ratios in the post period for the full sample obtains only for firms with in-house portfolio management, as the coefficient for *Treat*× *Post* is not statistically different from zero, but the combined coefficient for *Treat*× *Post* and *Treat* × *Post* × *InHouse* is marginally positive. We also find that information ratios are higher in the post period for firms managing their portfolios in-house relative to those that outsource.

We also examine two proxies of pre-adoption risk taking, as the disciplining channel should be stronger for firms engaging in greater risk taking prior to adoption. Specifically, we split our sample based on average pre-period volatility in the equity portfolio as well as based on the extent of unrealized gains on sales of securities in the pre-period. The latter is based on prior research in insurance and banking that finds that some firms engage in gains trading (i.e., selective sales of securities in large unrealized gain positions to boost net income) to manage earnings (Ellul, et al. 2015, Barth, Gomez-Biscarri, et al. 2017). If a firm wished to engage in gains trading, it could hold more volatile securities in the equity portfolio to increase the likelihood that some positions would have large unrealized gains that could be realized on sale, which could result in portfolios with an inefficient level of volatility relative to return. ASU 2016-01 eliminates the ability to engage in gains trading by requiring quarterly marking to market of securities through net income regardless of whether they are sold.

In Panel B of Table 6, *HighPreVol* takes a value of 1 for firms with above-median average equity portfolio volatility in the pre-period and 0 otherwise. In Panel C, *HighPreGains* takes a value of 1 for firms in the top decile of realized gains on sales in of equity securities in the pre-period, and 0 otherwise. In Panel B, while the triple interaction term *Treat* × *Post* × *HighPreVol*

is only significantly different from zero in column (8) for the size factor, we find that the decrease in idiosyncratic risk is statistically significant at the 10% level only among firms with high pre-period equity portfolio volatility (the p-value for the increase in Sharpe ratios for firms with high pre-period volatility is just outside the conventional 10% level for statistical significance). In Panel C of Table 6, we find that improvement in portfolio performance is stronger in firms that were realizing more significant realized gains from selling securities in the pre-period. The coefficient for the triple interaction *Treat* × *Post* × *HighPreGains* is significantly positive for the Sharpe ratio, information ratio, returns, and five-factor alpha. We also find that the decreases in market beta and idiosyncratic risk are significantly negative only for firms with high pre-period gains by combining the coefficient for *Treat* × *Post* with the coefficient *Treat* × *Post* × *HighPreGains*.

Taken together, the results in Table 6 suggest that ASU 2016-01 had a disciplining effect on firms' investment choices, as the results are strongest among firms that manage their own portfolios and those that were taking greater risk in the pre-period.

4.4.2 The Risk-Perception Channel

The risk-perception channel predicts that managers sub-optimally decrease portfolio volatility due to concerns that investors will penalize them for increased earnings volatility. Consequently, if the risk-perception channel explains changes in managers' investment choices, then we would expect our results to be stronger in firms subject to greater capital market pressure. We therefore examine cross-sectional variation in our results based on three proxies of capital market pressure: equity portfolio size, the level of dedicated institutional ownership, and extent of sell-side analyst following. For firms with larger equity portfolios, unrealized gains and losses will be more material to overall net income, and thus risk-perception concerns should be greater. Further, prior literature theorizes that capital market pressure can incentivize firm managers to

myopically focus on near-term earnings at the expense of long-term firm value (Bushee 1998, Bushee 2001, Porter 1992) and that this pressure is greater to the extent that investors are not "dedicated" investors committed to providing long-term capital. Finally, a large literature suggests that firm managers are under significant pressure to meet or beat market expectations, such as analyst earnings forecasts (e.g. Jensen (2005), Graham, Harvey and Rajgopal (2005)).

The results for tests of the risk-perception channel are presented in Table 7. In Panel A, we examine differences in our results based on the relative size of the equity portfolio. The variable *EquityHigh* takes a value of 1 for firms with an above-median weighting of equity securities as a percent of total assets in 2017. Inconsistent with the risk-perception channel, we find that the decrease in the volatility of the equity portfolio holds only for firms with *smaller*, rather than larger, equity portfolios. The coefficient on the interaction term *Treat* × *Post* indicates a 13.3% decrease in volatility from the pre-period mean of 1.05% for these firms (untabulated). Further, we find no significant difference between firms with larger portfolios relative to smaller portfolios in terms of portfolio performance or portfolio diversification measures. Importantly, the increase in the Sharpe ratio is found in firms with smaller equity portfolios and is not stronger for firms with larger equity portfolios, as the coefficient for the interaction term *Treat* × *Post* is significantly positive, while the coefficient for the triple interaction *Treat* × *Post* × *EquityHigh* is negative but not statistically significant. We find that exposures to the value factor (HML) and the investment factor (CMA) increase rather than decrease for treatment firms with larger equity portfolios in the post period, inconsistent with the risk-perception channel.

In Panels B and C, we examine cross-sectional variation in changes in portfolio performance and risk based on the level of dedicated institutional ownership and sell-side analyst

following, respectively.[29] Because these variables are available only at the parent level for treatment firms, we include only treatment firms in these analyses. In Panel B, we gather data on institutional ownership and classify them as "transient," "quasi-indexer," and "dedicated" following Bushee (1998, 2001).[30] *LowDED* takes a value of 1 for firms with below-median shares held by dedicated institutional investors as a percentage of shares outstanding and thus captures firms with relatively more transient and quasi-indexer institutional ownership. In Panel C, *HighFollowing* takes a value 1 if a firm has above-median sell-side analyst following, as determined from data in the IBES summary file.

In Panel B, the results for low dedicated institutional ownership and high analyst following are generally inconsistent with the risk perception channel. Firms with lower dedicated institutional ownership do not decrease portfolio volatility in the post period relative to other treatment firms; they increase portfolio diversification based on two of the three diversification measures; and they have improved portfolio performance in the form of higher Sharpe ratios and information ratios as well as higher raw returns and five-factor alphas. Rather than the being consistent with costly portfolio changes as a result of concerns over investor risk perceptions, this pattern of results suggests improved portfolio performance for firms with greater capital market pressure consistent with the disciplining channel. In Panel C, results for firms with high analyst following are generally insignificant except for a marginal decrease in market betas and overall provide no real support for the risk-perception channel.

Taken together, the results of our cross-sectional tests based on measures of capital market

[29] For our three tests requiring parent-level data (i.e., cross-sectional tests based on parent institutions ownership, analyst following, and management compensation), we manually match subsidiary firms to public companies in the Compustat universe based on CIK and company name in Schedule Y.

[30] We thank Brian Bushee for making his institutional investor classification data available on his personal website: https://accounting-faculty.wharton.upenn.edu/bushee/.

pressure do not provide support for the risk-perception channel and instead provide more evidence consistent with the disciplining channel.

4.4.3 The Compensation Channel

Next, we examine the compensation channel by gathering data on the inclusion of fair value changes of equity securities in performance measures used in management compensation. We hand collected data from the CD&A of 45 publicly traded parents of the treatment insurers in our sample. The results are presented in Panel A of Table 8. Of these 45 companies, 12 did not include an income-based performance benchmark or exclude fair value changes on equity securities in their incentive compensation plans for management in the pre- and post- period. Of the remaining 33 parents, 11 modified their income-based performance benchmarks in 2018 or 2019 to explicitly exclude changes in the fair value of equity securities after the adoption of ASU 2016-01, while 22 include fair changes in income-based performance benchmarks in the post period. Of the 11 parent companies that modified their plans, eight modified the plans in 2018 and three modified in 2019.

To examine whether managers are motivated by incentive compensation plans to decrease the risk of their equity portfolios to mitigate potential earnings volatility, we examine whether the change in equity portfolio risk varies based on the inclusion or exclusion of fair value changes from income-based performance benchmarks after the adoption of ASU 2016-01. We create an indicator variable, *INCOMP*, that takes a value of 1 if fair value changes on equity securities are included in income-based performance benchmarks in the post-period, and 0 for parent companies that either did not have income-based performance benchmarks in the pre- or post-period or that excluded fair value changes from benchmarks beginning in 2018. We exclude four parent companies that modified their compensation contracts in a year other than 2018. The results,

presented in Panel B of Table 8, do not provide support for the compensation channel. The coefficients for the interaction term *INCOMP* × *Post* are not significant at conventional levels for any outcome variable except the investment strategy risk-factor.

Taken together, the above results suggest that our finding that firms reduce the risk in their equity portfolios operates through a disciplining channel rather than through a risk-perception channel or a compensation channel.

5. Additional Analysis

5.1 FALSIFICATION TEST

We take advantage of security-level disclosure of insurers' stock holding information to examine whether the volatility of the equity portfolio *would* have declined in the post-period if firms had not changed the composition of their equity portfolios. While we cannot know what managers would have done in the absence of adopting ASU 2016-01, our security-level data allows a unique counterfactual test. Specifically, we construct "as-if" equity security portfolios that assume firms held the same stocks in the post-adoption period that they did at the end of 2017Q4. We then construct a new variable, *VolFal*, by replacing the true *Vol* in the post-period with the return volatility of the 2017Q4 portfolios and use this variable as the dependent variable to estimate Equation (3).

Table 9 presents the estimated coefficients of this analysis. We find that the coefficient on *Treat*×*Post* is insignificantly different from zero at the conventional levels for *VolFal*, indicating that volatility of equity securities for treatment firms would not have declined relative to control firms if treatment firms had maintained the composition of their equity portfolios. This finding further bolsters our conclusion that firms changed the level of risk in their equity portfolios in response to the requirement to report unrealized gains and losses in net income.

5.2 THE REGULATORY CAPITAL CHANNEL

A strength of our setting is that we are able to test the effect of including fair value changes in earnings in a setting in which the calculation of regulatory capital does not change between treatment and control firms. To provide additional evidence that our result is not driven by a regulatory capital channel, we examine cross-sectional variation in our result based on firms' risk-based capital levels. We sort firms into deciles based on *RBC* at the end of 2017 and then create an indicator variable *LowRBC* that takes a value of 1 for firms in the lowest decile of regulatory capital and 0 otherwise. We then interact this indicator variable with *Treat* and *Post*. The results, presented in Table 10, show that our results do not significantly differ for low-capital firms. In untabulated analysis, we find that this result is robust to defining *LowRBC* as firms in the lowest quartile of *RBC* or below-median *RBC* at the end of 2017. This result is inconsistent with a regulatory capital channel explaining a decrease in equity portfolio risk in the post period.

5.3 SPILLOVER EFFECTS

Coordinated risk management theory (Schrand and Unal 2002) suggests that firms are likely to allocate risk among multiple risk sources to achieve an overall desired level of risk and return. Thus, to the extent that firms alter the level of risk in their equity portfolios, they may compensate by altering the level of risk in other areas of their business. However, our results above suggest that firms engage in more *efficient* risk-taking after the adoption of ASU 2016-01, decreasing volatility without sacrificing portfolio returns, on average. Nevertheless, we next examine whether the decrease in risk-taking in the equity security portfolio has spillover effects in other areas of treatment firms' businesses, including in their underwriting activities as well as in other areas of their investment portfolios.

The results of our spillover tests are presented in Table 11 shows and do not find evidence

of spillover effects. In columns (1) to (3), we examine changes in geographical and business line concentration in the post period as well as changes in the extent of the average tail of policies written. In column (4), we examine the extent to which firms purchase reinsurance, which provides insurers a risk management tool by enabling them to retain desirable underwriting risks while transferring undesirable risks to reinsurers (Adiel 1996). We follow prior literature to measure the usage of reinsurance (*Rein*) as the ratio of premiums ceded to the sum of direct premiums written and reinsurance assumed (Grace and Leverty 2010). In column (5), we examine changes in firms' loss ratios. The loss ratio is the ratio of losses paid on claims to net premiums earned. A sudden shift to riskier (safer) underwriting could result in a near-term lower (higher) loss ratios, as higher premiums are earned on new policies before losses are incurred. However, we do not find a significant change in the loss ratio.

In columns (6) to (10), we examine whether treatment firms compensate for lower risk in their equity portfolios by taking on greater risk in their government debt portfolios by examining changes in the holdings of safer (riskier) debt securities in the form of U.S. treasury bonds (municipal bonds) as well as the average value-weighted yield, spread, and ratings of corporate bond securities. We do not find a significant change in any measure of debt portfolio risk.

5.4 RECONCILING TO OTHER STUDIES OF ASU 2016-01

Amornsiripanitch et al. (2022) and Kim et al. (2024) also study managerial actions in response to implementation of ASU 2016-01. The focuses and conclusions of these studies differ in important ways from our study, and they also use different research designs and sample periods. Amornsiripanitch et al. (2022) et al., in addition to studying how investor inattentiveness affects the market response to earnings that include fair value changes, examine changes to the level of equity security holdings, finding that insurers decrease their holdings of equity securities. Like our

study, they use public insurers as treatment firms and private insurers as controls for this analysis. However, Amornsiripanitch et al. (2022) do not examine changes in portfolio risk and performance and do not utilize security-level data available at the subsidiary level, as we do in our study. Further, their sample period includes the years 2015 to 2020, while we study a tighter window around the adoption of ASU 2016-01 from 2016 to 2019. They also include life and health insurance companies, which typically hold fewer equity securities.

Kim et al. (2024) focus on actions managers take in response to including fair value changes in earnings, including the level of equity security holdings, the extent and volatility of realized and unrealized gains and losses, and their disclosure of non-GAAP earnings. Importantly, their sample includes only public insurance companies, which are all affected by ASU 2016-01, using the relative size of the equity portfolio as their treatment variable. Like Amornsiripanitch et al. (2022), Kim et al. (2024) use a sample period from 2015 to 2020. Like us, they find that many firms exclude fair value changes from management compensation. However, Kim et al. (2024) suggest that insurers most affected by ASU 2016-01 *increase* the level and riskiness of their equity portfolios after adoption of ASU 2016-01. Their proxies for portfolio risk differ significantly from ours, as Kim et al. (2024) use annual data from regulatory filings to calculate the absolute value and standard deviation of aggregate realized and unrealized gains and losses on equity investments in unaffiliated and affiliated common and preferred stocks. In contrast, we utilize the granularity of regulatory data available on a quarterly basis to construct daily portfolios of insurers' investments in only unaffiliated common stocks. We use this data to calculate unrealized holdings gains and losses and our various measures of portfolio-level risk and performance. However, our results regarding risk taking are not necessarily inconsistent with their results, as we also find that equity portfolio risk is higher for public firms with larger equity securities *relative* to firms with

smaller portfolios after adoption. However, because we use private firms as a control group, our results suggest that this change is driven by a decrease in risk-taking by firms with smaller portfolios, consistent with the disciplining channel, rather than an increase in risk-taking by firms with larger portfolios.

6. Conclusion

In this paper, we examine how requiring firms to recognize changes in the fair values of assets in net income affects their investment decisions. Examining differences in public and private P&C insurers around the adoption of ASU 2016-01, we find that firms required to recognize fair value changes of equity securities in net income respond by decreasing the riskiness of their equity portfolios. This results in less volatile equity portfolios, consistent with managers' desires to reduce net income volatility and with preparer comments submitted during the standard-setting process that requiring recognition of fair value changes in income could prompt a change in their investment behavior. However, rather than inefficient changes in investment behavior implied by some firms in the comment letter process, our evidence suggests that including fair value changes in net income has a disciplining effect on some firms' risk-taking.

This paper contributes to the long-running debate about whether fair value changes should be included in net income, an important topic given the recurring question standard setters face of whether the corresponding effects of asset re-measurements should be reflected in reported income or elsewhere, such as accumulated other comprehensive income. We do not address the decision-usefulness of including fair value changes in earnings and therefore do not argue that it is always preferable. However, our results suggest that doing so can have beneficial real effects.

Appendix 1: Variable Definitions

Variable Name	Variable Description
Treat	An indicator variable that equals one if an insurer itself or at least one of its direct or indirect parent firms is a public firm listed on NYSE, NASDAQ, or AMEX and zero otherwise (Schedule Y provided by SPGMI).
Post	An indicator variable that equals one for observations in years after the adoption of ASU 2016-01(2018 or 2019) and zero otherwise.
Vol	The standard deviation of the value-weighted average daily portfolio returns of an insurer's common stock holding in a quarter. The market value of a stock is calculated as the price obtained from CRSP multiplied by the insurer's daily holding shares of this stock (SPGMI Insurance Investment Holdings Database KeyField 241632). Daily portfolio holdings are constructed using quarter-end holding shares (SPGMI Insurance Investment Holdings Database, KeyField 241632) and daily shares acquired and sold (SPGMI Insurance Investment Transactions Database, KeyField 233588).
URGL	The net unrealized gains and losses for all stocks in an insurer's stock portfolio at the end of a quarter divided by the total cost for all stocks. The unrealized gains and losses for each common stock is the difference between the quarter-end market value and the cost of that stock investment (SPGMI Insurance Investment Holdings Database, KeyField 241611).
URGL_GLVol	The standard deviation of *UnrealizedGL* in the eight quarters pre- and post-adoption.
FVChange	The total of daily fair value changes in each quarter divided by the portfolio size at the beginning of the quarter. Daily fair value change is calculated as the daily portfolio return multiplied by the size of the equity portfolio at the beginning of each day.
FVChange_Vol	The standard deviation of quarterly portfolio fair value changes (*FVChange)* in the eight quarters pre- and post-adoption.
SharpeRatio	The annualized ratio of a portfolio's average daily return divided by its standard deviation in a quarter.
Ret	The average daily return of an insurer's portfolio over a quarter
Beta	The market beta of an insurer's common stocks portfolio estimated by using a Fama-French five-factor (Fama and French 2015) model over trading days in each quarter.
AbsSMB	The absolute value of the coefficient on the SMB factor of an insurer's common stocks portfolio estimated by using a Fama-French five-factor model over trading days in each quarter.
AbsHML	The absolute value of the coefficient on the HML factor of an insurer's common stocks portfolio estimated by using a Fama-French five-factor model over trading days in each quarter.
AbsRMW	The absolute value of the coefficient on the RMW factor of an insurer's common stocks portfolio estimated by using a Fama-French five-factor model over trading days in each quarter.
AbsCMA	The absolute value of the coefficient on the CMA factor of an insurer's common stocks portfolio estimated by using a Fama-French five-factor model over trading days in each quarter.
Alpha	The constant estimated using a Fama-French five-factor model for each insurer-quarter.
IdioRisk	The idiosyncratic volatility of an insurer's common stocks portfolio in a quarter. Idiosyncratic volatility is calculated as the standard deviation of the residual value estimated by using the Fama-French five-factor model for each insurer-quarter.
InfoRatio	The Alpha estimated from a Fama-French five-factor model (*Alpha*) divided by the standard deviation of the model residuals (*IdioRisk*).
NV	Normalized variance (Goetzmann and Kumar 2008), calculated as the ratio of the variance of daily returns of the quarter-end portfolio to the average variance of the daily returns of individual stocks in the quarter-end portfolio for an insurer. Lower values indicate greater diversification.

SSPW	The average of squared portfolio weights over a quarter for an insurer, calculated as the sum of the squared weights of each stock in a daily portfolio (Goetzmann and Kumar 2008). Lower values indicate greater diversification.
Size	The natural logarithm of total net admitted assets (SPGMI Insurance Statutory Financials Database, KeyField 113963).
ROA	The net income (SPGMI Insurance Statutory Financials Database, KeyField 114129) divided by total net admitted assets (SPGMI Insurance Statutory Financials Database, KeyField 113963).
RBC	Total adjusted capital (SPGMI Insurance Statutory Financials Database KeyField 234709) divided by the Authorized Control Level risk-based capital (SPGMI Insurance Statutory Financials Database, KeyField 234710).
GeoCon	The Herfindahl index of direct premiums written (SPGMI Insurance Statutory Financials Database, KeyField 120034) across 58 states and territories.
LineCon	The Herfindahl Index of direct premiums written (SPGMI Insurance Statutory Financials Database, KeyField 120034) across business lines.
Long_tail	The percentage of direct premiums (SPGMI Insurance Statutory Financials Database KeyField 120034) written on long-tail lines.
VolFal	The standard deviation of the value-weighted average daily return of an insurer's falsified common stock portfolio in a quarter, assuming that insurers would hold the same portfolios in the post-adoption period as they did at the end of 2017Q4 (SPGMI Insurance Investment Holdings Database, KeyField 241632).
Inhouse	Equal to one if an insurer does not outsource management of more than 10% of their assets to unaffiliated third parties in 2017, and zero otherwise (SPGMI Insurance Statutory Financials Database KeyField 267460).
HighPreVol	Equal to one for insurers with above-median average equity portfolio volatility (*VOL*) in the pre-period and zero otherwise
HighPreGains	Equal to one for insurers in the top decile of realized gains on sales (SPGMI Insurance Investment Transactions Database KeyField 233608) of equity securities in the pre-period and zero otherwise
EquityHigh	Equal to one for insurers with an above-median weighting of equity securities (SPGMI Insurance Statutory Financials Database KeyField 120815) as a percent of total assets in 2017Q4
LowDED	Equal to one for insurers with below-median shares held by dedicated institutional investors (Bushee 1998, Bushee 2001) as a percentage of shares outstanding
HighFollowing	Equal to one if an insurer has above-median sell-side analyst following, as determined from data in the IBES summary file
LowRBC	Equal to 1 for firms in the lowest decile of *RBC* in 2017 and 0 otherwise.
Incomp	Equal to one if fair value changes on equity securities are included in income-based performance benchmarks in the post-period, and 0 for parent companies that either did not have income-based performance benchmarks in the pre- or post-period or that excluded fair value changes from benchmarks beginning in 2018
Rein	Premiums ceded (SPGMI Insurance Statutory Financials Database KeyField 114235 and 114236) divided by the sum of direct premiums written (SPGMI Insurance Statutory Financials Database KeyField 114247) and reinsurance assumed (SPGMI Insurance Statutory Financials Database KeyField 114233 and 114234)
LossRatio	Direct losses incurred (SPGMI Insurance Statutory Financials Database KeyField 114245) divided by Direct premiums earned (SPGMI Insurance Statutory Financials Database KeyField 114244).
Gov_bond	The holdings of bonds issued by the federal (SPGMI Insurance Statutory Financials Database, KeyField 114770, 114771, and 114772) divided by assets.
Muni_bond	The holdings of municipal bonds (SPGMI Insurance Statutory Financials Database, KeyField 114774, and 114775) divided by assets.
VW_Yield	Value-weighted average of the yield-to-maturity of an insurer's quarter-end corporate bond portfolio. The yield-to-maturity of corporate bonds is obtained from the WRDS bond return database.

VW_Spread	Value-weighted average of the spreads between the yield-to-maturity of corporate bonds and the yield of matched treasury bills of an insurer's quarter-end corporate bond portfolio. The yield-to-maturity of corporate bonds is obtained from the WRDS bond return database, and the yield of treasury bills is obtained from the WRDS CRSP database.
VW_Rating	Value-weighted average of the bond ratings of an insurer's quarter-end corporate bond portfolio. The bond rating data is obtained from the Mergent FISD database.

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Table 1: Sample Selection and Distribution

Panel A of Table 1 describes the sample selection procedures. Panel B presents the distribution of our sample by quarter.

Panel A: Sample Selection

Sample selection process	Number of Observations	Number of Insurers
All insurer-quarter observations from 2016Q1-2019Q4	41,152	2,762
Less: observations with missing values of independent variables in Equation (3)	(6,382)	(386)
Less: insurers that changed public status in our sample period	(1,522)	(99)
Less: insurers with missing quarterly reports	(177)	(14)
Less: observations without unaffiliated public common stock holdings at the quarter end	(18,615)	(1,192)
Less: observations without available daily stock portfolio returns for at least 30 days to calculate the dependent variables	(4)	(0)
Less: insurers that are not part of an insurance group throughout the sample period	(5,647)	(434)
Less: insurers with only one observation throughout the sample period (singleton)	(14)	(14)
Final sample	8,791	623

Panel B: Sample distribution

Year-Quarter	Frequency	Percent
2016Q1	560	6.37
2016Q2	560	6.37
2016Q3	550	6.26
2016Q4	552	6.28
2017Q1	552	6.28
2017Q2	548	6.23
2017Q3	557	6.34
2017Q4	551	6.27
2018Q1	550	6.26
2018Q2	550	6.26
2018Q3	554	6.3
2018Q4	556	6.32
2019Q1	549	6.25
2019Q2	540	6.14
2019Q3	538	6.12
2019Q4	524	5.96
Total	8,791	100.00

Table 2: Descriptive Statistics and Correlation Matrix

Panel A of Table 2 presents the descriptive statistics for our sample separately for treatment and control firms. Panel B Table 2 presents the Pearson correlation matrix. Correlation coefficients in bold indicate significance at the 0.05 level or below. The definitions of variables are presented in Appendix 1.

Panel A: Descriptive Statistics

Variables	N	Mean	Sd.	Min.	p25	p50	p75	Max.
Treat=1								
Portfolio Volatility Variables								
Vol	2,672	0.0099	0.0055	0.0033	0.0061	0.0086	0.0120	0.0311
URGL_Vol	274	0.1857	0.1933	0.0272	0.0738	0.1305	0.2021	1.0220
FVChange_Vol	274	0.0703	0.0445	0.0132	0.0345	0.0672	0.0921	0.2537
Portfolio Performance Variables								
SharpeRatio	2,672	1.4459	1.8648	-2.8815	0.2768	1.4391	2.7170	5.3808
InfoRatio	2,672	0.0560	0.1476	-0.2681	-0.0501	0.0509	0.1534	0.4477
Ret	2,672	0.0007	0.0012	-0.0028	0.0002	0.0007	0.0012	0.0035
Alpha	2,672	0.0001	0.0008	-0.0022	-0.0002	0.0001	0.0004	0.0025
Beta	2,672	0.9234	0.2503	0.0915	0.8265	0.9516	1.0303	1.5261
AbsSMB	2,672	0.2133	0.2269	0.0001	0.0756	0.1482	0.2533	1.1989
AbsHML	2,672	0.3301	0.3749	0.0000	0.0621	0.1654	0.4820	1.5100
AbsRMW	2,672	0.2626	0.2869	0.0001	0.0616	0.1678	0.3485	1.3376
AbsCMA	2,672	0.4502	0.4012	0.0001	0.1310	0.3316	0.6522	1.5418
IdioRisk	2,672	0.0049	0.0050	0.0004	0.0019	0.0033	0.0058	0.0257
NV	2,672	0.4738	0.3201	0.0511	0.1982	0.3792	0.7313	1.0313
SSPW	2,672	0.3166	0.3558	0.0063	0.0339	0.1523	0.4992	1.0000
Control and Cross-Sectional Variables								
Size	2,672	20.4543	1.8428	15.4696	19.1510	20.5163	21.5386	24.4256
ROA	2,672	0.0070	0.0122	-0.0515	0.0025	0.0066	0.0118	0.0505
RBC	2,672	15.8876	34.0175	2.3331	4.8108	6.6618	9.8054	186.6523
Long_tail	2,672	0.7450	0.2579	0.0000	0.6575	0.8028	0.9373	1.0000
GeoCon	2,672	0.3025	0.3305	0.0410	0.0700	0.1278	0.4191	1.0000
LineCon	2,672	0.4687	0.2733	0.1174	0.2491	0.3834	0.6416	1.0001
InHouse	2,195	0.5854	0.4928	0.0000	0.0000	1.0000	1.0000	1.0000
HighPreVol	2,656	0.6182	0.4859	0.0000	0.0000	1.0000	1.0000	1.0000
HighPreGains	2,672	0.1460	0.3531	0.0000	0.0000	0.0000	0.0000	1.0000
EquityHigh	2,585	0.4747	0.4995	0.0000	0.0000	0.0000	1.0000	1.0000
LowDED	2,672	0.5015	0.5001	0.0000	0.0000	1.0000	1.0000	1.0000
HighFollowing	2,672	0.4311	0.4953	0.0000	0.0000	0.0000	1.0000	1.0000
Incomp	2,414	0.3331	0.4714	0.0000	0.0000	0.0000	1.0000	1.0000
LowRBC	2,585	0.1091	0.3118	0.0000	0.0000	0.0000	0.0000	1.0000
Spillover Test Variables								
Rein	689	0.4308	0.3159	0	0.1475	0.4152	0.6888	1
LossRatio	2,564	0.5965	0.4327	0.0233	0.4041	0.5398	0.6636	4.2374
Gov_bond	689	0.0513	0.0669	0.0000	0.0080	0.0297	0.0644	0.5401
Muni_bond	689	0.0429	0.0672	0.0000	0.0000	0.0114	0.0574	0.3217
VW_Yield	2,220	2.9837	0.7158	1.4888	2.4554	2.9028	3.4848	5.8646
VW_Spread	2,220	1.0954	0.4902	0.3141	0.7658	0.9969	1.3338	3.8895
VW_Rating	2,220	0.0547	0.0766	0.0000	0.0000	0.0270	0.0798	0.4926

Variables	N	Mean	Sd.	Min.	p25	p50	p75	Max.
Treat=0								
Portfolio Volatility Variables								
Vol	6,119	0.0081	0.0041	0.0033	0.0052	0.0071	0.0099	0.0311
URGL_Vol	630	0.1196	0.1219	0.02717	0.06211	0.08502	0.1254	1.022
FVChange_Vol	630	0.0559	0.03914	0.01207	0.02105	0.06018	0.07724	0.2537
Portfolio Performance Variables								
SharpeRatio	6,119	1.6386	1.8089	-2.8815	0.5996	1.6176	2.9396	5.3808
InfoRatio	6,119	0.0640	0.1450	-0.2681	-0.0344	0.0602	0.1544	0.4477
Ret	6,119	0.0006	0.0009	-0.0028	0.0003	0.0007	0.0011	0.0035
Alpha	6,119	0.0001	0.0005	-0.0022	-0.0001	0.0001	0.0003	0.0025
Beta	6,119	0.9123	0.1808	0.0915	0.8668	0.9493	0.9955	1.5261
AbsSMB	6,119	0.1511	0.1667	0.0000	0.0543	0.1092	0.1847	1.1989
AbsHML	6,119	0.1405	0.2028	0.0000	0.0343	0.0788	0.1608	1.5100
AbsRMW	6,119	0.1620	0.2002	0.0000	0.0439	0.0993	0.2016	1.3376
AbsCMA	6,119	0.2627	0.2611	0.0001	0.0780	0.1841	0.3597	1.5418
IdioRisk	6,119	0.0027	0.0033	0.0004	0.0012	0.0017	0.0028	0.0257
NV	6,118	0.3852	0.2919	0.0511	0.1657	0.2781	0.5059	1.0313
SSPW	6,118	0.1911	0.2779	0.0063	0.0236	0.0514	0.2479	1.0000
Control and Cross-Sectional Variables								
Size	6,119	19.3768	1.9125	15.4696	18.0156	19.3172	20.6988	24.4256
ROA	6,119	0.0051	0.0141	-0.0515	0.0002	0.0054	0.0110	0.0505
RBC	6,119	13.6480	21.2939	2.3331	5.8187	9.0033	13.1001	186.6523
Long_tail	6,119	0.7461	0.2581	0.0000	0.6629	0.7873	0.9522	1.0000
GeoCon	6,119	0.5259	0.3735	0.0410	0.1581	0.4654	1.0000	1.0000
LineCon	6,119	0.5015	0.2987	0.1174	0.2480	0.4019	0.7699	1.0001
InHouse	5,513	0.3581	0.4795	0.0000	0.0000	0.0000	1.0000	1.0000
HighPreVol	5,996	0.4445	0.4969	0.0000	0.0000	0.0000	1.0000	1.0000
HighPreGains	6,119	0.0783	0.2686	0.0000	0.0000	0.0000	0.0000	1.0000
EquityHigh	5,850	0.5089	0.5000	0.0000	0.0000	1.0000	1.0000	1.0000
LowRBC	5,850	0.0944	0.2924	0.0000	0.0000	0.0000	0.0000	1.0000
Spillover Test Variables								
Rein	1,567	0.392	0.3043	0	0.1249	0.3246	0.6211	1
LossRatio	5,842	0.6254	0.5456	0.0233	0.4091	0.5458	0.6757	4.2374
Gov_bond	1,567	0.0754	0.0964	0.0000	0.0151	0.0453	0.0945	0.5401
Muni_bond	1,567	0.0458	0.0649	0.0000	0.0000	0.0211	0.0649	0.3217
VW_Yield	5,598	2.9784	0.8073	1.4888	2.4206	2.8411	3.4437	5.8646
VW_Spread	5,598	1.0487	0.6116	0.3141	0.6861	0.8851	1.1796	3.8895
VW_Rating	5,598	0.0397	0.0885	0.0000	0.0000	0.0000	0.0330	0.4926

Panel B: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
(1) Vol	1.00																										
(2) SharpeRatio	**-0.51**	1.00																									
(3) InfoRatio	**-0.06**	**0.37**	1.00																								
(4) Ret	**-0.28**	**0.86**	**0.36**	1.00																							
(5) Alpha	0.00	**0.39**	**0.69**	**0.53**	1.00																						
(6) Beta	**0.22**	**-0.03**	**-0.09**	**0.02**	**-0.14**	1.00																					
(7) AbsSMB	**0.52**	**-0.13**	**-0.10**	0.00	0.01	0.02	1.00																				
(8) AbsHML	**0.46**	**-0.12**	**-0.11**	**0.02**	-0.01	**0.13**	**0.37**	1.00																			
(9) AbsRMW	**0.50**	**-0.12**	**-0.13**	-0.01	0.00	0.01	**0.41**	**0.36**	1.00																		
(10) AbsCMA	**0.39**	**-0.18**	**-0.12**	**-0.07**	**-0.04**	**-0.02**	**0.32**	**0.46**	**0.44**	1.00																	
(11) IdioRisk	**0.78**	**-0.23**	**-0.14**	**-0.06**	0.02	**-0.04**	**0.64**	**0.54**	**0.66**	**0.53**	1.00																
(12) NV	**0.48**	**-0.34**	**-0.24**	**-0.19**	**-0.10**	**0.04**	**0.28**	**0.34**	**0.26**	**0.28**	**0.42**	1.00															
(13) SSPW	**0.39**	**-0.17**	**-0.24**	**-0.06**	**-0.08**	**-0.05**	**0.36**	**0.38**	**0.35**	**0.31**	**0.54**	**0.79**	1.00														
(14) Size	**0.05**	0.01	**0.07**	0.02	0.01	0.01	0.01	0.00	**-0.02**	**-0.03**	0.02	**-0.18**	**-0.11**	1.00													
(15) ROA	0.00	**0.03**	0.00	0.02	0.01	0.01	-0.01	0.00	**-0.03**	0.00	-0.01	-0.01	-0.02	**0.06**	1.00												
(16) RBC	**0.16**	**-0.05**	**-0.04**	-0.02	**-0.02**	0.01	**0.16**	**0.19**	**0.11**	**0.09**	**0.19**	**0.25**	**0.29**	**-0.25**	**0.03**	1.00											
(17) Long_tail	**-0.04**	0.01	0.00	0.00	0.01	-0.02	-0.01	**-0.08**	**-0.03**	**-0.03**	**-0.04**	**-0.03**	**-0.06**	0.01	**-0.06**	-0.01	1.00										
(18) GeoCon	**-0.07**	0.01	-0.01	0.00	0.00	0.01	**-0.04**	**-0.06**	**-0.03**	**-0.05**	**-0.09**	**0.03**	0.00	**-0.49**	**-0.03**	**0.09**	**0.05**	1.00									
(19) LineCon	**-0.05**	0.01	0.00	0.01	0.01	**-0.02**	-0.03	**0.04**	0.00	**0.02**	**-0.04**	-0.01	**-0.02**	**-0.33**	**0.02**	**0.05**	**0.12**	**0.31**	1.00								
(20) InHouse	**0.13**	**-0.04**	**-0.05**	0.01	0.00	**0.05**	**0.13**	**0.25**	**0.08**	**0.15**	**0.16**	**0.04**	**0.09**	**0.24**	0.01	**0.05**	**-0.16**	**-0.18**	**-0.18**	1.00							
(21) HighPreVol	**0.34**	**-0.13**	**-0.11**	0.00	0.00	**0.10**	**0.28**	**0.40**	**0.27**	**0.22**	**0.41**	**0.20**	**0.24**	**0.05**	0.00	**0.06**	**-0.03**	**-0.08**	-0.02	**0.12**	1.00						
(22) HighPreGains	**0.19**	**-0.07**	**-0.08**	-0.01	**-0.02**	**0.04**	**0.13**	**0.19**	**0.16**	**0.13**	**0.22**	**0.24**	**0.26**	**0.10**	**0.03**	**0.09**	**0.04**	**-0.08**	-0.01	**0.05**	**0.17**	1.00					
(23) EquityHigh	**-0.11**	**0.06**	**0.09**	**0.02**	0.02	**0.07**	**-0.10**	-0.02	**-0.15**	**-0.07**	**-0.19**	**-0.17**	**-0.23**	**-0.08**	**0.06**	**-0.11**	**0.09**	**0.03**	**0.09**	**-0.06**	**-0.08**	**-0.12**	1.00				
(24) LowDED	**0.13**	**-0.23**	**-0.08**	**-0.18**	-0.04	**0.08**	-0.01	**0.27**	0.03	**0.19**	0.03	**0.17**	**0.06**	-0.03	**-0.04**	-0.04	0.01	**0.05**	**0.12**	**0.18**	**0.24**	**0.06**	**0.13**	1.00			
(25) HighFollowing	**0.10**	-0.03	0.05	-0.02	0.03	0.02	0.03	0.03	-0.04	**-0.08**	0.04	**0.06**	**0.07**	**0.32**	**0.09**	-0.02	0.02	**-0.18**	**-0.07**	**-0.09**	**-0.04**	**0.13**	-0.01	**-0.10**	1.00		
(26) INCOMP	**0.11**	**-0.06**	**-0.04**	-0.03	-0.01	**-0.07**	**0.18**	**-0.10**	**0.10**	**-0.07**	**0.12**	**0.04**	**0.15**	**0.09**	0.00	**0.11**	**0.10**	**-0.21**	**-0.10**	**-0.36**	**0.08**	**0.16**	**-0.25**	**-0.20**	**0.23**	1.00	
(27) LowRBC	**0.10**	**-0.04**	**-0.04**	-0.02	0.01	**-0.13**	**0.13**	0.01	**0.16**	**0.06**	**0.17**	**0.05**	**0.10**	**0.08**	**-0.10**	**-0.14**	**-0.05**	**-0.03**	**-0.03**	0.02	**0.05**	**0.04**	**-0.21**	**-0.05**	**0.06**	**0.14**	1.00

Table 3: Adoption of ASU 2016-1 and Portfolio Return Volatility

This table reports the regression estimates of Equation (3). The dependent variable is *Vol*, which is the standard deviation of the value-weighted average daily portfolio returns of an insurer's common stock holding in a quarter. The estimated t-statistics in parentheses are based on standard errors clustered at the group level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

Dep: *Vol*	(1)	(2)	(3)	(4)
Treat×Post	**-0.0009****	**-0.0009****	**-0.0006****	**-0.0006****
	(-2.1828)	**(-2.1882)**	**(-2.0918)**	**(-2.0705)**
Treat	0.0022***	0.0021***		
	(3.8156)	(3.4927)		
Size		0.0001		-0.0005
		(0.6973)		(-0.5544)
ROA		-0.0097*		-0.0014
		(-1.7188)		(-0.8477)
RBC		0.0000***		0.0000
		(4.0536)		(1.5886)
GeoCon		-0.0002		-0.0002
		(-0.4532)		(-0.3068)
LineCon		-0.0004		-0.0005
		(-1.1611)		(-1.0866)
Long_tail		-0.0007		0.0005
		(-1.5845)		(0.9171)
Constant	0.0081***	0.0071***	0.0087***	0.0192
	(41.2627)	(3.6213)	(191.7303)	(0.9831)
Observations	8,791	8,791	8,791	8,791
R-squared	0.3648	0.3902	0.8197	0.8203
Firm FE	NO	NO	YES	YES
Year-Quarter FE	YES	YES	YES	YES

Table 4: Adoption of ASU 2016-1 and Unrealized Gain/Loss Volatility

This table presents the regression estimates of Equation (4). The dependent variable in Columns (1) and (2) is *UnrealizedGLVol*, which represents the standard deviation of quarter-end net unrealized gains or losses of the equity portfolio held by an insurer divided the total cost of the equity portfolio for the eight quarters before or after the adoption. The dependent variable in Columns (3) and (4) is *FVChangeVol*, which represents the standard deviation of quarterly portfolio fair value changes in the eight quarters pre- and post-adoption. Control variables are aggregated separately in the pre- and post-adoption periods. The estimated t-statistics in parentheses are based on standard errors clustered at the group level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

	(1) *URGLVol*	(2) *URGLVol*	(3) *FVChangeVol*	(4) *FVChangeVol*
Treat×Post	**-0.0247****	**-0.0251****	**-0.0165*****	**-0.0160*****
	(-2.2690)	**(-2.3574)**	**(-3.0253)**	**(-3.1166)**
Post	0.0064	0.0139	0.0483***	0.0469***
	(0.8749)	(1.5138)	(22.3587)	(16.2454)
Size		-0.0658*		0.0050
		(-1.8314)		(0.4153)
ROA		-0.2767		0.4125
		(-0.3237)		(1.4929)
RBC		-0.0008		0.0000
		(-0.8042)		(0.0024)
GeoCon		-0.0812		-0.0100
		(-1.6379)		(-0.6118)
LineCon		-0.1330		0.0471**
		(-1.2638)		(2.0077)
Long_tail		-0.0507		0.0311
		(-0.4828)		(1.2433)
Constant	0.1402***	1.5890**	0.0386***	-0.1030
	(49.4947)	(2.1531)	(35.8878)	(-0.4229)
Observations	904	904	904	904
R-squared	0.8378	0.8403	0.8195	0.8222
Firm FE	YES	YES	YES	YES

Table 5: Changes in Portfolio Performance after Adoption of ASU 2016-1

This table presents results examining changes in equity portfolio performance after the adoption of ASU 2016-01. The estimated t-statistics in parentheses are based on standard errors clustered at the group level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

	Portfolio Performance				***Portfolio Systematic Risk Exposures***					***Portfolio Diversification***		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep:	*SharpeRatio*	*InfoRatio*	*Ret*	*Alpha*	*Beta*	*AbsSMB*	*AbsHML*	*AbsRMW*	*AbsCMA*	*IdioRisk*	*NV*	*SSPW*
Treat × Post	**0.1316***	**0.0188**	**-0.0000**	**0.0000**	**-0.0324****	**-0.0200****	**0.0024**	**-0.0308***	**0.0017**	**-0.0004***	**-0.0209**	**-0.0086**
	(1.7920)	**(0.7833)**	**(-0.8608)**	**(0.4351)**	**(-2.0684)**	**(-2.0121)**	**(0.0775)**	**(-1.9627)**	**(0.0537)**	**(-1.7580)**	**(-1.2098)**	**(-0.4310)**
Size	0.3206**	0.0485**	0.0002	0.0002	0.0628**	-0.0389	-0.0046	-0.0306	-0.0390	-0.0014	-0.0614	-0.1046*
	(2.5545)	(2.0318)	(1.5246)	(1.3909)	(2.4765)	(-1.4310)	(-0.0925)	(-0.5823)	(-0.7297)	(-1.4840)	(-1.2214)	(-1.7705)
ROA	1.0394	0.0109	0.0006	0.0005	-0.1494	0.0397	-0.3012*	-0.3868***	0.0537	0.0002	-0.1003	-0.1245
	(0.9491)	(0.0844)	(0.8214)	(0.8118)	(-0.8920)	(0.3849)	(-1.7407)	(-2.7929)	(0.2653)	(0.1050)	(-0.7473)	(-1.2529)
RBC	0.0009	0.0002	0.0000	0.0000	0.0006	0.0005*	0.0008*	0.0001	0.0001	0.0000	0.0000	0.0003
	(0.3831)	(1.0235)	(1.0820)	(1.5518)	(1.3400)	(1.8732)	(1.8000)	(0.3741)	(0.1118)	(1.2492)	(0.0550)	(0.3999)
GeoCon	-0.0926	-0.0026	-0.0001	0.0001	0.0021	-0.0252	0.0302	0.0646	0.0309	0.0002	-0.0095	0.0002
	(-0.4142)	(-0.1226)	(-0.4770)	(0.6526)	(0.0669)	(-0.9719)	(1.0947)	(1.4700)	(0.5816)	(0.4896)	(-0.3007)	(0.0080)
LineCon	0.1387	0.0174	0.0001	0.0001	0.0142	-0.0501	0.0233	-0.0212	-0.1083**	-0.0008**	-0.0257	-0.0438
	(0.7237)	(0.8839)	(0.6458)	(0.7977)	(0.5353)	(-1.3063)	(0.9830)	(-0.6784)	(-2.5359)	(-2.0176)	(-0.8774)	(-1.4871)
Long_tail	0.1667	0.0163	0.0002	0.0002*	0.0301	-0.0157	-0.0076	0.1034***	0.0226	0.0004	-0.0202	0.0571
	(0.8704)	(0.7055)	(1.5163)	(1.7712)	(0.9907)	(-0.5542)	(-0.2499)	(3.0867)	(0.4539)	(0.9436)	(-0.4673)	(1.5658)
Constant	-4.9255**	-0.9190*	-0.0030	-0.0032	-0.3560	0.9787*	0.2593	0.7047	1.1084	0.0301	1.6568*	2.2674*
	(-2.0191)	(-1.9617)	(-1.3499)	(-1.4702)	(-0.7104)	(1.7623)	(0.2631)	(0.6694)	(1.0530)	(1.6414)	(1.6509)	(1.9301)
Observations	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,790	8,790
R-squared	0.7022	0.2582	0.6153	0.1274	0.4562	0.5605	0.6935	0.5170	0.5286	0.8298	0.8296	0.8890
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 6: Tests of the Disciplining Channel

This table presents results examining cross-sectional variation in changes in portfolio performance based on proxies for in-house equity portfolio management and pre-period risk taking. In Panel A, *InHouse* is an indicator variable that takes a value of 1 for firms that do not outsource management of their portfolio to third parties. In Panel B, *HighPreVol* is an indicator variable that takes a value of 1 for treatment firms with above-median equity portfolio volatility in the two years prior to adoption of ASU 2016-01 and 0 otherwise. In Panel C, *HighPreGains* is an indicator variable that takes a value of 1 for treatment firms that have top decile realized gains from sales of equity securities in the two years prior to adoption of ASU 2016-01 and 0 otherwise. The estimated t-statistics in parentheses are based on standard errors clustered at the group level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

Panel A: Portfolio Management	***Portfolio Performance***					***Portfolio Systematic Risk Exposures***					***Portfolio Diversification***		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Vol	*SharpeRatio*	*InfoRatio*	*Ret*	*Alpha*	*Beta*	*AbsSMB*	*AbsHML*	*AbsRMW*	*AbsCMA*	*IdioRisk*	*NV*	*SSPW*
Treat × Post	0.0002	0.0454	-0.0191	-0.0000	-0.0001*	0.0107	0.0016	-0.0033	0.0104	-0.0109	0.0004	0.0445*	0.0665***
	(0.4952)	(0.4547)	(-1.3499)	(-0.8221)	(-1.9027)	(0.4468)	(0.1187)	(-0.2388)	(0.5197)	(-0.2860)	(1.0176)	(1.7107)	(2.6651)
Postt × InHouse	0.0003	-0.0959	-0.0217	-0.0001*	-0.0001	0.0107	0.0139	0.0057	0.0190	0.0149	0.0004**	0.0172	0.0126
	(1.1671)	(-1.3161)	(-1.4191)	(-1.7384)	(-1.3033)	(0.7367)	(1.2333)	(0.5306)	(1.4444)	(0.8364)	(2.0145)	(0.8858)	(0.7477)
Treat × Post × InHouse	**-0.0017****	**0.1896**	**0.0617***	**0.0000**	**0.0003***	**-0.0729****	**-0.0394***	**0.0073**	**-0.0808*****	**0.0288**	**-0.0014*****	**-0.1144*****	**-0.1249*****
	(-2.4539)	**(1.1989)**	**(1.6520)**	**(0.5141)**	**(1.6878)**	**(-2.1719)**	**(-1.8366)**	**(0.1740)**	**(-2.7070)**	**(0.5154)**	**(-2.9153)**	**(-3.3802)**	**(-3.4738)**
Observations	7,708	7,708	7,708	7,708	7,708	7,708	7,708	7,708	7,708	7,708	7,708	7,707	7,707
R-squared	0.8179	0.7186	0.2728	0.6399	0.1336	0.4615	0.5513	0.6673	0.5225	0.5371	0.8206	0.8266	0.8753
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Test of joint significance for *Treat × Post + Treat × Post × InHouse*:													
Joint coefficient	-0.0015***	0.2350*	0.0426	0.0000	0.0002	-0.0622***	-0.0378**	0.0040	-0.0704***	0.0179	-0.0010***	-0.0699***	-0.0584**
F-statistic	7.6400	3.6200	1.4900	0.0000	1.0600	7.1000	5.5400	0.0100	9.6100	0.2000	10.3400	11.1200	5.2400
p-value	0.0061	0.0582	0.2239	0.9995	0.3049	0.0082	0.0193	0.9196	0.0021	0.6585	0.0015	0.0010	0.0229

Table 6 (cont.)

Panel B: High Pre-Period Volatility	***Portfolio Performance***					***Portfolio Systematic Risk Exposures***					***Portfolio Diversification***		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Vol	*SharpeRatio*	*InfoRatio*	*Ret*	*Alpha*	*Beta*	*AbsSMB*	*AbsHML*	*AbsRMW*	*AbsCMA*	*IdioRisk*	*NV*	*SSPW*
Treat × Post	-0.0001	0.0101	-0.0053	-0.0000	-0.0000	-0.0155	-0.0012	0.0074	-0.0263**	0.0052	0.0000	0.0060	0.0186
	(-0.5913)	(0.1354)	(-0.3256)	(-0.4880)	(-0.1012)	(-1.2261)	(-0.1607)	(0.3607)	(-2.0014)	(0.1497)	(0.1687)	(0.2943)	(1.1727)
Post × HighPreVol	-0.0007***	0.2153***	-0.0007	-0.0001**	0.0000	-0.0374***	0.0242**	-0.0163	-0.0368***	-0.0653***	0.0000	-0.0019	0.0186
	(-3.3774)	(3.6062)	(-0.0538)	(-1.9923)	(0.2368)	(-2.9775)	(2.2040)	(-1.5405)	(-2.9338)	(-3.8232)	(0.1800)	(-0.1021)	(1.0715)
Treat × Post × HighPreVol	**-0.0006**	**0.1368**	**0.0396**	**-0.0000**	**0.0001**	**-0.0169**	**-0.0374****	**-0.0030**	**0.0028**	**0.0124**	**-0.0006***	**-0.0436**	**-0.0500**
	(-1.0576)	**(1.1268)**	**(1.2200)**	**(-0.2565)**	**(0.5260)**	**(-0.6393)**	**(-2.2448)**	**(-0.0951)**	**(0.1078)**	**(0.2029)**	**(-1.7272)**	**(-1.3029)**	**(-1.6492)**
Observations	8,652	8,652	8,652	8,652	8,652	8,652	8,652	8,652	8,652	8,652	8,652	8,651	8,651
R-squared	0.8193	0.7039	0.2587	0.6197	0.1237	0.4547	0.5575	0.6950	0.5170	0.5286	0.8238	0.8277	0.8880
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Test of joint significance for *Treat × Post + Treat × Post × HighPreVol*:													
Joint coefficient	-0.0007	0.1469*	0.0343	0.0000	0.0001	-0.0324	-0.0386**	0.0044	-0.0235	0.0176	-0.0006*	-0.0376	-0.0314
F-statistic	1.8400	2.7800	1.1600	0.2000	0.2300	1.9700	5.8400	0.0100	1.0100	0.1200	3.1400	2.0700	1.2400
p-value	0.1766	0.0963	0.2831	0.6575	0.6315	0.1613	0.0164	0.9185	0.3148	0.7274	0.0774	0.1509	0.2669

Panel C: High Pre-Period Realized Gains	***Portfolio Performance***					***Portfolio Systematic Risk Exposures***					***Portfolio Diversification***		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Vol	*SharpeRatio*	*InfoRatio*	*Ret*	*Alpha*	*Beta*	*AbsSMB*	*AbsHML*	*AbsRMW*	*AbsCMA*	*IdioRisk*	*NV*	*SSPW*
Treat × Post	-0.0005	0.0674	0.0098	-0.0001	0.0000	-0.0218	-0.0213*	-0.0010	-0.0316**	-0.0045	-0.0002	-0.0189	-0.0076
	(-1.5795)	(0.8293)	(0.4239)	(-1.5460)	(0.1041)	(-1.5054)	(-1.8883)	(-0.0418)	(-2.1544)	(-0.1653)	(-1.0802)	(-1.1088)	(-0.3815)
Post × HighPreGains	-0.0002	-0.2515**	-0.0605**	-0.0002**	-0.0002**	0.0130	0.0237	0.0104	0.0199	0.0360	0.0003	0.0409	0.0273
	(-0.4902)	(-2.2808)	(-2.0123)	(-2.2618)	(-2.1321)	(0.4672)	(0.9486)	(0.3626)	(0.7056)	(0.9314)	(0.8743)	(0.7970)	(0.8645)
Treat × Post × HighPreGains	**-0.0011**	**0.5676*****	**0.0913*****	**0.0003****	**0.0004*****	**-0.0804**	**-0.0020**	**0.0193**	**-0.0036**	**0.0271**	**-0.0011**	**-0.0333**	**-0.0198**
	(-1.0032)	**(2.9391)**	**(2.7842)**	**(2.4304)**	**(2.9689)**	**(-1.4423)**	**(-0.0447)**	**(0.2523)**	**(-0.0585)**	**(0.2773)**	**(-1.3071)**	**(-0.5070)**	**(-0.3078)**
Observations	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,791	8,790	8,790
R-squared	0.8210	0.7026	0.2606	0.6159	0.1293	0.4572	0.5608	0.6936	0.5171	0.5291	0.8302	0.8298	0.8891
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Test of joint significance for *Treat × Post + Treat × Post × HighPreVol*:													
Joint coefficient	-0.0016	0.6350***	0.1011**	0.0002**	0.0004**	-0.1022*	-0.0233	0.0183	-0.0352	0.0226	-0.0013*	-0.0522	-0.0274
F-statistic	2.0800	16.5000	6.3500	4.6100	5.0000	3.5000	0.3300	0.0400	0.3300	0.0500	2.7800	0.6400	0.1900
p-value	0.1501	0.0001	0.0123	0.0327	0.0261	0.0624	0.5690	0.8407	0.5637	0.8275	0.0966	0.4251	0.6664

Table 7: Tests of the Risk Perception Channel

This table presents results examining cross-sectional variation in changes in portfolio performance based on proxies for capital market pressure, including the size of the equity portfolio, the extent of non-dedicated investors, and relative analyst following. In Panel A, *EquityHigh* is an indicator variable that takes a value of 1 for firms with above-median equity portfolio size, calculated as the level of the equity portfolio scaled by total assets, and 0 otherwise. In Panel B, *LowDED* is an indicator variable that takes a value of 1 for treatment firms with below-median dedicated institutional investor ownership (Bushee 1998, 2001) and 0 otherwise. In Panel C, *HighFollowing* is an indicator variable that takes a value of 1 for treatment firms that have above-median sell-side analyst following and 0 otherwise. The estimated t-statistics in parentheses are based on standard errors clustered at the group level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

Panel A: Equity Portfolio Size	***Portfolio Performance***					***Portfolio Systematic Risk Exposures***					***Portfolio Diversification***		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Vol	*SharpeRatio*	*InfoRatio*	*Ret*	*Alpha*	*Beta*	*AbsSMB*	*AbsHML*	*AbsRMW*	*AbsCMA*	*IdioRisk*	*NV*	*SSPW*
Treat × Post	-0.0012***	0.2098**	0.0191	-0.0000	-0.0000	-0.0291	-0.0212	-0.0300	-0.0259	-0.0352	-0.0006	-0.0367	0.0015
	(-2.6319)	(2.5137)	(1.2768)	(-0.7878)	(-0.3445)	(-1.1704)	(-1.2593)	(-1.4262)	(-0.9783)	(-1.1402)	(-1.6403)	(-1.5813)	(0.0603)
Treat × EquityHigh	0.0001	0.0430	0.0272**	0.0000	0.0001*	0.0054	0.0068	0.0101	0.0166	-0.0021	-0.0000	-0.0125	-0.0090
	(0.4671)	(0.7451)	(2.2392)	(1.1338)	(1.8946)	(0.4571)	(0.8859)	(1.3240)	(1.5153)	(-0.1271)	(-0.3317)	(-0.8202)	(-0.6414)
Treat × Post × EquityHigh	**0.0014*** **	**-0.1613**	**0.0013**	**0.0000**	**0.0002**	**0.0028**	**0.0061**	**0.0785****	**0.0010**	**0.0906****	**0.0006**	**0.0371**	**-0.0133**
	(2.7329)	**(-1.2714)**	**(0.0363)**	**(0.5313)**	**(1.1804)**	**(0.1095)**	**(0.3460)**	**(2.2156)**	**(0.0346)**	**(2.0796)**	**(1.4754)**	**(1.3454)**	**(-0.5171)**
Observations	8,435	8,435	8,435	8,435	8,435	8,435	8,435	8,435	8,435	8,435	8,435	8,435	8,435
R-squared	0.8251	0.7070	0.2565	0.6354	0.1220	0.4647	0.5518	0.7109	0.5163	0.5300	0.8242	0.8266	0.8861
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Test of joint significance for *Treat × Post + Treat × Post × EquityHigh*:													
Joint coefficient	0.0002	0.0485	0.0204	0.0000	0.0002	-0.0263*	-0.0151	0.0485	-0.0249	0.0554	0.0000	0.0004	-0.0118
F-statistic	0.4900	0.1700	0.2900	0.1000	0.7200	3.2700	2.3700	1.7600	2.4200	2.3600	0.0100	0.0000	0.3000
p-value	0.4831	0.6774	0.5923	0.7468	0.3955	0.0718	0.1251	0.1857	0.1207	0.1254	0.9349	0.9865	0.5813

Table 7 (cont.)

Panel B: Institutional Ownership	***Portfolio Performance***					***Portfolio Systematic Risk Exposures***					***Portfolio Diversification***		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Vol	*SharpeRatio*	*InfoRatio*	*Ret*	*Alpha*	*Beta*	*AbsSMB*	*AbsHML*	*AbsRMW*	*AbsCMA*	*IdioRisk*	*NV*	*SSPW*
LowDED	-0.0002	-0.1763	-0.0460*	0.0001	-0.0002*	0.0124	0.0310*	-0.0952**	0.0381	-0.0324	0.0001	0.0260	0.0496***
	(-0.4091)	(-1.1697)	(-1.7353)	(0.9042)	(-1.7024)	(0.3235)	(1.7007)	(-2.1777)	(1.0933)	(-0.6387)	(0.2102)	(1.0768)	(2.7208)
Treat × LowDED	**0.0003**	**0.5234*** **	**0.0998** **	**0.0003** **	**0.0005*** **	**0.0141**	**-0.0133**	**0.0728** **	**0.0038**	**0.0040**	**-0.0002**	**-0.0626** **	**-0.1202*** **
	(0.6406)	**(4.4241)**	**(2.6387)**	**(2.4424)**	**(2.8973)**	**(0.5196)**	**(-0.6875)**	**(2.3647)**	**(0.1259)**	**(0.0574)**	**(-0.6088)**	**(-2.5834)**	**(-3.7954)**
Observations	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672
R-squared	0.7775	0.6156	0.2805	0.5006	0.1474	0.4229	0.5370	0.6808	0.4725	0.4651	0.8146	0.8211	0.9093
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Panel C: Analyst Following	***Portfolio Performance***					***Portfolio Systematic Risk Exposures***					***Portfolio Diversification***		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Vol	*SharpeRatio*	*InfoRatio*	*Ret*	*Alpha*	*Beta*	*AbsSMB*	*AbsHML*	*AbsRMW*	*AbsCMA*	*IdioRisk*	*NV*	*SSPW*
HighFollowing	0.0005	0.0303	0.0127	0.0001	0.0001	0.0340*	-0.0135	0.0376	-0.0107	-0.0359	0.0002	-0.0130	-0.0135
	(1.4651)	(0.2525)	(0.6331)	(0.7339)	(1.6237)	(1.7311)	(-1.6698)	(1.1765)	(-0.5354)	(-1.0875)	(0.7584)	(-0.7226)	(-0.8735)
Treat × HighFollowing	**-0.0004**	**-0.0434**	**-0.0042**	**-0.0001**	**-0.0000**	**-0.0574*** **	**0.0074**	**-0.0238**	**0.0105**	**-0.0285**	**-0.0004**	**0.0076**	**0.0243**
	(-0.8566)	**(-0.3799)**	**(-0.2132)**	**(-0.9582)**	**(-0.4812)**	**(-1.8741)**	**(0.5115)**	**(-0.8382)**	**(0.3487)**	**(-0.6094)**	**(-1.1004)**	**(0.2837)**	**(0.9827)**
Observations	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672
R-squared	0.7779	0.6129	0.2653	0.4978	0.1361	0.4253	0.5363	0.6781	0.4714	0.4665	0.8149	0.8199	0.9057
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 8: Test of the Compensation Channel

Panel A presents the hand collected compensation data for 45 public traded insurance parents. Panel B presents results examining cross-sectional variation in portfolio performance based on the inclusion of fair value changes of equity securities in income-based performance benchmarks. *INCOMP* equals one if fair value changes on equity securities are included in income-based performance benchmarks in the post-period. The estimated t-statistics in parentheses are based on standard errors clustered at the group level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

Panel A

Company Name	Equity FV Changes in Income Benchmark in Post Period (*INCOMP*)	Changed Plan to Exclude Equity FV Changes	Change Year
ALLEGHANY CORP	1	No	
ALLSTATE CORP	1	No	
ALLY FINANCIAL INC	0	Yes	2018
AMERCO	0	No	
AMERICAN FINANCIAL GROUP INC	1	No	
AMERICAN INTERNATIONAL GROUP	0	Yes	2018
AMERISAFE INC	1	No	
ARCH CAPITAL GROUP LTD	1	No	
ARGO GROUP INTL HOLDINGS LTD	1	No	
ASSURANT INC	0	No	
AXIS CAPITAL HOLDINGS LTD	1	No	
BERKLEY (W R) CORP	1	No	
BERKSHIRE HATHAWAY	0	No	
CHUBB LTD	1	No	
CINCINNATI FINANCIAL CORP	0	No	
CNA FINANCIAL CORP	1	No	
EMPLOYERS HOLDINGS INC	0	Yes	2018
EVEREST RE GROUP LTD	1	No	
FEDNAT HOLDING COMPANY	0	Yes	2019
FIRST AMERICAN FINANCIAL CP	1	No	
HARTFORD FINANCIAL SERVICES	1	No	
HCI GROUP INC	0	No	
HERITAGE INSURANCE HOLDINGS	1	No	
HILLTOP HOLDINGS INC	1	No	
HORACE MANN EDUCATORS CORP	1	No	
JAMES RIVER GROUP HLDGS LTD	0	No	
KEMPER CORP/DE	0	Yes	2018
MARKEL CORP	0	No	
MERCURY GENERAL CORP	0	No	
METLIFE INC	0	No	
NATIONAL GENERAL HOLDINGS CP	1	No	
NATIONAL SEC GROUP INC	1	No	
OLD REPUBLIC INTL CORP	0	Yes	2018
PROASSURANCE CORP	1	Yes	*
PROGRESSIVE CORP-OHIO	0	No	
PROTECTIVE INSURANCE CORP	0	Yes	2019
RLI CORP	0	Yes	2019
SAFETY INSURANCE GROUP INC	0	Yes	2018
SELECTIVE INS GROUP INC	0	Yes	2018
STATE AUTO FINANCIAL CORP	0	No	
TIPTREE INC	1	No	
TRAVELERS COS INC	1	No	
UNITED FIRE GROUP INC	0	No	
UNITED INSURANCE HOLDINGS CO	0	Yes	2018
UNIVERSAL INSURANCE HLDGS	1	No	

*Proassurance removed fair value changes from their performance benchmark in 2020 but included them during our post-period.

Table 8 (cont.)

Panel B:	***Portfolio Performance***					***Portfolio Systematic Risk Exposures***					***Portfolio Diversification***		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Vol	*SharpeRatio*	*InfoRatio*	*Ret*	*Alpha*	*Beta*	*AbsSMB*	*AbsHML*	*AbsRMW*	*AbsCMA*	*IdioRisk*	*NV*	*SSPW*
Post × *InComp*	-0.0009	-0.0308	-0.0446	-0.0002	-0.0002	-0.0089	-0.0138	-0.0462	-0.0120	-0.1148**	-0.0003	0.0512	0.0533
	(-1.2099)	(-0.2762)	(-1.3963)	(-1.6334)	(-1.5406)	(-0.2157)	(-0.6271)	(-0.9736)	(-0.3418)	(-2.2906)	(-0.5435)	(1.4470)	(1.4768)
Observations	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413
R-squared	0.7930	0.6075	0.2575	0.4885	0.1341	0.3993	0.5434	0.6848	0.4783	0.4688	0.8257	0.8312	0.9151
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 9: Falsification Test

This table presents the regression estimates of Equation (3), replacing *Vol* with *VolFal*, which represents the standard deviation of the value-weighted average daily return by assuming that insurers would hold the same portfolios in the post-adoption period as they did at the end of 2017Q4. The estimated t-statistics in parentheses are based on standard errors clustered at the group level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

	(1) *VolFal*	(2) *VolFal*
Treat×Post	**-0.0003**	**-0.0003**
	(-0.9323)	**(-0.9281)**
Size		0.0000
		(0.0369)
ROA		-0.0010
		(-0.6019)
RBC		-0.0000
		(-0.3610)
GeoCon		-0.0001
		(-0.3375)
LineCon		0.0003
		(0.9344)
Long_tail		0.0004
		(1.0130)
Constant	0.0086***	0.0078
	(187.5513)	(0.6993)
Observations	8,606	8,606
R-squared	0.8522	0.8522
Firm FE	YES	YES
Year-Quarter FE	YES	YES

Table 10: The Regulatory Capital Channel

This table presents results examining cross-sectional variation in changes in *Vol* based on regulatory capital. *LowRBC* is an indicator variable that takes a value of 1 if a firm has risk-based capital in the lowest decile and 0 otherwise. *Vol* represents the standard deviation of the value-weighted average daily portfolio returns of an insurer's common stock holding in a quarter. The estimated t-statistics in parentheses are based on standard errors clustered at the group level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

	(1) *Vol*	(2) *Vol*
Treat×Post	-0.0005	-0.0005
	(-1.6446)	(-1.6424)
Post×LowRBC	0.0003	0.0003
	(0.6378)	(0.6717)
Treat×Post×LowRBC	-0.0008	-0.0008
	(-0.7683)	(-0.7909)
Controls	NO	YES
Observations	8,435	8,435
R-squared	0.8232	0.8233
Firm FE	YES	YES
Year-Quarter FE	YES	YES

Table 11: Spillover Effects

This table presents the regression estimates of Equation (3), replacing the dependent variable with three dimensions of operating risks (*GeoCon*, *LineCon*, and *Long_tail*), reinsurance usage (*Rein*) and government bond investment (*Gov_bond and Muni_bond*). Control variables in Columns (4), (6) and (7) are aggregated to the annual level. The estimated t-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * indicate significance at 0.01, 0.05, and 0.1 levels respectively. The definitions of variables are presented in Appendix 1.

	(1) *GeoCon*	(2) *LineCon*	(3) *Long_tail*	(4) *Rein*	(5) *LossRatio*	(6) *Gov_bond*	(7) *Muni_bond*	(8) *VW_Yield*	(9) *VW_Spread*	(10) *VW_Rating*
Treat×Post	**0.0013**	**-0.0076**	**-0.0008**	**-0.0114**	**-0.0181**	**-0.0061**	**0.0033**	**0.0042**	**-0.0503**	**-0.0078**
	(0.2004)	**(-1.3791)**	**(-0.1618)**	**(-0.9691)**	**(-0.7755)**	**(-0.5000)**	**(0.2743)**	**(0.0961)**	**(-1.3981)**	**(-1.2847)**
Size	-0.0415*	-0.0039	0.0081	-0.0225	0.0549	-0.0010	-0.0169	-0.0157	-0.0226	0.0124
	(-1.8946)	(-0.2297)	(0.5880)	(-0.6753)	(0.9771)	(-0.0635)	(-1.2931)	(-0.2128)	(-0.3860)	(1.1509)
ROA	0.0756	0.0888	-0.0823	0.5926	-8.7981***	-0.3525	0.3931	-0.1855	-0.1323	-0.0462
	(1.0140)	(1.1311)	(-0.9076)	(0.7396)	(-11.0294)	(-1.3366)	(1.6236)	(-0.6084)	(-0.6130)	(-0.7041)
RBC	0.0002	-0.0002	-0.0004**	0.0005	-0.0011	0.0002	-0.0001	-0.0004	-0.0000	0.0000
	(0.6358)	(-0.6340)	(-1.9997)	(0.8425)	(-0.9196)	(1.4417)	(-0.4953)	(-0.5407)	(-0.0351)	(0.5866)
GeoCon	0.2296***		0.0115	0.0072	0.2369*	0.0170	0.0122	0.1666	0.1594*	0.0153
	(3.9191)		(0.1953)	(0.0990)	(1.7230)	(0.3913)	(0.5288)	(1.4921)	(1.6594)	(0.8647)
LineCon	-0.0218	0.0135		-0.1079	-0.0485	0.0181	0.0225	-0.0766	-0.0984	-0.0225**
	(-0.4089)	(0.1948)		(-0.9988)	(-0.2387)	(0.4500)	(0.7150)	(-0.9659)	(-1.3649)	(-2.0137)
Long_tail		0.2195***	-0.0178	-0.0458	0.0499	0.0243	-0.0162	-0.1162	-0.1058	-0.0097
		(3.6359)	(-0.4161)	(-0.3208)	(0.3787)	(0.4470)	(-0.3980)	(-0.7688)	(-0.8996)	(-0.4589)
Constant	1.1764***	0.4620	0.5946**	0.9216	-0.5019	0.0520	0.3709	3.3249**	1.5598	-0.1865
	(2.6696)	(1.3409)	(2.1650)	(1.4265)	(-0.4409)	(0.1693)	(1.4242)	(2.2767)	(1.3587)	(-0.8765)
Observations	8,791	8,791	8,791	2,256	8,405	2,256	2,256	7,816	7,816	7,816
R-squared	0.9683	0.9498	0.9452	0.9506	0.5008	0.7974	0.7708	0.8953	0.8752	0.7967
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Figure 1: Difference in Portfolio Volatility between Treatment and Control Firms by Quarter around ASU 2016-01

Figure 1 depicts differences in *Vol* between treatment and control firms by quarter surrounding the adoption of ASU 2016-01 with Q4 2017 as the benchmark quarter. The x-axis denotes fiscal year-quarter. The y-axis denotes the estimated coefficient for each year-quarter of our main analysis. The dots represent coefficient estimates, and the lines represent 90% confidence intervals.