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 other comprehensive income on firms' investment portfolio holdings. To examine this impact, we focus on the adoption of Accounting Standards Update 2016-01 for a sample of property and casualty insurance companies. We find that firms adopting the new standard, which required them to recognize changes in the fair value of equity securities in net income, decreased the riskiness of their equity portfolios relative to firms that did not adopt the new standard. We also find that our results are weaker for adopters that outsource management of a portion of their assets to third parties and stronger for adopters with smaller equity portfolios. Overall, our results suggest that recognizing fair value changes in net income has real effects, prompting firms to alter their investment holdings to reduce earnings volatility.

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. Opponents of fair value measurements often contend that including fair value changes in net income makes net income unnecessarily volatile. Proponents counter that this additional volatility properly reflects economic risk. In this paper, we examine whether, in response to concerns about greater net income volatility, firms change their investment choices when they are required to recognize fair value changes in net income.[1]

To examine this research question, we focus on the adoption of Accounting Standards Update (ASU) 2016-01: *Recognition and Measurement of Financial Assets and Financial Liabilities*. The FASB issued this Update in 2016, and it became effective for public business entities for fiscal years beginning after December 15, 2017. This update was issued as part of the FASB's continued efforts to improve the accounting and reporting for financial instruments. Among other things, ASU 2016-01 requires firms to report changes in the fair values of equity securities in net income. Previously, such changes were recorded in other comprehensive income (OCI) except in cases where declines in value were deemed to be other-than-temporary. Like other proposals to recognize assets at fair value with changes recorded in net income, ASU 2016-01 met

[1] Prior studies examine the impact of recognizing fair value changes in net income on the decision usefulness of earnings (e.g., Hopkins and Wahlen, 2004; Hodder, Hopkins, & Wahlen, 2006). In contrast, we focus on the investment effects. This is not the first study to examine the real investment effects of fair value accounting (see, e.g., Beatty, 1995; Hodder, Kohlbeck, and McAnally, 2002; Chircop and Novotny-Farkas, 2016). However, these prior studies focus on the impact of fair value measurements on banks' investment choices via their impact on regulatory capital. Prior research does not address whether, absent a regulatory capital channel, recognition of fair value changes in net income leads firms to change their investment behavior.

industry resistance, with many preparers expressing concern that recognizing fair value changes would make net income unnecessarily volatile and would not be decision-useful for investors.

To test our research question, we examine the impact of ASU 2016-01 on the investment choices of firms in the property-and-casualty insurance industry. Examining insurance companies provides two unique empirical advantages. First, ASU 2016-01 was rejected by the National Association of Insurance Commissioners (NAIC) for inclusion in Statutory Accounting Principles (SAP). SAP is used to determine net income and capital for regulatory purposes. 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, allowing us to more clearly identify a treatment effect. Second, insurance companies are required to disclose information about their investment portfolios at an individual security level. This granularity allows us to examine changes in insurance companies' equity investment portfolios surrounding the adoption of ASU 2016-01.

A priori, the impact of the adoption of ASU 2016-01 on firms' investment decisions is unclear. On the one hand, if managers are concerned that increased income volatility could negatively affect investors' perceptions of firm risk, they may choose to alter their portfolio to mitigate this reported volatility. Consistent with this idea, several firms, in their comment letters opposing the inclusion of fair value changes in net income, cautioned that it could lead them to substantially alter their investment portfolios. On the other hand, because insurance companies' investments are a key part of their earnings and risk-management strategies, changes to the investment portfolio could result in a non-optimal level of risk and return. Therefore, empirical analysis is required to determine if the perceived financial reporting benefits of changing investment strategy outweigh the real costs often enough to appear in the data.

We conduct several analyses to examine whether ASU 2016-01 prompted insurance companies with publicly traded parents to alter their investment portfolios. We use a difference-in-differences research design with insurance companies that have publicly traded parents as our treatment group and privately held parents as our control group. First, we examine whether ASU 2016-01 prompted an increase in disposals of equity securities for treatment banks. We do not find an increase in the volume of disposals, on average. Second, we examine changes in the riskiness of adopters' equity security portfolios. We find that, after adoption, treatment firms decrease the overall risk and volatility of their equity security portfolios as measured by beta and return volatility.

Next, to more specifically examine the impact of ASU 2016-01 on net income volatility, we examine changes in the volatility of unrealized gains and losses on equity securities in the eight quarters pre- and post-adoption. We find that, relative to control firms, treatment firms exhibit a decline in the volatility of unrealized gains and losses. Taking advantage of the security-level granularity of insurance company data, we perform a falsification test to see if the volatility of the equity portfolio *would* have declined in the post period if firms had held the same equity securities in their portfolios that they held in the pre period. We find that volatility of equity securities for treatment firms would *not* have declined relative to control firms if treatment firms had not made changes to 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.

We perform two additional analyses. First, we examine whether our results vary cross-sectionally based on the extent to which insurers outsource management of their investment portfolios and based on the size of their equity portfolios. We find that firms that outsource

management of at least 10% of their investment portfolios do not reduce the beta or volatility of their portfolios, consistent with insurers only reducing the riskiness of their portfolios when investment choices are made by managers that are concerned with the volatility of net income. Further, we find that our result is moderated by the size of the equity security portfolio relative to total assets, suggesting that as the size of the equity portfolio increases, the benefit of mitigating income volatility is outweighed by the cost of deviating from preferred risk levels.

Second, we examine whether the decrease in risk taking in the equity security portfolio has spillover effects in other areas of treatment firms' businesses. Coordinated risk management theory (Schrand & 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 firms' overall level of risk below their desired level, they may compensate by increasing risk in other areas of their business. We examine several potential dimensions of risk in the insurance industry, including firms' business line and geographical diversity, the "tail" of the insurance policies underwritten (with longer tail policies carrying greater risk), and the extent to which firms purchase reinsurance for policies they have underwritten. We do not find a significant change in business line or geographical diversity in the post period for treatment firms relative to control firms, which is not surprising given the long-term, strategic nature of these diversification decisions. We also do not find a significant change in the tails of policies underwritten or the extent to which treatment firms purchase reinsurance in the post period relative to control firms. While these are not comprehensive measures of firm risk, we do not find evidence of spillover effects whereby firms compensate for the decreased risk in their equity portfolios by increasing risk in other parts of the firm, at least during our sample window.

This paper makes contributions that should be of interest to standard setters, preparers,

regulators, and academics. Primarily, 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, & McAnally, 2002; Chircop & Novotny-Farkas, 2016), 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 examining the effect of reporting assets at fair value versus historical cost. 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. Because SAP continues to exclude fair value changes from regulatory capital, we provide evidence on the effect of reporting fair value changes in net income in the *absence* of a regulatory capital channel.

Our paper contributes to a growing stream of research using the adoption of ASU 2016-01 to study the effects of recording fair value changes in net income. McGregor (2021) finds that earnings volatility and analyst forecast errors increase for firms adopting ASU 2016-01, and both Campbell et al. (2022) and McGregor (2021) find that value-relevance of earnings decreases. Amornsiripanich et al. (2021) use ASU 2016-01 to examine whether reporting fair value changes in net income affects the market response to changes in the fair value of equity securities, arguing that investor inattention causes an overreaction to such changes. Similar to our study, they examine whether ASU 2016-01 prompts managers to change their equity portfolio holdings. However, they focus on the overall level of the equity holdings and find a decrease in overall equity investments. We focus on how ASU 2016-01 affects the *riskiness* of the equity securities firms hold. In contrast to their findings, we do not find an overall decrease in the level of equity investments, but we do

find that managers decrease the risk of the securities they hold in an effort to reduce the volatility of net income.

Kim et al. (2022) examine how the adoption of ASU 2016-01 affects managers' use of non-GAAP reporting, finding that more highly affected insurers increase the use of non-GAAP measures that exclude unrealized gains and losses on equity investments. Like us, they examine whether ASU 2016-01 affects insurers holdings of equity securities. Consistent with our findings, they do not find a change in overall equity security holdings. However, in contrast to their results, we find evidence that ASU 2016-01 does affect the riskiness of affected insurers' equity holdings. Our finding in additional analysis that this result is attenuated as the size of the equity portfolio increases helps reconcile our results with those of Kim et al. (2022), who use the size of the equity portfolio as their treatment variable and find that firms with larger equity investment portfolios do not change the size or risk of their portfolios.

Regarding the generalizability of our results, we believe that, while our study examines a specific accounting standard change that differentially effects firms based on the extent to which they invest in equity securities, 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 are debated.[2] 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. Investors and analysts often remove supposedly "transitory"

[2] 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 on May 20, 2021 as part of the FASB's post-implementation review process for the Current Expected Credit Loss Standard ("CECL"), including both preparers and investors, questioned whether CECL 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 other comprehensive income.

items such as fair value adjustments from earnings in attempts to forecast "core" earnings. Regardless of whether including fair value changes makes net income a more decision-useful measure of firm performance, the results in this paper suggest that doing so can have real effects. While we do not comment on the optimality of these real effects, they may be of interest to standard setters in future rule making related to the measurement of net income.

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.

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 & 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. Zeff (2007) provides a detailed account of the SEC's stance on the use of fair value measurements since its inception in the 1930's. For roughly the first four decades of its existence as the primary government regulator of accounting and financial reporting standards, he notes that 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. 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, & Schipper, 2013). The first standard issued that resulted in significant use of periodic fair value re-measurements was SFAS 115.[3,4] This standard was issued by the FASB in 1993 in the wake of the savings and loan crisis of the late 1980's and early 1990's, with proponents of increased use of fair value measurements arguing that the use of historical costs had resulted in banks engaging in "gains trading" and deferring losses such that they appeared solvent on a book value basis when in reality they were insolvent due to significant declines in the value of their assets (Beatty, 1995; Barth, Landsman, & Wahlen, 1995).[5]

SFAS 115 created three categories of securities—trading, available-for-sale, and held-to-maturity—that required classification of securities based on management's intent regarding each security's disposition rather than based on its characteristics. Securities classified as "held-to-maturity" 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." Both trading and available-for-sale 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 other comprehensive income.

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

[3] 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.

[4] SFAS 107, issued in 1991, required *disclosure* of fair values of financial instruments but not recognition.

[5] See paragraph 31 of SFAS 115.

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 firms' "core" earnings. Further, banks argued that reporting changes in the fair values of only certain assets in income but not related liabilities resulted in net income volatility that did not reflect actual economic volatility.[6]

The question of how to report fair value changes arose again during the financial crisis of 2007-2009, which was characterized by a significant decline in market liquidity for certain types of financial instruments and led to debate about the appropriateness of writing assets down to "fire sale" prices when markets were not active (Hodder, Hopkins, & Schipper, 2013; Badertscher, Burks, & Easton, 2012). In particular, there was a concern among banks that other-than-temporary impairment charges recorded in net income contained not only declines related to decreases in expected future cash flows (which make the decline "other-than-temporary"), but also large liquidity discounts. In response to these concerns, the FASB's Emerging Issues Task Force (EITF) issued EITF SFAS 115-2, which permitted firms to record the non-credit related component of an OTTI charge in other comprehensive income 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. These proposals have met resistance from practitioners and other stakeholders. In 2010, the FASB issued an exposure draft proposing that most financial instruments be periodically re-measured at fair value. This proposal received strong resistance from the banking industry (Hodder & Hopkins, 2014) and ultimately was withdrawn in 2011. In the comment letter process, banks expressed particular concern over the proposal that

[6] See paragraph 55 of SFAS 115.

held-to-maturity loans be reported at fair value.

After considering feedback received in response to the 2010 exposure draft, the FASB in 2013 issued a new 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. For non-PBEs, it became effective for fiscal years beginning after December 15, 2018. While not as significant a departure from prior practice as the 2010 exposure draft, 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 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. As with the 2010 exposure draft, the FASB again received industry resistance to the requirement to recognize fair value changes in net income. 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, Lincoln Financial Group argues that:

"a life insurance company's earnings under the proposed guidance will become more volatile as more financial instruments are classified and measured at fair value through net income ('FV-NI'). This volatility in earnings will not be indicative of the life insurance company's performance and would, in our view, provide misleading performance information to financial statement users…We prefer the current classification and measurement approach under U.S. GAAP for financial instruments which allows us to appropriately report our financial results in a manner consistent with our asset-liability management business model."

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. The bulk of the pre-financial crisis of 2007-2009 literature is surveyed by Holthausen & Watts (2001) and Barth, Beaver, & Landsman (2001), while Laux & Leuz (2009) discuss the debate about the use of fair value measurements that arose during the financial crisis. 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 (Barth, 1994; Barth, Beaver, & Landsman, 1996; Eccher, Ramesh, & Thiagarajan, 1996; Nelson, 1996) are significantly associated with firm market values, implying that fair values, at least of investment securities, are relevant and sufficiently reliable. Results regarding fair value changes are more mixed, with some studies finding evidence that fair value changes are associated with market value changes (Barth, Beaver, & Landsman, 1996) and

others not (Barth, 1994).

Fewer existing 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. other comprehensive income improves or degrades net income as a summary performance measure. For instance, Dhaliwal, Subramanyam, & Trezevant (1999), under the assumption that stock returns reflect "true" firm performance, find that income including changes in the fair value of marketable securities better summarizes firm performance than net income excluding such adjustments, though they do not show that including fair value changes better predicts year-ahead net income or cash flows. In an experimental setting, Hirst, Hopkins, & Wahlen (2004) find that bank equity analysts are able to distinguish banks based on their level of interest rate risk when fair value changes of financial instruments are included in net income. Hodder, Hopkins, & Wahlen (2006) compare the volatility of net income, comprehensive income (as reported under SFAS 115), and full-fair-value income (including changes in the fair values of held-to-maturity securities, loans, derivatives, deposits, and long-term liabilities) and find that, while full-fair-value income is significantly more volatile than net income or comprehensive income, it reflects the effects of value-relevant risk factors that are not fully captured by these measures. They conclude that full-fair-value income may more accurately reflect the risk profile of banks. Taken together, the results of these studies suggest that including changes in the fair values of assets, at least those of investment securities, may provide decision-useful information to investors.

A number of studies examine how carrying assets and liabilities at fair value affects firms' investment decisions. Studying derivatives, Lins, Servaes, and Tamayo (2011) use survey evidence of a sample of international CFOs and find that the requirement to include derivative instruments

on the balance sheet and report them at fair value affects hedging activity. 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. 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.

Focusing on the banking industry, Beatty (1995) studies changes in banks' investment portfolios after the adoption of SFAS 115 and finds that, prior to bank regulators deciding to exclude unrealized gains and losses on investment securities from regulatory capital, banks decreased their holdings of investment securities and decreased the average duration of their investment portfolios. Similarly, Hodder, Kohlbeck, & 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 that this occurs through a regulatory capital channel. Whether firms adjust their investment choices in the *absence* of a regulatory capital channel due to having to report fair value changes in net income rather than other comprehensive income 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, as noted above, 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 affect firms operational or investment decisions. First, managers may be concerned about how increased income volatility would affect investors' perceptions of firm risk. In a survey of CFO's on the topic of "earnings quality," Dichev, Graham, Harvey, & Rajgopal (2012) find that firm managers have a strong preference for reporting "sustainable" accounting earnings. While some argue that the volatility resulting from recognizing changes in fair values reflects economic (or "inherent") volatility that should be reflected in financial statements (Barth, 2004; Hodder, Hopkins, & 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 on a particular date of assets with high inherent volatility may not be predictive of their future value and hence could mislead financial statement users by creating "artificial" volatility.

Second, the usefulness of earnings components in setting CEO compensation and evaluating management performance may be affected by their persistence and controllability. Arya

& Nagar (2021) study how the persistence and controllability of different earnings components affect their weighting by compensation committees in setting management compensation contracts. They find that, while compensation committees *do* distinguish somewhat between more and less persistent earnings components in their weighting, CEOs are only shielded from income-decreasing earnings components in the case of extraordinary items. While fair value changes may be less persistent than other earnings components and are, at least partially, uncontrollable,[7] managers still may have an incentive to smooth earnings for fear that volatility related to uncontrollable fair value changes may harm their performance evaluations.

While it is plausible that the issuance of ASU 2016-01 had no effect on firms' investment choices, research on the impact of SFAS 115 discussed previously suggests that banks did in fact respond to its implementation by adjusting their portfolio holdings, consistent with their opposition. We expect that firms will similarly "put their money where their mouth is" with respect to the requirement to recognize changes in the fair value of equity securities in net income. Thus, to decrease the impact of ASU 2016-01 on earnings volatility resulting from recognition unrealized gains and loss of equity investments, we expect firms to reduce the riskiness of their portfolio of equity investments. This leads to our hypothesis:

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

3. Research Design

3.1 SETTING

To test our hypothesis, we examine changes in the equity investment portfolios of property

[7] 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.

and casualty 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, 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, insurance companies continue to recognize changes in the value of equity securities directly in equity for regulatory reporting purposes, including the determination of regulatory capital. This means that publicly traded insurance companies (including insurance companies with publicly traded parents) must report net income excluding changes in the fair value of equity securities for regulatory purposes and including changes in the fair value of equity securities in their GAAP financial statements.[8] This is a key feature of our research setting.

Our set of treatment consists of insurance companies 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 privately held insurance companies (or insurance companies with privately held parents) that are 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 helps us to isolate the effect of reporting fair value changes in income absent other confounding factors.

[8] We consider the possibility that some property and casualty 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.

3.2 DATA

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 Schedule D Part 2 and transaction data from Schedule D Part 3-5 of the quarterly and annual statutory financial statements. We identify insurers' public status using the detailed ownership information provided by Schedule Y of annual statements. We code an insurer as a public insurer if its direct ultimate or indirect ultimate parent is listed on NYSE, NASDAQ, or AMEX. We obtain data on stocks' daily return and price information from the Center for Research in Security Prices (CRSP) database.

3.3 MEASURES OF EQUITY PORTFOLIO RISK

We use two variables to measure the riskiness of an insurer's common stock portfolio: *PortfolioBeta* and *PortfolioVol*. The first variable, *PortfolioBeta*, is the weighted average beta of an insurer's common stock holdings at the end of a quarter, calculated as:

$$PortfolioBeta_{iq} = \frac{(\sum_j MarketValue_{ijq} \times Beta_{jq})}{\sum_j MarketValue_{ijq}} \quad (1)$$

This variable captures the volatility of an insurer's common stock portfolio relative to the overall market. $MarketValue_{ijq}$ is calculated as the price of stock *j* held by insurer *i* at the end of quarter *q* multiplied by insurer *i*'s holding shares of this stock. $Beta_{jq}$ is estimated for stock *j* at the end of quarter *q* using the CAPM market model and a [-59, 0] day window prior to quarter end. We require a stock to have at least 30 days of return data to estimate beta and have available quarter-end price information in CRSP. Affiliated common stocks are excluded from our analysis because these investments are likely accounted for under equity method or consolidation and hence are not subject to ASU 2016-01.

The second variable, *PortfolioVol*, measures the total risk of common stocks held by

insurers. Specifically, we calculate the daily return volatility of insurer *i*'s common stock portfolio in quarter *q* as:

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

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

$$PortfolioRet_{idq} = \frac{\sum_j Ret_{ijdq} \times MarketValue_{ijdq}}{\sum_j MarketValue_{ijdq}} \quad (3)$$

Daily return (*Ret*) is collected from CRSP for each stock *j*. To obtain each stock's daily market value in an insurer's portfolio (*MarketValue*), we first employ the quarter-end stock holding data and daily transaction information to construct insurers' daily common stock portfolio holdings. We then calculate *MarketValue* as the daily price multiplied by shares held by the insurer on that day. At least 30 daily observations are required in the estimation of *PortfolioVol*. Similar to *PortfolioBeta*, affiliated common stocks are excluded from the calculation.

3.4 EMPIRICAL MODEL

We employ a difference-in-difference model to examine our hypothesis. We estimate the following regression:

$$StockPortfolioRisk_{iq} = \beta_0 + \beta_1 Treat \times Post + \sum_2^n \beta_n Control_{iq} + YearQuarterFE + FirmFE + \varepsilon_{iq} \quad (4)$$

In this regression, the dependent variable *StockPortfolioRisk* represents either *PortfolioBeta* or *PortfolioVol*. 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. *Post* equals

one for observations in years after the adoption of ASU 2016-01 and zero otherwise. 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-fixed and year-quarter fixed effects to control for time-invariant insurer characteristics and the general time trend, and hence the main effects of indicator variables *Treat* and *Post* are omitted from the regression.

We follow prior literature to control for several insurer-level characteristics that are likely associated with insurers' investment risk (Che & Liebenberg, 2017; Che, Liebenberg, & Lynch, 2020; Ge & Weisbach, 2021). We control for the natural logarithm of total net admitted assets (*Size*) and whether an insurer operates in a group (*Group*). 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 ratio (*RBC*), which equals total adjusted capital divided by the authorized control level risk-based capital.

Finally, we control for insurers' operating risks using four measures. *GeoCon* captures an insurer's geographic diversification, 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 value 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 insurer level (Khan, Ryan, & Abhishek, 2019). For both specifications, a negative coefficient on the interaction term (β_3) is consistent with our hypotheses that treated insurers will hold less risky common stocks after the adoption of ASU 2016-01.

4. Results

4.1 SAMPLE SELECTION AND SUMMARY STATISTICS

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 property and casualty insurers in SPGMI Insurance Statutory Financial 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 insurers holding at least one unaffiliated common at the end of a quarter. We also delete insurers that only file annual financial statements because the information on quarterly stock holdings and transactions is unavailable. Finally, we drop observations for which quarter-end price and daily return information of the stock holdings are not available in CRSP. 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 final sample contains 14,456 insurer-quarter observations. The definitions of variables are detailed in Appendix 1.

[Insert Table 1 Here]

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, for *PortfolioBeta*, the mean (median) for treatment firms is 0. 0.9089 (0.9156), larger than the mean (median) for control firms, which is 0.8809 (0.9034). Similarly, the mean (median) *PortfolioVol* of treatment firms is 0.0099 (0.0086), greater than that of control firms, which is 0.0079 (0.0070). In terms of other firm-level characteristics, treatment firms tend to be larger (*Size*), more profitable (*ROA*), and more likely to operate in a group (*Group*). 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 (*GeoCon*) or lines of business (*LineCon*) and underwrite less long-tail policies (*Long_tail*), indicating that treatment firms tend to have lower underwriting risks. Panel B of Table 2 provides the correlations of these variables.

[Insert Table 2 Here]

4.2 ASU 2016-01 ADOPTION AND CHANGES IN EQUITY SECURITY HOLDINGS

Before examining changes in the risk characteristics of firms' equity portfolios around the adoption of ASU 2016-01, we first examine whether firms changed their trading behavior with respect to equity securities in response to the new standard. To do this, we use security-level data to examine changes in the volume of disposals, acquisitions, and net acquisitions around ASU 2016-01 adoption. We replace the dependent variable in Equation (4) with *Disposalratio*, *Acquireratio*, and *Acquire_net_ratio*, representing, respectively, the dollar values of disposals, the dollar values of acquisitions, and the dollar values of net acquisitions. Disposals, acquisitions, and net acquisitions are divided by the market value of common stock holding at the beginning of each period. The results of these analyses are presented in Table 3. We do not find evidence of a significant change in the volume of equity securities acquisitions and disposals for treatment firms after ASU 2016-01 adoption relative to control firms. This result is consistent with Kim et al. (2022) but inconsistent with Amornsiripanitch et al. (2021).

4.3 ASU 2016-01 ADOPTION AND INSURERS' EQUITY PORTFOLIO RISK

Table 4 presents the results of H1 from estimating Eq. (3). In Columns (1) and (2), the dependent variable is *PortfolioBeta*. Column (1) reports the result without control variables, and the coefficient on the interaction term *Treat*×*Post* is negative and statistically significant ($p<0.01$).

In Column (2), we include all control variables, and the coefficient on *Treat×Post* remains negative and statistically significant ($p<0.01$). We then replace the dependent variable with *PortfolioVol* and re-estimate Equation (3). The results of this test are reported in Columns (3) and (4). In both columns, the coefficient on *Treat×Post* is negative and statistically significant ($p<0.05$).

Overall, these results support our hypothesis that affected firms decrease the risk of their equity portfolio after the adoption of ASU 2016-01. Economically, based on the coefficients in Column (2) and (4), treatment firms decrease their portfolio beta and return volatility by 6 percent and 6 percent, respectively, of the sample means of the two portfolio risk measures.

[Insert Table 4 Here]

5. Additional Analysis

5.1 UNREALIZED GAINS AND LOSSES ON EQUITY SECURITIES

In the above tests, we have documented that, relative to control firms, treatment firms exhibit a significant decline in the risk of their equity portfolios. To more specifically examine the impact of ASU 2016-01 on net income volatility, a key concern voiced by firms opposing recognition of fair value changes in income, we compare the volatility of unrealized gains and losses on equity securities in the eight quarters pre- and post-adoption. Ideally, we would like to examine the volatility of each quarter's unrealized gains and losses recognized in net income. However, such data is not available in insurers' quarterly statutory filings. Thus, we employ a measure that captures the volatility of accumulated unrealized gains and losses.

Specifically, we first calculate the accumulated unrealized gains and losses 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 *UnrealizedGL* equal to the change in the net unrealized gains or loss for all stocks held

by a firm divided by the total cost for all stocks and calculate *UnrealizedGLVol* as the volatility of *UnrealizedGL* in the eight quarters pre- and post-adoption.[9] We then keep one observation for each firm before and after the adoption of ASU 2016-01 and estimate the following regression:

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

$$+PostFE + Firm\ FE + \varepsilon_{ip} (5),$$

We aggregate the control variables included in Equation (3) by calculating the mean of these variables in the pre- and post-adoption periods. We include firm-fixed and post period fixed effects. We estimate t-statistics using robust standard errors clustered at the insurer level. Table 5 presents the results both with and without control variables. In Columns (1) and (2), 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. These results are consistent with these firms mitigating increased net income volatility due to recognizing fair value changes in earnings by decreasing their equity portfolio risks.

[Insert Table 5 Here]

5.2 FALSIFICATION TEST

Next, 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. 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, *PortfolioVolFal*, by replacing the true *PortfolioVol* in the post-period with the return volatility of the 2017Q4 portfolios and use

[9] Thus, in this test we exclude firms with missing quarters over the sample period.

this variable as the dependent variable to estimate Equation (3).

Table 6 presents the estimated coefficient of this analysis. In both Columns (1) and (2), we find that the coefficient on *Treat*×*Post* is insignificantly different from zero at the conventional levels, indicating that volatility of equity securities for treatment firms would *not* have declined relative to control firms if treatment firms had not made changes to 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.

[Insert Table 6 Here]

5.3 CROSS-SECTIONAL ANALYSES

We next consider two characteristics of insurers that could affect the extent to which they decrease in the riskiness of equity portfolios in response to the adoption of ASU 2016-01. The first characteristic we examine is the extent to which insurers outsource management of their investment portfolios. 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 property and casualty 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."[10]

We conjecture that our finding that insurers decrease the riskiness of their investment portfolios after adoption of ASU 2016-01 is likely to be weaker to the extent that they outsource management of their investment portfolios, as the unaffiliated investment manager is concerned with maximizing investment returns and not with the volatility of the insurers' unrealized gains

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

and losses. We test this conjecture by gathering data on the extent to which insurers outsource management of their investment portfolios to unaffiliated third parties from the "General Interrogatories" section of insurers' annual statutory filings available on SPGMI. We create an indicator variable, *UnaffiliatedMgr*, that we set equal to one if an insurer outsources management of at least 10% of their assets to unaffiliated third parties in 2017, and zero otherwise. We then estimate Eq. (4) with the interaction terms *Post* × *UnaffiliatedMgr* and *Treat* × *Post* × *UnaffiliatedMgr*. The results are presented in columns (1) and (2) of Table 8. We find that our result is significantly attenuated for insurers that outsource management of their investment portfolios. This is consistent with the idea that managers that do not outsource management of their portfolios reduce risk in an effort to decrease net income volatility after adoption of ASU 2016-01.

The second characteristic we examine is the relative size of an insurers' equity security portfolio. Ex ante, whether our main result should be stronger or weaker for insurers with larger equity security portfolios is unclear. On the one hand, insurers with larger equity portfolios would benefit more, in terms of reducing net income volatility, from reducing the riskiness of their equity holdings. On the other hand, the cost of doing so could be larger for such firms in terms of moving them away from their optimal level of risk. Consistent with the latter, in a concurrent working paper, (Kim, Kim, Marquardt, & Shin, 2022) consider insurers with larger equity portfolios as their treatment group when examining the impact of ASU 2016-01 and find that such insurers do not reduce the size or risk of their equity portfolios. We examine how our main result varies cross-sectionally based on the size of the equity portfolio in the pre-period by interacting our treatment variable with *StockPct*, calculated as equity investments as a percent of total assets at the end of 2017Q4.

The results of this analysis are presented in columns (3) and (4) of Table 8. Consistent with the costs of decreasing the riskiness of the equity portfolio outweighing the benefits in terms of reducing net income volatility decreasing as the size of the equity portfolio increases, we find that the coefficient on the interaction term *Treat* × *Post* × *StockPct* is positive and significant in column (4). However, we do not find a significant difference in column (3) for portfolio beta.

[Insert Table 7 Here]

5.4 SPILLOVER EFFECTS

In the last set of tests, we examine whether the decrease in risk-taking in the equity security portfolio has spillover effects in other areas of treatment firms' businesses. Coordinated risk management theory (Schrand & Unal, 2002) suggests that firms are likely to allocate risk among multiple risk sources to achieve an overall desired risk level. Thus, to the extent that reducing risk in the equity portfolio reduces firms' overall level of risk below their desired level, they may compensate by increasing risk in other areas of their business. We first examine insurers' three dimensions of operating risks: insurers line of business concentration, geographical concentration, and the "tail" of the insurance policies underwritten (with longer tail policies carrying greater risk). Columns (1) to (3) in Table 8 shows results for these tests. In each Column, the coefficient on the interaction term *Treat*×*Post* is not significantly different zero, suggesting that treatment firms did not significantly change their operating decisions in terms of business lines and geographical concentration in the post period.

We then examine the extent to which firms purchase reinsurance for policies they have underwritten. Reinsurance 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 & Leverty, 2010). We conduct this analysis at the insurer-year level as reinsurance information is not available in insurers' quarterly statutory filings. We aggregate other control variables to the annual level by calculating the average values across the four quarters.

[Insert Table 8 Here]

Columns (4) presents the result of this analysis. The coefficient is negative but not significantly different from zero in Column (4).

Finally, we examine whether treatment firms compensate for lower risk in their equity portfolios by taking on greater risk in their debt portfolios by examining whether treatment firms decrease (increase) their holdings of safer (riskier) debt securities in the form of U.S. treasury bonds (municipal bonds). In columns (5) and (6), we do not find a significant change in treatment firms' debt security holdings. Taken together, the results in Table 9 do not provide evidence of spillover effects from the reduction of risk taking in the equity security portfolio.

5.5 ROBUSTNESS

5.5.1 Pre-Adoption Trends in Equity Portfolio Risk. We examine the parallel trends assumption by evaluating the difference in the equity portfolio risks between the treatment and control insurers surrounding the adoption of ASU 2016-01. Specifically, we replace the *Post* indicator variable in the interaction term of Eq. (3) with six indicator variables equal to one if the observation belongs to that period and zero otherwise. Figure 1 plots the coefficients on the interaction terms between *Treat* and the six new period indicators. In Panel A, we observe no significant changes in the difference between portfolio beta between treatment and control insurers in the pre-period. However, in the post-period, coefficients are all negative and significant at the $p<0.01$ ($p<0.05$) level in 2018 Q2 (after 2018 Q3).

Panel B presents the coefficients when we use *PortfolioVol* as the dependent variable. We observe no significant changes in the difference between portfolio return volatility between treatment and control insurers in the pre-period. Similar to the beta test, in the post-period, all three coefficients are negative. Furthermore, the coefficients are significant at the 10% level (5% level) for 2018Q1 (2018Q3-2019Q4). Overall, these results support the parallel trends assumption in our setting.

[Insert Figure 1 Here]

5.5.2 Entropy Balancing. Overall, the above descriptive statistics suggest that the treatment and control insurers are different in various firm-level characteristics. While we include control variables in all our analyses to account for these differences, we perform an additional analysis using entropy balancing to mitigate the concern that our treatment and control samples are inherently different and to ensure that our results are not a spurious artifact of differences between treatment and control firms not associated with ASU 2016-01. Entropy balancing (Hainmueller, 2012) is an approach to balancing the covariates between treatment and control groups in observational studies. The goal of entropy balancing is to place weights on control observations to achieve balance on moments of the covariate distributions between treatment and control observations while staying as close to equal weighting as possible.

In untabulated analysis, we follow prior studies to perform entropy balancing using the first and the second moment (i.e., mean and variance) as the highest order of moment constraints (Ege, Glenn, & Robinson, 2020). We find that all our results are robust to the use of entropy balancing with the exception of our analysis of changes in the extent of unrealized gains and losses for treatment firms in the post period. In our analysis of changes in unrealized losses, the coefficient for the interaction term *Treat×Post* is slightly more negative but is statistically

insignificant (-0.0284, t=-1.62).

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 property and casualty 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.

This paper 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. This is important given the recurring question standard setters face of whether the corresponding effects of asset re-measurements should be reflected in reported income or else, such as accumulated other comprehensive income. While we do not examine how including fair value changes in income affects the decision-usefulness of firms' financial statements, we provide evidence that doing so can have real effects on firms' investment choices. In this case, recognizing fair value changes in net income results in a decrease in risk-taking in the equity portfolio, and we do not find that firms compensate for this decrease in risk by increasing risk in other parts of the firm. While we do not comment on the optimality of these real effects, they should be of interest to standard setters in future rule making related to the measurement of net income.

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Appendix 1: Definition of Variables

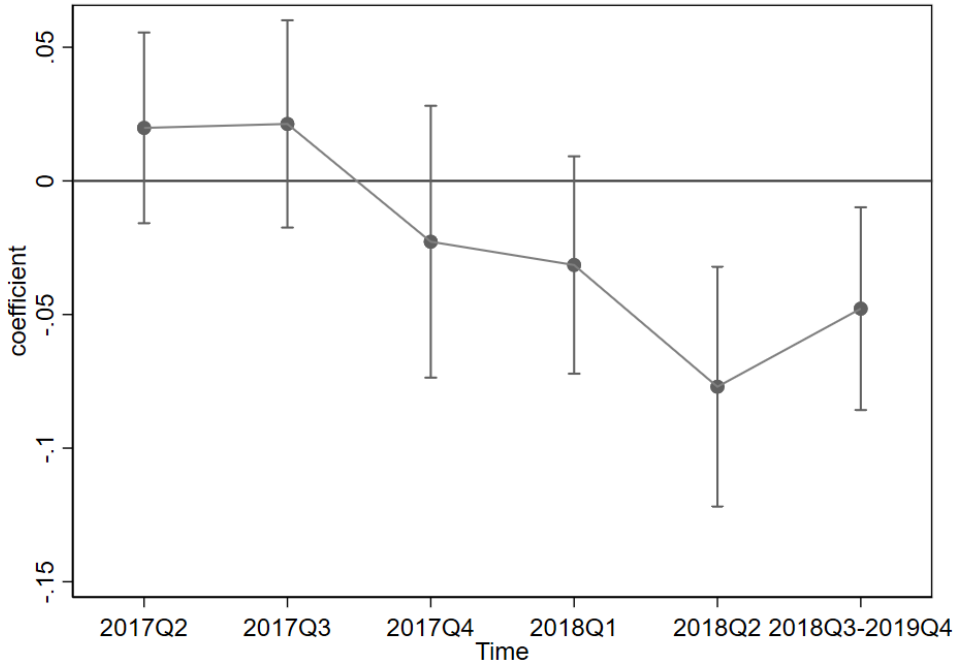
Variable Name	Variable Description
Disposalratio	The value of disposed common stocks (SPGMI Insurance Investment Transactions Database KeyField 233598) of an insurer in a quarter divided by total market value of common stock holding at the beginning of the period (SPGMI Insurance Investment Holdings Database KeyField 241632).
Acquireratio	The value of acquired common stocks (SPGMI Insurance Investment Transactions Database KeyField 233589) of an insurer in a quarter divided by total market value of common stock holding at the beginning of the period (SPGMI Insurance Investment Holdings Database KeyField 241632).
Acquire_net_ratio	The difference between the values of acquired common stocks and disposed common stocks of an insurer in a quarter divided by total market value of common stock holding at the beginning of the period.
PortfolioBeta	The value-weighted average beta of an insurer's common stocks portfolio at the end of a quarter. Beta is calculating using a market model over the 60 trading days prior to quarter end. The market value of a stock is calculated as the price obtained from CRSP multiplied by the quarter-end holding shares of this stock (SPGMI Insurance Investment Holdings Database KeyField 241632)
PortfolioVol	The standard deviation of the value-weighted average daily return of an issuer's common stock portfolio in a quarter. 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)
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 and zero otherwise.
Post	An indicator variable that equals one for observations in years after the adoption of ASU 2016-01(2018 or 2019) and zero otherwise.
Size	The natural logarithm of total net admitted assets (SPGMI Insurance Statutory Financials Database, KeyField 113963).
Group	An indicator variable that equals one if an insurer operates in a group and zero otherwise (SPGMI Insurance Statutory Financials Database KeyField 227521).
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.
UnrealizedGL	The total accumulated unrealized gains and losses for all stocks in an issuers' stock portfolio at the end of a quarter divided by the total cost for all stocks. The accumulated 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).
UnrealizedGLVol	The standard deviation of *UnrealizedGL* in the eight quarters pre- and post-adoption.
PortfolioVolFal	The standard deviation of the value-weighted average daily return of an issuer's falsification common stock portfolio in a quarter, assuming that insurers will hold the same portfolios in the post-adoption period as they did at the end of 2017Q4 (SPGMI Insurance Investment Holdings Database KeyField 241632).
Rein	Premiums ceded divided (SPGMI Insurance Statutory Financials Database, KeyField 114235

	and 114236) by the sum of direct premiums written (SPGMI Insurance Statutory Financials Database, KeyField: 114232) and reinsurance assumed (SPGMI Insurance Statutory Financials Database, KeyField 114233 and 114234).
DivYield	Total dividend income, equal to the sum of dividends declared but unpaid and dividends received (SPGMI Insurance Statutory Financials Database, KeyField 120817 and 122894) from unaffiliated equity investments over a year divided by the cost of securities owned at the end of the year (SPGMI Insurance Statutory Financials Database, KeyField 120816).
UnaffiliatedMgr	Equal to one if an insurer outsources management of at least 10% of their assets to unaffiliated third parties in 2017, and zero otherwise (SPGMI Insurance Statutory Financials Database KeyField 267460).
StockPct	Unaffiliated equity investments (SPGMI Insurance Statutory Financials Database KeyField: 120815) as a percent of total net admitted assets at the end of 2017 (SPGMI Insurance Statutory Financials Database, KeyField 113963).
Gov_bond	Government bond investments (SPGMI Insurance Statutory Financials Database KeyField 322867 for 2019 and 114770-114772 for 2016-2018) as a percent of total net admitted assets (SPGMI Insurance Statutory Financials Database KeyField 113963).
Muni_bond	Municipal bond investments (SPGMI Insurance Statutory Financials Database KeyField 322869-322870 for 2019 and 114774-114775 for 2016-2018) as a percent of total net admitted assets (SPGMI Insurance Statutory Financials Database KeyField 113963).

Figure 1: Parallel Trend Assumption

Figure 1 depicts the test for the parallel trend assumption. The x-axis denotes fiscal year-quarter. The y-axis denotes the estimated coefficient for each year-quarter. The dots represent coefficient estimates, and the lines represent 95% confidence intervals.

Panel A: Portfolio Beta



Panel B: Portfolio Return Volatility

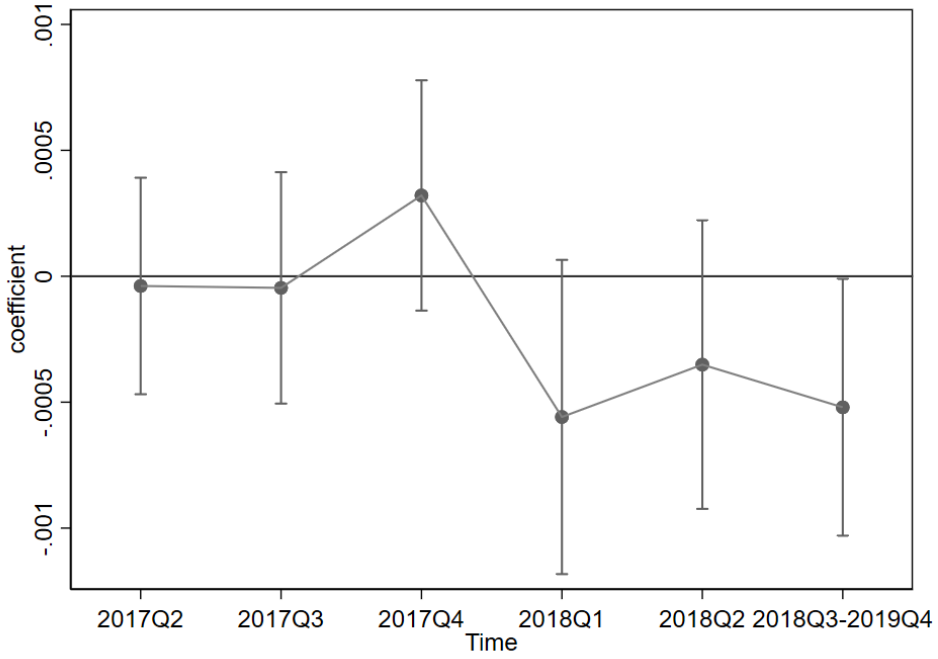


Table 1: Sample Selection and Distribution

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: observations of firms that changed public status in our sample period	(1,522)	(99)
Less: observations without unaffiliated common stock holdings and observations not filing quarterly reports	(15,937)	(1,019)
Less: observations for which quarter-end price and daily return information of the stock holdings are not available in CRSP	(2,855)	(187)
Final sample	14,456	1,071

Panel B: Sample distribution

Year-Quarter	Frequency	Percent
2016Q1	923	6.38
2016Q2	915	6.33
2016Q3	906	6.27
2016Q4	909	6.29
2017Q1	918	6.35
2017Q2	896	6.2
2017Q3	913	6.32
2017Q4	904	6.25
2018Q1	911	6.3
2018Q2	899	6.22
2018Q3	903	6.25
2018Q4	910	6.29
2019Q1	904	6.25
2019Q2	885	6.12
2019Q3	888	6.14
2019Q4	872	6.03
Total	14,456	100.00

Table 2: Descriptive Statistics and Correlation Matrix

Panel A of Table 2 presents the descriptive statistics for our sample. The mean value of the treatment group that is significantly different from the control group at the 0.05 level or below is marked in bold. 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								
PortfolioVol	2,716	**0.0099**	0.0054	0.0029	0.0061	0.0086	0.0122	0.0280
PortfolioBeta	2,716	**0.9089**	0.2954	0.1494	0.7619	0.9156	1.0324	1.7011
Long_tail	2,716	**0.7474**	0.2570	0.0000	0.6598	0.8038	0.9401	1.0000
GeoCon	2,716	**0.3018**	0.3285	0.0419	0.0704	0.1288	0.4188	1.0017
LineCon	2,716	**0.4707**	0.2750	0.1205	0.2495	0.3847	0.6454	1.1479
Size	2,716	**20.4243**	1.8353	15.3756	19.1076	20.4566	21.5218	24.1382
Group	2,716	**0.9867**	0.1144	0.0000	1.0000	1.0000	1.0000	1.0000
ROA	2,716	**0.0071**	0.0132	-0.0631	0.0025	0.0067	0.0120	0.0639
RBC	2,716	**14.8296**	29.4079	1.6417	4.7525	6.5873	9.7827	152.7978
Post	2,716	0.4882	0.5000	0.0000	0.0000	0.0000	1.0000	1.0000
Disposalratio	2,703	0.2041	0.6063	0.0000	0.0000	0.0122	0.1252	4.0997
Acquireratio	2,689	0.2290	0.7506	0.0000	0.0000	0.0105	0.1141	5.3995
Acquire_net_ratio	2,689	**0.0144**	0.4178	-1.4453	-0.0120	0.0000	0.0101	2.5499
PortfolioVolFal	2,674	**0.0099**	0.0052	0.0030	0.0061	0.0086	0.0123	0.0260
UnaffiliatedMgr	2,239	**0.4234**	0.4942	0.0000	0.0000	0.0000	1.0000	1.0000
StockPct	2,662	**0.1463**	0.1635	0.0001	0.0282	0.0953	0.1984	0.7475
Rein	707	**0.4319**	0.3149	0.0000	0.1475	0.4154	0.6887	1.0000
Gov_bond	707	**0.0507**	0.0655	0.0000	0.0078	0.0286	0.0644	0.4989
Muni_bond	707	**0.0445**	0.0712	0.0000	0.0000	0.0123	0.0582	0.4316
UnrealizedGLVol	306	**0.1812**	0.1865	0.02612	0.07366	0.1259	0.2021	0.9707
Treat=0								
PortfolioVol	11,736	0.0079	0.0038	0.0029	0.0051	0.0070	0.0098	0.0280
PortfolioBeta	11,740	0.8809	0.2099	0.1494	0.7909	0.9034	0.9819	1.7011
Long_tail	11,740	0.7650	0.2890	0.0000	0.6877	0.8436	1.0000	1.0000
GeoCon	11,740	0.6143	0.3726	0.0419	0.2343	0.6514	1.0000	1.0017
LineCon	11,740	0.5961	0.3152	0.1205	0.3109	0.5243	0.9845	1.1479
Size	11,740	18.5629	1.9378	14.9922	17.1489	18.3186	19.7877	24.1382
Group	11,740	0.5513	0.4974	0.0000	0.0000	1.0000	1.0000	1.0000
ROA	11,740	0.0054	0.0177	-0.0631	-0.0007	0.0058	0.0128	0.0639
RBC	11,740	12.6883	15.5861	1.6417	5.6544	9.1205	14.1022	152.7978
Post	11,740	0.4980	0.5000	0.0000	0.0000	0.0000	1.0000	1.0000
Disposalratio	11,740	0.2109	0.5311	0.0000	0.0000	0.0492	0.1675	4.0997
Acquireratio	11,740	0.2565	0.6891	0.0000	0.0019	0.0605	0.1900	5.3995
Acquire_net_ratio	11,740	0.0346	0.3954	-1.4453	-0.0092	0.0000	0.0312	2.5499
PortfolioVolFal	11,466	0.0079	0.0036	0.0030	0.0051	0.0070	0.0097	0.0260
UnaffiliatedMgr	10,514	0.6836	0.4651	0.0000	0.0000	1.0000	1.0000	1.0000
StockPct	11,296	0.1566	0.1427	0.0001	0.0582	0.1208	0.2077	0.7475
Rein	3,113	0.3195	0.2877	0.0000	0.0878	0.2203	0.5081	1.0000
Gov_bond	3,117	0.0790	0.1003	0.0000	0.0104	0.0432	0.1064	0.4989
Muni_bond	3,117	0.0517	0.0841	0.0000	0.0000	0.0151	0.0690	0.4342
UnrealizedGLVol	1,297	0.1131	0.1187	0.02612	0.05994	0.08047	0.1188	0.9707

Panel B: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Disposalratio	1.00														
(2) Acquireratio	**0.65**	1.00													
(3) Acquire_net_ratio	**-0.19**	**0.53**	1.00												
(4) PortfolioBeta	**0.02**	-0.01	**-0.03**	1.00											
(5) PortfolioVol	**0.11**	**0.12**	**0.02**	**0.33**	1.00										
(6) Size	**0.05**	**0.03**	**-0.02**	**0.10**	**0.08**	1.00									
(7) Group	**-0.02**	**-0.03**	**-0.02**	**0.06**	**0.09**	**0.47**	1.00								
(8) ROA	0.01	0.00	0.00	0.01	-0.01	**0.04**	0.00	1.00							
(9) RBC	**-0.05**	**-0.06**	**-0.02**	**0.01**	**0.12**	**-0.16**	**0.05**	**0.07**	1.00						
(10) GeoCon	**-0.02**	0.00	**0.02**	**-0.04**	**-0.09**	**-0.47**	**-0.31**	0.00	**0.08**	1.00					
(11) LineCon	0.01	0.01	0.01	**-0.02**	**-0.05**	**-0.35**	**-0.30**	-0.01	**0.02**	**0.25**	1.00				
(12) Long_tail	**-0.02**	**-0.02**	0.00	-0.01	**-0.04**	0.01	**-0.06**	**-0.07**	**-0.04**	**0.08**	**0.12**	1.00			
(13) PortfolioVolFal	**0.09**	**0.11**	**0.03**	**0.32**	**0.97**	**0.08**	**0.10**	-0.01	**0.10**	**-0.09**	**-0.04**	**-0.04**	1.00		
(14) UnaffiliatedMgr	**-0.02**	**-0.04**	-0.02	-0.01	**-0.11**	**-0.19**	**-0.14**	-0.01	**-0.06**	**0.16**	**0.18**	**0.17**	**-0.12**	1.00	
(15) StockPct	**-0.06**	**-0.06**	-0.01	**0.05**	**-0.10**	**-0.13**	**-0.12**	**0.04**	**-0.11**	**0.06**	**0.08**	**-0.03**	**-0.10**	0.01	1.00

Table 3: Equity Portfolio Changes

This table reports the results of the changes in insurers' equity security portfolios around the adoption of ASU 2016-01. The dependent variable is *Disposalratio* in Columns (1) and (2), *Acquireratio* in Columns (3) and (4), and *Acquire_net_ratio* in Columns (5) and (6). 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)	(2)	(3)	(4)	(5)	(6)
	Disposal ratio	*Disposal ratio*	*Acquire ratio*	*Acquire ratio*	*Acquire_net_ ratio*	*Acquire_net_ ratio*
Treat×Post	0.0374	0.0364	0.0178	0.0169	-0.0080	-0.0088
	(1.1088)	(1.0778)	(0.4819)	(0.4552)	(-0.4140)	(-0.4551)
Size		0.0437		0.1138*		0.0699*
		(0.9627)		(1.7536)		(1.8669)
Group		-0.0234		-0.0238		-0.0132
		(-0.4349)		(-0.4465)		(-0.3184)
ROA		1.1240***		0.8883**		-0.1424
		(3.2014)		(2.2941)		(-0.5253)
RBC		-0.0005		-0.0018		-0.0007
		(-0.6362)		(-1.3976)		(-0.8453)
GeoCon		-0.0115		-0.0309		-0.0188
		(-0.1608)		(-0.4206)		(-0.5107)
LineCon		-0.0356		0.0628		0.0153
		(-0.7120)		(0.9835)		(0.4024)
Long_tail		-0.0462		-0.1389		-0.0612
		(-0.5703)		(-1.3135)		(-1.0325)
Constant	0.2060***	-0.5445	0.2499***	-1.7824	0.0318***	-1.2240*
	(66.4163)	(-0.6223)	(73.6168)	(-1.4389)	(17.9924)	(-1.7259)
Observations	14,456	14,456	14,456	14,456	14,456	14,456
R-squared	0.3482	0.3493	0.3766	0.3777	0.1685	0.1692
Firm FE	YES	YES	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES	YES	YES

Table 4: Adoption of ASU 2016-1 and Portfolio Risk

This table reports the regression estimates of Equation (3). The dependent variable is *PortfolioBeta* in Columns (1) and (2) and *PortfolioVol* in Columns (3) and (4). 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) *PortfolioBeta*	(2) *PortfolioBeta*	(3) *PortfolioVol*	(4) *PortfolioVol*
Treat×Post	-0.0510***	-0.0517***	-0.0005**	-0.0005**
	(-3.1183)	(-3.1774)	(-2.2660)	(-2.2620)
Size		0.0384*		-0.0004
		(1.8155)		(-1.1210)
Group		-0.0073		-0.0000
		(-0.4006)		(-0.0847)
ROA		0.0176		-0.0009
		(0.2036)		(-0.7906)
RBC		0.0001		0.0000*
		(0.1039)		(1.8445)
GeoCon		0.0162		0.0000
		(0.7082)		(0.1292)
LineCon		-0.0244		-0.0006**
		(-1.1512)		(-2.0666)
Long_tail		-0.0005		0.0002
		(-0.0167)		(0.5992)
Constant	0.8909***	0.1742	0.0084***	0.0164**
	(593.3719)	(0.4369)	(387.1008)	(2.2492)
Observations	14,456	14,456	14,452	14,452
R-squared	0.5757	0.5762	0.8254	0.8258
Firm FE	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES

Table 5: Adoption of ASU 2016-1 and Unrealized Gain/Loss Volatility

This table presents the regression estimates of Equation (4). The dependent variable is *UnrealizedGLVol*. 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 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) *UnrealizedGLVol*	(2) *UnrealizedGLVol*
Treat×Post	-0.0243**	-0.0249**
	(-2.0572)	(-2.0997)
Size		-0.0304
		(-0.8891)
Group		-0.0346
		(-1.3343)
ROA		-0.4094
		(-0.6169)
RBC		-0.0004
		(-0.4497)
GeoCon		0.0066
		(0.0968)
LineCon		-0.0861
		(-1.1840)
Long_tail		-0.0539
		(-0.6435)
Constant	0.1292***	0.8232
	(114.6873)	(1.2319)
Observations	1,603	1,603
R-squared	0.8241	0.8253
Firm FE	YES	YES
Post FE	YES	YES

Table 6: Falsification Test

This table presents the regression estimates of Equation (3), replacing the dependent variable with *PortfolioVolFal*. 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) *PortfolioVolFal*	(2) *PortfolioVolFal*
Treat×Post	-0.0002	-0.0002
	(-1.1068)	(-1.0687)
Size		-0.0002
		(-0.7561)
Group		0.0002
		(1.0936)
ROA		-0.0012
		(-1.1749)
RBClow		-0.0000
		(-0.3293)
GeoCon		0.0002
		(0.9675)
LineCon		-0.0001
		(-0.6257)
Long_tail		0.0002
		(0.7701)
Constant	0.0083***	0.0114**
	(431.0400)	(2.5005)
Observations	14,140	14,140
R-squared	0.8567	0.8568
Firm FE	YES	YES
Year-Quarter FE	YES	YES

Table 7: Cross-Sectional Analyses

This table presents results examining cross-sectional variation in our main results from Table 4. 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) *PortfolioBeta*	(2) *PortfolioVol*	(3) *PortfolioBeta*	(4) *PortfolioVol*
Treat×Post	-0.0867***	-0.0011***	-0.0614**	-0.0010**
	(-3.8346)	(-2.9988)	(-2.2817)	(-2.4371)
Post×UnaffiliatedMgr	0.0081	-0.0000		
	(0.7775)	(-0.2002)		
Treat×Post×UnaffiliatedMgr	0.0945***	0.0013**		
	(2.7999)	(2.3384)		
Post×StockPct			0.0689**	0.0007**
			(2.1538)	(2.0088)
Treat×Post×StockPct			0.0740	0.0031**
			(0.8125)	(2.4586)
Size	0.0390*	-0.0004	0.0442**	-0.0002
	(1.7148)	(-1.0153)	(2.0136)	(-0.6628)
Group	-0.0017	-0.0000	-0.0057	-0.0001
	(-0.0918)	(-0.0971)	(-0.3068)	(-0.2088)
ROA	0.0070	-0.0014	0.0321	-0.0006
	(0.0807)	(-1.1001)	(0.3687)	(-0.5121)
RBC	-0.0000	0.0000	0.0002	0.0000**
	(-0.0109)	(1.4786)	(0.3533)	(2.5703)
GeoCon	0.0133	0.0000	0.0213	0.0002
	(0.5673)	(0.0115)	(0.8769)	(0.8331)
LineCon	-0.0167	-0.0005	-0.0324	-0.0004*
	(-0.7605)	(-1.6349)	(-1.4873)	(-1.7575)
Long_tail	0.0016	0.0000	-0.0018	0.0002
	(0.0497)	(0.0260)	(-0.0549)	(0.7929)
Constant	0.1490	0.0161**	0.0575	0.0115**
	(0.3464)	(2.0714)	(0.1385)	(2.2039)
Observations	12,753	12,751	13,958	13,954
R-squared	0.5668	0.8222	0.5742	0.8274
Firm FE	YES	YES	YES	YES
Year-Quarter FE	YES	YES	YES	YES

Table 8: 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), (5) and (6) 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)	(2)	(3)	(4)	(5)	(6)
	GeoCon	*LineCon*	*Long_tail*	*Rein*	*Gov_bond*	*Muni_bond*
Treat×Post	0.0003	-0.0049	-0.0015	-0.0097	-0.0005	0.0048
	(0.0496)	(-0.8344)	(-0.3662)	(-1.2093)	(-0.1145)	(1.1038)
Size	-0.0590***	-0.0023	-0.0032	-0.0398*	0.0009	-0.0176**
	(-3.2591)	(-0.1799)	(-0.3296)	(-1.8298)	(0.1460)	(-2.1208)
Group	-0.0041	0.0061	-0.0076	0.0736***	-0.0145	-0.0147
	(-0.2422)	(0.8233)	(-1.3036)	(2.6816)	(-1.2859)	(-1.3708)
ROA	0.1020*	0.0554	-0.0724	0.1097	0.0460	0.2968***
	(1.8863)	(1.1600)	(-1.3483)	(0.2806)	(0.3914)	(2.6227)
RBC	0.0001	0.0000	-0.0006**	0.0008	0.0002	-0.0001
	(0.5034)	(0.0196)	(-2.1383)	(1.2386)	(1.0176)	(-0.6733)
GeoCon		0.1610***	0.0041	0.0133	0.0019	0.0002
		(4.3743)	(0.1847)	(0.2726)	(0.0755)	(0.0125)
LineCon	0.1774***		0.0331	-0.0724	-0.0074	0.0191
	(4.4763)		(0.8760)	(-1.0674)	(-0.2848)	(0.7079)
Long_tail	0.0066	0.0482		-0.0956	0.0042	-0.0131
	(0.1854)	(0.8538)		(-0.9786)	(0.1283)	(-0.4561)
Constant	1.5645***	0.4857*	0.8150***	1.1411***	0.0620	0.3898**
	(4.5733)	(1.9595)	(4.3472)	(2.7587)	(0.4801)	(2.4706)
Observations	14,456	14,456	14,456	3,748	3,824	3,824
R-squared	0.9618	0.9474	0.9561	0.9439	0.8393	0.7589
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES