Asymmetric Cost Behavior and Non-Financial Firms' Risky Financial Investments

JiHoon Hwang*

University of Arizona

2023/08/29

ABSTRACT

Using a hand-collected sample of non-financial firms' financial portfolios, I examine how asymmetric cost behavior (or cost stickiness) affects risky financial investments. Sticky costs amplify the downward effect of sales decrease on profits because costs do not fall when sales decrease by as much as they rise when sales increase. I find that firms with sticky costs reduce risky financial investments because of expected liquidity needs and the trade-off between operating and financial risk. Oster's delta, difference-in-differences analysis, and synthetic control method address endogeneity concerns. For non-financial firms with sticky costs, investing in risky securities subdues non-financial investments and increases a firm's risk exposure without creating shareholder value.

Keywords: Risky Financial Investments, Asymmetric Cost Behavior, Cost Stickiness, Precautionary Saving

JEL codes: D22, G32, G39, M41

---

* Hwang is from Eller College of Management, University of Arizona (Tel: 520-403-8805; E-mail: jihoonhwang@arizona.edu). I thank Kathleen Kahle, Sandy Klasa, Alice Bonaimé, Andrea Rossi, Scott Cederburg, Richard Sias, Mitch Towner, Chris Lamoureux, Tiemen Woutersen, Michael O'Connor Keefe, Stephen Ciccone, Enshuai Yu, and Young Baek for feedback. I also thank Alexander Chaprak, other participants at the 2023 American Accounting Association (AAA) Annual Meeting, and seminar participants at the University of Arizona, the 2023 AAA Spark Meeting (Western), the 2023 AAA Southwest Region Meeting, the 2023 Southwestern Finance Association Annual Meeting, the 2022 Financial Management Association (FMA) Annual Meeting, the 2022 Southern Finance Association Annual Meeting, the 2022 World Finance Conference at University of Turin, and the 2022 Financial Markets and Corporate Governance conference at Monash University for comments. All errors are mine only.

I. INTRODUCTION

Prior studies assume that non-financial firms hold safe, liquid securities as financial reserves because of transaction costs, precautionary savings motive, agency problems, or repatriation taxes (e.g., Miller and Orr, 1966; Jensen, 1986; Opler, Pinkowitz, Stulz, and Williamson, 1999; Foley, Hartzell, Titman, and Twite, 2007; Bates, Kahle, and Stulz, 2009). Yet, recent evidence shows that these firms also hold risky, illiquid securities with significant default risk and price uncertainty.[1] Duchin, Gilbert, Harford, and Hrdlicka (2017) show that risky securities represent 40 percent of S&P 500 non-financial firms' financial portfolios and dub the phenomenon "a $1.5 trillion shadow hedge fund industry operating within U.S. industrial firms." Further, risky securities may not create value for shareholders (Duchin et al., 2017) and even increase the probability of stock price crash (Ni, Peng, and Shen, 2021). Despite the potential pitfalls of risky financial investments, the literature offers little evidence on why non-financial firms hold them (Almeida, Campello, Cunha, and Weisbach, 2014). In this paper, I address this gap by documenting an important determinant of financial investments: asymmetric cost behavior.

Asymmetric cost behavior, or cost stickiness, refers to the case in which a firm's costs do not fall when sales decrease by as much as they rise when sales increase. Due to frictions in adjusting production factors, managers become reluctant to cut resources when sales decrease (e.g., Anderson, Banker, and Janakiraman, 2003). For instance, even if a firm wants to lay off workers when revenue declines, firing costs make it difficult to do so. Also, firms may resist losing organization capital embodied in their workers (e.g., Lev and Radhakrishnan, 2005). When sales increase, however, a firm is less susceptible to frictions because it must increase investments (e.g.,

[1] Price uncertainty in this context means either volatile price movements in an active market or dispersion of value estimates when there is no active market.

hire workers and buy equipment) to meet the rise in product demand. Firms with stickier costs face a larger decline in profits when adverse shocks decrease product demand than those with less sticky costs do.[2] Accordingly, a manager is concerned whether a firm with sticky costs can sustain its financial policy in the future, regardless of its current profits (He, Tian, Yang, and Zuo, 2020).

How cost stickiness affects risky financial investments is uncertain *ex-ante*. On the one hand, a firm with sticky costs may prefer safe, cash-like securities to risky, non-cash-like securities because of expected liquidity needs. Financially constrained firms, in particular, might need to access internal funds to pay sticky expenses when sales decline. In addition, firms might prefer safe financial assets due to the trade-off between operating and financial risks (e.g., Mauer and Triantis, 1994). When operating risk increases, firms adopt conservative financial policies (e.g., Serfling, 2016). Lower profits caused by stickier costs when sales decline signal an operating risk factor. Thus, sticky costs may induce firms to be conservative in their liquidity management and reduce risky financial investments.

On the other hand, asymmetric cost behavior may encourage risky financial investments to compensate for the low earnings induced by sticky costs when sales decline. Risky securities may generate greater periodic income (e.g., interest payments or dividends) and exhibit more pronounced price uncertainty than safe instruments do. Although price uncertainty does not necessarily ensure capital gains, managers can be overconfident in their ability to generate returns from financial investments (Duchin et al., 2017). Also, firms may manipulate earnings upward by

[2] This cost framework is broader than the dichotomy between fixed and variable costs, because the relation between changes in sales and costs is no longer symmetric between sales decrease and increase and managerial discretion plays a larger role in determining costs in response to changes in sales (Banker and Byzalov, 2014).

selling off securities with high valuation when operating profits are low (Ni et al., 2021). Securities with a volatile price are suitable for potential earnings management.

In this study, I exploit the Statement of Financial Accounting Standards (SFAS) No. 157, which requires firms to report the fair value of major financial asset classes on their balance sheet. Following Duchin et al. (2017), I hand-collect data from 10-Ks of S&P 500 non-financial firms from 2009 to 2019. Due to the limited information in 10-Ks, I use the dichotomous classification scheme and divide total financial assets into safe and risky ones (Duchin et al., 2017). Risky financial assets are non-money-like securities that are primarily illiquid and unstable in value (e.g., asset-backed securities). Safe financial assets are money-like securities that are liquid and stable in value (e.g., cash and cash equivalents).

Following Anderson et al. (2003) and He et al. (2020), I define cost stickiness as the degree of asymmetry in cost (selling, general, and administrative costs (SG&A)) responses to decreases versus increases in sales, based on 16 quarterly observations. I find that cost stickiness is inversely related to risky financial investments in non-financial firms. When cost stickiness increases by one standard deviation, risky financial investments decrease by 13.1 percent relative to the sample mean. The baseline result is robust to using alternative cost measures (sales minus earnings; cost of goods sold (COGS) plus SG&A) and excluding U.S. agency debt securities or foreign government bonds from risky investments.

Next, I address endogeneity concerns. Resource adjustment costs, managerial discretion, and agency problems affect cost stickiness (e.g., Banker, Byzalov, Fang, and Liang, 2018). Consequently, I control for the standard determinants of cost asymmetry and CEO characteristics; the baseline result remains robust. Further, Oster (2019)'s delta is not consistent with an omitted variable bias (OVB) nullifying the effect of cost stickiness on risky financial investments. The test statistic is strongly negative, implying that the main coefficient of interest increases in magnitude when one adds more controls to the model (e.g., Bonaimé, Kahle, Moore, and Nemani, 2020).

I also conduct a difference-in-differences (DID) analysis and complement it with the synthetic control method (Abadie, Diamond, and Hainmueller, 2010), using the Great Recession (which was likely exogenous to an individual firm). Firms with high cost-stickiness before the recession (treated) make their cost structure more flexible in the post-recession period compared to firms with low cost-stickiness before the recession (control). Due to the inverse relation between cost stickiness and risky financial investments, a more pronounced decrease in cost stickiness for a treated firm should enable it to invest more in risky securities in the post-recession period, compared with a control firm. I obtain pre-2009 observations from Darmouni and Mota (2020)'s dataset, which follows Duchin et al.'s (2017) methodology. In the post-recession period, I find that cost stickiness decreases for treated firms relative to control firms, while risky financial investments increase for treated firms relative to control firms, consistent with my hypothesis. Entropy balancing (Hainmueller, 2012) minimizes the difference in observable firm fundamentals between the two groups and alleviates the concern that effects of the Great Recession unrelated to sticky costs may drive the increase in risky financial investments for treated firms.

Next, I test how financial constraints affect the relation between sticky costs and risky financial investments. Sticky costs should increase expected liquidity needs only if a firm cannot readily access external financing. Indeed, the relation between cost stickiness and risky financial investments is significant only for firms with relatively binding financial constraints, proxied by the Hadlock and Pierce (2010) index, the Whited and Wu (2006) index, and leverage.

I also examine how the relation between cost asymmetry and risky financial assets affects non-financial ('real') investments such as capital expenditure, R&D, and acquisition expense. Cost asymmetry may adversely affect cash flows when sales decrease and generally increase the cost of debt financing (Homburg, Hoppe, Nasev, Reimer, and Uhrig-Homburg, 2018). A firm may be concerned whether it can sustain its non-financial investments when sales decline; however, converting risky securities to cash to fund those investments can be difficult. Thus, firms with sticky costs, instead, may opt for scaling down their non-financial investments as a precaution. Consistent with my hypothesis, the interaction between lagged cost stickiness and risky financial investments is inversely related to expenditures on real investments, particularly capex.

Lastly, I examine how a firm's risk exposure and stock returns are affected by holding risky securities under cost asymmetry. I find that total and idiosyncratic risk increase as firms with sticky costs hold larger amounts of risky securities. This result is consistent with the notion that sticky costs can be an operating risk factor and that risky securities add to corporate risk-taking (Chen and Duchin, 2023). I also find that stock returns are positively associated with the change in total financial assets when a firm's cost is sticky. However, the relation is solely driven by the change in safe financial assets, not risky ones. For a firm with sticky costs, holding risky securities increases its risk exposure without creating shareholder value.

My study contributes to the literature on non-financial firms' risky financial investments. Duchin et al. (2017) document that risky securities represent a significant portion of non-financial firms' financial reserves. However, the lack of data on the decomposition of a firm's financial portfolio makes it difficult for researchers to study risky financial investments (Almeida et al., 2014), and an analysis with an extended period is necessary since Duchin et al. (2017) cover four years of sample period (2009-2012). I address this gap in the literature and find that cost asymmetry leads firms to avoid risky financial investments. The precautionary savings motive seems to drive the relation between cost stickiness and risky securities.

This study also contributes to the literature on asymmetric cost behavior. Early works on cost stickiness focus on accounting-related topics such as earnings prediction (Banker and Chen, 2006), analysts' forecasts (Weiss, 2010), and conservatism (Banker, Basu, Byzalov, and Chen, 2016). More recent studies examine how cost stickiness affects corporate finance outcomes. For instance, He et al. (2020) show that asymmetric cost behavior decreases dividend payments. Jang and Yehuda (2021) find that an acquirer's cost stickiness reduces synergies from a merger deal. Extending this line of study, I find that cost stickiness affects the active management of a firm's financial portfolio.

II. RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

II.A. Non-Financial Firms' Risky Financial Investments

Assuming that non-financial firms largely hold cash-like securities, prior studies use Compustat cash and short-term investments (CHE) as a measure of corporate liquidity (e.g., De Simone, Piotroski, and Tomy, 2019; Begenau and Palazzo, 2021). However, recent studies show that these firms also hold risky, illiquid securities which exhibit significant default risk and price uncertainty (Duchin et al., 2017).

Research on the determinants of risky, illiquid securities has been limited (Almeida et al., 2014), albeit with a few exceptions. Duchin et al. (2017) find that risky financial assets are largely concentrated in financially unconstrained firms. Darmouni and Mota (2020) document that tax incentives play a role in the accumulation of high-yield securities; multinationals shift earnings to non-U.S. countries to avoid paying U.S. taxes and hold financial assets, instead of distributing profits. Firms are also more likely to hold relatively high-yield, illiquid securities if they can better predict liquidity needs and have lower default risk (Cardella, Fairhurst, and Klasa, 2021).

Recent studies claim that risky financial investments are likely value-decreasing for non-financial firms. Duchin et al. (2017) argue that such assets can be suboptimal because a firm's cost of capital increases with risky financial assets, which may more than offset the additional returns earned. They also claim that agency problems may drive the active management of a financial portfolio. Chen and Duchin (2023) argue that distressed firms may use risky securities for asset substitution. Ni et al. (2021) posit that financial assets can be exploited for earnings management. By timing the realization of gains from financial investments, managers may increase short-term earnings without improving a firm's profits from operations. This practice creates an illusion that a firm's overall performance is improving. Such information asymmetry, induced by financial assets, may later lead to a stock price crash.

II.B. Asymmetric Cost Behavior and Hypothesis Development

Asymmetric cost behavior refers to a state in which a firm cannot decrease its costs when sales decline by as much as it can increase costs when sales increase. Managerial expectation may affect cost asymmetry. For instance, when sales decrease, a CEO may not cut resources if the person is optimistic and believes that the resources will be required when sales bounce back (Anderson et al., 2003; Banker, Byzalov, Ciftci, and Mashruwala, 2014). Empire-building or managerial self-interest may also increase cost stickiness when managers want to maintain the scale of investments despite the sales decline (Anderson et al., 2003). Friction in resource adjustment is also a key driver of asymmetric cost behavior (e.g., Banker, Byzalov, and Chen, 2013). For example, a firm can adjust the number of workers in the short run, but doing so involves significant costs, such as severance payments or personnel training and search costs. Though the positive association between changes in sales and costs may be subject to the friction both when sales increase and decrease, such friction should be more pronounced when sales decrease because firms have to increase investments to meet the rise in product demand (e.g., He et al., 2020).

Cost stickiness can amplify the downward effect of sales decrease on profits. Figure 1 depicts the cost and profit functions for firms with sticky and anti-sticky costs, respectively.[3] Stickier costs result in lower cost savings and a greater decline in earnings when revenue decreases. Because a firm's current cost stickiness is partly driven by its production technology, its cost behavior likely has a significant implication on how a firm's earnings respond to future events. Thus, with sticky costs, a manager is concerned about a firm's ability to sustain its financial policy, especially when sales decrease (He et al., 2020).

[Insert Figure 1 here.]

How asymmetric cost behavior affects a non-financial firm's risky financial investments is an empirical question. Asymmetric cost behavior may lead firms to avoid risky financial investments due to liquidity needs. When sales decrease, a firm must still pay for certain sticky expenses. Unconstrained firms can obtain funds from outside investors if needed. However, financially constrained firms require internal funds to cover these expenses and might have to sell risky securities at a discount if they need them for liquidity purposes. Moreover, accounting standards discourage converting risky securities to cash if they are classified as held-to-maturity.[4] Consequently, if managers anticipate a drop in sales and profits, they should shift the composition of their financial reserves from non-cash to cash-like securities to meet liquidity needs. Also, the

[3] Compared with 'sticky' costs, costs are 'anti-sticky' if a firm's costs do not rise when sales increase by as much as they fall when sales decrease (e.g., Weiss, 2010).

[4] Cardella et al. (2021) note, "according to SFAS 115, the selling of a security originally classified as held-to-maturity "should be rare" and a rationale for such a sale must be reported in the notes to the financial statements. In any case, the sale of a security originally classified as held-to-maturity should not be motivated by changes in market interest rates, needs for liquidity, or changes in the yields of alternative investments."

adverse effect of sticky costs on earnings when sales decrease signals operating risk. Given the trade-off between operating and financial risk (e.g., Mauer and Triantis, 1994), sticky costs should induce managers to adopt a conservative financial policy. If a firm's risk-taking manifests through risky securities (Chen and Duchin, 2023), a firm with sticky costs should avoid them.

Asymmetric cost behavior can also encourage risky financial investments. Low earnings induced by sticky costs when sales decline may induce managers to find ways to compensate. One way of doing so is to realize gains from available-for-sale securities or recognize unrealized gains from trading securities to increase accounting profits (Ni et al., 2021). Risky securities with price uncertainty are more suitable than safe securities for this practice. Although price uncertainty does not ensure capital gains, a manager may be overconfident about one's ability to generate returns from financial investments (Duchin et al., 2017). A firm can also earn periodic income (e.g., interest payments or dividends) from risky securities.

III. DATA, SUMMARY STATISTICS, AND RESEARCH DESIGN

III.A. Sample Selection and Non-Financial Firms' Risky Financial Asset Data

My sample covers firms listed on the S&P 500 Index between fiscal year 2009 and 2019.[5] I use the Compustat Index Constituent data to identify S&P 500 firms and exclude financial firms and utilities (SIC 60-69 and 49).[6] I also require non-missing book assets and sales.

Following Duchin et al. (2017), I obtain the fair value of a firm's financial asset portfolio by hand-collecting information in the footnote (e.g., 'Fair Value of Financial Instruments') of each

[5] I focus on S&P500 firms because investment in risky financial assets is likely confined to large firms. Small firms are financially constrained (Hadlock and Pierce, 2010) and unlikely to hold risky securities (Duchin et al., 2017).
[6] The sample period ends in 2019 because (1) the index constituents data were removed from Compustat in July 2020, and (2) I exclude the Covid period (2020-) from my analysis to focus on the time period with relatively normal economic conditions (e.g., Baker, Davis, and Levy, 2022).

firm's 10-K. This study covers a firm's non-operating financial asset holdings in various balance sheet accounts such as 'cash and cash equivalents,' 'short-term (or long-term) investments,' and 'other assets.'[7] Appendix B shows an example of Apple's fair value disclosure.

I classify each financial asset class as either safe or risky, based on whether it is money-like (Anderson and Kavajecz, 1994; Duchin et al., 2017).[8] Money-like assets are safe because their value is relatively stable over time. Safe financial assets include cash and cash equivalents, money market funds, bank deposits, time deposits, commercial paper, and U.S. Treasuries. The remaining non-money-like (risky) financial assets are relatively illiquid and volatile in price movements. Such assets are corporate bonds, asset-backed securities, auction rate securities, equity, foreign government debt, and U.S. non-Treasury government securities.[9] I aggregate the fair values of safe and risky securities for each firm-year and compute the value of a firm's safe, risky, and total financial assets each year.[10] I do not cover the financial assets tied to restricted investments, pension plan assets, deferred compensation, derivative hedging, and strategic investments since those assets meet a firm's operating needs.

---

[7] One financial asset class can be a part of multiple balance sheet accounts. For example, Apple in 2019 held U.S. Treasuries, U.S. agency securities, foreign government bond, certificate of deposit and time deposits, corporate bonds, and asset-backed securities in both 'Short-Term Marketable Securities' and 'Long-Term Marketable Securities.'

[8] Safe securities are mostly liquid and risky securities tend to be illiquid. However, equity is a liquid, but risky financial instrument, because an investor can easily buy or sell a share in an organized exchange, but equity shows relatively volatile price movements. Also, safe financial asset classes like commercial paper and time deposits can be Level Two assets, which are relatively illiquid based on SFAS 157.

[9] In absolute terms, even cash can be risky. Inflation undermines the purchasing power of cash. A currency may be depreciated against other major currencies (e.g., Euro). However, in relative terms, 'risky' securities are indeed riskier than 'safe' securities due to additional layers of risk such as default probability and price uncertainty. Risky securities, except for equities, are mostly Level Two or Three assets, which means there is no active market with an observable price for these securities and such price needs to be estimated using observable or unobservable inputs. Also, interest rate risk exposure is likely smaller for safe assets than for risky ones (Duchin et al., 2017).

[10] SFAS 157 regulation only requires limited information. For instance, a firm's 10-K does not state an issuer's identity or the investment return of a financial asset a firm holds. Also, a firm does not disaggregate the value of non-U.S. government bonds by issuing country.

Figure 2 presents the financial portfolio composition of non-financial firms during the sample period. Note that Compustat CHE underestimates the size of a firm's financial portfolio. In aggregate terms, the value of total financial assets is 16.6 percent greater than that of CHE. The aggregate total financial assets were $1.842 trillion and $1.203 trillion in 2017 and 2012, respectively, whereas the corresponding CHE figures were $1.582 trillion and $1.021 trillion, respectively. Total financial assets and CHE are equivalent to 14.6 percent and 12.5 percent of book assets, respectively. Also, risky financial assets account for about 30.7 percent of total financial assets and 35.8 percent of CHE, equivalent to 3.0 to 5.9 percent of book assets.[11] Assuming that a firm only holds liquid cash and using CHE for cash holdings can be misleading.

To highlight the accuracy of my data collection, I compare the numbers in my sample with those in Darmouni and Mota's (2020) dataset. The two datasets are comparable because both follow Duchin et al.'s (2017) methodology, focus on non-financial firms, and cover the years from 2009 to 2019.[12] Both datasets exhibit similar values. For example, Darmouni and Mota (2020) report that, in aggregate terms, Compustat CHE comprised 83 percent and 79 percent of total financial assets in 2012 and 2015, respectively, and the corresponding numbers in my sample were 85 percent and 81 percent, respectively. The aggregate value of total financial assets is slightly larger in my sample. Even among the S&P 500 members, relatively small firms seem to add little to the aggregate values. Figure 2 also shows a trend in the growth of a non-financial firm's financial portfolio, driven by the increase in corporate bonds, consistent with Darmouni and Mota (2020).

[Insert Figure 2 here.]

---

[11] In Section OA.I of the Online Appendix, I explain why the fair value of risky financial assets in my dataset, from 2009 to 2012, is lower than that of Duchin et al. (2017).

[12] However, Darmouni and Mota (2020) only focus on the 200 largest non-financial (industrial) firms and their definition of 'non-cash-like' financial assets is different from my definition of risky financial assets.

III.B. Firm-Level Asymmetric Cost Behavior

Following Noreen and Soderstrom (1997), Anderson et al. (2003), and He et al. (2020), for each firm-quarter observation, I estimate a firm's cost stickiness using the most recent 16 quarters of data from Compustat Quarterly with the following model:

$$\Delta Ln\ (SG\&A) = \alpha_0 + \alpha_1 * \Delta Ln\ (Sales) + \alpha_2 * Decrease * \Delta Ln\ (Sales) + e, \quad (1)$$

where $\Delta Ln\ (SG\&A)$ is the quarterly change in the natural log of a firm's SG&A, $\Delta Ln\ (Sales)$ is the change in the natural log of a firm's sales, and *Decrease* is an indicator equal to one if $\Delta Ln\ (Sales)$ is less than zero for a firm-quarter and zero otherwise. α_1 captures the percentage change in a firm's SG&A for a one percent increase in sales and $\alpha_1 + \alpha_2$ measures the percentage change in costs when sales decrease by one percent.[13] α_1 is positive when costs increase with sales. With sticky costs, α_2 should be the opposite of α_1 in sign, indicating that costs fall less for sales decreases than they rise for sales increases. The firm-level asymmetric cost behavior measure (*CostStickiness*) is a negative value of α_2. A larger value of *CostStickiness* indicates stickier costs. *CostStickiness* and risky financial assets are matched on fiscal year-end for each firm-year.[14]

I focus on SG&A because cost stickiness is more pronounced for SG&A than for COGS because COGS resembles variable costs which change with sales (Chen, Harford, and Kamara 2019).[15] SG&A should be the main channel through which cost stickiness affects a firm-level outcome. Later, I also estimate cost stickiness with sales minus earnings or COGS plus SG&A.

---

[13] Using 16 quarters of data to compute a firm-year score is not rare in the literature. For example, De Franco, Kothari, and Verdi (2011) measures a firm's financial statement comparability based on how quarterly earnings respond to quarterly stock returns over the previous 16 quarters. He et al. (2020) use the exact same specification as Equation (1) to estimate cost stickiness.

[14] In Table OA1 of the Online Appendix, I identify firms with seasonal quarterly sales following Fairhurst (2020), exclude them from the sample, and find that the baseline result remains robust.

[15] Note that the sum of COGS and SG&A often defines operating costs (e.g., Novy-Marx, 2011).

III.C. Research Design, Variables, and Summary Statistics

I estimate the effect of cost stickiness on risky financial assets as follows:

$$Risky\ FA\ /\ Total\ FA_{it} = \beta_0 + \beta_1 * CostStickiness_{it-1} + \gamma' X_{it-1} + \theta_j + \mu_t + \varepsilon_{it}, \qquad (2)$$

where *i, j,* and *t* denote firm, industry, and year, respectively. *Risky FA / Total FA* is the fair value of risky financial investments scaled by the fair value of total financial assets for a firm in year *t*. *CostStickiness* is the negative of α_2 estimated in Equation (1) and lagged by one year.

$X_{i,t-1}$ is a vector of one-year lagged controls. *Market-to-Book* and *R&D_Exp* may capture high-tech and pharmaceutical firms which have high stock valuation and hold a large amount of non-cash-like securities (Darmouni and Mota, 2020). I control for firm size (*Size*) because large firms are likely to hold risky securities (Duchin et al., 2017; Cardella et al., 2021). Profitability (*CashFlow*) is positively associated with risky financial investments (Duchin et al., 2017). Net working capital (*NWC*) includes current assets that can be easily converted to liquid cash if necessary. *Capex* captures the expenses required for capital expenditure. Leverage *(Debt*) may substitute for non-money-like securities in terms of risk-taking (Chen and Duchin, 2023). I also include a dividend payer indicator (*Dividend_Pay*). Volatile earnings *(Earn_Vol)* may induce a firm to hold more liquid assets. Appendix A presents definitions of the variables.

In Equation (2), θ_j and μ_t denote industry (three-digit SIC) and year fixed effects, respectively, controlling for unobserved, time-invariant industry-level properties, and macroeconomic factors. I do not include firm fixed effects because cost stickiness is persistent over time for each firm. Since *CostStickiness* is based on the previous 16 quarters, the *CostStickiness* measures in adjacent years may show significant overlap. Also note that *Risky FA / Total FA* is also persistent within a firm in my sample period. Standard errors are adjusted for heteroscedasticity and clustered at the firm level. A firm-year observation must have a non-missing value for the fair value of risky and total financial assets and lagged control variables in the baseline model. For the corporate governance variables, I use Thomson Reuters 13F, ExecuComp, and RiskMetrics. The final sample contains 4,347 firm-year observations of 498 unique firms from 2009 to 2019. All continuous firm-level variables are winsorized at the 1st and 99th percentiles.

Table 1 shows the summary statistics of the variables in Equation (2). The average cost stickiness is -0.0047 with a standard deviation of 1.7554.[16] The mean *Risky FA / Total FA* is 10.2 percent and is larger than its 75th percentile value, implying that large firms in the S&P 500 index drive the aggregate risky financial investments (Duchin et al., 2017; Darmouni and Mota, 2020). An average firm has a market-to-book of 2.4, lagged book assets of $10.4 billion, profitability of 12.6 percent (relative to lagged book assets), net working capital of 17.9 percent, capital expenditure of 4.9 percent, R&D expense of 3.1 percent, and leverage of 29.6 percent. 71.6 percent of the firm-year observations pay dividends in the previous year.

[Insert Table 1 here.]

IV. RESULTS

IV.A. Baseline OLS Results

Table 2 shows the baseline OLS results and confirms that sticky costs reduce risky financial investments.[17] A one-standard-deviation increase in *CostStickiness* reduces *Risky FA / Total FA*

---

[16] A negative value of cost stickiness implies 'anti-sticky' cost behavior and is not an aberration (Banker and Byzalov, 2014). Both He et al. (2020) and Jang and Yehuda (2021) show that at least 25% of their firm-year observations have a negative value of cost stickiness and the average cost stickiness is close to zero. The relatively large standard deviation of *CostStickiness* is also consistent with that of He et al. (2020) and Jang and Yehuda (2021).

[17] Defining industry fixed effects at the two-digit SIC or the Fama-French 48 level does not change the inference (Table OA2 of the Online Appendix).

by 13.1 percent relative to the sample mean (Column (2)).[18] Because I control for profits (*CashFlow*) and earnings volatility (*Earn_Vol*), the mechanical relation between costs and earnings does not drive the baseline result (He et al., 2020). For firms with the same level and volatility of earnings, those with sticky costs shy away from risky financial investments in the current period, because sticky costs may increase liquidity needs when negative shocks hit a firm's sales and exacerbate operating risk due to the inflexibility in cost adjustment.[19] Table 2 is not consistent with the 'reaching for yield' motive.[20]

Regarding the controls, *Market-to-Book* and *R&D_Exp* show positive and significant coefficients, capturing high stock-valuation firms holding risky securities (Darmouni and Mota, 2020). The positive coefficient of *Size* and *NWC* confirms that larger firms and those with more net working capital invest more in risky securities. The negative coefficient of *Debt* implies that leverage can substitute for risky securities as a means of corporate risk-taking. Dividend payouts seem to reduce funds for risky financial investments, but only in Column (1). *CashFlow, Capex,* and *Earn_Vol* do not show any significant estimates.[21]

[Insert Table 2 here.]

IV.B. Alternative Measures

In Table 3, I test whether the baseline result is robust to alternative measures of costs. Instead of SG&A, I use operating costs (sales minus operating income after depreciation and

[18] Since *Risky FA / Total FA* is censored at zero and one, in Table OA3, I show that the baseline result is robust to using a Tobit model.
[19] If stickiness in SG&A behavior reduces risky financial investments, this result should be more pronounced for firms with a higher portion of SG&A relative to their scale. Table OA4 confirms that it is true.
[20] In Table 2, Column (1) shows a higher adjusted R^2 than Column (2) does. Thus, in subsequent analyses, I include industry and year fixed effects separately.
[21] Based on Column (1), I also check the variance inflation factor (VIF). None of the main firm-level independent variables shows a VIF value exceeding 2.8, with a mean VIF value for the whole model equal to 2.02. Thus, multicollinearity is not likely to be a serious problem.

amortization) and total costs (COGS plus SG&A) to estimate cost asymmetry (Kama and Weiss, 2013; Rouxelin, Wonsunwai, and Yehuda, 2018). I also address the concern that one should use the sum of α_1 and α_2, not just α_2 in Equation (1), to fully capture cost stickiness. SG&A, operating costs, and total costs correspond to Columns (1) and (4), (2) and (5), and (3) and (6), respectively. The main independent variable, *CostStickiness_Alt*, is defined as the negative of α_2 in Equation (1) in Columns (1), (2), and (3), and as the negative of the sum of α_1 and α_2 in Columns (4), (5), and (6).[22] A higher *CostStickiness_Alt* indicates a stickier cost structure. Table 3 shows that the coefficient of *CostStickiness_Alt* is negative and significant in all columns. In terms of economic magnitude, Column (2) and (3) show that a one-standard-deviation increase in *CostStickiness_Alt* reduces *Risky FA / Total FA* by 13.8 and 10.3 percent relative to the sample mean, respectively. Table 3 confirms that the baseline result is robust to using alternative cost measures.

[Insert Table 3 here.]

I also check whether the baseline result is robust to alternative measures of risky financial investments. In Panel A of Table 4, I exclude U.S. agency securities from risky financial investments (Column (1)). The default risk of U.S. agency securities may be similar to that of U.S. Treasuries (Bildersee, 1978; Cardella et al., 2021), which makes U.S. agency debt obligations safe, not risky. In addition, foreign government bonds issued by developed countries may be safe in terms of default probability. Since 10-Ks do not disclose the identity of an issuing country, in Column (2), I exclude non-U.S. government bonds from risky securities. The coefficient of

[22] A positive α_2 implies that the association between changes in sales and costs is more positive when sales decrease than when sales increase ('anti-sticky' cost behavior). The sum of α_1 and α_2 goes up with a greater α_2. Thus, the negative of the sum is positively associated with cost stickiness. The inference for Table 3 remains robust when I limit my sample to observations with a positive α_1 (Table OA5 of the Online Appendix).

CostStickiness remains negative and significant in both specifications. The 'safe' portion of U.S. agency securities and foreign government bonds does not confound my baseline result.

In Panel B, I decompose the main dependent variable, *Risky FA / Total FA*, and see which component drives the baseline result. Total financial assets are divided into six types: cash-like securities, U.S. Treasuries, government bonds excluding U.S. Treasuries, corporate bonds, equity, and other securities, all of which are scaled by total financial assets to be used as dependent variables. While holding firm fundamentals (e.g., size) constant, in Column (1), I find that firms with sticky costs accumulate cash-like securities. This result is consistent with the precautionary savings motive that firms accumulate cash in anticipation of future liquidity needs. Other types of securities do not show significant estimates.[23] Since cash-like securities are safe, their increase is consistent with the decrease in *Risky FA / Total FA* in response to sticky costs. Panel B, Table 4 also highlights the importance of more detailed information on a firm's financial portfolio. Prior works often use total cash holdings (proxied by Compustat CHE) to examine the precautionary savings motive. However, Panel B shows that risky financial assets do not meet such needs, and firms invest more in cash-like securities for the liquidity buffer necessary to cope with the downward effect of sticky costs on profits when sales decline.

In Table OA6 of the Online Appendix, I show that the baseline result is robust to different scaling or taking the log of risky securities, that the results in Panel B, Table 4 hold while holding the size of total financial assets constant, and that cost stickiness reduces illiquid financial assets.

[Insert Table 4 here.]

[23] However, note that I find the significant decrease in some categories of risky securities (government debt excluding U.S. Treasuries, equity, and other securities) in response to cost stickiness when I take the natural log of one plus the fair value of each type of financial assets while holding the size of total financial assts constant (Panel B, Table OA6 of the Online Appendix). So, the baseline result may not be entirely driven by the increase in cash-like securities.

IV.C. Addressing Potential Confounders

When a researcher examines the effect of cost asymmetry on other outcomes, Banker et al. (2018) caution that the determinants of a firm's cost stickiness should not affect the outcome of interest directly and also not be correlated with an omitted variable. To address this concern, I additionally control for the determinants of cost stickiness documented by the literature (e.g., Banker and Byzalov, 2014) and follow Oster (2019)'s delta (δ) to see how omitted variable bias (OVB) potentially affects the baseline result.

IV.C.1. Controlling for the Standard Determinants of Cost Stickiness

There are three major determinants of cost stickiness: resource adjustment costs, managerial expectations for future sales, and firm-level agency problems.[24] A firm's resource adjustment costs are proxied by asset intensity and employee intensity because adjustment costs are likely to be higher when firms depend on internally held assets and employees (Anderson et al., 2003). A dummy variable for successive sales decreases in year *t*-1 and *t*-2 captures managers' optimism about future sales because the expectation should become less optimistic with the sales decline in the previous period (Anderson et al., 2003).[25] Agency problems can affect both cost stickiness (e.g., Chen, Lu, and Sougiannis, 2012) and risky financial investments (Duchin et al., 2017). I include in my test specification the proxies for corporate governance: institutional ownership, the entrenchment index, industry concentration, and a dummy variable for the CEO-chairman duality (Edmans, 2014; Bebchuk, Cohen, and Ferrell, 2009; Giroud and Mueller, 2010).

---

[24] Banker and Byzalov (2014) further note that slack resources carried over from the prior period can also affect cost stickiness. For instance, if revenue increased in the prior year, the amount of resources required to keep up with the increased demand also goes up, implying that the slack resources in the current year should be close to zero. I additionally control for the lagged sales growth and find that the baseline result remains robust (Table OA7 of the Online Appendix).

[25] I do not use GDP growth to proxy for managerial expectations (Anderson et al., 2003) due to year fixed effects.

In Column (1), (2), and (3) of Panel A, Table 5, the baseline result is robust to including proxies for resource adjustment costs, managerial expectations about sales, and corporate governance, respectively. In Column (4) which includes all proxies in one model, the coefficient of lagged *CostStickiness* is negative and significant. Interestingly, none of the corporate governance variables shows a significant relation with *Risky FA / Total FA*.

Since managerial discretion can affect both cost stickiness (e.g., Anderson et al., 2003) and risky financial investments (Duchin et al., 2017), I also test whether the baseline result remains robust to controlling for CEO characteristics, including CEO age, tenure, gender, delta, and vega. For CEO age, I create dummy variables for the CEOs who are in their 50s, 60s, and at least 70s, respectively.[26] I also include indicators for the CEOs who have served in the position for two to five, five to ten, or at least eleven years, respectively.

In Panel B of Table 5, after controlling for CEO characteristics, the coefficient of *CostStickiness* is negative and significant in all columns. CEO characteristics do not subsume the relation between sticky costs and risky financial investments. Interestingly, compared with CEOs in their 40s, CEOs in their 50s and 60s shy away from risky financial investments. Female CEOs also tend to avoid investing in risky securities relative to non-female CEOs. Such relations are consistent with the notion that overconfident CEOs invest in risky securities (Duchin et al., 2017). Based on Panels A and B of Table 5, neither the standard determinants of cost stickiness nor CEO characteristics seem to subsume the effect of cost stickiness on risky financial investments.

IV.C.2. Omitted Variable Bias and Oster's δ

[26] In my sample, the minimum (maximum) value for CEO age is 41 (73).

Omitted variables may affect both cost stickiness and risky financial investments, thereby biasing the estimates. Recognizing this issue, Oster (2019) proposes an approach to address OVB.[27] In empirical studies, one establishes the robustness of findings by computing the value of δ (Oster's delta) that sets the main coefficient of interest to zero for a given R_{Max}. R_{Max} is the R-squared of a hypothetical regression of *Risky FA / Total FA* on the full set of observed and unobserved controls. If observed and unobserved controls fully explain an outcome, then R_{Max} is equal to one, which is unlikely due to measurement error. Oster (2019) sets R_{Max} to be equal to 1.3 times the R-squared value of the regression with observed controls.

Based on the two specifications in Table 2, I compute Oster's delta. I set R_{Max} to be equal to 1.3 times the R-squared of each OLS specification. Panel C, Table 5 shows that the baseline test specifications yield Oster's delta values of -6.7300 and -5.7061, respectively. A negative value of Oster's delta indicates that if observed controls are positively (negatively) correlated with lagged *CostStickiness*, then omitted variables must be negatively (positively) correlated with lagged *CostStickiness* to nullify the effect of cost stickiness on risky financial investments. A negative δ implies that the magnitude of the main coefficient increases when a regression model is augmented with additional controls (e.g., Bonaimé et al., 2020). The value of δ in Panel C is not consistent with an OVB nullifying the relation between cost stickiness and risky financial investments.

[Insert Table 5 here.]

IV.D. Difference-in-Differences: Great Recession

In this section, I use the Great Recession as an exogenous shock to a firm's cost behavior and risky financial investments in a DID analysis. I examine how *CostStickiness* and *Risky FA /*

[27] I explain how Oster (2019)'s technique can be applied in my setting in Section OA.IX of the Online Appendix.

Total FA change in the post-recession period, compared with the pre-recession period, for the treated and the control group. The treated (control) firms are those with relatively sticky (less sticky) costs before the recession (in 2006). Since firms in 2006 are unlikely to have set their policies in anticipation of the Great Recession, it is a plausible quasi-natural experimental setting.

Hypothetically, the Great Recession should induce firms to reduce cost stickiness in the post-recession period, especially those with sticky costs pre-recession. A significant economic bust may lead to hysteresis in managerial pessimism. For instance, Yagan (2019) shows that local businesses heavily affected by the Great Recession were reluctant to increase sticky resources (employees) long after a business cycle's impacts cease.[28] Cost stickiness should be less pronounced when revenue declined in the preceding period (during the recession) because managerial expectation about future demand becomes less optimistic (Anderson et al., 2003). Taylor (2014) documents a weak U.S. economic recovery from the recession, suggesting that the post-recession rebound in sales is likely subdued in all industries. If so, the benefit from retaining resources in anticipation of a rebound may not be significant. Then, firms with relatively sticky costs before the recession, likely make their cost structure less sticky after the recession.

Note that the decrease in cost stickiness implies the increase in risky financial investments (Table 2). By making the cost structure less sticky after the recession, treated firms may become less worried about the lower earnings arising from sticky costs when sales decrease, which should give firms more scope of investing in risky securities. Since the return on risky securities bounces back in the post-recession period, risky financial investments should resume after the recession.

[28] Sticky resources mean that "the frictions in resource adjustment are neither small enough to make them fully variable nor large enough to make them fully fixed (Banker and Byzalov, 2014)."

Because my hand-collected dataset starts in 2009, I use Darmouni and Mota (2020)'s dataset, which contains pre-2009 observations. Their dataset does not decompose the amount of U.S. Treasuries and agencies; thus, I exclude U.S. agency debt obligations from risky financial assets. My sample period starts in 2005 and ends in 2013. I drop 2007, 2008, and 2009 (the recession years) from the sample and focus on firms with non-missing total financial assets in 2006. I split the sample firms into two groups based on the median value of *CostStickiness* in 2006 and define firms with an above-median (below-median) value of *CostStickiness* in 2006 as a treated (control) group. The treated firms had relatively sticky costs right before the economic bust. Since the recession officially ended in 2009, the indicator *Post* is equal to one if a firm-year observation is in 2010 or beyond, and zero otherwise. I use the following model for my DID analysis:

$$Dep\ Var_{it} = \beta_0 + \beta_1 * Treat * Post_{it} + \gamma X_{it-1} + FEs + \varepsilon_{it}, \tag{3}$$

where *i* and *t* denote firm and year, respectively. The coefficient of the interaction term *Treat*Post* shows how a treated firm's cost stickiness and risky financial investments change after the recession relative to the control group. The coefficient of *Treat*Post* should be negative (positive) when *CostStickiness* (*Risky FA / Total FA*) is a dependent variable. I include the firm-level controls and the fixed effects (firm and year).[29] Year (firm) fixed effects subsume *Post* (*Treat*).

I also use entropy balancing (Hainmueller, 2012) to address the concern that the effect of the recession on risky financial investments may be driven by firm fundamentals unrelated to cost stickiness. Entropy balancing assigns continuous weights to each observation in the control group

[29] In the DID model, I can use firm fixed effects, instead of industry fixed effects, because the Great Recession likely causes a structural break in cost stickiness and risky financial investments, leading to a significant within-firm variation in two outcomes. Excluding the recession years (2007-2009) should make the overlap between the pre-recession and the post-recession cost stickiness relatively insignificant. Also, note that the estimation window for the *CostStickiness* value in 2010 or afterwards does not cover the pre-recession period (2005-2006).

to achieve a covariate balance for the desired moments (mean, variance, and skewness) of all variables between the treated and control groups without losing observations.

Compared with Panel A, Panel B of Table 6 shows that the difference in mean, variance, and skewness for the firm-level controls is minimized between the treated and control group. Panel C corroborates the inverse relation between cost stickiness and risky financial investments. Columns (1) and (2) ((3) and (4)) report the results without (with) entropy balancing. Columns (1) and (3) show that the degree of cost asymmetry significantly decreases for a treated firm relative to that of the control group, showing that the Great Recession induced firms to make their cost structure less sticky than before.[30, 31] More importantly, Columns (2) and (4) show that the increase in risky financial investments is more pronounced in the treated group than in the control group. The baseline OLS result (Table 2) and the DID analysis (Table 6) show that the relation between cost stickiness and risky financial investments can be both cross-sectional within an industry (with industry fixed effects) and temporal within a firm (with firm fixed effects).

[Insert Table 6 here.]

I also check whether the parallel trends assumption holds. Modifying Equation (3), I disaggregate *Post* into indicator variables corresponding to each year (2005, 2006, 2010, 2011, 2012) and interact the dummies with *Treat*. Each interaction term (e.g., *Treat*2005*) shows the difference in *CostStickiness* or *Risky FA / Total FA* between the treated and control group each

---

[30] The absolute degree of the coefficient of *Treat*Post* (Column (1) and (3), Panel C, Table 6) is larger than that of He et al. (2020) (= 0.622), who use union elections for their regression discontinuity design. The greater coefficient estimate in my paper is understandable since the Great Recession is likely more significant than a union election. I do not use union elections in my setting because the effect of unionization becomes insignificant when the number of workers who vote is small relative to a firm's total workforce (Lee and Mas, 2012). Union elections normally involve less than 100 people; however, the median number of employees in my full sample is 20,000.

[31] Note that cost stickiness departs from the dichotomy between fixed and variable costs and is significantly determined by managerial discretion (e.g., Banker and Byzalov, 2014). A firm's percentage change in response to a 1% change in sales can exceed 1%P, implied by the standard deviation of cost stickiness measure in He et al. (2020).

year. Similar to Mirenda, Mocetti, and Rizzica (2022), I normalize the coefficient estimate in 2006, one year before the event starts, to zero. In Figure 3, the difference in *CostStickiness* and *Risky FA / Total FA* between the two groups in the pre-recession period does not change significantly. However, in the post-recession period, the coefficient of *Treat*2010, Treat*2011,* and *Treat*2012* is negative (positive) and significant when *CostStickiness* (*Risky FA / Total FA*) is a dependent variable. Figure 3 confirms that the parallel trends assumption holds.[32,33]

[Insert Figure 3 here.]

IV.E. Synthetic Control Method: Great Recession

I complement the DID analysis with the synthetic control method (SCM) proposed by Abadie et al. (2010). The treatment effect is equal to the observed outcome for the treated after the intervention minus the counterfactual (unobserved) outcome for the treated in the absence of the intervention. In a DID analysis, a researcher estimates the counterfactual outcome by assuming the parallel trends between the two groups in the absence of the treatment. SCM estimates the counterfactual outcome by minimizing the difference in pre-treatment characteristics between the treated and the 'synthetic control.' The synthetic control is a weighted average of the observations in the control group, obtained by the data-driven process to minimize the difference in pre-

[32] One may claim that the increase in risky financial investments after the recession may 'cause' firms to reduce cost stickiness. However, it is difficult to explain why the appetite for risky financial investments is necessarily high after the recession but low before the recession for firms with relatively sticky costs pre-recession, if the change in the appetite is not driven by the variation in cost stickiness. Also, the decision making regarding their nonfinancial business model (i.e., cost structure) should take precedence over how firms allocate their financial assets since I cover non-financial firms.

[33] I address the concern that *CostStickiness* from 2010 to 2012 may reflect cost stickiness during the recession, not after, since the measure is based on the previous 16 quarters. After dropping years from 2007 to 2012, I still find that *CostStickiness* decreases and *Risky FA / Total FA* increases for the treated group relative to the control (Table OA8).

treatment characteristics between the two groups. SCM addresses the parallel trends issue by matching the pre-exposure trends between the treated and the control group by reweighting units.[34]

In my setting, I check whether the increase in *Risky FA / Total FA* for the treated group relative to the control is robust to using SCM. I do not use *CostStickiness* as a dependent variable, because the treatment assignment is based on the difference in *CostStickiness* before the recession. SCM minimizes the difference in pre-recession *CostStickiness* between the two groups, which defeats the purpose of the test design. For pre-treatment predictors of a post-intervention outcome, I use the pre-treatment average of the firm-level controls and the pre-treatment fair value of risky financial assets scaled by total financial assets in 2005, 2006, 2007, 2008, and 2009. For SCM, I do not drop the recession years (2007-2009) because (1) the post-recession *Risky FA / Total FA* is not directly affected by its value during the recession and (2) violating the parallel trends assumption is not a concern since SCM matches the pre-treatment trends in *Risky FA / Total FA*.[35] I use the STATA package ('synth_runner') developed by Galiani and Quistorff (2017) to allow for multiple treatment units (firms).[36] *p*-value is the proportion of firms in the control group that have an estimated effect at least as large as that of the treated group and is interpreted in the same way as the conventional *p*-value in the OLS analysis (Galiani and Quistorff, 2017).

Table 7 presents how risky financial investments change for the treated group relative to those of the synthetic control. As shown in Panel A of Table 7 and in Figure 4, I find a statistically significant increase in risky financial investments in the post-recession period for firms with

---

[34] I explain in more detail how I apply SCM in my setting in Section OA.XI of the Online Appendix.
[35] In the DID analysis with *CostStickiness* as a dependent variable, the violation of the parallel trends assumption can be concerning if I include the recession years in the pre-treatment period, firms with relatively sticky costs before the recession should see their profits decline during the recession (2007-2009). Thus, the treated firms may decrease their cost stickiness during the recession to preserve profits, which violates the parallel trends assumption.
[36] The original SCM and the associated package ('synth') only allow one treated unit (firm). However, Galiani and Quistorff (2017)'s package comes with relatively limited features compared to the synth package. Their package does not present, for example, variable weights, observation weights, and covariate balance.

relatively sticky costs before the recession. This inference is confirmed by the positive estimate in each post-recession year and the associated *p*-values. Panel B of Table 7 shows that the synthetic control more closely matches the pre-treatment risky financial investments than the simple pre-treatment average among the control firms. SCM confirms that firms with sticky costs pre-recession increase risky financial investments after the recession, relative to firms with less sticky costs before the recession, consistent with the DID analysis in Table 6.

[Insert Table 7 here.]

[Insert Figure 4 here.]

IV.F. Financial Constraints

In Table 8, I test whether asymmetric cost behavior affects a firm's financial portfolio composition only if a firm is financially constrained. The proxies for firm-level financial constraints are the Size and Age (SA) index (Hadlock and Pierce, 2010), the Whited and Wu (2006) index (or WW), and leverage. A higher value of the two indices indicates more binding financial constraints. Leverage reduces the available cash flow due to interest expenses, and existing debt claims may subdue additional external financing (Myers, 1977). Accordingly, *High SA* (*High WW*) is an indicator variable equal to one if a firm in year *t* has an above-median value of the SA index (the WW index) for the full sample and zero otherwise. *High_Debt* is an indicator equal to one if a firm in year *t* has an above-median value of lagged financial leverage, and zero otherwise. I split the full sample into two groups based on each indicator and conduct subsample analyses.

In Table 8, the relation between cost stickiness and risky financial investments is significant only in financially constrained firms. The coefficient of *CostStickiness* is negative and significant in firms with a high SA index, WW index, and high leverage in the previous year, respectively (Columns (1), (3), and (5)). The coefficient of *CostStickiness* is insignificant in Columns (2), (4), and (6) for unconstrained firms. Table 8 implies that the precautionary savings motive induces firms with sticky costs to limit risky financial investments only if they are financially constrained and need internal cash to pay sticky expenses when sales decline.

I acknowledge that the coefficient of *CostStickiness* is not statistically different between the constrained and unconstrained subsamples. Duchin et al. (2017) argue that it is suboptimal for financially constrained firms to hold risky securities. So, it is possible that financially constrained firms already hold little to no risky financial assets regardless of sticky costs, subduing the inverse relation between *CostStickiness* and *Risky FA / Total FA* for constrained firms.

[Insert Table 8 here.]

IV.G. Non-Financial ('Real') Investments

Liquidity management is important in the sense that firms should find a way to fund investment projects that create value (Graham and Harvey, 2001; Almeida et al., 2014). Accordingly, it is important to examine how the relation between cost asymmetry and risky financial investments affects non-financial ('real') investments. Hypothetically, risky securities may curtail a firm's ability to fund non-financial investment projects, because firms may need to sell risky securities at a discounted price (before maturity) if they need to convert risky securities into cash. Also, accounting standards discourage firms from converting risky securities into cash for a held-to-maturity security (Cardella et al., 2021). Since sticky costs may amplify the downward effect of sales decrease on earnings and increase the cost of debt (Homburg et al., 2018), investing in risky securities may reduce the liquidity available to sustain non-financial investment projects when a negative shock hits a firm.

In Table 9, I examine how the relation between cost asymmetry and risky financial assets affects capital expenditure, R&D, acquisition expense, and 'real investments' (the sum of the three), all scaled by lagged book assets. The main independent variable is the interaction between lagged *CostStickiness* and *Risky FA / Risky FA*. Here, I also lag *Risky FA / Total FA* since a firm may consider converting risky securities to cash when the adverse shock to sales hits a firm in the future. I regress each expense on the interaction-term, the firm-level controls, and fixed effects.

From Column (1) to (4) of Table 9, with industry and year fixed effects, the interaction between *CostStickiness* and *Risky FA / Total FA* shows a negative coefficient estimate, but statistically insignificant. From Column (5) to (8), I instead include firm and year fixed effects. Unlike the baseline specification, I can add firm fixed effects since the interaction between *CostStickiness* and *Risky FA / Total FA* should exhibit more within-firm variation than *CostStickiness* or *Risky FA / Total FA* alone and firm fixed effects are more granular than industry fixed effects. Also note that the DID analysis with firm fixed effects (Table 6) shows that the relation between cost stickiness and risky securities can also be temporal within a firm.

In Column (5) of Table 9, the coefficient of the interaction between *CostStickiness* and *Risky FA* / *Total FA* is negative and significant with *Capex* as a dependent variable. In Column (6) and (7), R&D and acquisition expense do not show a significant relation with the interaction term. However, when I consider the sum of capex, R&D, and acquisition expense, the coefficient of the interaction term is negative and significant (Column (8)). The effect is concentrated in firms with highly sticky costs. For firms with *CostStickiness* one standard deviation above the sample median, a one standard-deviation increase in *Risky FA / Total FA* reduces real investments by 3.9% relative to the sample median or $28 million U.S. dollars. Overall, holding risky securities seems to subdue real investments, and in particular capital expenditure, for firms with sticky costs.

[Insert Table 9 here.]

IV.H. Firm Risk

Sticky costs can be a significant risk factor for a firm. The inflexibility in cost adjustments increases credit default swap (CDS) spreads (Homburg et al., 2018). The frictions in resource adjustments also limit synergies in M&A deals (Jang and Yehuda, 2021). In this context, it is important to examine how liquidity management affects risk exposure of companies with sticky costs. Hypothetically, holding risky securities under cost asymmetry should add to the overall risk of a firm because risky securities are relatively difficult to be converted into cash and can also be used for managerial risk-taking (Chen and Duchin, 2023). Also, the price volatility of risky securities may affect a firm's risk exposure if it holds a large amount of them.

To evaluate a firm's risk exposure, I use the total and idiosyncratic risk measure estimated from the market model and the Fama-French (1993) three-factor model (Ang, Hodrick, Xing, and Zhang, 2006). Total risk is the volatility of a firm's realized stock returns and idiosyncratic risk is the volatility of a firm's residual stock returns. The variation in idiosyncratic risk should be driven by firm-specific information not captured by a market factor. If holding risky securities for a given level of cost stickiness increases a firm's risk exposure, then the coefficient of the interaction term (*CostStickiness* * *Risky FA / Total FA*) should be positive and significant. In all columns of Table 10, the interaction term is positively and significantly related to the risk measures. Holding risky securities increases the risk exposure of firms with sticky costs. The effect is also concentrated in firms with highly sticky costs. For firms with *CostStickiness* one standard deviation above the sample median, a one standard-deviation increase in *Risky FA / Total FA* raises idiosyncratic risk by 2.2% relative to the sample median (Column (5)). Considering that sticky costs alone can be a significant risk factor (e.g., Homburg et al., 2018), stakeholders should assess whether a firm's overall risk exposure becomes excessive with significant risky financial asset holdings.

[Insert Table 10 here.]

IV.I. Stock Returns

Lastly, I examine how the relation between cost asymmetry and risky financial investments affects a firm's stock returns. Prior works argue that idiosyncratic risk should be positively related to expected returns (e.g., Merton, 1987; Fu, 2009). Holding risky securities increases idiosyncratic risk when costs are sticky; however, these investments underperform safe securities (Duchin et al., 2017). Thus, it is hypothetically unclear how risky financial investments affect stock returns for firms with sticky costs.

To evaluate the stock market reactions, I adopt the approach of Faulkender and Wang (2006) and Duchin et al. (2017) with the following regression model:

$$r_{it} - r_{it}^{B} = \beta_0 + \beta_1 \Delta Financial\_Assets_{it} * CostStickiness_{it-1} + \beta_2 \Delta Financial\_Assets_{it} + \beta_3 CostStickiness_{it-1} + \gamma' X_{it} + \varepsilon_{it}, \quad (4)$$

where *i* and *t* denote firm and year, respectively. $r_{it} - r_{it}^{B}$ is either a firm's raw stock return or its return during its fiscal year minus the return on the matching portfolio following Daniel, Grinblatt, Titman, and Wermers (1997) (or DGTW returns). *ΔFinancial_Asset* is the change in either total, safe, or risky financial assets from year *t*-1 to *t*, respectively. *X* is a vector of control variables used in the Duchin et al. (2017) approach: change in earnings before extraordinary items, net assets, R&D expense, interest expense, and dividends, lagged total financial assets, leverage, net financing, the interaction between total financial assets and its change, and the interaction between leverage and change in total financial assets. All variables excluding stock returns and leverage in

Equation (4) are scaled by lagged market value of equity. I include firm and year fixed effects following Duchin et al. (2017).[37] The main coefficient of interest is β_1, which shows how change in total, safe, or risky financial assets under cost asymmetry is associated with a firm's stock returns for the fiscal year, respectively.

In Column (1) and (2) of Table 11, change in total financial assets is positively associated with a firm's stock returns (the positive coefficient of *ΔFinancial_Asset*), and such positive relation becomes more pronounced as a firm's cost becomes stickier (the positive coefficient of *ΔFinancial_Asset*CostStickiness*). In Column (3) and (4), I show that the positive relation between the change in financial assets under cost asymmetry and stock returns is largely driven by safe financial assets. Interestingly, in Column (5) and (6), neither *ΔRisky_FA* nor *ΔRisky_FA*CostStickiness* shows a significant coefficient. Shareholders value holding more safe financial assets when a firm's cost structure is stickier since firms with sticky costs need them to sustain profitable investment projects when sales decline. However, investing in risky securities does not seem to generate value for shareholders in firms with sticky costs. Considering the increase in a firm's risk exposure when it invests in risky securities under cost asymmetry, holding risky securities seems hardly justifiable with little to no shareholder value creation.[38]

[Insert Table 11 here.]

IV.J. Other Tests

[37] The main interaction term does not show a significant estimate with industry and year fixed effects, which I omit for brevity.

[38] I do not interpret the estimates in Table 11 as the marginal value of total, safe, or risky financial assets because such inference is unreliable (Halford, McConnell, Sibilkov, and Zaiats, 2020).

In the Online Appendix, I show that the inverse relation between sticky costs and risky financial investments is concentrated in firms operating in competitive industries (Table OA9). The baseline result remains robust to controlling for U.S. multinationals (Table OA10) and holding the size of total financial assets constant (Table OA11). Also, Table OA12 addresses a potential concern with outliers due to the relatively large standard deviation of *CostStickiness* (Table 1) by further limiting the sample to the 10-90 percentile range of the value. The baseline result is robust.

V. CONCLUSION

Sticky costs amplify the adverse effect of sales decrease on a firm's earnings, which may induce firms to rely on internal financial asset holdings for future expenses, especially when they are financially constrained. I find that firms with asymmetric cost behavior reduce their risky financial investments. This relation is likely driven by expected liquidity needs and the trade-off between operating and financial risks. Recent profitability and earnings volatility are not the mechanisms underlying the relation between sticky costs and risky securities. The baseline result is robust to alternative measures of cost stickiness and risky financial investments. I address the endogeneity concern using Oster's delta, difference-in-differences analysis, and the synthetic control method. Holding risky securities under cost asymmetry seems to subdue a firm's non-financial investments (e.g., capex) because converting risky securities into cash is subject to frictions. When firms with sticky costs invest in risky securities, doing so increases a firm's overall risk exposure without creating value for shareholders. Thus, limiting risky financial investments seems to be a reasonable decision for firms with sticky costs.

References

Abadie, A., A. Diamond, and J. Hainmueller. 2010. Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program. *Journal of the American Statistical Association*, 105(490): 493-505.

Almeida, H., M. Campello, I. Cunha, and M. S. Weisbach. 2014. Corporate liquidity management: A conceptual framework and survey. *Annual Review of Financial Economics* 6 (1): 135-162.

Anderson, M. C., R. D. Banker, and S. Janakiraman. 2003. Are selling, general, and administrative costs "sticky"? *Journal of Accounting Research* 41 (1): 47-63.

Anderson, R., and K. Kavajecz. 1994. *A historical perspective on the Federal Reserve's monetary aggregates: A timeline.* Federal Reserve Bank of St. Louis.

Ang, A., R. J. Hodrick, Y. Xing, and X. Zhang. 2006. The cross-section of volatility and expected returns. *Journal of Finance* 61 (1): 259-299.

Baker, S. R., S. J. Davis, and J. A. Levy. 2022. State-level economic policy uncertainty. *Journal of Monetary Economics* 132: 81-99.

Balakrishnan, R., M. J. Petersen, and N. S. Soderstrom. 2004. Does capacity utilization affect the "stickiness" of cost? *Journal of Accounting, Auditing & Finance* 19(3): 283-300.

Banker, R. D., S. Basu, D. Byzalov, and J. Y. Chen. 2016. The confounding effect of cost stickiness on conservatism estimates. *Journal of Accounting and Economics* 61 (1): 203-220.

Banker, R. D., and D. Byzalov. 2014. Asymmetric cost behavior. *Journal of Management Accounting Research* 26 (2): 43-79.

Banker, R. D., D. Byzalov, and L. T. Chen. 2013. Employment protection legislation, adjustment costs and cross-country differences in cost behavior. *Journal of Accounting and Economics* 55 (1): 111-127.

Banker, R. D., D. Byzalov, M. Ciftci, and R. Mashruwala. 2014. The moderating effect of prior sales changes on asymmetric cost behavior. *Journal of Management Accounting Research* 26 (2): 221-242.

Banker, R. D., D. Byzalov, S. Fang, and Y. Liang. 2018. Cost management research. *Journal of Management Accounting Research* 30 (3): 187-209.

Banker, R. D., and L. Chen. 2006. Predicting earnings using a model based on cost variability and cost stickiness. *The Accounting Review* 81 (2): 285-307.

Bates, T. W., K. M. Kahle, and R. M. Stulz. 2009. Why do US firms hold so much more cash than they used to? *Journal of Finance* 64 (5): 1985-2021.

Bebchuk, L., A. Cohen, and A. Ferrell. 2009. What matters in corporate governance? *Review of Financial Studies* 22 (2): 783-827.

Begenau, J., and B. Palazzo. 2021. Firm selection and corporate cash holdings. *Journal of Financial Economics* 139 (3): 697-718.

Bildersee, J. S. 1978. US government and agency securities: An analysis of yield spreads and performance. *Journal of Business* 51 (3): 499-520.

Bonaimé, A., K. Kahle, D. Moore, and A. Nemani. 2020. Employee compensation still impacts payout policy. *Critical Finance Review*: forthcoming.

Cardella, L., D. Fairhurst, and S. Klasa. 2021. What determines the composition of a firm's cash reserves? *Journal of Corporate Finance* 68: 101924.

Chen, C. X., H. Lu, and T. Sougiannis. 2012. The agency problem, corporate governance, and the asymmetrical behavior of selling, general, and administrative costs. *Contemporary Accounting Research* 29 (1): 252-282.

Chen, Z., and R. Duchin. 2023. Do non-financial firms use financial assets to take risk? *Review of Corporate Finance Studies*: forthcoming.

Chen, Z., J. Harford, and A. Kamara. 2019. Operating leverage, profitability, and capital structure. *Journal of Financial and Quantitative Analysis* 54 (1): 369-392.

Daniel, K., M. Grinblatt, S. Titman, and R. Wermers. 1997. Measuring mutual fund performance with characteristic-based benchmarks. *Journal of Finance* 52 (3): 1035-1058.

Darmouni, O., and L. Mota. 2020. The financial assets of non-financial firms. Working paper.

De Franco, G., S. P. Kothari, and R. S. Verdi. 2011. The benefits of financial statement comparability. *Journal of Accounting Research* 49 (4): 895-931.

De Simone, L., J. D. Piotroski, and R. E. Tomy. 2019. Repatriation taxes and foreign cash holdings: The impact of anticipated tax reform. *Review of Financial Studies* 32 (8): 3105-3143.

Duchin, R., T. Gilbert, J. Harford, and C. Hrdlicka. 2017. Precautionary savings with risky assets: When cash is not cash. *Journal of Finance* 72 (2): 793-852.

Edmans, A. 2014. Blockholders and corporate governance. *Annual Review of Financial Economics* 6 (1): 23-50.

Fairhurst, D. 2020. Financing seasonal demand. *Financial Management* 49 (3): 839-870.

Fama, E. F., and K. R. French. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33 (1): 3-56.

Faulkender, M., and R. Wang. 2006. Corporate financial policy and the value of cash. *Journal of Finance* 61 (4): 1957-1990.

Foley, C. F., J. C. Hartzell, S. Titman, and G. Twite. 2007. Why do firms hold so much cash? A tax-based explanation. *Journal of Financial Economics* 86 (3): 579-607.

Fu, F. 2009. Idiosyncratic risk and the cross-section of expected stock returns. *Journal of Financial Economics* 91 (1): 24-37.

Galiani, S., and B. Quistorff. 2017. The synth_runner package: Utilities to automate synthetic control estimation using synth. *Stata Journal* 17 (4): 834-849.

Giroud, X., and H. M. Mueller. 2010. Does corporate governance matter in competitive industries? *Journal of Financial Economics* 95 (3): 312-331.

Graham, J. R., and C. R. Harvey. 2001. The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics* 60 (2-3): 187-243.

Hadlock, C. J., and J. R. Pierce. 2010. New evidence on measuring financial constraints: Moving beyond the KZ index. *Review of Financial Studies* 23 (5): 1909-1940.

Hainmueller, J. 2012. Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political Analysis* 20 (1): 25-46.

Halford, J. T., J. J. McConnell, V. Sibilkov, and N. Zaiats. 2020. Existing methods provide unreliable estimates of the marginal value of cash. *Critical Finance Review*: forthcoming.

He, J., X. Tian, H. Yang, and L. Zuo. 2020. Asymmetric cost behavior and dividend policy. *Journal of Accounting Research* 58 (4): 989-1021.

Homburg, C., A. Hoppe, J. Nasev, K. Reimer, M. Uhrig-Homburg. 2018. How cost stickiness affects credit risk. Working paper.

Jang, Y., and N. Yehuda. 2021. Resource adjustment costs, cost stickiness, and value creation in mergers and acquisitions. *Contemporary Accounting Research* 38 (3): 2264-2301.

Jensen, M. C. 1986. Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review* 76 (2): 323-329.

Kama, I., and D. Weiss. 2013. Do earnings targets and managerial incentives affect sticky costs? *Journal of Accounting Research* 51 (1): 201-224.

Lee, D. S., and A. Mas. 2012. Long-run impacts of unions on firms: New evidence from financial markets, 1961-1999. *Quarterly Journal of Economics* 127(1): 333-378.

Lev, B., and S. Radhakrishnan. 2005. The valuation of organization capital. In C. Corrado, J. Haltiwanger, and D. Sichel (Ed.), *Measuring Capital in the New Economy* (pp. 73-110). University of Chicago Press.

Mauer, D. C., and A. J. Triantis. 1994. Interactions of corporate financing and investment decisions: A dynamic framework. *Journal of Finance* 49(4): 1253-1277.

Merton, R. C. 1987. A simple model of capital market equilibrium with incomplete information. *Journal of Finance* 42 (3): 483-510.

Miller, M., and D. Orr. 1966. A model of the demand for money by firms. *Quarterly Journal of Economics* 80: 413-435.

Mirenda, L, S. Mocetti, and L. Rizzica. 2022. The economic effects of mafia: Firm level evidence. *American Economic Review* 112 (8): 2748-2773.

Myers, S. C. 1977. Determinants of corporate borrowing. *Journal of Financial Economics* 5(2): 147-175.

Ni, X., Y. Peng, and J. Shen. 2021. Available-for-sale is available for hoarding: When non-financial firms hold financial assets. Working paper.

Noreen, E., and N. Soderstrom. 1997. The accuracy of proportional cost models: Evidence from hospital service departments. *Review of Accounting Studies* 2 (1): 89-114.

Novy-Marx, R. 2011. Operating leverage. *Review of Finance* 15 (1): 103-134.

Opler, T., L. Pinkowitz, R. Stulz, and R. Williamson. 1999. The determinants and implications of corporate cash holdings. *Journal of Financial Economics* 52 (1): 3-46.

Oster, E. 2019. Unobservable selection and coefficient stability: Theory and evidence. *Journal of Business & Economic Statistics* 37 (2): 187-204.

Rouxelin, F., W. Wongsunwai, and N. Yehuda. 2018. Aggregate cost stickiness in GAAP financial statements and future unemployment rate. *The Accounting Review* 93 (3): 299-325.

Serfling, M. 2016. Firing costs and capital structure decisions. *Journal of Finance* 71 (5): 2239-2286.

Taylor, J. B. 2014. The role of policy in the Great Recession and the weak recovery. *American Economic Review* 104 (5): 61-66.

Weiss, D. 2010. Cost behavior and analysts' earnings forecasts. *The Accounting Review* 85 (4): 1441-1471.

Whited, T. M., and G. Wu. 2006. Financial constraints risk. *Review of Financial Studies* 19 (2): 531-559.

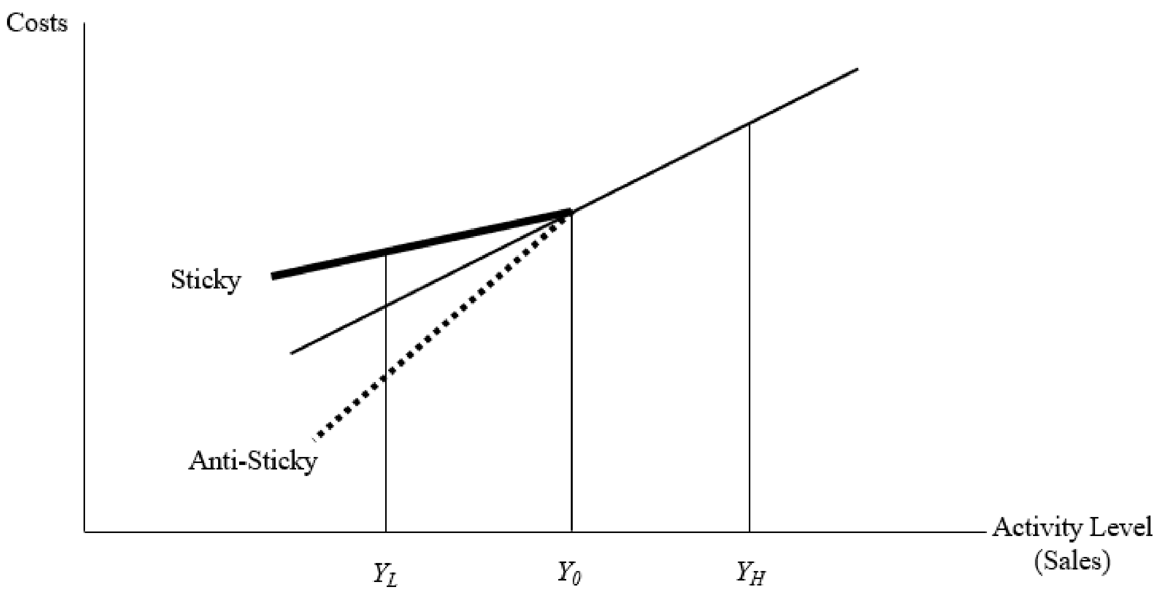
Yagan, D. 2019. Employment hysteresis from the Great Recession. *Journal of Political Economy* 127 (5): 2505-2558.

Figure 1

Asymmetric Cost Behavior and *ex ante* Profits

Based on Balakrishnan, Petersen, and Soderstrom (2004) and Weiss (2010), this figure describes how cost asymmetry affects a firm's *ex ante* profits depending on its activity level (or sales). I assume high-capacity utilization for activity level Y_0. Compared with 'sticky' costs, costs are 'anti-sticky' if a firm's costs do not rise when sales increase by as much as they fall when sales decrease (e.g., Weiss, 2010). Figure 1.a) depicts the cost function of a firm with sticky costs and Figure 1. b) displays the profit function.

1.a) Cost Function



1.b) *Ex-ante* Profit Function

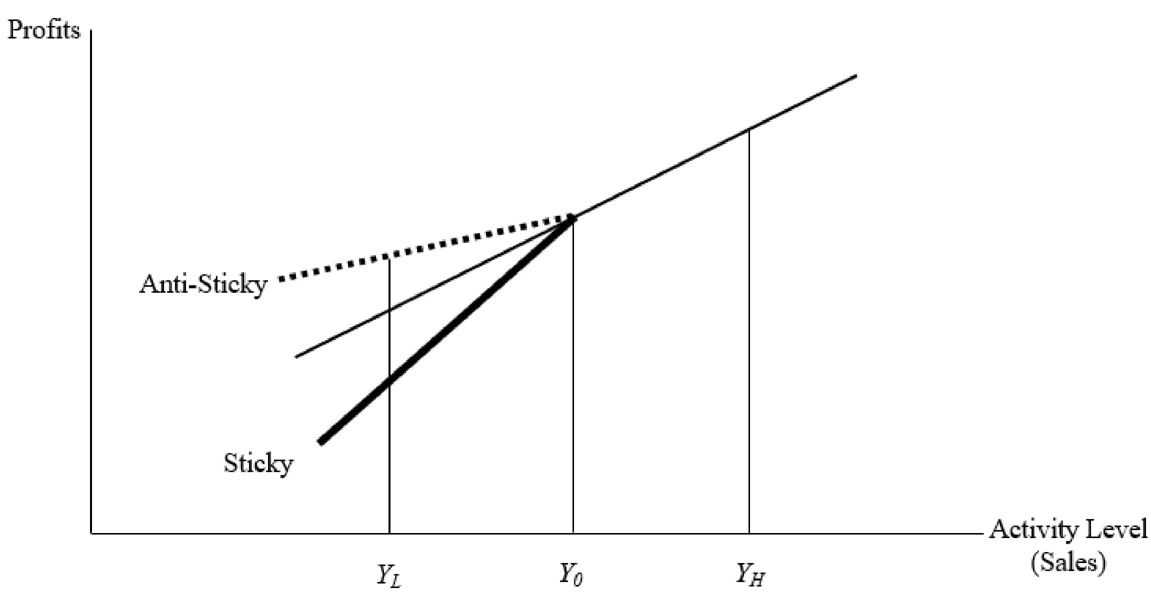
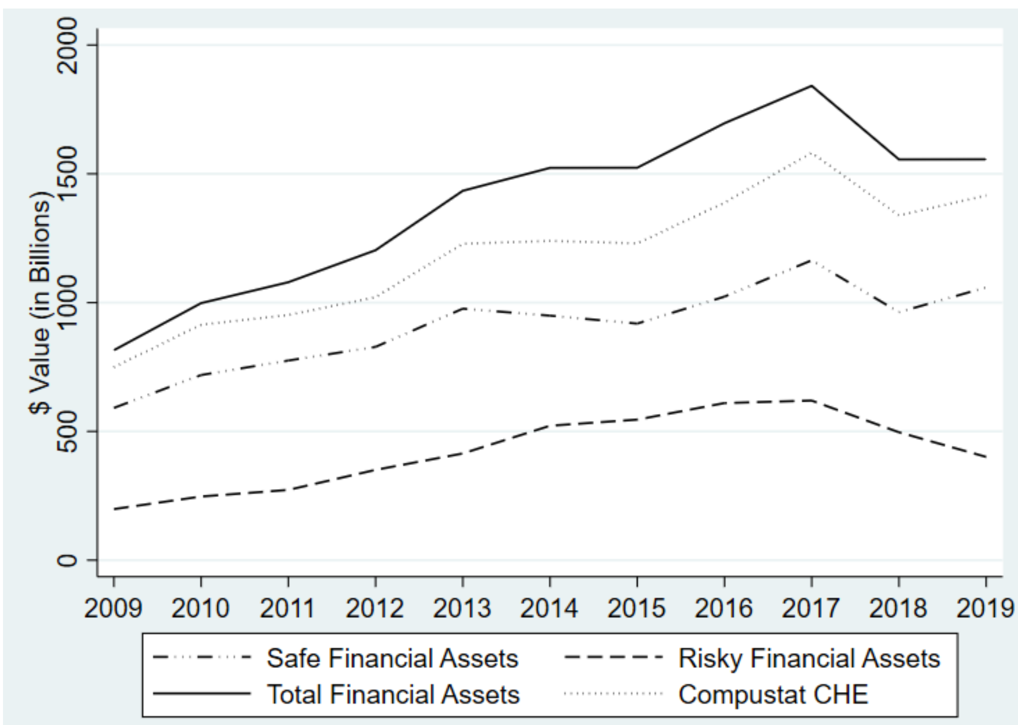


Figure 2

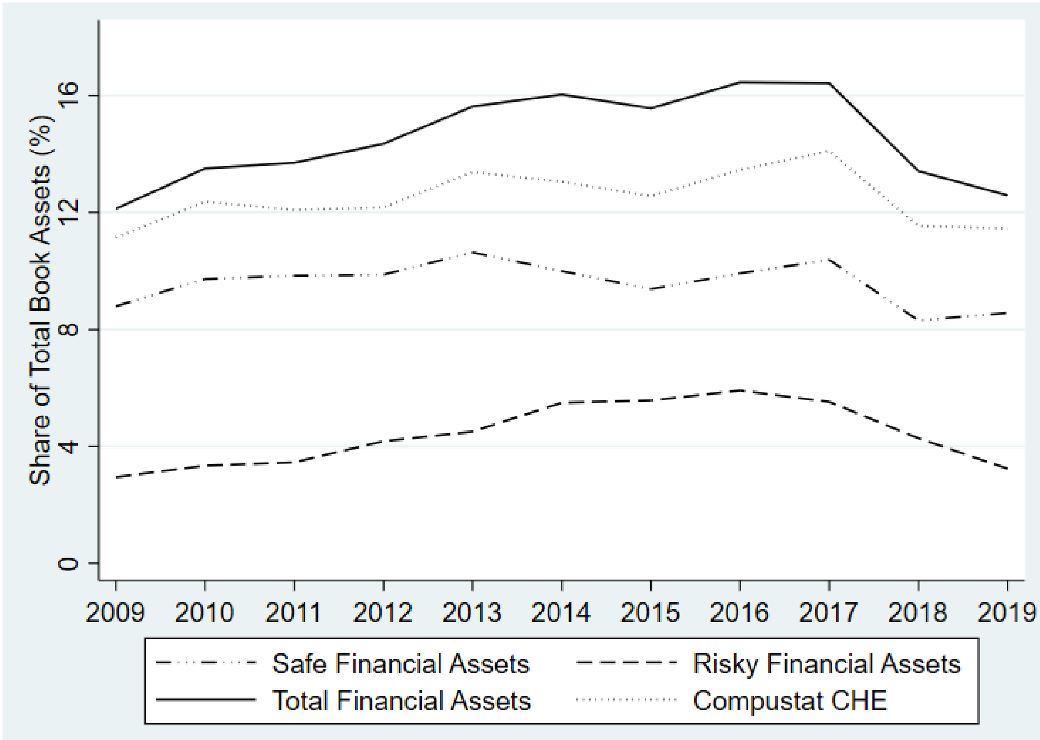
Composition of a Non-Financial Firm's Financial Portfolio

This figure presents the composition of a nonfinancial firm's financial assets during the sample period. The sample covers 4,347 firm-year observations from 2009 to 2019. Following Duchin et al. (2017), risky (safe) financial assets are non-money-like (money-like) securities. Total financial assets include both safe and risky financial assets. Compustat CHE shows a firm's cash and short-term investments in year *t*. Figure 2.a) plots the aggregate value of each financial asset class. Figure 2.b) shows the weighted average fair value of each financial asset class relative to book assets for each year. Figure 2.c) shows the aggregate value of each type of financial assets. 'Cash-like' is defined as the sum of cash, money market funds, deposits, commercial paper, and other securities that are classified as cash and cash equivalents. 'Non-U.S. Treasuries Gov. Debt' covers government-issued debt securities that are not U.S. Treasuries. "Other" includes financial instruments that are not solely classified as cash and cash equivalents, U.S. Treasuries, government debt excluding U.S. Treasuries, corporate debt, or equity.

2.a) Aggregate Value by Year



2.b) Financial Assets Relative to Book Assets (%)



3.c) Aggregate Value of Each Type of Financial Assets by Year

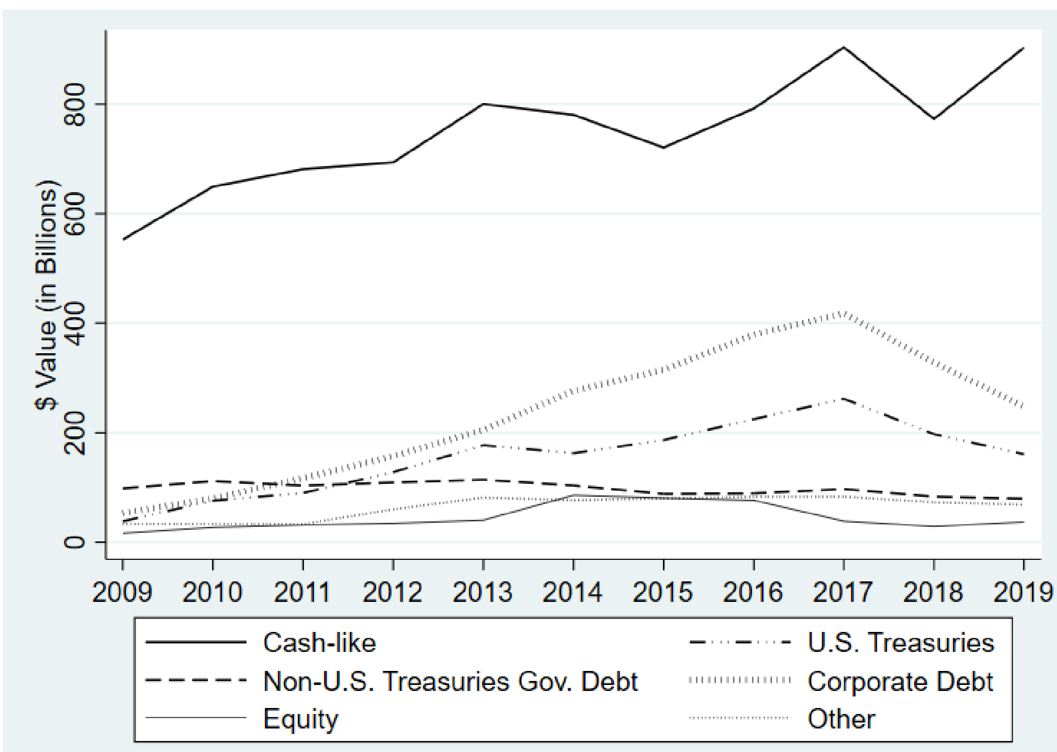
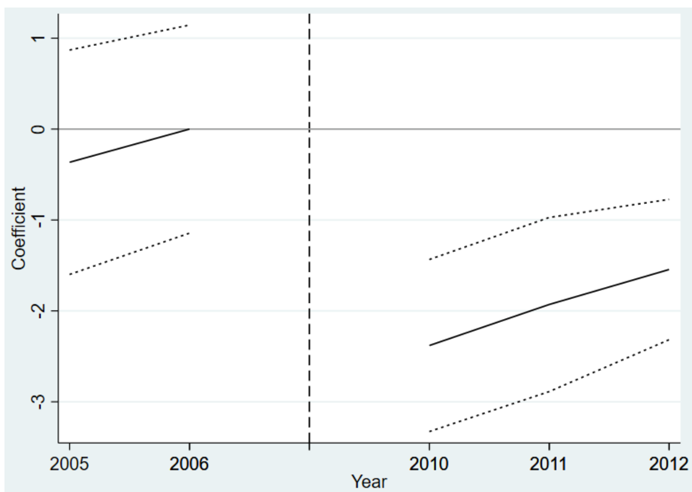


Figure 3

Parallel Trends Assumption

This figure shows whether the DID analysis based on the Great Recession satisfies the parallel trends assumption. I use Darmouni and Mota's (2020) dataset, which contains pre-2009 observations. The sample period starts in 2005 and ends in 2013. I drop the years 2007, 2008, and 2009 from my sample. I create indicator variables corresponding to each year (2005, 2006, 2010, 2011, and 2012) and interact the dummies with *Treat*. *Treat* is an indicator equal to one if the value of a firm's *CostStickiness* is greater than the median value of *CostStickiness* for the 2006 sample firms and zero otherwise. A solid line plots the coefficient of *Treat*2005*, *Treat*2006*, *Treat*2010, Treat*2011,* and *Treat*2012*, which shows the difference in *CostStickiness* and *Risky FA / Total FA* between the two groups each year. Two dotted lines plot the 95% confidence interval for each coefficient. The coefficient estimate in 2006 is normalized to zero. The dependent variables are a firm's *CostStickiness* and *Risky FA / Total FA.* Entropy balancing minimizes the difference in observable firm-level controls between the two groups (Panel B, Table 6). I include firm and year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered at the firm level.

3.a) Cost Stickiness



3.b) Risky Financial Investments

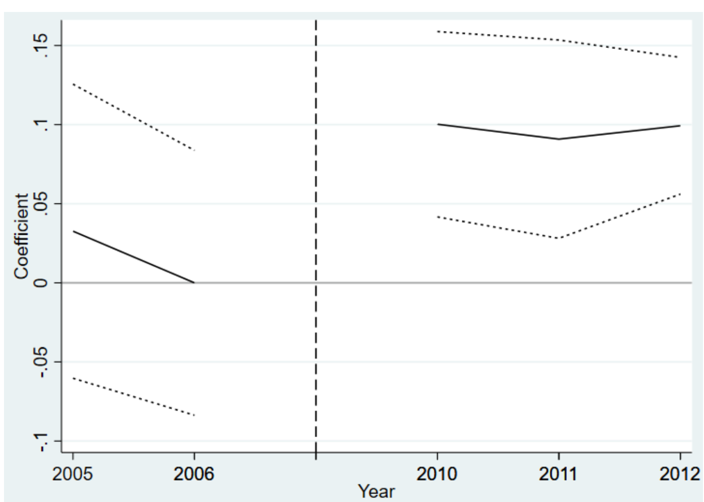


Figure 4

Synthetic Control Method

This figure shows the effect of asymmetric cost behavior on a non-financial firm's risky financial investments based on the synthetic control method. I use Darmouni and Mota (2020)'s dataset, which contains pre-2009 observations. The sample period starts in 2005 and ends in 2013. I limit the analysis to firms in Darmouni and Mota (2020)'s sample for 2006, one year before the Great Recession. A firm-year observation is treated if its *CostStickiness* value is greater than the median *CostStickiness* value for the 2006 sample firms. The post-treatment period starts in 2010 because the Great Recession officially ended in 2009. I use the pre-treatment average of the firm-level controls used in Table 2 and the pre-treatment fair value of risky financial assets scaled by total financial assets in 2005, 2006, 2007, 2008, and 2009 as the predictor variables. The dependent variable is the fair value of risky financial assets scaled by total financial assets for a firm in year *t*. The SYNTH_RUNNER package is used to accommodate multiple treated firms (Galiani and Quistorff, 2017). Appendix A presents the definitions of the variables.

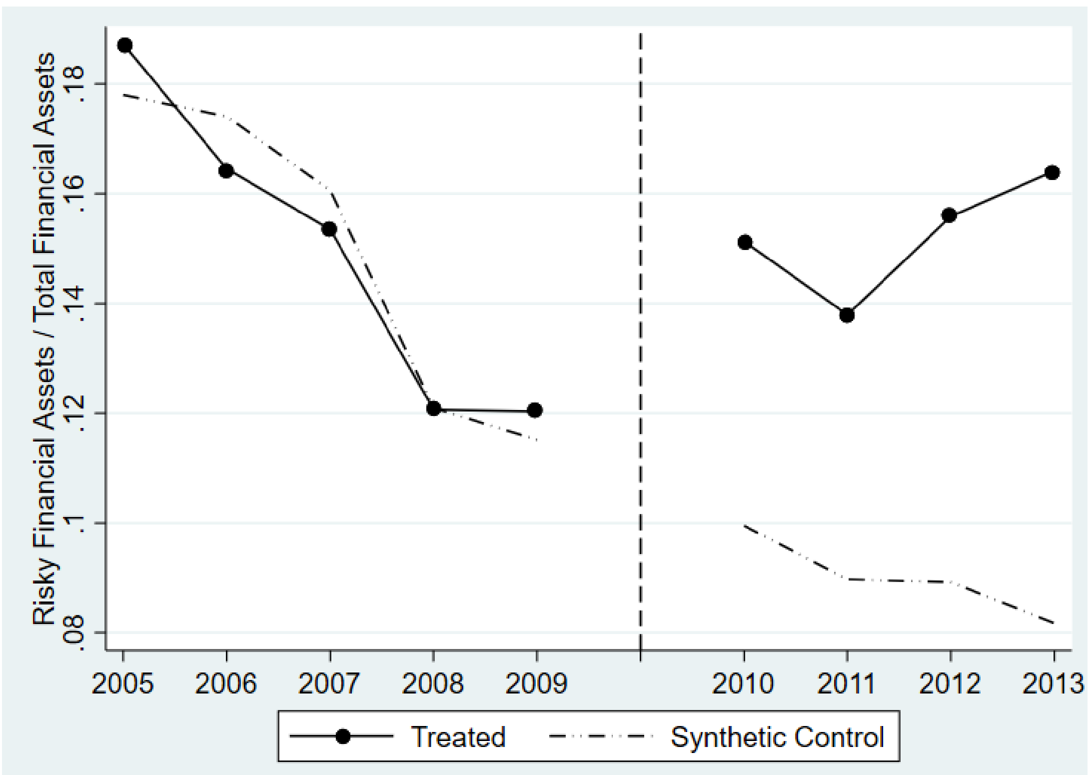


Table 1

Summary Statistics

This table presents descriptive statistics of the variables in the baseline regression. The sample covers 4,347 firm-year observations from 2009 to 2019. Following Duchin et al. (2017), I focus on S&P 500 non-financial firms, require non-missing assets and sales, and exclude financials (SIC 60-69) and utilities (SIC 49). All firm-level continuous variables are winsorized at the 1st and 99th percentiles. Appendix A provides variable definitions.

Variable	N	Mean	Median	STD	P25	P75
CostStickiness $_{t-1}$	4,347	-0.0047	-0.0040	1.7554	-0.5598	0.6402
Risky FA / Total FA $_{t}$	4,347	0.1018	0.0000	0.1917	0.0000	0.0993
Market-to-Book $_{t-1}$	4,347	2.4006	1.9487	1.5270	1.4041	2.8334
Size $_{t-1}$	4,347	9.2460	9.1303	1.1717	8.4065	10.0173
CashFlow $_{t-1}$	4,347	0.1259	0.1172	0.0688	0.0834	0.1619
NWC $_{t-1}$	4,347	0.1788	0.1416	0.1884	0.0445	0.2769
Capex $_{t-1}$	4,347	0.0490	0.0337	0.0466	0.0193	0.0606
Debt $_{t-1}$	4,347	0.2957	0.2611	0.2056	0.1582	0.3915
Dividend_Pay $_{t-1}$	4,347	0.7161	1.0000	0.4509	0.0000	1.0000
Earn_Vol $_{t-1}$	4,347	0.0391	0.0262	0.0374	0.0165	0.0468
R&D_Exp $_{t-1}$	4,347	0.0306	0.0067	0.0496	0.0000	0.0407

Table 2

Asymmetric Cost Behavior and Non-Financial Firm's Risky Financial Assets

This table shows how asymmetric cost behavior affects a nonfinancial firm's risky financial asset holdings. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects, or industry-by-year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) *Risky FA / Total FA* $_t$	(2) *Risky FA / Total FA* $_t$
CostStickiness $_{t-1}$	-0.0049**	-0.0076**
	(-2.350)	(-2.472)
Market-to-Book $_{t-1}$	0.0128*	0.0156*
	(1.963)	(1.691)
Size $_{t-1}$	0.0323***	0.0340***
	(3.785)	(3.242)
CashFlow $_{t-1}$	-0.0132	-0.0188
	(-0.138)	(-0.143)
NWC $_{t-1}$	0.2012***	0.2113***
	(3.935)	(3.224)
Capex $_{t-1}$	0.1926	0.2219
	(0.979)	(0.819)
Debt $_{t-1}$	-0.1025***	-0.1081**
	(-2.891)	(-2.324)
Dividend_Pay $_{t-1}$	-0.0265*	-0.0290
	(-1.653)	(-1.402)
Earn_Vol $_{t-1}$	0.1400	0.1387
	(0.725)	(0.547)
R&D_Exp $_{t-1}$	0.5510**	0.5250*
	(2.235)	(1.719)
Industry FE	Yes	No
Year FE	Yes	No
Industry-by-Year FE	No	Yes
Observations	4,347	4,347
Adjusted R^2	0.2953	0.1062

Table 3

Validation Test: Alternative Measures of Asymmetric Cost Behavior

This table shows whether the effect of cost asymmetry on risky financial investments remains robust to using alternative measures of cost stickiness.

$$\Delta Ln\ (Costs) = \alpha_0 + \alpha_1 * \Delta Ln\ (Sales) + \alpha_2 * Decrease * \Delta Ln\ (Sales) + e$$

I use the above model to estimate a firm's cost stickiness in year *t* using the previous 16 quarterly observations. Columns (1) and (4) use SG&A, Columns (2) and (5) use operating costs (sales minus operating income after depreciation and amortization), and Columns (3) and (6) use total costs (COGS plus SG&A) to estimate a firm's asymmetric cost behavior (He et al., 2020; Kama and Weiss, 2013; Rouxelin et al., 2018). Columns (1), (2), and (3) define *CostStickness_Alt* as the negative value of α_2. Columns (4), (5), and (6) define *CostStickiness_Alt* as the negative of the sum of α_1 and α_2. A higher value of *CostStickiness_Alt* indicates that a firm's costs are stickier. The dependent variable is the fair value of risky financial assets scaled by the fair value of the total financial assets for each firm in year *t*. The firm-level independent variables are lagged by one year. I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. I use the control variables in Table 2. Appendix A presents the definitions of the variables.

	(1) *Risky FA / Total FA* $_t$	(2) *Risky FA / Total FA* $_t$	(3) *Risky FA / Total FA* $_t$	(4) *Risky FA / Total FA* $_t$	(5) *Risky FA / Total FA* $_t$	(6) *Risky FA / Total FA* $_t$
CostStickiness_Alt $_{t-1}$	-0.0049**	-0.0169***	-0.0100**	-0.0059*	-0.0181**	-0.0136**
	(-2.350)	(-2.969)	(-2.469)	(-1.782)	(-2.154)	(-2.327)
Costs	SG&A	Operating Costs	Total Costs	SG&A	Operating Costs	Total Costs
Stickiness Measure	-α_2	-α_2	-α_2	-$(\alpha_1 + \alpha_2)$	-$(\alpha_1 + \alpha_2)$	-$(\alpha_1 + \alpha_2)$
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,347	4,347	4,347	4,347	4,347	4,347
Adjusted R^2	0.2953	0.2986	0.2963	0.2948	0.2966	0.2963

Table 4

Validation Test: Alternative Measures of Financial Assets

This table shows how cost asymmetry affects alternative measures of a firm's financial assets. Panel A redefines risky financial assets by excluding U.S. agency debt securities and non-U.S. government-issued debt securities in each column, respectively. Panel B uses each type of a firm's financial assets (cash-like, U.S. Treasuries, non-U.S. Treasuries government debt, corporate debt, equity, and others) scaled by total financial assets as a dependent variable. 'Cash-like' is defined as the sum of cash, money market funds, deposits, commercial paper, and other securities that are classified as cash and cash equivalents. 'Non-U.S. Treasuries Gov. Debt' covers government-issued debt securities that are not U.S. Treasuries. "Other" includes financial instruments that are not solely classified as cash and cash equivalents, U.S. Treasuries, government debt excluding U.S. Treasuries, corporate debt, or equity. I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. I follow the controls in Table 2. The constant is not shown for brevity. Appendix A presents the variable definitions.

Panel A: Risky Financial Assets Excluding U.S. Agencies or Foreign Government Debt

	(1) Excluding U.S. Agencies	(2) Excluding Foreign Gov. Debt
Dependent Variable:	*Risky FA / Total FA* $_t$	*Risky FA / Total FA* $_t$
CostStickiness $_{t-1}$	-0.0045**	-0.0046**
	(-2.352)	(-2.318)
Controls	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	4,347	4,347
Adjusted R^2	0.2670	0.2982

Panel B: Each Type of Financial Assets

	(1) *Cash-like* $_t$	(2) *U.S. Treasuries* $_t$	(3) *Non-U.S. Treasuries Gov. Debt* $_t$	(4) *Corporate Debt* $_t$	(5) *Equity* $_t$	(6) *Other* $_t$
CostStickiness $_{t-1}$	0.0061**	-0.0012	-0.0014	-0.0019	-0.0008	-0.0005
	(2.083)	(-0.961)	(-1.409)	(-1.358)	(-1.473)	(-0.937)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,347	4,347	4,347	4,347	4,347	4,347
Adjusted R^2	0.3611	0.2152	0.2208	0.2850	0.1267	0.1420

Table 5

Addressing Potential Confounders

This table addresses the issue of potential confounders. In Panel A, I additionally control for the standard determinants of asymmetric cost behavior noted by the literature (e.g., Anderson et al., 2003). Panel B includes CEO characteristics (age, tenure, gender, delta, and vega). Panel C presents the importance of omitted variable bias, proxied by Oster (2019)'s δ, for the OLS specifications in Table 2. Oster's δ shows the ratio of the explanatory power of unobserved, omitted variables to the observed, necessary to nullify the effect of the variable of interest (*CostStickiness*). The negative value of Oster's δ suggests that the effect of the main independent variable increases as one adds more control variables (e.g., Bonaimé et al., 2020). Thus, omitted variables are unlikely to nullify the main inference. I compute Oster's δ assuming R_{max} is equal to 1.3 times the observed *R-Squared* for each OLS specification. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. In Panel A and B, I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. 'Controls' are the ones used in Table 2. Appendix A presents the variable definitions.

Panel A: Standard Determinants of Cost Asymmetry

	(1) *Risky FA / Total FA $_t$*	(2) *Risky FA / Total FA $_t$*	(3) *Risky FA / Total FA $_t$*	(4) *Risky FA / Total FA $_t$*
CostStickiness $_{t-1}$	-0.0045**	-0.0049**	-0.0056**	-0.0047**
	(-2.195)	(-2.350)	(-2.338)	(-2.028)
Asset_Int$_{t-1}$	0.0226**			0.0315***
	(2.451)			(2.737)
Emp_Int$_{t-1}$	-0.0127***			-0.0126***
	(-3.581)			(-3.295)
Successive_Dec$_{t-1}$		-0.0018		0.0024
		(-0.174)		(0.220)
Inst_Own$_{t-1}$			0.0324	0.0253
			(1.122)	(0.897)
Entrench_Index$_{t-1}$			-0.0113	-0.0102
			(-1.592)	(-1.463)
HHI$_{t-1}$			0.1166	0.1065
			(1.627)	(1.502)
CEO_Chair$_{t-1}$			-0.0197	-0.0175
			(-1.582)	(-1.411)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4,342	4,347	3,766	3,761
Adjusted R^2	0.3157	0.2951	0.3152	0.3383

Panel B: CEO Characteristics				
	(1) *Risky FA / Total FA $_t$*	(2) *Risky FA / Total FA $_t$*	(3) *Risky FA / Total FA $_t$*	(4) *Risky FA / Total FA $_t$*
CostStickiness $_{t-1}$	-0.0049**	-0.0051**	-0.0051**	-0.0052**
	(-2.369)	(-2.431)	(-2.320)	(-2.388)
Age_50s$_{t-1}$	-0.0255*			-0.0286*
	(-1.660)			(-1.783)
Age_60s$_{t-1}$	-0.0300*			-0.0362*
	(-1.657)			(-1.919)
Age_70orAbove$_{t-1}$	-0.0334			-0.0332
	(-1.541)			(-1.500)
Tenure_2to5$_{t-1}$	0.0029			0.0015
	(0.383)			(0.178)
Tenure_6to10$_{t-1}$	-0.0063			-0.0135
	(-0.600)			(-1.024)
Tenure_11orAbove$_{t-1}$	0.0133			0.0041
	(0.813)			(0.228)
Female_CEO$_{t-1}$		-0.0545**		-0.0592**
		(-2.182)		(-2.382)
CEO_Delta$_{t-1}$			0.0034	0.0043
			(0.570)	(0.659)
CEO_Vega$_{t-1}$			-0.0041	-0.0044
			(-1.340)	(-1.471)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4,347	4,347	4,113	4,113
Adjusted R^2	0.2969	0.2974	0.2838	0.2892

Panel C: Oster's δ		
	(1) *Risky FA / Total FA $_t$*	(2) *Risky FA / Total FA $_t$*
Coefficient	-0.0049	-0.0076
(R-Squared)	(0.3222)	(0.3939)
Oster's δ	-6.7300	-5.7061

Table 6

Difference-in-Differences: Great Recession

This table presents the results of the DID analysis based on the Great Recession. I use Darmouni and Mota (2020)'s dataset, which contains pre-2009 observations. The sample period starts in 2005 and ends in 2013. I drop the years 2007, 2008 and 2009 from my sample. After requiring a non-missing value for total financial assets and a positive value for book assets, I limit the analysis to firms in Darmouni and Mota (2020)'s sample for 2006, one year before the Great Recession (165 firms). *Treat* is an indicator equal to one if the value of a firm's *CostStickiness* is greater than the median value of *CostStickiness* for the 2006 sample firms and zero otherwise. *Post* is an indicator equal to one if a firm-year observation is in 2010 or beyond and zero otherwise. After assigning treatment, I further delete the observations with missing values for the dependent and the independent variables. The dependent variables are a firm's *CostStickiness* and the fair value of risky financial asset holdings, scaled by the fair value of total financial assets. Panel A reports the covariate balance (mean, variance, and skewness) between the treated and control group before reweighting and Panel B presents the balance after reweighting. Panel C shows the results of the weighted OLS regression for the entropy balanced sample. I include firm and year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered at the firm level (*t*-statistics in parentheses). Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. I omit the constant for brevity. Appendix A presents the variable definitions.

Panel A: Covariate Balance Before Reweighting

	Treated			Control		
	Mean	Var	Skew	Mean	Var	Skew
Market-to-Book $_{t-1}$	2.1810	2.6180	3.1800	2.2310	2.6150	3.0320
Size $_{t-1}$	9.9540	1.2670	-0.1868	10.1300	0.8523	-0.1305
CashFlow $_{t-1}$	0.1214	0.0058	0.5867	0.1154	0.0040	0.6546
NWC $_{t-1}$	0.1556	0.0362	1.8860	0.1432	0.0362	1.6370
Capex $_{t-1}$	0.0543	0.0039	3.5210	0.0580	0.0037	2.8830
Debt $_{t-1}$	0.2881	0.0584	2.0960	0.2817	0.0464	1.7030
Dividend_Pay $_{t-1}$	0.7126	0.2053	-0.9395	0.7722	0.1764	-1.2980
Earn_Vol $_{t-1}$	0.0402	0.0021	3.8080	0.0371	0.0015	2.7730
R&D_Exp $_{t-1}$	0.0309	0.0020	1.5670	0.0260	0.0016	1.6250

Panel B: Covariate Balance After Reweighting

	Treated			Control		
	Mean	Var	Skew	Mean	Var	Skew
Market-to-Book $_{t-1}$	2.1810	2.6180	3.1800	2.1810	2.6180	3.1800
Size $_{t-1}$	9.9540	1.2670	-0.1868	9.9540	1.2670	-0.1877
CashFlow $_{t-1}$	0.1214	0.0058	0.5867	0.1214	0.0058	0.5865
NWC $_{t-1}$	0.1556	0.0362	1.8860	0.1556	0.0362	1.8860
Capex $_{t-1}$	0.0543	0.0039	3.5210	0.0543	0.0039	3.5210
Debt $_{t-1}$	0.2881	0.0584	2.0960	0.2881	0.0584	2.0960
Dividend_Pay $_{t-1}$	0.7126	0.2053	-0.9395	0.7126	0.2053	-0.9395
Earn_Vol $_{t-1}$	0.0402	0.0021	3.8080	0.0402	0.0021	3.8070
R&D_Exp $_{t-1}$	0.0309	0.0020	1.5670	0.0309	0.0020	1.5670

Panel C: Results				
	(1)	(2)	(3)	(4)
	Without Entropy Balancing		With Entropy Balancing	
	CostStickiness $_t$	*Risky FA / Total FA* $_t$	*CostStickiness* $_t$	*Risky FA / Total FA* $_t$
*Treat*Post* $_t$	-1.4467***	0.0727*	-1.7088***	0.0825**
	(-3.612)	(1.919)	(-3.919)	(2.180)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	816	816	816	816
Adjusted R^2	0.2962	0.6580	0.3393	0.7340

Table 7

Synthetic Control Method: Great Recession

This table presents the results of the synthetic control method based on the Great Recession. I use Darmouni and Mota (2020)'s dataset, which contains pre-2009 observations. The sample period starts in 2005 and ends in 2013. I limit the analysis to firms in Darmouni and Mota (2020)'s sample for 2006, one year before the Great Recession. A firm-year observation is treated if its *CostStickiness* value is greater than the median *CostStickiness* value for the 2006 sample firms. The post-treatment period starts in 2010 because the Great Recession ended in 2009. I use the pre-treatment average of the firm-level controls used in Table 2 and the pre-treatment fair value of risky financial assets scaled by total financial assets in 2005, 2006, 2007, 2008, and 2009 as the predictor variables. *p-value* is the proportion of firms in the control group that have an estimated effect at least as large as that of the treated group and is interpreted in the same way as the conventional *p-value* in the multivariate analysis (Galiani and Quistorff, 2017). The dependent variable is the fair value of risky financial assets scaled by total financial assets for a firm in year *t*. Panel A shows the synthetic control estimates of the treatment effect in each year in the post-treatment period, and Panel B shows the balance of the pre-treatment *Risky FA / Total FA* among the treated group, the synthetic control, and the control group. A coefficient with *p-value* lower than 0.1, 0.05, and 0.01 is indicated by *, **, and ***, respectively. Appendix A presents the variable definitions.

Panel A: Synthetic Control Estimates

	Estimate	*p-value*
Treatment Effect in 2010	0.0518***	<0.0001
Treatment Effect in 2011	0.0482***	<0.0001
Treatment Effect in 2012	0.0667***	0.0018
Treatment Effect in 2013	0.0824***	<0.0001

Panel B: Balance of Pre-Treatment *Risky FA / Total FA*

	Treated Group	*Synthetic Control*	*Control Group (Mean)*
Risky FA / Total FA in 2009	0.1203	0.1152	0.1763
Risky FA / Total FA in 2008	0.1206	0.1209	0.1820
Risky FA / Total FA in 2007	0.1535	0.1606	0.2486
Risky FA / Total FA in 2006	0.1645	0.1741	0.2865
Risky FA / Total FA in 2005	0.1873	0.1800	0.2477

Table 8

Financial Constraints

This table presents how a non-financial firm's financial constraints affect the relation between asymmetric cost behavior and risky financial investments. I use the Size and Age (or SA) index (Hadlock and Pierce, 2010), the Whited and Wu (2006) (or WW) index, and lagged financial leverage (Myers, 1977) as proxies for firm-level financial constraints. A firm in year *t* is relatively financially constrained if it has an above-median value of the lagged SA index, the lagged WW index, or lagged financial leverage, respectively. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1)	(2)	(3)	(4)	(5)	(6)
	High SA	*Low SA*	*High WW*	*Low WW*	*High Debt $_{t-1}$*	*Low Debt $_{t-1}$*
Dependent Variable:	*Risky FA / Total FA $_t$*	*Risky FA / Total FA $_t$*	*Risky FA / Total FA $_t$*	*Risky FA / Total FA $_t$*	*Risky FA / Total FA $_t$*	*Risky FA / Total FA $_t$*
CostStickiness $_{t-1}$	-0.0068**	-0.0026	-0.0059*	-0.0030	-0.0048*	-0.0042
	(-2.419)	(-0.887)	(-1.965)	(-1.097)	(-1.924)	(-1.077)
	$\beta(1) = \beta(2)$ (*p-value*: 0.2734)		$\beta(3) = \beta(4)$ (*p-value*: 0.4332)		$\beta(5) = \beta(6)$ (*p-value*: 0.8862)	
Market-to-Book $_{t-1}$	0.0220***	-0.0103	0.0207***	-0.0016	0.0092	0.0120
	(2.955)	(-0.966)	(2.819)	(-0.176)	(1.373)	(1.373)
Size $_{t-1}$	0.0356***	0.0338**	0.0303**	0.0443***	0.0352***	0.0293***
	(3.435)	(2.472)	(2.149)	(3.280)	(3.429)	(2.633)
CashFlow $_{t-1}$	-0.0856	0.2327	-0.1350	0.1136	0.0402	-0.0649
	(-0.785)	(1.570)	(-1.266)	(0.854)	(0.393)	(-0.482)
NWC $_{t-1}$	0.1616***	0.2051*	0.1657***	0.2500***	0.2207***	0.2108***
	(2.915)	(1.856)	(2.883)	(3.402)	(3.439)	(2.820)
Capex $_{t-1}$	-0.1033	0.3244	0.0619	0.3304	0.1358	0.2959
	(-0.440)	(0.943)	(0.217)	(1.415)	(0.799)	(0.929)
Debt $_{t-1}$	-0.1106**	-0.0132	-0.0994**	-0.0961**		
	(-2.431)	(-0.262)	(-2.167)	(-2.140)		
Dividend_Pay $_{t-1}$	-0.0459**	0.0121	-0.0006	-0.0754*	-0.0298	-0.0137
	(-2.430)	(0.439)	(-0.030)	(-1.789)	(-1.637)	(-0.612)
Earn_Vol $_{t-1}$	0.0786	-0.0424	0.1561	0.0891	0.0693	0.2248
	(0.351)	(-0.107)	(0.649)	(0.362)	(0.391)	(0.685)
R&D_Exp $_{t-1}$	0.4219	0.6705	0.3621	1.1923***	0.1276	0.8056***
	(1.587)	(1.566)	(1.332)	(3.087)	(0.414)	(2.597)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,184	2,163	2,174	2,173	2,174	2,173
Adjusted R^2	0.3762	0.2790	0.3213	0.3337	0.2368	0.3250

Table 9

Cost Asymmetry, Risky Financial Assets, and 'Real' Investments

This table shows how the relation between asymmetric cost behavior and risky financial investments affects 'real' investments in the subsequent period. For the main independent variable, I interact the lagged *CostStickiness* with the lagged portion of risky financial assets in a firm's portfolio. The dependent variables are a firm's capital expenditure, R&D expense, and acquisition expense scaled by lagged book assets. *Real_Invest* is the sum of the three expenses. Columns (1) to (4) are based on industry and year fixed effects and Column (5) to (8) are based on firm and year fixed effects. I can include firm fixed effects because the interaction term (*CostStickiness* * *Risky FA / Total FA*) should exhibit more within-firm variation than *CostStickiness* and firm fixed effects are more granular than industry fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) *Capex* $_t$	(2) *R&D* $_t$	(3) *Acquisition* $_t$	(4) *Real_Invest* $_t$	(5) *Capex* $_t$	(6) *R&D* $_t$	(7) *Acquisition* $_t$	(8) *Real_Invest* $_t$
CostStickiness $_{t-1}$ * *Risky FA / Total FA* $_{t-1}$	-0.0010	-0.0005	-0.0037	-0.0044	-0.0038***	-0.0000	-0.0066	-0.0090**
	(-1.009)	(-0.596)	(-0.734)	(-1.032)	(-2.754)	(-0.034)	(-1.468)	(-2.029)
CostStickiness $_{t-1}$	0.0000	0.0001	-0.0014	-0.0013	0.0006*	0.0000	-0.0013	-0.0006
	(0.023)	(0.579)	(-1.607)	(-1.318)	(1.655)	(0.276)	(-1.131)	(-0.522)
Risky FA / Total FA $_{t-1}$	0.0030	0.0054***	-0.0186*	-0.0073	0.0085**	-0.0023	-0.0191	-0.0085
	(1.364)	(3.766)	(-1.871)	(-0.765)	(2.402)	(-0.857)	(-1.256)	(-0.566)
Market-to-Book $_{t-1}$	0.0009	-0.0000	-0.0003	0.0004	0.0031***	0.0006	0.0057**	0.0091***
	(1.618)	(-0.034)	(-0.173)	(0.236)	(4.318)	(1.221)	(2.047)	(3.313)
Size $_{t-1}$	-0.0009	-0.0012***	-0.0057***	-0.0084***	-0.0087***	-0.0070***	-0.0370***	-0.0521***
	(-1.577)	(-4.554)	(-3.216)	(-4.514)	(-4.890)	(-4.853)	(-5.608)	(-7.298)
CashFlow $_{t-1}$	0.0144	-0.0133**	0.0538	0.0557	0.0313**	-0.0214**	0.0070	0.0212
	(1.210)	(-2.033)	(1.547)	(1.594)	(2.213)	(-2.573)	(0.176)	(0.526)
NWC $_{t-1}$	-0.0056*	-0.0083***	0.0376**	0.0174	-0.0056	-0.0145***	0.1531***	0.1245***
	(-1.752)	(-3.526)	(2.224)	(1.086)	(-1.021)	(-3.582)	(4.693)	(3.977)
Capex $_{t-1}$	0.6987***	-0.0134	-0.1129**	0.5661***	0.3823***	0.0155*	0.0228	0.4166***
	(24.210)	(-1.518)	(-2.418)	(10.659)	(11.947)	(1.732)	(0.340)	(5.532)
Debt $_{t-1}$	-0.0144***	-0.0080***	-0.0058	-0.0274**	-0.0171***	-0.0079***	-0.0586***	-0.0798***
	(-5.851)	(-5.932)	(-0.511)	(-2.453)	(-4.598)	(-3.257)	(-3.255)	(-4.418)
Dividend_Pay $_{t-1}$	-0.0029*	0.0003	0.0081*	0.0052	0.0008	0.0005	0.0049	0.0057
	(-1.861)	(0.465)	(1.858)	(1.184)	(0.393)	(0.589)	(0.763)	(0.883)
Earn_Vol $_{t-1}$	0.0395**	0.0062	-0.0101	0.0260	-0.0413*	-0.0107	-0.1607*	-0.2017**
	(2.077)	(0.843)	(-0.195)	(0.492)	(-1.778)	(-0.606)	(-1.680)	(-2.044)
R&D_Exp $_{t-1}$	-0.0529***	0.9285***	-0.1325**	0.7310***	-0.1036***	0.4959***	-0.5687***	-0.0865
	(-4.796)	(79.979)	(-2.584)	(13.696)	(-3.145)	(9.254)	(-3.321)	(-0.509)
Industry FE	Yes	Yes	Yes	Yes	No	No	No	No
Firm FE	No	No	No	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,925	3,925	3,555	3,555	3,925	3,925	3,555	3,555
Adjusted R^2	0.7976	0.9609	0.0649	0.3068	0.8320	0.9722	0.1462	0.3720

Table 10

Cost Asymmetry, Risky Financial Investments, and Firm Risk

This table shows how the relation between asymmetric cost behavior and risky financial investments affects firm-level risk. For the main independent variable, I interact the lagged *CostStickiness* with the lagged portion of risky financial assets in a firm's portfolio. The dependent variable is a firm's risk measure in year *t*, proxied by total volatility and idiosyncratic volatility based on the market model and the Fama-French (1993) three-factor model, respectively (Ang et al., 2006). I include either industry and year or firm and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) $TVOL_t$	(2) $TVOL_t$	(3) $IVOL\_Mkt_t$	(4) $IVOL\_Mkt_t$	(5) $IVOL\_FF3_t$	(6) $IVOL\_FF3_t$
$CostStickiness_{t-1}$* $Risky\ FA / Total\ FA_{t-1}$	0.0008**	0.0006*	0.0009**	0.0007*	0.0009**	0.0007*
	(2.053)	(1.702)	(2.243)	(1.651)	(2.364)	(1.825)
$CostStickiness_{t-1}$	-0.0001	-0.0001	-0.0001	-0.0000	-0.0001	-0.0000
	(-1.036)	(-0.732)	(-1.178)	(-0.640)	(-1.151)	(-0.631)
$Risky\ FA / Total\ FA_{t-1}$	0.0001	-0.0016	0.0006	-0.0010	0.0006	-0.0008
	(0.167)	(-1.647)	(0.729)	(-1.065)	(0.747)	(-0.921)
$Market\text{-}to\text{-}Book_{t-1}$	-0.0005***	-0.0002	-0.0007***	-0.0006***	-0.0007***	-0.0005***
	(-3.100)	(-1.144)	(-4.125)	(-3.126)	(-4.331)	(-3.139)
$Size_{t-1}$	-0.0015***	-0.0016***	-0.0015***	-0.0019***	-0.0015***	-0.0017***
	(-8.240)	(-3.053)	(-8.802)	(-3.442)	(-8.834)	(-3.183)
$CashFlow_{t-1}$	-0.0194***	-0.0147***	-0.0166***	-0.0115***	-0.0157***	-0.0109***
	(-5.716)	(-4.573)	(-4.841)	(-3.683)	(-4.773)	(-3.676)
NWC_{t-1}	0.0014	-0.0029**	0.0017	-0.0020*	0.0018	-0.0019*
	(1.236)	(-2.501)	(1.531)	(-1.723)	(1.629)	(-1.703)
$Capex_{t-1}$	0.0085	-0.0017	0.0090	0.0018	0.0090	0.0026
	(1.272)	(-0.249)	(1.346)	(0.284)	(1.405)	(0.447)
$Debt_{t-1}$	0.0028***	0.0032***	0.0027***	0.0034***	0.0027***	0.0033***
	(3.121)	(3.553)	(3.096)	(3.933)	(3.171)	(3.866)
$Dividend\_Pay_{t-1}$	-0.0035***	-0.0004	-0.0034***	-0.0003	-0.0033***	-0.0003
	(-7.035)	(-0.617)	(-6.979)	(-0.526)	(-7.057)	(-0.497)
$Earn\_Vol_{t-1}$	0.0391***	0.0137*	0.0400***	0.0166**	0.0389***	0.0169**
	(5.923)	(1.798)	(6.543)	(2.292)	(6.585)	(2.429)
$R\&D\_Exp_{t-1}$	0.0069	0.0354***	0.0096	0.0421***	0.0091	0.0400***
	(1.057)	(3.592)	(1.443)	(3.683)	(1.407)	(3.564)
Industry FE	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,899	3,899	3,899	3,899	3,899	3,899
Adjusted R^2	0.5271	0.6883	0.5008	0.6773	0.4988	0.6797

Table 11

Cost Asymmetry, Risky Financial Investments, and Stock Returns

This table examines how financial investments held by firms with sticky costs affect their stock returns. I follow the test specification used by Faulkender and Wang (2006) and Duchin et al. (2017). The dependent variable is either a firm's raw stock return or the portfolio-adjusted return following Daniel et al. (1997) for a fiscal year. I include firm and year fixed effects following Duchin et al. (2017). I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the definitions of the variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Raw_Return_t	$DGTW\_Return_t$	Raw_Return_t	$DGTW\_Return_t$	Raw_Return_t	$DGTW\_Return_t$
$\Delta Financial\_Asset_t * CostStickiness_{t-1}$	0.0872*	0.0808**				
	(1.739)	(2.115)				
$\Delta Financial\_Asset_t$	1.3779***	0.8307***				
	(6.000)	(4.707)				
$\Delta Safe\_FA_t * CostStickiness_{t-1}$			0.1059**	0.1016***		
			(2.032)	(2.624)		
$\Delta Safe\_FA_t$			0.9254***	0.4775***		
			(4.499)	(2.867)		
$\Delta Risky\_FA_t * CostStickiness_{t-1}$					0.0487	-0.0070
					(0.132)	(-0.025)
$\Delta Risky\_FA_t$					0.2765	0.2369
					(0.787)	(0.988)
$CostStickiness_{t-1}$	-0.0036	0.0000	-0.0037	-0.0001	-0.0035	0.0002
	(-0.982)	(0.001)	(-1.000)	(-0.037)	(-0.981)	(0.067)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,118	3,118	3,118	3,118	3,118	3,118
Adjusted R^2	0.3682	0.2685	0.3610	0.2628	0.3504	0.2568

Appendix A

Variable Definitions

Variable	Definition
Dependent Variables	
Risky FA / Total FA	The fair value of risky financial asset holdings (*Risky FA*) scaled by the fair value of total financial assets.
Cash-like	The sum of cash, money market funds, deposits, commercial paper, and other securities that are classified as cash and cash equivalents, scaled by total financial assets.
U.S. Treasuries	The fair value of U.S. Treasuries scaled by total financial assets.
Non-U.S. Treasuries Gov. Debt	The fair value of government bonds excluding U.S. Treasuries scaled by total financial assets.
Corporate Debt	The fair value of corporate bonds scaled by total financial assets.
Equity	The fair value of equity holdings scaled by total financial assets.
Other	The fair value of financial instruments that are not solely classified as cash and cash equivalents, U.S. Treasuries, government debt excluding U.S. Treasuries, corporate debt, or equity, scaled by total financial assets.
Total FA	The natural log of one plus the fair value of total financial assets.
Acquisition	The amount of acquisition expense (AQC) scaled by lagged book assets (AT).
Real_Invest	The sum of capital expenditure (CAPX), R&D expense (XRD), and acquisition expense (AQC), scaled by lagged book assets (AT).
TVOL	The volatility of a firm's realized stock returns for a fiscal year, obtained from WRDS Beta Suite.
IVOL_Mkt	The volatility of a firm's realized stock returns unexplained by expected returns for a fiscal year, based on the market model and obtained from WRDS Beta Suite.
IVOL_FF3	The volatility of a firm's realized stock returns unexplained by expected returns for a fiscal year, based on the Fama-French (1993) three-factor model and obtained from WRDS Beta Suite.
Raw_Return	A firm's realized stock returns for a fiscal year.
DGTW_Return	A firm's realized stock returns adjusted for the matched portfolio returns following Daniel et al. (1997) for a fiscal year.
Independent Variables	
CostStickiness	For each firm-quarter, I use the most recent 16 quarters of data (year *t-3* to *t*) and estimate the following model: $\Delta Ln(SG\&A) = \beta_0 + \beta_1 * \Delta Ln(Sales) + \beta_2 * Decrease * \Delta Ln(Sales) + e$, where $\Delta Ln(SG\&A)$ is the quarterly change in the natural log of SG&A (XSGA), $\Delta Ln(Sales)$ is the quarterly change in the natural log of sales (SALE), and *Decrease* is an indicator set to one if $\Delta Ln(Sales)$ in a quarter is less than zero, and zero otherwise. *CostStickiness* is equal to the negative of β_2 in the above model. I set XSGA to zero if missing.

CostStickiness_Alt	Alternative measures of cost stickiness for a firm in year t. For costs, I use either operating costs (the difference between quarterly sales (SALESQ) and quarterly operating income after depreciation and amortization (OIADPQ)) or total costs (the sum of quarterly cost of goods sold (COGSQ) and quarterly SG&A (XSGAQ)). The cost stickiness is defined as the negative of β_2 in the above model or of the sum of β_1 and β_2.
Δ*Financial_Asset*	The annual change in the fair value of total financial assets.
Δ*Safe_FA*	The annual change in the fair value of safe financial assets.
Δ*Risky_FA*	The annual change in the fair value of risky financial assets.
Control Variables	
Market-to-Book	Market value of assets scaled by lagged book assets (AT).
Size	The natural log of book assets (AT).
CashFlow	Earnings before interest, taxes, depreciation, and amortization (EBITDA) minus income taxes (TXT) minus interest expense (XINT), scaled by lagged book assets (AT).
NWC	Current assets (ACT) minus current liabilities (LCT) scaled by lagged book assets (AT).
Capex	Capital expenditures (CAPX) scaled by lagged book assets (AT).
Debt	The sum of long-term debt (DLTT) and debt in current liabilities (DLC) scaled by lagged book assets (AT).
Dividend_Pay	An indicator equal to one if a firm in year *t* has a positive value of cash dividends (DV), and zero otherwise.
Earn_Vol	The standard deviation of earnings in the last ten years for a firm in year *t*. Earnings are defined as operating income before depreciation and amortization (OIBDP) minus interest payments (XINT) minus income taxes (TXT) minus common stock dividends (DVC) scaled by book assets (AT).
R&D_Exp	R&D expenditures (XRD) scaled by lagged book assets (AT). I set XRD to zero if missing.
Asset_Int	A firm's book assets (AT) scaled by sales (SALE).
Emp_Int	The number of employees (EMP) multiplied by 1,000, then scaled by sale (SALE).
Successive_Dec$_{t-1}$	A dummy variable equal to one if a firm in year *t* experienced sales decrease in both year *t-1* and *t-2*, and zero otherwise.
Inst_Own	Institutional ownership of a firm in year *t*, obtained from Thomson Reuters 13F data.
Entrench_Index$_{t-1}$	The E-Index for a firm in year *t*, following Bebchuk et al. (2009).
HHI	The Herfindahl-Hirschman index defined at the three-digit SIC level.
CEO_Chair	A dummy variable equal to one if a firm in year *t* has its CEO simultaneously serving as the chairman of the board, and zero otherwise.
CEO_Age	A CEO's age for a firm in year *t*.
CEO_Tenure	The number of years a CEO has served in the position for a firm in year *t*.
Female_CEO	A dummy variable equal to one if a firm in year *t* has a female CEO and zero otherwise.

CEO_Delta	A CEO's delta for a firm in year *t*.
CEO_Vega	A CEO's vega for a firm in year *t*.
Conditioning Variables	
SA	The Size and Age index following Hadlock and Pierce (2010). I compute the index as follows: -0.737 times the natural log of inflation-adjusted (at 2004 price level) book assets (AT) plus 0.043 times the squared value of the log of inflation-adjusted book assets minus 0.04 times firm age. Firm age is the number of years since the firm's first appearance in Compustat. The inflation-adjusted book asset is capped at 4,500 and the firm age is capped at 37.
WW	Whited and Wu (2006) (or WW) financial constraint index. I compute WW index as follows: -0.091 times ((IB+DP)/AT) minus 0.062 times indicator for positive dividends plus 0.021 times Compustat DLTT/AT minus 0.044 times the natural log of assets (Compustat AT) plus 0.102 times industry sales growth minus 0.035 times firm sales growth. The indicator for positive dividends equals one when Compustat DVC plus DVP is strictly greater than zero. Firm sales growth is the relative change in Compustat SALE. Industry sales growth is the mean of the firm sales growth for the three-digit SIC industry to which the firm belongs.

Appendix B

Apple's 2019 10-K Footnote: Fair Value of Financial Instruments

This table shows the footnote in Apple's 2019 10-K disclosure of the firm's fair value of cash, cash equivalents, and marketable securities. In this example, safe securities are cash, cash equivalents, money market funds, U.S. Treasuries, certificates of deposit and time deposits, and commercial paper, and risky securities are U.S. agency securities, non-U.S. government securities, corporate debt securities, municipal securities, and mortgage- and asset-backed securities. I compute the fair value of safe and risky financial assets and repeat the same process for every sample firm from 2009 to 2019.

	2019						
	Adjusted Cost	Unrealized Gains	Unrealized Losses	Fair Value	Cash and Cash Equivalents	Short-Term Marketable Securities	Long-Term Marketable Securities
Cash	$ 12,204	$ —	$ —	$ 12,204	$ 12,204	$ —	$ —
Level 1 (1):							
Money market funds	15,897	—	—	15,897	15,897	—	—
Subtotal	15,897	—	—	15,897	15,897	—	—
Level 2 (2):							
U.S. Treasury securities	30,293	33	(62)	30,264	6,165	9,817	14,282
U.S. agency securities	9,767	1	(3)	9,765	6,489	2,249	1,027
Non-U.S. government securities	19,821	337	(50)	20,108	749	3,168	16,191
Certificates of deposit and time deposits	4,041	—	—	4,041	2,024	1,922	95
Commercial paper	12,433	—	—	12,433	5,193	7,240	—
Corporate debt securities	85,383	756	(92)	86,047	123	26,127	59,797
Municipal securities	958	8	(1)	965	—	68	897
Mortgage- and asset-backed securities	14,180	67	(73)	14,174	—	1,122	13,052
Subtotal	176,876	1,202	(281)	177,797	20,743	51,713	105,341
Total (3)	$ 204,977	$ 1,202	$ (281)	$ 205,898	$ 48,844	$ 51,713	$ 105,341

Asymmetric Cost Behavior and Non-Financial Firms' Risky Financial Investments

Online Appendix

JiHoon Hwang

University of Arizona

2023/08/29

OA.I. Comparison with Duchin, Gilbert, Harford, and Hrdlicka (2017)'s Sample

From 2009 to 2012, the fair value of risky financial assets in my dataset is lower than that of Duchin et al. (2017) for three reasons. First, there are some cases in which a firm does not provide a decomposition of the fair value of 'U.S. Treasuries (safe) and Agencies (risky).' For example, Costco Wholesale Corporation's 10-K in 2011 states that the firm's 'investment in U.S. government and agency securities' amounts to $1,177 million without showing the amount of U.S. Treasuries and agencies separately. Cardella, Fairhurst, and Klasa (2021) also point out this issue in their internet appendix.[1] If I do not find any information to determine the amount of U.S. Treasuries and agency debt obligations separately in a 10-K, then I omit the amount from both safe and risky financial assets. Thus, in my sample, total financial assets are not necessarily the sum of safe and risky financial assets.[2] Omitting agency debt obligations tied to U.S. Treasuries may understate risky financial assets relative to the values in Duchin et al. (2017). Second, note that I further require a non-missing, lagged *CostStickiness* for a firm-year observation to be included in the sample. Without such a condition, the sample size increases from 4,347 to 4,558 (or by 211). The equal-weighted average *Risky FA / Total FA* for these 211 observations is 13.77%, which is higher than the full-sample average of 10.18%. Thus, requiring a non-missing, lagged *CostStickiness* may understate the amount of risky financial assets. Third, I winsorize my full sample at the 1st and the 99th percentiles since I focus on the average effect of cost stickiness on risky financial investments, whereas Duchin et al. (2017) mention nothing about winsorization or

[1] Cardella et al. (2021) state, "we found that many firms classify both debt issued by the U.S. government and agency securities, such as those issued by the Government National Mortgage Association (Ginnie Mae) or the Student Loan Marketing Association (Sallie Mae), as U.S. government debt, aggregating them on the balance sheet." Darmouni and Mota (2020) also follow the methodology of Duchin et al. (2017), but do not decompose "U.S. government holdings" into Treasuries and agency debt.
[2] In aggregate terms, for my full sample, the sum of safe and risky financial assets is equivalent to 96.2% of total financial assets.

truncation to address outliers. In my sample, the 1st percentile value of *Risky FA / Total FA* is just zero, and the 99th percentile value of *Risky FA / Total FA* is 78.94%. Winsorizing *Risky FA / Total FA* should lower the average risky financial investments in my sample compared with Duchin et al. (2017).

OA.II. Excluding Firms with Seasonal Quarterly Sales from the Sample

One issue with using quarterly data is that firm-level variables may show seasonal patterns. Such seasonality may affect the estimation of *CostStickiness* measure. To show that the baseline result is not necessarily affected by seasonality, I exclude firms with seasonal quarterly sales from the sample and re-run the analysis. To identify seasonal firms, I follow the methodology of Fairhurst (2020). Specifically, with quarterly sales data starting from 2000, I regress quarterly sales scaled by the annual average book assets for year *t* on the four indicator variables corresponding to each quarter:

$$\frac{Sales_t}{Assets_t} = \beta_1 Q_1 + \beta_2 Q_2 + \beta_3 Q_3 + \beta_4 Q_4 + \epsilon_t. \quad (1)$$

A firm is considered seasonal in my sample if the following test is rejected at the 5% level:

$$\beta_1 = \beta_2 = \beta_3 = \beta_4. \quad (2)$$

In Table OA1, I show that the inverse relation between asymmetric cost behavior and risky financial investments is robust to excluding firms with seasonal quarterly sales from the sample. Thus, seasonality is unlikely to confound the baseline result.

OA.III. Defining an Industry at the Two-Digit SIC or the Fama-French 48 Level

In Table OA2, I show that the baseline result (Table 2 in the main manuscript) is robust to defining an industry at the two-digit SIC (SIC2) or the Fama-French 48 (FF48) level. I include both industry and year and industry-by-year fixed effects.

OA.IV. Tobit Regression

Since the main dependent variable (*Risky FA / Total FA*) is censored at zero and one, it is important to test whether the result in Table 2 based on the OLS model is robust to using a Tobit model. Table OA3 based on the Tobit model confirms the inverse relation between cost stickiness and risky financial investments.

OA.V. High vs. Low Selling, General, and Administrative Costs (SG&A) Subsample

If the stickiness associated with SG&A reduces risky financial investments, then it is obvious that the relation should be more pronounced for firms with a higher portion of SG&A relative to their scale. To check whether such conjecture is true, in Table OA4, I divide the full sample into two groups (*High* vs. *Low SG&A*) based on the median value of SG&A over total assets and re-estimate the baseline specification for each subsample. The coefficient of lagged *CostStickiness* is negative and significant only for *High SG&A* firms. This result implies that firms with higher SG&A relative to their size are more mindful of how sticky costs may deteriorate their operating performance in the future when sales decrease. Thus, sticky costs induce *High SG&A* firms to reduce risky financial assets in their portfolio as a precaution. The difference in the coefficient of lagged *CostStickiness* is significant between the two subsamples (*p-value*: 0.0576).

OA.VI. Limiting the Sample to Observations with a Positive α_1 in Equation (1)

In Equation (1) of the main manuscript, α_1 shows the degree of an association between change in sales and costs when sales increase, and α_2 displays how the association changes when sales decrease. Normally, α_1 is positive since sales and costs generally move in the same direction. However, there may be some cases where α_1 is negative, for example, when a firm's cost efficiency improves. A negative α_1 may make the interpretation of *CostStickiness* somewhat unintuitive. Thus, in Table OA5, I limit my sample to the observations with a positive α_1 and confirm that, in all columns, the inference in Table 3 remains robust. The alternative cost stickiness measure, *CostStickiness_Alt*, shows a negative and significant relation with *Risky FA / Total FA*. Interestingly, the coefficients are all larger than the ones in Table 3. For instance, in Column (1), the coefficient increases from -0.0049 to -0.0091. In terms of economic magnitude, Column (1) of Table OA5 shows that a one-standard-deviation increase in *CostStickiness_Alt* reduces *Risky FA / Total FA* by 13% relative to the sample mean.[3] Note that in Column (1) of Table 3, a one-standard-deviation increase in *CostStickiness_Alt* reduces *Risky FA / Total FA* by 8.4% relative to the sample mean. So, limiting the sample to the observations with a positive α_1 does not only clarify the interpretation of *CostStickiness*, but also help isolate the firms which respond more sensitively to cost stickiness by limiting their risky financial investments.

OA.VII. Alternative Scaling and Illiquid Financial Assets

In Panel A of Table OA6, I use alternative scaling methods for risky financial investments. In Columns (1), (2), and (3), I scale the fair value of risky financial investments by lagged book assets, lagged sales, and lagged market value of assets, respectively. In Column (4), I use the natural log of one plus the fair value of risky financial investments for each firm in year *t*. The coefficient of *CostStickiness* is negative and significant in all the columns. Column (4) implies that

[3] Note that I use the mean and the standard deviation of the sample limited to the ones with a positive α_1.

the baseline findings are not driven by the variation in total financial assets but by the decrease in the fair value of risky securities.

In Panel B of Table OA6, I decompose the main dependent variable, *Risky FA / Total FA*, and see which component drives the baseline result. Total financial assets are divided into six types: cash-like securities, U.S. Treasuries, government bonds excluding U.S. Treasuries, corporate bonds, equity, and other securities. From Column (1) to (6), to minimize a concern that the findings may be driven by the variation in a denominator, I regress the natural log of one plus the fair value of each category on *CostStickiness*, while holding the size of total financial assets and firm size constant along with other controls used in Table 2. In Column (7), I regress the natural log of one plus *Total FA* on *CostStickiness* to see how total financial assets change with sticky costs.

For a given level of total financial assets and firm size, in Column (1), I find that firms with sticky costs accumulate cash-like securities. This result is consistent with the precautionary savings motive that firms accumulate cash in anticipation of future liquidity needs. From Column (2) to (6), I document the significant decrease in non-U.S. Treasuries government debt, equity, and other securities in response to cost stickiness. Corporate debt and U.S. Treasuries do not show a significant relation. Overall, firms with sticky costs seem to invest more in cash-like securities, but less in some risky securities, and the variation in safe and risky financial assets seems to offset each other. In Column (7), the relation between cost stickiness and total financial assets is insignificant. Panel B seems to highlight the importance of more detailed information on a firm's financial portfolio. Prior works often use total cash holdings (proxied by Compustat CHE) to examine the precautionary savings motive. However, Panel B shows that risky financial assets do not meet such needs, and firms invest more in cash-like securities for the liquidity buffer necessary to cope with the downward effect of sticky costs on profits when sales decline.

Panel C of Table OA6 re-examines the claim in Panel B, Table 4 with the size of total financial assets (the log of one plus the fair value of total financial assets) additionally held constant. Column (1) shows the significant increase in cash-like securities in response to sticky costs, while other columns show insignificant estimates. Thus, holding the size of total financial assets constant does not nullify the findings in Panel B, Table 4.

In Panel D of Table OA6, instead of risky securities, the fair value of illiquid securities is used as the dependent variable. Based on the Statement of Financial Accounting Standards (SFAS) No. 157, liquid financial assets are Level One securities with quoted prices in an active market. Illiquid financial assets are the sum of Level Two securities that require observable information to estimate value, and Level Three securities that require unobservable inputs to estimate price. The coefficient of lagged *CostStickiness* is negative and significant in all columns except for Column (2). Firms with sticky costs avoid illiquid securities because they need cash-like securities to pay sticky expenses if sales decline in the future.

OA.VIII. Controlling for Sales Growth

In addition to resource adjustment costs, managerial expectation for future sales, and agency problems, Banker and Byzalov (2014) further note that slack resources carried over from the prior period can also affect cost stickiness. For instance, if revenue increased in the prior year, the amount of resources required to keep up with the increased demand also goes up, implying that the slack resources in the current year should be close to zero. The literature uses sales growth to capture the slack resources carried over from the previous period (e.g., Banker and Byzalov, 2014). I additionally control for the one-year and two-year lagged sales growth and find that the baseline result remains robust (Table OA7).

OA.IX. Explaining Oster (2019)'s Delta in My Setting

To explain how Oster (2019)'s delta fits into my framework, I need to extend Equation (2) in the main manuscript to hypothetically include 'unobserved controls' as follows:

$$Risky\ FA\ /\ Total\ FA_{it} = \beta * CostStickiness_{it-1} + W_1 + W_2 + \varepsilon_{it}, \quad (3)$$

where *i* and *t* denote firm and year, respectively.[4] W_1 is the effect of the observed controls on *Risky FA / Total FA* (coefficients times variables), W_2 is the effect of the unobserved controls on *Risky FA / Total FA*. β is the true effect of cost stickiness on risky financial investments.

Based on Equation (3), I set three regression models: (1) the 'short regression' of *Risky FA / Total FA* on *CostStickiness* (coefficient: β_{short}; *R*-squared: R^2_{short}), (2) the 'intermediate regression' of *Risky FA / Total FA* on *CostStickiness* and the observed controls (coefficient: β_{med}; *R*-squared: R^2_{med}), and (3) the hypothetical 'full regression' of *Risky FA / Total FA* on *CostStickiness,* the observed controls, and W_2 (coefficient: β_{full}; *R*-squared: R^2_{full}). β_{short}, β_{med}, and β_{full} estimate the effect of *CostStickiness* on *Risky FA / Total FA* in each model. Note that R^2_{full} is the same as R_{max} in the main manuscript.

Oster (2019) further defines the proportional selection relationship, which can be described as $\delta * [Cov(W_1, CostStickiness_{it-1})/Var(W_1)] = [Cov(W_2, CostStickiness_{it-1})/Var(W_2)]$, where δ is the coefficient of proportionality, $Cov(W_1, CostStickiness_{it-1})/Var(W_1)$ is the covariance of lagged cost stickiness and the effect of observed controls, scaled by the variance of the effect of observed controls, and $Cov(W_2, CostStickiness_{it-1})/Var(W_2)$ is the covariance of lagged cost stickiness and the effect of omitted variables, scaled by the variance of the effect of

[4] Note that I borrow heavily from Section 3.1 and 3.2 of Oster (2019) for the exposition of this section.

unobservables. Although one cannot directly measure $[Cov(W_2, CostStickiness_{it-1})/Var(W_2)]$, one can infer the importance of omitted variables by estimating δ (Oster's delta).

Under certain assumptions, Oster (2019) defines β^* that approaches the true β asymptotically and shows that β^* can be approximated as follows:

$$\beta^* \approx \beta_{med} - \delta\,[\beta_{short} - \beta_{med}]\frac{R^2_{full} - R^2_{med}}{R^2_{med} - R^2_{short}}. \tag{4}$$

Note that in Equation (4), both δ and R^2_{full} (or R_{max} in the main manuscript) are not observable. Thus, one needs to set either δ or R^2_{full} fixed at a certain point and compute the other value. β_{med}, β_{short}, R^2_{med}, and R^2_{short} can be estimated in-sample. Following Oster (2019), in my setting, I set R^2_{full} to be 1.3 times the *R*-squared of the regression model for Column (1), Table 2 and compute the value of δ that makes the right-hand side of Equation (4) (or the approximated true effect of cost stickiness on risky financial investments) zero (δ = -6.7300). Equation (4) is a relatively simple formulation based on restrictive assumptions. Thus, Oster (2019) cautions that one should not directly use Equation (4) as an estimator, but also notes that the formula is useful for intuition.

Then, the remaining questions are (1) how readers should interpret δ and (2) why Oster (2019) suggests δ = 1 as a cutoff for whether omitted variable bias is significant or not. In computing δ for a given R^2_{full}, understanding 'selection on observables (and unobservables)' is crucial. In my context, 'selection on observables (unobservables)' means whether firms with stickier costs and less sticky costs differ in ways we can (cannot) observe. Selection on observables can be defined as $Cov(W_1, CostStickiness_{it-1})/Var(W_1)$, and selection on unobservables can be defined as $Cov(W_2, CostStickiness_{it-1})/Var(W_2)$, both of which are important to compute δ. Intuitively, for example, if δ = 2 makes β^* zero for a given R^2_{full}, it means that unobserved controls should be twice as important as observed controls to make the effect of cost stickiness on risky financial investments zero.

Oster (2019) suggests a cutoff of $\delta = 1$ (observables and unobservables are equally important), arguing that a researcher chooses the most important controls first when running a regression. Thus, the remaining omitted controls are not likely to be highly important (δ more than or equal to 1). Supporting this argument, Oster (2019) estimates wage returns to education in her simulation based on the National Longitudinal Surveys of Youth (NLSY) data and finds that, "the average δ is 0.545 and 86% of values fall within the [0, 1] range."

Before I explain how to interpret a negative δ, note that Oster (2019)'s methodology is an extension of the "coefficient stability" approach; that is, checking the sensitivity of the main coefficient to the inclusion of observed controls. Examining how including an observed control one at a time affects the main coefficient of interest enables a researcher to deduce the effect of including unobservables on the main effect. Also, note that the coefficient of *CostStickiness* on *Risky FA / Total FA* increases in magnitude as I introduce more controls. For instance, regressing *Risky FA / Total FA* on lagged *CostStickiness* with no controls produces $\hat{\beta}$ = -0.0022 (*p-value*: 0.351). Further including firm-level controls gives me $\hat{\beta}$ = -0.0031 (*p-value*: 0.098). Additionally controlling for industry and year fixed effects and industry-by-year fixed effects yields $\hat{\beta}$ = -0.0049 and -0.0076, respectively, significant at the 5% level. Thus, including controls implies that adding unobservables likely increases the main coefficient in magnitude.

However, the negative δ equal to -6.7300 (Column (1), Panel C, Table 5) implies that, for the baseline result to be nullified, (1) the correlations between observables and *CostStickiness,* and between unobservables and *CostStickiness* have opposing signs, and (2) unobservables should be about 6.7 times as important as observables in absolute degree, which is unlikely according to Oster (2019). Thus, when the inclusion of observed controls strengthens the main result, a negative δ is interpreted to suggest that omitted variables are unlikely to nullify the main effect (Graham, Miller, and Strøm, 2017). Other works claim that a negative δ itself shows that adding omitted controls strengthens the main effect in a model (e.g., Bonaimé, Kahle, Moore, and Nemani, 2020; Ivlevs, 2021). So, I conclude that the negative δ in Panel C, Table 5 is inconsistent with omitted variable bias nullifying the baseline result.

OA.X. Excluding the Years from 2007 to 2012 from the Difference-in-Differences Analysis

In the difference-in-differences (DID) analysis used for Table 6, excluding the recession years (2007-2009) should alleviate the concern that the post-recession (from 2010) *CostStickiness* may be driven by the pre-recession (2005-2006) observations because the 2010 *CostStickiness* value should be estimated based on the recent 16 quarters (2007-2010). However, it is a valid point that the *CostStickiness* value in 2010, 2011, and 2012 can be driven by the recession years (2007-2009). Thus, in Table OA8, I only use the observations in 2005, 2006, and 2013 for my DID analysis and check whether the result in Table 6 stays robust. Since the algorithm for entropy balancing fails to converge within specified tolerance when I attempt to match on mean, variance, and skewness, for Table OA8, I only match on mean and variance between the treated and the control group. Panel B, Table OA8 shows that the two groups show close values in mean and variance after reweighting. Panel C, Table OA8 corroborates that the treated group decreases their *CostStickiness* after the recession relative to the control group, which increases risky financial investments for the treated group as well. Thus, the decrease in the post-recession *CostStickiness* is not solely driven by the recession years (2007-2009). Also, the recession years affecting the 2010, 2011, and 2012 *CostStickiness* values does not seem to confound the DID analysis.

OA.XI. Explanation on the Synthetic Control Method (SCM)

In this section, I explain in more detail how I apply SCM. Note that this section is heavily based on Section 2 of Abadie, Diamond, and Hainmueller (2010). Here, I only assume there is only one treated unit (firm). Galiani and Quistorff (2017)'s 'synth_runner' package automates the single-treated-unit SCM process for multiple treated units. Suppose I have a total of *J+1* firms, with one treated firm (j = 1) and J control firms (j = 2, …., J+1). In my SCM analysis, the length of the total sample period is 9 years (2005-2013) with 5 years of pre-treatment period (2005-2009). So, let T = 9 and T_0 = 5 with t = 1, 2, 3, 4, T_0 (or 5), …, 9 (or T). In this section, I denote the main dependent variable, *Risky FA / Total FA*, as *RFA* for brevity. Let RFA_{jt}^{I} and RFA_{jt}^{N} be the risky financial investments (scaled by the total financial assets) that would be observed after a firm's exposure to the treatment and in the absence of the treatment, respectively, for a firm j in year t. So, only the treated firm shows RFA_{jt}^{I} in the post-recession period. Assume that there is no difference in RFA_{jt}^{I} and RFA_{jt}^{N} in the absence of the treatment.

The effect of the Great Recession on the treated is as follows:

$$\alpha_{1t} = RFA_{1t}^{I} - RFA_{1t}^{N}, \tag{5}$$

with t > T_0 (in the post-recession period). RFA_{jt}^{I} is observable for the treated, so I need to estimate RFA_{jt}^{N} (the counterfactual risky financial investments in the post-recession period) to compute the treatment effect. In a DID analysis, a researcher assumes the parallel trends between the treated and the control group to estimate the counterfactual outcome. Abadie et al. (2010) argue that SCM estimates the counterfactual outcome by minimizing the difference in pre-treatment characteristics (an outcome and other observables) between the treated and the 'synthetic' control obtained through a data-driven process.

To explain the data-driven process, let W be a (J x 1) vector, $(w_2, w_3, \ldots, w_{J+1})'$, with w_j greater than or equal to zero and the elements of W sum to one. Each W corresponds to a weighted average of the control firms; i.e., synthetic control. Also, let K be a (T_0 x 1) vector, $(k_1, k_2, \ldots, k_{T_0})'$, defining a linear combination of the pre-recession risky financial investments: $\overline{RFA}_j^K = \sum_{s=1}^{T_0} k_s RFA_{js}$. Assume that I have M such linear combinations: K_1, …, K_M. Then, define X_1 for the treated firm (j = 1): $X_1 = (Z_1', \overline{RFA}_1^{K_1}, \ldots, \overline{RFA}_1^{K_M})'$, which is a ((r + M) x 1) vector pre-recession covariates and risky financial investments, where Z_1 is a (r x 1) vector of pre-recession firm-level controls. In a similar vein, let X_0 be a ((r + M) x J) matrix corresponding to the control firms with its jth column equal to $(Z_j', \overline{RFA}_j^{K_1}, \ldots, \overline{RFA}_j^{K_M})'$. Z_j is also a vector of pre-recession firm-level controls. Then, the optimal vector W^* minimizes the distance between X_1 and X_0W, or $\|X_1 - X_0W\|_V$. Abadie et al. (2010) defines the distance between X_1 and X_0W as $\sqrt{(X_1 - X_0W)'V(X_1 - X_0W)}$. V is a ((r + M) x (r + M)) matrix that is symmetric and positive semidefinite. V is chosen through the data-driven process that minimizes the mean squared prediction error of the outcome variable (Abadie and Gardeazabal, 2003; Abadie et al., 2010).

Then, Abadie et al. (2010) show that the counterfactual outcome for the treated can be estimated by a linear combination of the control units' post-invention outcomes, which allows a researcher to compute the treatment effect. In my context, the estimated treatment effect is as follows:

$$\hat{\alpha}_{1t} = RFA_{1t}^I - \sum_{j=2}^{J+1} w_j^* RFA_{jt}, \tag{6}$$

where w_j^* is a scalar in a vector W* that minimizes the distance between X_1 and X_0W. In other words, SCM estimates the treatment effect by using a vector W* that minimizes the difference in pre-treatment characteristics (an outcome and other observables) between the treated and the control group.

OA.XII. Product Market Competition

Next, I examine how product market competition affects the relation between cost asymmetry and risky financial investments. Morellec, Nikolov, and Zucchi (2014) show that firms operating in competitive industries tend to hold cash for survival, especially when they are financially constrained. Also, competition mitigates managerial slack (Giroud and Mueller, 2010), implying that risky financial investments driven by a manager's self-interested motives should be less pronounced in competitive industries. Thus, one may deduce that the inverse relation between cost asymmetry and risky financial investment should be more pronounced when firms face competitive pressures.

I measure the degree of industry-level competition using the Herfindahl-Hirschman index (HHI) defined at the three-digit SIC level and split the full sample into two based on the median HHI value. By construction, a low (high) HHI indicates that an industry is relatively competitive (concentrated). In Table OA9, *Competitive* (*Concentrated*) is the subsample with a below-median (above-median) value of the HHI for the full sample. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I find that the inverse relation between cost asymmetry and risky financial investments is significant only in the *Competitive* subsample. The coefficients between the two subsamples are statistically different (*p-value*: 0.0262). Thus, firms with sticky costs limit risky financial investments only when they face significant competitive pressure.

OA.XIII. Controlling for Multinationals

In Table OA10, I also address the concern that U.S. multinationals may confound my analysis. Darmouni and Mota (2020) documents a sharp contraction in corporate financial portfolio driven by the 2017 repatriation tax reform. Multinationals hold a substantial amount of cash- and non-cash securities since they cannot distribute the funds to shareholders due to tax incentives. Thus, a firm's multinational status can be related to its risky financial investments.

To measure the extent of a firm's multinational business, I use a firm's foreign pre-tax income (Compustat PIFO) and income taxes (Compustat TXFO) scaled by sales. I additionally control for the lagged value of each. In Table OA10, the inverse relation between cost asymmetry and risky financial investments is robust to including foreign pre-tax income and taxes in the baseline specification. Interestingly, risky financial investments are positively associated with the amount of foreign pre-tax income. So, multinationals with significant foreign cash flow seem to invest in risky securities to increase the return on their financial portfolio. Also, foreign taxes are inversely related to risky financial investments. Firms seem to prefer cash-like securities when they have to pay taxes in the countries they operate.

OA.XIV. Size and Composition of Total Financial Assets

Duchin et al. (2017) point out that the size and composition of a firm's financial portfolio may be jointly determined. To address this issue, they use a two-stage least squares (2SLS) regression model using unexpected cash flow shocks for an instrument. Unexpected cash flow shocks are the portion of the change in cash flows unexplained by the lagged changes in cash flows for the last three years. In the first stage, they regress financial assets scaled by book assets on the instrument. In the second stage, they regress the portion of risky securities in a firm's total financial assets on the instrumented total financial assets. Duchin et al. (2017) justify their model by arguing, "unexpected cash flow shocks affect the overall size of the firm's portfolio of financial assets (inclusion restriction), but does not directly affect the composition of the portfolio (exclusion restriction)."

However, I do not follow the 2SLS model because cost behavior likely affects earnings expectations (e.g., Anderson, Banker, Huang, and Janakiraman, 2007). This point is also related to Duchin et al. (2017)'s caution about their 2SLS model that 'unexpected cash flow shocks' may actually be anticipated by managers and shareholders. They further acknowledge that unobservable firm-level variables may drive the cash flow shocks. Cost behavior can be one variable not included in Duchin et al. (2017)'s model that affects either expected profitability or risky financial investments.

As an alternative, I additionally control for the size of total financial assets by adding the log of total financial assets (*Log_Total_FA)* to the baseline model. In Table OA11, the size of a firm's financial portfolio (*Log_Total_FA*) is positively related to the portion of risky securities in a firm's financial portfolio, consistent with the findings of Duchin et al. (2017). More importantly, the inverse relation between cost asymmetry and risky financial investments remains robust.

Note that the effect of cost stickiness on total financial assets is statistically insignificant (Column (7), Panel B, Table OA6). The increase in cash-like securities (Column (1), Panel B, Table OA6) and the decrease in some categories of non-cash-like securities (Column (3), (5), and (6), Panel B, Table OA6) seem to offset each other, leading to the insignificant association between cost stickiness and total financial assets. I do not find evidence that cost stickiness first determines the size of total financial assets, then sets the composition of financial assets (similar to Duchin et al. (2017)'s 2SLS design). Instead, cost stickiness seems to directly affect cash-like and non-cash-like securities separately since only cash-like securities seem consistent with the precautionary savings motive. And total financial assets are determined as a result of setting cash-like and non-cash-like securities in response to cost stickiness.

OA.XV. The 10-90 Percentile Range of Lagged *CostStickiness*

Compared with the interquartile range of lagged *CostStickiness*, its standard deviation is relatively large (Table 1).[5] Since I examine the average effect of sticky costs on risky financial investments, outliers implied by the large standard deviation may confound my analysis. To address this concern, I limit my sample to the observations within the 10-90 percentile range of lagged *CostStickiness*. The 10th percentile value is -1.455729 and the 90th percentile value is 1.480352. In Table OA12, I find the inverse relation between cost stickiness and risky financial investments to be robust after further limiting the sample. Table OA12 alleviates the concern that the observations with extremely high or low *CostStickiness* may drive my baseline result.

[5] However, note that the prior related studies also show the standard deviation of their cost stickiness measure to be relatively large (He et al., 2020; Jang and Yehuda, 2021).

References

Abadie, A., A. Diamond, and J. Hainmueller, 2010. Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program. *Journal of the American Statistical Association* 105 (490): 493-505.

Abadie, A., and J. Gardeazabal. 2003. The economic costs of conflict: A case study of the Basque Country. *American Economic Review* 93 (1): 113-132.

Anderson, M., R. D. Banker, R. Huang, and S. Janakiraman. 2007. Cost behavior and fundamental analysis of SG&A costs. *Journal of Accounting, Auditing, & Finance* 22 (1): 1-28.

Banker, R. D., and D. Byzalov. 2014. Asymmetric cost behavior. *Journal of Management Accounting Research* 26 (2): 43-79.

Bonaimé, A., K. Kahle, D. Moore, and A. Nemani. 2020. Employee compensation still impacts payout policy. *Critical Finance Review*: forthcoming.

Cardella, L., D. Fairhurst, and S. Klasa. 2021. What determines the composition of a firm's cash reserves? *Journal of Corporate Finance* 68: 101924.

Darmouni, O., and L. Mota. 2020. The financial assets of non-financial firms. Working paper.

Duchin, R., T. Gilbert, J. Harford, and C. Hrdlicka. 2017. Precautionary savings with risky assets: When cash is not cash. *Journal of Finance* 72 (2): 793-852.

Fairhurst, D. 2020. Financing seasonal demand. *Financial Management* 49 (3): 839-870.

Galiani, S., and B. Quistorff. 2017. The synth_runner package: Utilities to automate synthetic control estimation using synth. *Stata Journal* 17 (4): 834-849.

Giroud, X., and H. M. Mueller. 2010. Does corporate governance matter in competitive industries? *Journal of Financial Economics* 95 (3): 312-331.

Graham, B. A., M. K. Miller, and K. W. Strøm. 2017. Safeguarding democracy: Powersharing and democratic survival. *American Political Science Review* 111 (4): 686-704.

He, J., X. Tian, H. Yang, and L. Zuo. 2020. Asymmetric cost behavior and dividend policy. *Journal of Accounting Research* 58 (4): 989-1021.

Ivlevs, A. 2021. Does emigration affect pro-environmental behaviour back home? A long-term, local-level perspective. *Kyklos* 74 (1): 48-76.

Jang, Y., and N. Yehuda. 2021. Resource adjustment costs, cost stickiness, and value creation in mergers and acquisitions. *Contemporary Accounting Research* 38 (3): 2264-2301.

Kama, I., and D. Weiss. 2013. Do earnings targets and managerial incentives affect sticky costs? *Journal of Accounting Research* 51 (1): 201-224.

Morellec, E., B. Nikolov, and F. Zucchi. 2014. Competition, cash holdings, and financing decisions. Working paper.

Oster, E. 2019. Unobservable selection and coefficient stability: Theory and evidence. *Journal of Business & Economic Statistics* 37 (2): 187-204.

Rouxelin, F., W. Wongsunwai, and N. Yehuda. 2018. Aggregate cost stickiness in GAAP financial statements and future unemployment rate. *The Accounting Review* 93 (3): 299-325.

Weiss, D. 2010. Cost behavior and analysts' earnings forecasts. *The Accounting Review* 85 (4): 1441-1471.

Table OA1

Excluding Firms with Seasonal Quarterly Sales

This table shows whether the relation between cost asymmetry and risky financial investments is robust to excluding firms with seasonal quarterly sales. Seasonal firms are identified based on the methodology of Fairhurst (2020). The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects or industry-by-year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) *Risky FA / Total FA* $_t$	(2) *Risky FA / Total FA* $_t$
CostStickiness $_{t-1}$	-0.0046**	-0.0077**
	(-2.003)	(-2.246)
Controls	Yes	Yes
Industry FE	Yes	No
Year FE	Yes	No
Industry-by-Year FE	No	Yes
Observations	3,015	3,015
Adjusted R^2	0.2842	0.0871

Table OA2

Industry Fixed Effects: Two-Digit SIC or Fama-French 48

This table shows whether the baseline result is robust to defining an industry at the two-digit SIC (SIC2) or the Fama-French 48 (FF48) level. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects or industry-by-year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) *Risky FA / Total FA* $_t$	(2) *Risky FA / Total FA* $_t$	(3) *Risky FA / Total FA* $_t$	(4) *Risky FA / Total FA* $_t$
CostStickiness $_{t-1}$	-0.0039**	-0.0048**	-0.0046**	-0.0053**
	(-1.973)	(-2.084)	(-2.358)	(-2.486)
Controls	Yes	Yes	Yes	Yes
SIC2 FE	Yes	No	No	No
FF48 FE	No	No	Yes	No
Year FE	Yes	No	Yes	No
SIC2-by-Year FE	No	Yes	No	No
FF48-by-Year FE	No	No	No	Yes
Observations	4,347	4,347	4,347	4,347
Adjusted R^2	0.2577	0.1958	0.2684	0.2346

Table OA3

Tobit Regression

This table presents the effect of asymmetric cost behavior on risky financial investments based on a Tobit model. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects or industry-by-year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) *Risky FA / Total FA* $_t$	(2) *Risky FA / Total FA* $_t$
CostStickiness $_{t-1}$	-0.0077*	-0.0125***
	(-1.954)	(-2.736)
Controls	Yes	Yes
Industry FE	Yes	No
Year FE	Yes	No
Industry-by-Year FE	No	Yes
Observations	4,347	4,347
Pseudo R^2	0.5018	0.6567

Table OA4

Validation Test: SG&A

This table shows whether the relation between asymmetric cost behavior and risky financial assets is more pronounced for firms with higher SG&A. I set SG&A to zero if missing. *High (Low) SG&A* is the subsample with an above-median (below-median) value of lagged SG&A over book assets for the full sample. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the definitions of the variables.

	(1)	(2)
	High SG&A $_{t-1}$	*Low SG&A $_{t-1}$*
Dependent Variable:	*Risky FA / Total FA $_t$*	*Risky FA / Total FA $_t$*
CostStickiness $_{t-1}$	-0.0105**	-0.0009
	(-2.125)	(-0.505)
	H_0: $\beta(1) = \beta(2)$ (*p-value*: 0.0576)	
Controls	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	2,173	2,174
Adjusted R^2	0.3301	0.2992

Table OA5

Limiting the Sample to Observations with a Positive α_1.

This table shows whether the effect of cost asymmetry on risky financial investments remains robust to using alternative measures of cost stickiness.

$$\Delta Ln\ (Costs) = \alpha_0 + \alpha_1 * \Delta Ln\ (Sales) + \alpha_2 * Decrease * \Delta Ln\ (Sales) + e$$

I use the above model to estimate a firm's cost stickiness in year *t* using the previous 16 quarterly observations. Columns (1) and (4) use SG&A, Columns (2) and (5) use operating costs (sales minus operating income after depreciation and amortization), and Columns (3) and (6) use total costs (COGS plus SG&A) to estimate a firm's asymmetric cost behavior (He, Tian, Yang, and Zuo, 2020; Kama and Weiss, 2013; Rouxelin, Wongsunwai, and Yehuda, 2018). Columns (1), (2), and (3) define *CostStickness_Alt* as the negative value of α_2. Columns (4), (5), and (6) define *CostStickiness_Alt* as the negative of the sum of α_1 and α_2. A higher value of *CostStickiness_Alt* indicates that a firm's costs are stickier. The dependent variable is the fair value of risky financial assets scaled by the fair value of the total financial assets for each firm in year *t*. The firm-level independent variables are lagged by one year. Only the observations with a positive α_1 are included. I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. I use the control variables in Table 2. Appendix A presents the definitions of the variables.

	(1) *Risky FA / Total FA $_t$*	(2) *Risky FA / Total FA $_t$*	(3) *Risky FA / Total FA $_t$*	(4) *Risky FA / Total FA $_t$*	(5) *Risky FA / Total FA $_t$*	(6) *Risky FA / Total FA $_t$*
CostStickiness_Alt $_{t-1}$	-0.0091***	-0.0179**	-0.0112**	-0.0101**	-0.0163*	-0.0142**
	(-2.893)	(-2.399)	(-2.178)	(-2.281)	(-1.655)	(-2.024)
Costs	SG&A	Operating Costs	Total Costs	SG&A	Operating Costs	Total Costs
Stickiness Measure	$-\alpha_2$	$-\alpha_2$	$-\alpha_2$	$-(\alpha_1 + \alpha_2)$	$-(\alpha_1 + \alpha_2)$	$-(\alpha_1 + \alpha_2)$
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,503	4,141	4,134	3,503	4,141	4,134
Adjusted R^2	0.3003	0.3059	0.3028	0.2992	0.3037	0.3026

Table OA6

Alternative Scaling and Illiquid Financial Assets

This table shows how cost asymmetry affects alternative measures of a firm's financial assets. The dependent variables in Panel A are the fair value of risky financial assets scaled by lagged book assets, lagged sales, and lagged market value of assets, respectively, and the natural log of one plus the fair value of risky financial assets for a firm in year *t*. Market value of assets is defined as book assets minus the stockholders' equity of common shareholders plus the product of the number of common shares outstanding and a firm's fiscal year-end share price. Panel B uses the natural log of one plus each type of a firm's financial assets (cash-like, U.S. Treasuries, non-U.S. Treasuries government debt, corporate debt, equity, and others) as a dependent variable, while holding the size of total financial assets and firm size constant. Panel C uses the fair value of each type of a firm's financial assets scaled by total financial assets as a dependent variable while adding the log of one plus total financial assets as a control. *Total FA* in Panel B and C is the log of one plus total financial assets. Panel D uses five dependent variables: the natural log of one plus the fair value of illiquid financial assets, the fair value of illiquid financial assets scaled by the fair value of total financial assets, lagged book assets, lagged sales, and lagged market value of assets, respectively, for each firm in year *t*. Based on SFAS No. 157, liquid financial assets are Level One securities with quoted prices in an active market. Illiquid financial assets are the sum of Level Two securities that require observable information to estimate value and Level Three securities that require unobservable inputs to estimate price. I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

Panel A: Alternative Scaling

	(1) *Risky FA $_t$ / Assets $_{t-1}$*	(2) *Risky FA $_t$ / Sales $_{t-1}$*	(3) *Risky FA $_t$ / MVA $_{t-1}$*	(4) *Log (1 + Risky FA) $_t$*
CostStickiness $_{t-1}$	-0.0027**	-0.0053**	-0.0011***	-0.0872***
	(-2.480)	(-2.525)	(-2.656)	(-2.886)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4,347	4,347	4,347	4,347
Adjusted R^2	0.3790	0.3523	0.3419	0.4903

Panel B: Each Type of Financial Assets (Log of One plus Each Financial Asset Category)

	(1) *Cash-like $_t$*	(2) *U.S. Treasuries $_t$*	(3) *Non-U.S. Treasuries Gov. Debt $_t$*	(4) *Corporate Debt $_t$*	(5) *Equity $_t$*	(6) *Other $_t$*	(7) *Total FA$_t$*
CostStickiness $_{t-1}$	0.0166**	-0.0382	-0.0797***	-0.0414	-0.0533**	-0.0493**	-0.0096
	(2.506)	(-1.295)	(-2.823)	(-1.353)	(-2.467)	(-1.983)	(-0.739)
Total FA $_t$	0.9206***	0.3363***	0.4454***	0.5755***	0.3211***	0.4102***	
	(44.996)	(5.218)	(6.566)	(7.337)	(5.629)	(6.198)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,347	4,347	4,347	4,347	4,347	4,347	4,347
Adjusted R^2	0.8892	0.3599	0.4222	0.4891	0.3776	0.3818	0.7313

Panel C: Each Type of Financial Assets (Scaled by Total Financial Assets)						
	(1) *Cash-like $_t$*	(2) *U.S. Treasuries $_t$*	(3) *Non-U.S. Treasuries Gov. Debt $_t$*	(4) *Corporate Debt $_t$*	(5) *Equity $_t$*	(6) *Other $_t$*
CostStickiness $_{t-1}$	0.0056**	-0.0011	-0.0013	-0.0017	-0.0008	-0.0004
	(2.050)	(-0.922)	(-1.347)	(-1.240)	(-1.453)	(-0.829)
Total FA $_t$	-0.0526***	0.0061**	0.0105***	0.0208***	0.0019	0.0055***
	(-6.659)	(2.090)	(4.367)	(5.898)	(1.173)	(3.517)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,347	4,347	4,347	4,347	4,347	4,347
Adjusted R^2	0.3906	0.2194	0.2311	0.3084	0.1275	0.1508

Panel D: Illiquid Financial Assets					
	(1) *Log (1 + IlliquidFA) $_t$*	(2) *Illiquid FA / Total FA $_t$*	(3) *Illiquid FA / Assets $_{t-1}$*	(4) *Illiquid FA / Sales $_{t-1}$*	(5) *Illiquid FA / MVA $_{t-1}$*
CostStickiness $_{t-1}$	-0.0858***	-0.0038	-0.0032**	-0.0059**	-0.0014***
	(-2.695)	(-1.241)	(-2.278)	(-2.302)	(-2.609)
Controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	4,347	4,347	4,347	4,347	4,347
Adjusted R^2	0.5140	0.3841	0.4256	0.3937	0.3971

Table OA7

Controlling for Lagged Sales Growth

This table shows whether the baseline result is robust to controlling for the lagged sales growth (*SGrow)*. I include a firm's sales growth in year *t*-1 and *t*-2 as additional controls. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the definitions of the variables.

	(1)	(2)
	$Risky\ FA\ /\ Total\ FA_{t}$	$Risky\ FA\ /\ Total\ FA_{t}$
$CostStickiness_{t-1}$	-0.0049**	-0.0076**
	(-2.347)	(-2.466)
$SGrow_{t-1}$	-0.0116	-0.0118
	(-0.601)	(-0.393)
$SGrow_{t-2}$	0.0154	0.0161
	(0.932)	(0.649)
Controls	Yes	Yes
Industry FE	Yes	No
Year FE	Yes	No
Industry-by-Year FE	No	Yes
Observations	4,346	4,346
Adjusted R^2	0.2951	0.1057

Table OA8

Difference-in-Differences: Years 2005, 2006, and 2013

This table presents the results of the DID analysis based on the Great Recession. I use Darmouni and Mota (2020)'s dataset, which contains pre-2009 observations. The sample period only covers 2005, 2006, and 2013. After requiring a non-missing value for total financial assets and a positive value for book assets, I limit the analysis to firms in Darmouni and Mota (2020)'s sample for 2006, one year before the Great Recession (165 firms). *Treat* is an indicator equal to one if the value of a firm's *CostStickiness* is greater than the median value of *CostStickiness* for the 2006 sample firms and zero otherwise. *Post* is an indicator equal to one if a firm-year observation is in 2010 or beyond and zero otherwise. After assigning treatment, I further delete the observations with missing values for the dependent and the independent variables. The dependent variables are a firm's *CostStickiness* and the fair value of risky financial asset holdings, scaled by the fair value of total financial assets. Panel A reports the covariate balance (mean, variance, and skewness) between the treated and control group before reweighting and Panel B presents the balance after reweighting. Panel C shows the results of the weighted OLS regression for the entropy balanced sample. I include firm and year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered at the firm level (*t*-statistics in parentheses). Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. I omit the constant for brevity. Appendix A presents the variable definitions.

Panel A: Covariate Balance Before Reweighting

	Treated			Control		
	Mean	Var	Skew	Mean	Var	Skew
Market-to-Book $_{t-1}$	2.4430	3.4310	2.7830	2.4330	3.5930	2.9090
Size $_{t-1}$	9.8210	1.3750	-0.1722	10.0400	0.8397	-0.0259
CashFlow $_{t-1}$	0.1227	0.0056	0.5042	0.1174	0.0048	0.7006
NWC $_{t-1}$	0.1626	0.0436	1.9060	0.1384	0.0368	1.6860
Capex $_{t-1}$	0.0627	0.0050	3.1930	0.0631	0.0049	2.8230
Debt $_{t-1}$	0.2885	0.0567	1.8000	0.2712	0.0478	1.8660
Dividend_Pay $_{t-1}$	0.7123	0.2059	-0.9378	0.7720	0.1769	-1.2970
Earn_Vol $_{t-1}$	0.0429	0.0032	3.6850	0.0381	0.0016	2.8350
R&D_Exp $_{t-1}$	0.0311	0.0020	1.4560	0.0275	0.0017	1.6020

Panel B: Covariate Balance After Reweighting

	Treated			Control		
	Mean	Var	Skew	Mean	Var	Skew
Market-to-Book $_{t-1}$	2.4430	3.4310	2.7830	2.4430	3.4320	2.5110
Size $_{t-1}$	9.8210	1.3750	-0.1722	9.8210	1.3750	0.2985
CashFlow $_{t-1}$	0.1227	0.0056	0.5042	0.1227	0.0056	0.7008
NWC $_{t-1}$	0.1626	0.0436	1.9060	0.1626	0.0437	1.2830
Capex $_{t-1}$	0.0627	0.0050	3.1930	0.0627	0.0050	2.8940
Debt $_{t-1}$	0.2885	0.0567	1.8000	0.2885	0.0567	1.7230
Dividend_Pay $_{t-1}$	0.7123	0.2059	-0.9378	0.7123	0.2060	-0.9381
Earn_Vol $_{t-1}$	0.0429	0.0032	3.6850	0.0429	0.0032	2.5850
R&D_Exp $_{t-1}$	0.0311	0.0020	1.4560	0.0311	0.0020	1.2750

Panel C: Results				
	(1)	(2)	(3)	(4)
	Without Entropy Balancing		With Entropy Balancing	
	CostStickiness $_t$	*Risky FA / Total FA* $_t$	*CostStickiness* $_t$	*Risky FA / Total FA* $_t$
*Treat*Post* $_t$	-1.5013***	0.0983**	-1.6162**	0.1194**
	(-2.678)	(2.228)	(-2.562)	(2.437)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	405	405	405	405
Adjusted R^2	0.3152	0.6117	0.2971	0.6755

Table OA9

Product Market Competition

This table shows how product market competition affects the relation between asymmetric cost behavior and risky financial investments. I evaluate the degree of product market competition for each firm in year *t* using the Herfindahl-Hirschman Index (HHI) defined at the three-digit SIC level. *Competitive* (*Concentrated*) is the subsample with a below-median (above-median) value of the HHI for the full sample. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the definitions of the variables.

	(1)	(2)
	$Competitive_{t-1}$	$Concentrated_{t-1}$
Dependent Variable:	$Risky\ FA / Total\ FA_t$	$Risky\ FA / Total\ FA_t$
$CostStickiness_{t-1}$	-0.0084**	0.0007
	(-2.517)	(0.331)
	H_0: $\beta(1) = \beta(2)$ (*p-value*: 0.0262)	
Controls	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	2,174	2,173
Adjusted R^2	0.2363	0.3499

Table OA10

U.S. Multinationals

This table shows whether the relation between cost asymmetry and risky financial investments is robust to including U.S. multinationals in the model. I use foreign pre-tax income (*Foreign_Income*) and taxes (*Foreign_Taxes*) scaled by sales to measure the extent of a firm's non-U.S. business. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects or industry-by-year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) *Risky FA / Total FA* $_t$	(2) *Risky FA / Total FA* $_t$
CostStickiness $_{t-1}$	-0.0044**	-0.0070**
	(-2.104)	(-2.276)
Foreign_Income $_{t-1}$	0.4049***	0.4520***
	(3.206)	(2.782)
Foreign_Taxes $_{t-1}$	-0.9517*	-1.2020*
	(-1.865)	(-1.880)
Controls	Yes	Yes
Industry FE	Yes	No
Year FE	Yes	No
Industry-by-Year FE	No	Yes
Observations	4,347	4,347
Adjusted R^2	0.3061	0.1228

Table OA11

Controlling for the Size of Financial Portfolio

This table shows whether the relation between cost asymmetry and risky financial investments is robust to controlling for the size of total financial assets. I include the log of total financial assets (*Log_Total_FA)*. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects or industry-by-year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) *Risky FA / Total FA* $_t$	(2) *Risky FA / Total FA* $_t$
CostStickiness $_{t-1}$	-0.0045**	-0.0070**
	(-2.277)	(-2.412)
Log_Total_FA $_t$	0.0411***	0.0448***
	(6.852)	(5.407)
Controls	Yes	Yes
Industry FE	Yes	No
Year FE	Yes	No
Industry-by-Year FE	No	Yes
Observations	4,347	4,347
Adjusted R^2	0.3247	0.1465

Table OA12

Addressing Outliers: The 10-90 Percentile Range of Lagged *CostStickiness*

This table shows whether the relation between cost asymmetry and risky financial investments is robust to limiting the sample to the observations within the 10-90 percentile range of lagged *CostStickiness*. The relatively large standard deviation of *CostStickiness* (Table 1) necessitates this test. The dependent variable is the fair value of risky financial assets scaled by the fair value of total financial assets for each firm in year *t*. I include industry and year fixed effects or industry-by-year fixed effects. I compute *t*-statistics (in parentheses) using robust standard errors clustered at the firm level. Statistical significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively. The constant is not shown for brevity. Appendix A presents the variable definitions.

	(1) *Risky FA / Total FA* $_t$	(2) *Risky FA / Total FA* $_t$
CostStickiness $_{t-1}$	-0.0175**	-0.0210*
	(-2.428)	(-1.785)
Controls	Yes	Yes
Industry FE	Yes	No
Year FE	Yes	No
Industry-by-Year FE	No	Yes
Observations	3,477	3,477
Adjusted R^2	0.2922	0.0540