Financial Leverage and Stock Return Comovement

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Abstract

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JEL Classification Codes: G10, G14, G32
Keywords: Leverage, Comovement, Clientele, Style Investing

This Version: October 21, 2020

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Abstract

We find that leverage-initiating stocks comove more (less) with existing leveraged (zero-leverage) stocks in the year after the leverage initiation event. Conversely, fully deleveraged stocks comove more (less) with zero-leverage (leveraged) stocks. These findings are robust after controlling for common factors and firm characteristics and considering many exogenous shocks to corporate leverage decisions. Shifts in the return comovement are greater for larger absolute leverage changes and distinct from the dividend clientele effect. We find that mutual funds adjust their holdings of leverage-changing stocks around the event year. These funds tend to invest following investors' preference for leveraged (zero-leverage) stocks.

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1. Introduction

Literature has reported numerous patterns of stock return comovement over the past 30 years. In a traditional framework of investor rationality, stock returns should move together due to commonality in asset fundamentals. However, investors' heuristic biases or limited ability to process information for thousands of stocks result in them labeling assets and allocating their funds based on these labels or styles (see Barberis and Shleifer, 2003). These style-based investments reportedly lead to excess return comovement among stocks with the same style (e.g., Barberis, Shleifer, and Wurgler, 2005; Greenwood, 2008; Boyer, 2011).

In this paper, we argue that financial leverage could be a style for investments. Some investors prefer firms with financial leverage while some others may only be interested in all-equity firms (e.g., Miller, 1977; Kim, Lewellen, and McConnell, 1979; DeAngelo and Masulis, 1980; Harris, Roenfeldt, and Cooley, 1983; Cornaggia, Simin, and Sonmez-Leopold, 2019). These financial leverage clienteles should result in return comovement among leveraged stocks and unleveraged ones. Indeed, this is what we find. Using 1,234 U.S. stocks that move from a zero-leverage firm to a leveraged firm, we find that stock returns of these leverage initiators (L0L1 hereafter) comove less with zero-leverage firms and more with leveraged firms one year after the leverage initiation. These changes in return comovement are statistically significant and economically meaningful. Specifically, L0L1 firms see their stock return sensitivity to the portfolio of leveraged firms increase from 0.172 in the year before the leverage initiation to 0.730 in the year after becoming a leveraged firm. In contrast, the sensitivity of their stock returns to the portfolio of zero-leverage firms decreases from 0.510 in the year before to 0.369 in the year after initiating leverage. Our results are not driven by possible commonality in fundamentals. We use a propensity score matching (PSM) method to find matching firms that share similar characteristics with our L0L1 sample firms and propensity to switch from a zero-leverage firm to a leveraged one. We find that these control firms do not show any significant change in return comovement with either zero-leverage or leveraged firms. After controlling for these matched firms' return comovements, our L0L1 firms still show a significant increase in return comovement with leveraged firms and a significant decrease in return comovement with zero-leverage firms in the year post leverage initiation.

In the opposite direction of financial leverage policy, we observe 2,291 firms that convert from a leveraged firm to a zero-leverage firm during our sample period of 1970–2016. Our analyses show that these zero-leverage initiators' (L1L0 hereafter) returns covary more with returns on other zero-leverage firms and less with returns on leveraged firms. The increase in these L1L0 firms' return sensitivity to the portfolio of zero-leverage firms is 0.086, whereas their return sensitivity to the portfolio of leveraged firms decreases by 0.453 one year surrounding the zero-leverage conversion year. This finding remains robust after controlling for the comovement behavior of a PSM matched sample.

We employ changes in bank lending standards from the Federal Reserve Bank (FED) as an exogenous shock to a firm's financial leverage choice. Literature has shown that the tightening (loosening) of these lending standards discourages (encourages) firms to have debt in their capital structure (e.g., Lown, Morgan, and Rohatgi, 2000; Lown and Morgan, 2006; Leary, 2009; Axelson, Jenkinson, Stromberg, and Weisbach, 2013; Bassett, Chosak, Driscoll, and Zakrajsek, 2014; Van der Veer and Hoeberichts, 2016). We classify yearly changes in the FED's lending standards into tightening and loosening standards years. We then restrict our L0L1 firms to loosening standards years and L1L0 firms to tightening standards years. We find that firms that initiate leverage in the loosening standards years comove significantly more with leveraged firms and less with zero-leverage firms, and these results are also similar in magnitude to the baseline results. For firms that fully deleverage, the decrease in return comovement is highly significant for the portfolio of leveraged firms before or after accounting for the control firms' return comovements. The increase in return comovement with zero-leverage firms is positive but not statistically significant.

Our results are robust when we use TED spread, i.e., the difference between 3-month LIBOR based on U.S. dollars and 3-month Treasury bill, or Adrian, Etula, and Muir's (2014) leverage factor as alternatives to FED's bank lending standards. Moreover, we use the 1989 collapse of Drexel Burnham Lambert investment bank (Lemmon and Roberts, 2010), the Securities and Exchange Commission's (SEC) temporary suspension of short-sale price tests for a number of Pilot securities (Gong, 2020), and the 2007 – 2009 global financial crisis (Dewally and Shao, 2014) as exogenous shocks in credit supply and short selling threat that lead to firm deleveraging. We also use corporate income tax cuts across the U.S. states as exogenous shocks to corporate deleverage due to the reduced value of tax shields (Heider and Ljungqvist, 2015). On the other hand, we use the introduction of bank loan ratings by Moody's and S&P in 1995 as an exogenous shock to firm leveraging (Sufi, 2009). Our comovement results remain when we restrict our sample firms to these shocks.

Our results are also robust to several other tests. First, Chen, Singal, and Whitelaw (2016) provide evidence against the use of bivariate regressions in return comovement studies. We address this issue by employing univariate regressions as an alternative method. Our univariate results are unchanged. Second, we find evidence of larger shifts in return comovement for larger absolute changes in the level of leverage. Third, Hameed and Xie (2019) find that the returns of dividend initiators covary more with dividend-paying firms and less with firms paying zero dividends. We exclude dividend initiators from our L0L1 and L1L0 samples and find that our results are similar, suggesting that the financial leverage clientele effect is different from the dividend clientele effect.

Fourth, our results stand when we limit to first-time (de)leverage initiators. Finally, we find that changes in return covariance do not exist beyond the event year for the leverage initiators; however, the deleverage initiators' results suggest slightly less stability.

We attempt to provide evidence on the drivers of leverage-induced comovement by investigating investor trading activities. First, if investors trade stocks in accordance with their leverage preferences, we should observe significant shifts in turnover comovement between (de)leverage initiators and the portfolios of zero-leverage and leverage stocks. Indeed, we find that firms that change from a zero-leverage firm to a leveraged one experience larger (smaller) turnover comovement with leveraged (zero-leverage) firms one year after the leverage initiation. As expected, we find the opposite results for firms that fully deleverage. Second, we focus on mutual fund holdings one year around the leverage change year and find that leverage-favored mutual funds significantly increase their holdings of leverage initiators, L0L1, while leverage-unfavored funds decrease their L0L1 holdings. On the other hand, deleverage initiators, L1L0, see their weights significantly increased (decreased) in the holdings of mutual funds that favor (disfavor) leverage. Our analysis of mutual fund flows indicates that funds tend to invest their capital flows in accordance with their investors' preference for leveraged (zero-leverage) stocks. Overall, our results indicate that financial leverage is indeed an investment style based on which investors structure their investment portfolios.

We contribute to the literature in several ways. First, researchers have long developed theoretical frameworks for the existence of financial leverage clienteles. Miller (1977), Kim, Lewellen, and McConnell (1979), and DeAngelo and Masulis (1980) employ market equilibrium models to argue that a firm's value is irrelevant to its leverage decision and that investors with different personal tax brackets will sort themselves into firms with varying leverage levels in the most tax-efficient manner. Specifically, investors with personal tax rates less than the corporate tax rate prefer stocks of highly leveraged firms because corporate leverage yields greater tax savings than personal leverage. On the other hand, investors with tax rates above the firm rate demand stocks of zero-leverage firms since it is better to lever up themselves than through the firm. Kim, Lewellen, and McConnell (1979) and Harris, Roenfeldt, and Cooley (1983) find empirical evidence that is consistent with the theoretical prediction of financial leverage clienteles. Other papers examine U.S. statutory changes in corporate and personal tax rates and report evidence to suggest that firms adjust their debt policies to suit investors' preferences for leverage (e.g., Givoly, Hayn, Ofer, and Sarig, 1992; Graham, 1999; Heider and Ljungqvist, 2015). Faccio and Xu (2018) study more than 300 corporate and personal tax reforms across 29 OECD countries and find that these tax changes affect the value of corporate interest tax shields, which subsequently induce investors to adjust the equity value of firms. Their results are not only in line with capital structure theories but also imply the existence of financial leverage clienteles in these countries.

The tax-induced leverage benefits assume that investors do not have any leverage constraints. However, recent literature on investors' risk preferences argue that many investors, including both individuals and institutional investors, face leverage constraints that prevent them from achieving a desired level of levered risk and return for their portfolios. To overcome borrowing constraints, investors tilt their portfolios towards high equity beta firms (e.g., Frazzini and Pedersen, 2014; Boguth and Simutin, 2018; Jylha, 2018) or, better still, firms with high financial leverage (Cornaggia, Simin, and Sonmez-Leopold, 2019). Gomes and Schmid (2010) show that compared to firm age, growth options, and default probability, financial leverage is the dominant factor influencing equity beta. The results in these papers suggest that leverage constraints of investors affect their investment behavior and that firms with different capital structures are attractive to investors depending on their risk preferences. Our paper contributes to the financial leverage clientele literature in the sense that when a firm changes its leverage level it triggers investors to restructure their portfolios, which results in a shift in the comovements of the firm's returns with those in the old and new groups of financial leverage.

We also add to the literature on style investment and excess return comovement. Barberis and Shleifer (2003) develop a model in which investors, due to cognitive biases, tend to select stocks based on some form of characteristic grouping. This style classification generates return comovement of stocks within the same style in excess of what can be explained by fundamentals. Since then, researchers have reported ample evidence on style investment and its associated excess return comovement. For example, Barberis, Shleifer, and Wurgler (2005), Greenwood (2008), and Boyer (2011) find that stocks included in an index apparently constitute a category for investment, and this index inclusion results in an increase in return covariance with stocks in the index. Excess comovement in return is also found among stocks of firms headquartered in the same geographic location (Pirinsky and Wang, 2006), stocks within a similar price range (Green and Hwang, 2009; Kumar, Page, and Spalt, 2013), stocks with listed options (Agyei-Ampomah and Mazouz, 2011), stocks that use the same lead underwriter during their IPOs (Grullon, Underwood, and Weston, 2014), stocks with similar size or book-to-market ratios (Kumar, 2009), and stocks with lottery features (Kumar, Page, and Spalt, 2016).[1] Hameed and Xie (2019) find that firms initiating dividend payments begin to comove more with the portfolio of dividend-paying stocks and less with the portfolio of non-dividend paying stocks. Our paper's results show that financial leverage (or lack thereof) is a style of investment, and its associated return comovement is distinct from that driven by the dividend clienteles.

[1] The extant literature also investigates the link between style investment and return comovement among industries based on the demand of retail investors (Jame and Tong, 2014), exchange-traded funds with similar investment styles (Broman, 2016), bonds that join a new credit rating class (Raffestin, 2017), and in the credit default swap market following an inclusion to or exclusion from a CDX index (Cathcart, El-Jahel, Evans, and Shi, 2019).

The remainder of the paper is organized as follows. Section 2 presents data selection and methodology. Section 3 discusses empirical results on financial leverage clientele and return comovement. Section 4 reports robustness tests. Section 5 displays evidence on turnover comovement and mutual fund holdings. Section 6 concludes our paper.

2. Data and Methodology

We extract stock prices, returns, trading volume, and other related data from Centre for Research in Security Prices (CRSP) monthly files. We source accounting data from Compustat, including long-term debt, total debt, total assets, operating income before depreciation, property, plant and equipment, total market value, book value per share, and common shares outstanding. Our sample includes common stocks that have share codes of 10 and 11 trading on NYSE/Amex and Nasdaq. Our research period is from 1970 to 2016.

We identify our sample based on their leverage, which is calculated as the ratio of long-term debt to total assets. We have two sets of samples: (1) L0L1 include firms that change from a zero-leverage firm in years t - 2 and t - 1 to a leveraged firm in year t, and (2) L1L0 firms are those that fully deleverage, i.e., moving from a leveraged firm in years t - 2 and t - 1 to a zero-leverage firm in year t.[2] For each of our (de)leverage initiating sample firms, we find a matched firm using the propensity score matching (PSM) method. Specifically, in each year t we first select all L0L1 firms and those that remain zero-leverage in the current year and the previous two years t - 2 and t - 1. Then we run the following logit model on the propensity to become a leveraged firm:

[2] Since a firm may change its leverage more than once during the research period, it can belong to either the L0L1 or L1L0 group in a particular year.

$$\Pr(L0L1\_DUM_i = 1) = \text{logit}\,(a + b_1 PROFIT_i + b_2 lnSIZE_i + b_3 TANG_i + b_4 MB_i + b_5 CFVOL_i + b_6 DIV_i + b_7 CAPEX_i + b_8 RD_i + b_9 CASH_i + b_{10} ASSET\_SALE_i + b_{11} TAX_i + b_{12} REPUR_i) + e_i \qquad (1)$$

where *L0L1_DUM* is equal one if a firm is a zero-leverage firm in years *t* - 2 and *t* - 1 and leveraged firm in year *t*, and zero otherwise. We follow the literature (e.g., Leary, 2009; Axelson, Jenkinson, Stromberg, and Weisbach, 2013; Strebulaev and Yang, 2013) and include variables that are likely determinants of leverage decisions. *PROFIT* is the operating income before depreciation (Compustat item 13) divided by total assets (item 6); *lnSIZE* is the log of total assets; *TANG* is the net total property, plant, and equipment (item 8) scaled by total assets; *MB* is the market-to-book ratio calculated as the market value of equity (items 24 * 25) divided by total stockholders' equity (item 216); *CFVOL* is the standard deviation of operating income (item 308); *DIV* is a dummy variable equal to one for dividend-paying firms, and zero otherwise; *CAPEX* is captial expenditures (item 128) divided by total assets; *RD* is the ratio of research and development expenses (item 46) to sales (item 12); *CASH* is the ratio of cash holdings (item 1) to total assets; *ASSET_SALE* is asset sales (item 107 + item 109) divided by total assets; *TAX* is the ratio of income tax (item 16) to total assets; and *REPUR* is the ratio of share repurchases (item 115) to total assets. Each of the L0L1 treated firms is matched to a control firm with the same three-digit SIC code and a propensity score within 0.01 caliper. This PSM method ensures that the control firms have similar characteristics as the treated firms except that they do not change into leveraged firms. We create a matched set of control firms for the L1L0 treated firms in a similar way by replacing the dependent variable in Eq. (1) with another dummy, *L1L0_DUM*, which is equal one for firms that change from a leveraged firm in years *t* - 2 and *t* - 1 to a zero-leverage firm in year *t*, and zero for firms that remain leveraged in three years *t* - 2, *t* - 1, and *t*.[3]

We measure the excess return comovement of our (de)leverage sample firms and the control firms with two benchmark portfolios. The first benchmark portfolio contains stocks that do not have any leverage in the years *t* - 2, *t* - 1, and *t*. The second benchmark portfolio includes stocks that consistently have leverage in the three years *t* - 2, *t* - 1, and *t*.[4] We then calculate daily equal-weighted returns for these zero-leverage and leveraged benchmark portfolios and denote them as *BMK0* and *BMK1*, respectively. We require stocks in *BMK0* and *BMK1* to have at least 200 daily return observations each year and hold them constant when we measure the return comovements for the years surrounding the (de)leverage event of our sample firms.

Before we evaluate excess return comovement between our firms and the benchmark portfolios, we first need to strip out the portion of benchmark returns that are explained by common factors using the following Fama-French-Carhart four factor model (see Carhart, 1997):

$$BMK_d = a + b_1 MKT_d + b_2 SMB_d + b_3 HML_d + b_4 MOM_d + u_d \qquad (2)$$

where BMK_d is the benchmark return on day *d*. *MKT*, *SMB*, *HML*, and *MOM* are the Fama-French-Carhart four factors: excess market return, small-minus-big size factor, high-minus-low book-to-

[3] For robustness checks, we identify firms as *L0L1* (*L1L0*) firms if they are a leveraged (non-leverage) firm at year *t* and a zero-leverage (leveraged) firm in the previous year *t* - 1 or in the previous three years *t* - 1, *t* - 2, and *t* - 3. The results are highly robust and available upon request.

[4] Alternatively, we consider two different conditions to allocate stocks into the two benchmark portfolios. (1) The first (second) portfolio includes stocks that retain a zero-leverage (leveraged) capital structure in the four years leading to year *t* (i.e., years *t* - 3, *t* - 2, *t* - 1, and *t*), or (2) the first (second) portfolio includes stocks that retain a zero-leverage (leveraged) capital structure in the two years leading to year *t* (i.e., years *t* - 1 and *t*). The results are highly robust and available upon request.

market factor, and momentum factor, respectively.[5] We run Eq. (2) for each of the benchmark portfolios by year and denote their daily residual returns as $BMK0_{res,d}$ and $BMK1_{res,d}$, respectively.

We use the following regression model to assess excess return comovement between the returns of our sample firms and the benchmarks' residual returns:

$$R_{i,d} = \alpha_i + \beta_{0i}BMK0_{res,d} + \beta_{1i}BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \tag{3}$$

where $R_{i,d}$ is the return on our (de)leverage firm i on day d. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day d, respectively. X_d is the four factors in the Fama-French-Carhart model, as described above.

We measure excess comovement for the control firms in the same manner. Specifically, we use the following Eq. (4):

$$R_{c,d} = \alpha_c + \beta_{0c}BMK0_{res,d} + \beta_{1c}BMK1_{res,d} + \gamma_c X_d + \varepsilon_{c,d} \tag{4}$$

where $R_{c,d}$ is the return on control firm c on day d. All other variables are defined as in Eq. (3).

We estimate Eq. (3) and Eq. (4) for the year prior to the leverage change, i.e., year t - 1, and for the year after the leverage change, i.e., year t + 1. We calculate the changes in excess return comovement for a sample firm i as follows:

$$\Delta\beta_{0i} = \beta_{0i,post} - \beta_{0i,pre} \tag{5a}$$

[5] We thank Kenneth French for sharing the data on his website, https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

$$\Delta\beta_{1i} = \beta_{1i,post} - \beta_{1i,pre} \tag{5b}$$

where $\Delta\beta_{0i}$ ($\Delta\beta_{1i}$) refers to the change in excess comovement of sample firm *i*'s returns with the benchmark portfolio of zero-leverage (leveraged) stocks. $\beta_{0i,post}$ and $\beta_{0i,pre}$ represent the comovements of the sample firm's returns with those of the zero-leverage portfolio in year $t + 1$ and year $t - 1$, respectively. Similarly, $\beta_{1i,post}$ and $\beta_{1i,pre}$ are the firm's return comovements with the portfolio of leveraged stocks in year $t + 1$ and year $t - 1$, respectively. We calculate the corresponding changes for control firm *c* in the same way as in Eq. (5a) and (5b) and denote them as $\Delta\beta_{0c}$ and $\Delta\beta_{1c}$.

If there exists the effect of financial leverage clienteles on return comovement, we expect an average decrease of $\Delta\beta_{0i}$ and an average increase of $\Delta\beta_{1i}$ for the L0L1 sample firms that change their capital structure from zero-leverage to leverage; that is, we test if $\Delta\beta_0 < 0$ and $\Delta\beta_1 > 0$. In contrast, the average of $\Delta\beta_{0i}$ ($\Delta\beta_{1i}$) is expected to increase (decrease) for the L1L0 sample firms that turn from leveraged firms to zero-leverage firms; that is, we test if $\Delta\beta_0 > 0$ and $\Delta\beta_1 < 0$. Since the control firms do not change their leverage, we do not expect them to experience any significant change in their excess return comovement with the benchmarks, i.e., $\Delta\beta_0 = 0$ and $\Delta\beta_1 = 0$.

3. Empirical Results

3.1 Descriptive Statistics

Table 1 presents the sample distribution across industries[6] and years. There is a total of 1,234 firms in the L0L1 group that convert from a zero-leverage firm to a leveraged one and 2,291 firms in the L1L0 group that shed their long-term debt entirely from the balance sheet. Panel A shows that the Business Equipments sector has the largest number of leverage events with 493 L0L1 firms and 758 L1L0 firms. The Healthcare sector ranks second with 323 leverage events in the L0L1 group and 449 deleverage events in the L1L0 group. Panel A also shows the average leverage level that the L0L1 firms introduce in their capital structure in the event year. While this differs across industries, it is approximately 12% across all firms. The average leverage that L1L0 firms discard from their capital structure in the year before the change is about 7%. Panel B shows that leverage events in both L0L1 and L1L0 groups occur more often in more recent periods than earlier periods. In addition, the average level of leverage for the L0L1 firms increases over time from 6% in the 1970 – 1985 period, to 11% in the 1986 – 2000 period, and 13% in the 2001 – 2016 period. The average leverage level for the L1L0 firms is relatively stable, ranging from 5% in the 1970 – 1985 period to 7% in the latter two periods.

[Insert Table 1 Here]

[Insert Figure 1 Here]

Table 2 presents the characteristics of our (de)leverage sample firms and their PSM matched peers. Panel A reports the results for the L0L1 firms while Panel B displays the L1L0 firms' results. The difference tests in the last two columns indicate that the PSM method has done a good job of

[6] We use the 12 industries as described on Kenneth French's website, https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html.

finding a matched firm for each sample firm. Forty-five out of 48 mean and median tests show no statistically significant differences between the sample and control firms.

[Insert Table 2 Here]

3.2 Baseline Results

We report the results for the changes in return comovement of the L0L1 sample firms and the control firms in Table 3. In general, the results show strong evidence that firms initiating leverage experience a significant decrease in excess comovement of their returns with the returns of zero-leverage stocks and a substantial increase in return comovement with other leveraged stocks. Specifically, Panel A shows that the coefficient of β_{0i}, on average, decreases from 0.510 to 0.369, a difference of -0.141 statistically significant at the 1% level. This finding suggests that a year after becoming a leveraged firm, the leverage initiator's returns covary significantly less with the returns of other zero-leverage firms. The result for β_{1i} displays a more remarkable change. The average β_{1i} for year t - 1 is only 0.172, suggesting that, on average, the L0L1 firms exhibit relatively low return comovement with leveraged firms in the year before their leverage initiation. However, the average β_{1i} for year t + 1 shows a substantial increase to 0.730; that is, the leverage initiators see their returns comove significantly more with leveraged stocks. The result for $\Delta\beta_i$ in the last row of Panel A indicates that a year before the leverage changing year, the L0L1 firms comove mainly with their zero-leverage peers; however, the comovement changes drastically towards leveraged firms one year after the event year. The difference-in-difference result of -0.699 indicates a net decrease in return comovement between the leverage initiators and zero-leverage stocks one year around the event year.

As for the control firms in Panel B, we find that their returns exhibit relatively larger positive comovement with the portfolio of zero-leverage stocks than the portfolio of leveraged stocks. However, these return comovements do not change between the pre- and post-event windows. The results for matched changes in return comovement in Panel C are consistent with those in Panel A in that the leverage initiators comove less with zero-leverage stocks and more with leveraged stocks after the leverage event year, and that these changes in return comovement exist even after accounting for the comovement changes of the control firms. All the matched changes between the post- and pre-event windows are statistically and economically significant. Specifically, the post – pre $\Delta\beta_0$ of -0.092 represents a 39% net decrease in return comovement with zero-leverage stocks while the post – pre $\Delta\beta_1$ increases from an approximately zero comovement to a highly significant comovement of 0.499.

[Insert Table 3 Here]

Table 4 presents the comovement results for the L1L0 sample firms and their matched peers. The results, in general, are in line with our expectation that the effect of financial leverage clienteles suggests a shift in return comovement when a firm leaves its current leverage group and joins another group without any leverage. Panel A shows that firms that fully deleverage experience a significant reduction in return comovement with the portfolio of leveraged firms. The average decrease of β_{1i} is -0.453, representing a 67% reduction relative to the return comovement level of 0.680 in the year before the event year. In contrast, the returns of these L1L0 firms covary noticeably more with other zero-leverage firms, with the comovement change being 0.086 (or a 29% increase) during the year post deleverage. The results in the last row of Panel A indicate that while the L1L0 firms expectedly show more return comovement with their leveraged peers than zero-leverage stocks during the pre-event year, their returns become more covariant with zero-leverage stocks than leveraged ones after they become zero-leverage firms.

We find that the results for the control firms in Panel B are similar to the L1L0 firms in that the control firms display higher return comovement with leveraged stocks than zero-leverage stocks in both the pre- and post-event years. However, these comovements are stable as we expect. In Panel C, we present the differences in return comovement across the deleverage initiators and control firms. We find that the return comovements with the two benchmark portfolios, $\Delta\beta_0$ and $\Delta\beta_1$, are not statistically different between the L1L0 firms and their matched firms in the pre-event year. However, the adjusted return comovement is statistically higher (lower) for the portfolio of zero-leverage (leveraged) stocks in the post-event year. The post – pre difference in the comovement of zero-leverage stocks, $\Delta\beta_0$, is 0.087 statistically significant at the 10% level whereas the post – pre difference in the comovement of leveraged stocks, $\Delta\beta_1$, is -0.431 statistically significant at the 1% level, which results in a grand net change of 0.518 in return comovement in the year after the deleverage event.

[Insert Table 4 Here]

Overall, our baseline results suggest that leverage is a style for investment. When a firm changes its capital structure to include or exclude leverage, it likely attracts a different investor clientele.[7] Hence, its returns covary more with stocks in the new leverage group and less with stocks in the old leverage group.

[7] As robustness tests, we use two alternative measures of leverage: (1) total long-term debt (item 8) plus debt in current liabilities (item 34) divided by total assets (item 6), and (2) total liabilities (Compustat item 181) divided by total assets. The results reported in Table A1 in the appendix are qualitatively similar.

3.3 Exogenous Shocks

3.3.1 Time-Series Funding Constraints

The results shown in Tables 3 and 4 are not likely subject to changes in firm fundamentals because we control for these possible fundamental changes by matching each sample firm to a control firm with similar characteristics. In this section, we further address this by employing various exogenous shocks to corporate leverage decisions. Our first candidate is changes in bank lending standards from the Federal Reserve Bank (FED).[8] Several studies show that firms tend to use more (less) debt in their capital structure when access to bank loan becomes easier (harder) during the period of low (high) bank lending standards. For example, Leary (2009) shows that changes in lending standards affect changes in the supply of bank loans, and Lown, Morgan, and Rohatgi (2000), Lown and Morgan (2006), and Bassett, Chosak, Driscoll, and Zakrajsek (2014)[9] show that shocks in lending standards strongly affect the capacity of businesses to borrow from the banking sector. Tighter credit standards are followed by declines in the aggregate volume of loans and vice versa. This relationship is evident not only in the U.S. but in international markets as well (e.g., De Bondt, Maddaloni, Peydro, and Scopel, 2010; Axelson, Jenkinson, Stromberg, and Weisbach, 2013; Van der Veer and Hoeberichts, 2016).

We compute yearly changes in the FED's lending standards since 1990 and divide them into tightening and loosening standards groups. We then restrict our leverage initiators, L0L1, to the years

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[8] This is based on FED's Senior Loan Officer Opinion Survey of Bank Lending Practices. This survey includes responses from up to 80 U.S. large commercial banks and 24 U.S. branches and agencies of foreign banks and is conducted on a quarterly basis since April 1990. https://fred.stlouisfed.org/series/DRTSCIS.

[9] See also Garleanu and Pedersen (2011), Demiroglu, James, and Kizilaslan (2012), and Saretto and Tookes (2013) for how bank lending standards affect credit supply.

of loosening standards and the deleverage initiators, L1L0, to the years of tightening standards.[10] Our L0L1 sample reduces to 780 firms while our L1L0 sample drops to 720 firms. Table 5 displays the results for changes in return comovement. In Panel A, we find that the comovement of the leverage initiators' returns with zero-leverage stocks, β_{0i}, decreases significantly from 0.530 in the pre-event year to 0.369 in the post-event year. This decrease of 0.161 (or 30%) is statistically significant at the 1% level. However, the return comovement coefficient of β_{1i} increases substantially between the leverage initiators and other leveraged firms. Specifically, the L0L1 firms, on average, exhibit a 0.162 comovement in return with leverage stocks in the year leading to the event year. This changes markedly to 0.674 (or 315%) during the year post leverage initiation. Comparing between β_{0i} and β_{1i}, we find that while the L0L1 firms covary more with zero-leverage stocks before the leverage initiation, their returns comove significantly more with the portfolio of leveraged stocks in during the post-event year. This leads to a difference-in-difference comovement of -0.672 statistically significant at the 1% level.

The comovement difference between the leverage initiators and their control firms is reported in Panel B.[11] The results show that after adjusting for the return comovement of the control firms, the L0L1 firms still display an increase (decrease) in return comovement with zero-leverage (leveraged) firms. The average coefficient differences of $\Delta\beta_0$ and $\Delta\beta_1$ are economically large and statistically significant. In addition, the magnitudes of absolute and relative changes between the post- and pre-event years are noticeably larger for $\Delta\beta_1$ than for $\Delta\beta_0$, suggesting that the L0L1 firms' increased comovement with other leveraged firms is relatively larger than their decreased comovement with

[10] Since there are two lending standards: one for small firms and the other one for middle and large firms, we match our firms to the appropriate standards on a yearly basis. However, our results do not change if we only use either the standards for small firms or the standards for medium and large firms.
[11] We do not report the results for the control firms to save space. They show that while the comovement coefficients, on average, are significant with both zero-leverage and leveraged stocks, they do not show any significant change after the leverage initiation year.

previous zero-leverage peers. The grand net comovement change of -0.637 is statistically significant at the 1% level.

[Insert Table 5 Here]

The results for the deleverage initiators, L1L0, are displayed in the right panels. The average coefficient of β_{0i} shows that there is a positive change in the comovement of the L1L0 firms' returns with the returns of other zero-leverage firms. However, this change of 0.074 from the average comovement one year before the deleverage event is not statistically significant. On the other hand, the result for β_{1i} indicates a drastic decrease in return comovement of the L1L0 firms with their previous leveraged peers. Specifically, in the year before becoming zero-leverage firms, the L1L0 firms have an average comovement coefficient of 0.760 with other leveraged firms; however, this average comovement drops to 0.153 in the year post deleverage. This comovement change represents an 80% decrease. The difference in the change of return comovement is 0.681 statistically significant at the 1% level. After adjusting for the return comovements of the control firms, the results still show a significant and economically large decrease in return comovement with the portfolio of leveraged stocks in the year after the deleverage year. In short, the results in this section confirm our baseline findings that changes in excess return comovement of our (de)leverage initiators are driven by style investment of financial leverage clienteles rather than changes in firm fundamentals.

Adrian, Etula, and Muir (2014) show that changes in the leverage of security broker-dealers represent the tightness of borrowing constraints in the financial intermediary sector. When funding constraints tighten, intermediaries are forced to deleverage by selling off assets and hence, reduce their ability to provide their funding services. We use the leverage factor from Adrian, Etula, and Muir

(2014)[12] to classify our sample period into funding tightening and relaxing years. We also use the TED spread as another factor that is commonly used in the literature to proxy for leverage constraints (e.g., Cornett, McNutt, Strahan, and Tehranian, 2011; Garleanu and Pedersen, 2011; Asness, Moskowitz, and Pedersen, 2013). The comovement results based on these two alternative shocks to corporate leverage decisions, shown in the appendix Table A2, are consistent with those in Tables 4 and 5.

3.3.2 Event Shocks to Corporate Leverage

While the above continuous series help preserve the number of (de)leverage initiations in our sample, they may not be the optimal measures of exogenous shocks to firm leverage decisions (e.g., Bassett, Chosak, Driscoll, and Zakrajsek, 2014; Frazzini and Pedersen, 2014; He, Kelly, and Manela, 2017; Boguth and Simutin, 2018; Jylha, 2018). We now turn to events that are perceived as more direct shocks to corporate leverage. We use the introduction of syndicated bank loan ratings by Moody's and S&P in 1995 as an exogenous shock to corporate debt increase. Sufi (2009) argue that loan ratings are important in lowering the information asymmetry among potential partners during the syndication process and between banks and institutional investors, which increases the supply of debt finance by lenders and better access to loan markets by corporate borrowers. Sufi (2009) finds a significant increase in corporate debt during the 1995 – 1998 period after the loan rating initiation. We use this event period as an exogenous shock to our L0L1 firms and find 223 leverage initiators. Table 6, Panel A displays the comovement results for these L0L1 firms. They are consistent with the findings in Table 3 and Table 5 in that there are significant shifts in return comovement from the zero-

[12] We thank Tyler Muir for providing the data on his website, https://sites.google.com/site/tylersmuir/home/data-and-code.

leverage portfolio to the leverage portfolio and that these shifts are robust even after controlling for the return comovements of the PSM matched firms.

We use various exogenous events that affect firms' incentive to shred off their leverage. First, Heider and Ljungqvist (2015) show that corporate income tax has a first-order effect on firm financial leverage. We use the 83 tax cuts in 27 U.S. states between 1989 and 2016.[13] Since tax cuts reduce the value of interest tax shields and hence inventize firms to reduce their leverage[14], we map our deleverage initiators, L1L0, to states where their headquarters are located. We select L1L0 firms that turn into zero-leverage firms in years *t*, *t* + 1, and *t* + 2 relative to the tax cut year. This selection yields 257 L1L0 firms. The results in Panel B of Table 6 show that the increase (decrease) in return comovement with the zero-leverage (leverage) portfolio is statitically and economically significant before and after adjusting for the comovement changes of the control firms. The magnitudes of the grand net changes, $\Delta\beta_i$ and $\Delta\beta$, are approximately twice as large as those in Table 4.

Second, Lemmon and Roberts (2010) use three exogenous shocks to credit supply in 1989, i.e., the collapse of Drexel Burnham Lambert, Inc., the passage of the Financial Institutions Reform, Recovery, and Enforcement Act, and a change in the National Association of Insurance Companies (NAIC) credit rating guidelines, and show that these events lead to a substantial decline in debt issuance during the post-shock period of 1990 – 1993. We restrict our L1L0 firms to this period and find 224 deleverage initiations. Third, Gong (2020) uses the SEC's temporary suspension of short-sale price tests for a number of Pilot securities in 2004 as an exogenous shock to firm deleveraging decisions due to an increase in short selling threats to the Pilot firms. We match our sample of L1L0

[13] We identify tax changes from the Tax Foundation website, http://www.taxfoundation.org. We find 46 tax increases in 24 states over the same period. However, when we map our leverage initiators, L0L1, to their headquarter and affected states, the sample reduces to only 76 firms. Our results for this limited sample do not yield any significant changes in return comovement.

[14] We note that while Heider and Ljungqvist (2015) do not find that tax cuts are associated with a significant change in the cross-section of firms headquartered in the affected states, our sample of zero-leverage initiators focuses on firms with the strongest incentive to deleverage after the tax cuts.

firms to the list of Pilot firms[15] for the 2004 – 2007 period as in Gong (2020) and find 337 deleverage initiators. Finally, Cornett, McNutt, Strahan, and Tehranian (2011) and Dewally and Shao (2014) show that the liquidity shock caused by the financial crisis of 2007 – 2009 reduces banks' ability to provide credit supply to corporate borrowers, which leads to firm deleveraging actions (Benguria and Taylor, 2019). We use 227 firms from the L1L0 sample between the 2007 – 2009 period. We combine these three event periods and report the comovement results for the L1L0 firms in Panel C of Table 6.[16] They are consistent with those in Table 4 except that the comovement change for the portfolio of zero-leverage stocks is not statistically significant. Overall, the results in this section supports the notion of leverage clientele-induced return comovement since the various events we use here are exogenous to firm leverage decisions.

[Insert Table 6 Here]

4. Robustness Tests

4.1 Univariate Regressions

Chen, Singal, and Whitelaw (2016) show that comovement coefficients from a bivariate regression are sensitive to small changes in the model parameters. They advocate the use of univariate regressions for both sample and control firms. We follow their suggestion and split our bivariate regression of Eq. (3) into two univariate regressions as below:

[15] The list is extracted from the SEC website, https://www.sec.gov/rules/other/34-50104.htm.

[16] The results for each event window are significant and in the same patterns as those in Panel C. They are available upon request.

$$R_{i,d} = \alpha_i + \beta_{0i} BMK0_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \tag{6a}$$

$$R_{i,d} = \alpha_i + \beta_{1i} BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \tag{6b}$$

All variables are defined as in Eq. (3). Similarly, we use the univariate regressions to re-estimate model (4) for the matched control firms. We report the results for the L0L1 and L1L0 sample firms in Panel A of Table 7, whereas the results for the differences between the sample firms and their matched control firms are presented in Panel B. In general, the results for leverage initiators are relatively similar to those in Table 3. The negative change in β_{0i} between the post- and pre-leverage initiation indicates a decrease in return comovement of the L0L1 firms' returns with their previous zero-leverage peers, and this result is also significant for the adjusted comovement change, $\Delta\beta_{0i}$. The average coefficients of β_{1i} and $\Delta\beta_{1i}$ for the L0L1 firms indicate that their returns covary considerably more with other leveraged stocks during the year after they become leveraged firms. This increased comovement with leveraged stocks is larger than the decreased comovement with zero-leverage stocks, resulting in a substantial net change in return comovement of both unadjusted and adjusted coefficient differences, $\Delta\beta_i$ and $\Delta\beta$.

The average changes for the firms that deleverage fully, L1L0, are relatively stronger and larger in magnitude than those reported in Table 4. Leaving the group of leveraged stocks induces a large decrease in return comovement with these leverage stocks while joining the new group of zero-leverage stocks triggers a significant increase in return comovement with these zero-leverage stocks. The average changes in β_{1i} and β_{0i} in Panel A are statistically significant at the 1% level one year around the deleverage year. The results for the comovement differences between the L1L0 firms and the control firms in Panel B display a similar pattern and statistical significance.

[Insert Table 7 Here]

With univariate regressions, we can also examine the strength of return comovement using the regression R-squared (R2). In the appendix Table A3, we report the results for average R2s and their changes one year surrounding the event year. For the L0L1 firms, the results show that there is a significant decrease in R2 of the regression with the portfolio of zero-leverage stocks, $R2_{0i}$, and a significant increase in R2 of the regression with the portfolio of leveraged stocks, $R2_{1i}$. For the L1L0 firms, we find a significant increase in $R2_{0i}$ but an unchanged $R2_{1i}$ after the deleverage year. These R2 changes are both statistically significant after accounting for the control firms' R2s, as shown in Panel B, Table A3. These R2 findings are consistent with those reported in Table 7 in that changing leverage induces a shift in return comovement[17].

4.2 The Extent of Leverage Change

Kim, Lewellen, and McConnell (1979) find evidence in support of Miller's (1977) that there is a negative relationship between corporate leverage and investors' tax brackets. However, the relationship is weak and apparently centered at zero and the high end of leverage ratios. Harris, Roenfeldt, and Cooley (1983) also report supportive results of financial leverage clienteles and

[17] Since the reported changes in R2 in Table A3 could be due to changes in the covariances between the stock returns and the four Fama-French-Carhart factors, our unreported results indicate that while the adjusted return comovements display small and significant changes for the market return, SMB, and HML factors for the L0L1 firms, there is no evidence of a significant change for the four factors for the L1L0 firms.

confirm that the leverage clientele effect is mixed for firms with moderate financial leverage policies. We examine if the change in return comovement differs depending on the extent of leverage change. Every year we classify leveraged firms in the cross-section into low and high leverage groups based on the cross-sectional median. We then estimate the excess return comovements of each sample firm with a portfolio of zero-leverage stocks and a portfolio of leveraged stocks corresponding to the size of the leverage taken up by the firm. We expect that the magnitude of the post – pre differences is larger for higher leverage initiators.

The results in Table 8 for the L0L1 sample firms are consistent with our expectations. In Panel A, we report the average changes in return comovement for firms that introduce a low level of leverage. We find that while the post – pre difference in the adjusted return comovement is not statistically significant for the portfolio of zero-leverage stocks, $\Delta\beta_0$, it is highly significant for the portfolio of leveraged stocks, $\Delta\beta_1$, which leads to a grand net change, $\Delta\beta$, of -0.560 statistically significant at the 1% level. Interestingly, the findings for the L0L1 firms with the high leverage initiation in Panel B show a larger increase in return comovement with highly leveraged stocks, resulting in a grand net change in return comovement of -0.746 statistically significant at the 1% level.

The right panels in Table 8 show the results for the L1L0 samples with different levels of deleveraging. We find that after adjusting for the corresponding return comovements by the control firms, the L1L0 firms that shed a small amount of leverage to become zero-leverage firms display a significant increase in return comovement with their new peers. In addition, they also experience a substantial decrease in return comovement with their previous counterparts of low leverage. The grand net increase, $\Delta\beta$, of 0.451 in Panel A is statistically significant at the 1% level. Panel B shows that both changes in return comovement with the two benchmark portfolios are larger in magnitude, leading to a grand net increase, $\Delta\beta$, of 0.650 statistically significant at the 1% level. Compared to the

$\Delta\beta$ of 0.451 in Panel A, this grand net increase is 44% higher. In short, the results in Table 8 indicate that the shift in return comovement is larger for a larger change in leverage. This finding is evident for both the leverage initiators and the deleverage initiators.

[Insert Table 8 Here]

4.3 Subsamples

Hameed and Xie (2019) find evidence of dividend clienteles. They show that firms that initiate dividend payment experience an increase in excess return comovement with the portfolio of dividend-paying stocks and a decrease in their return comovement with the portfolio of non-dividend payers. Heider and Ljungqvist (2015) show that tax-induced leverage changes differ between dividend payers and non-dividend payers. Colombo and Caldeira (2018) use a tax reform on dividends in Brazil and find that when dividends become tax-deductible, firms increase their dividend payment and simultaneously decrease their leverage, suggesting that the values of interest tax shields and dividend tax shields are substitutes. To address the concern that the leverage initiation effect we observe on return comovement may be contaminated by the dividend initiation effect, we remove firm-year observations where firms change their leverage structure and dividend policy at the same time.[18]

The results after this screening are reported in Panel A of Table 9 for the differences in return comovement between the sample firms and the matched control ones. For the L0L1 firms, the decrease in return comovement with the portfolio of zero-leverage stocks, $\Delta\beta_0$, is still negative and significant,

[18] The exclusion results in a reduction of 209 and 376 firms from the original numbers of 1,234 and 2,291 firms in the L0L1 and L1L0 samples, respectively.

whereas the increase in return comovement with the portfolio of leveraged stocks, $\Delta\beta_1$, is highly significant and economically large. The grand net change, $\Delta\beta$, of -0.673 represents a significant shift in return comovement towards the new leveraged peers in the year after the leverage initiation year. This grand net change is relatively similar to that in Table 3 and Table 7. The results for the L1L0 firms continue to show that the deleverage initiators' returns comove more with zero-leverage stocks and less with leveraged ones, yielding a significant grand net change, $\Delta\beta$, of 0.602 one year after the event. This grand net change is higher than that in Table 4 but relatively similar to that in Table 7. In summary, the results in Panel A, Table 9 suggest that the effect of financial leverage clienteles on return comovement is distinct from the effect of dividend clienteles documented in Hameed and Xie (2019).

[Insert Table 9 Here]

Lemmon, Roberts, and Zender (2008) examine the stability of capital structure in the U.S. find that it is indeed very stable for as long as 20 years. This stability cannot be explained by the determinants of capital structure. We restrict our samples of L0L1 and L1L0 firms to only first-time initiators, which reduces our sample size to 1,066 and 1,864, respectively. We report the results in Panel B of Table 9. The post – pre difference in $\Delta\beta_0$ is -0.059, suggesting that there is a reduction in the return comovement of the first-time leverage initiators with their previous zero-leverage peers, but this reduction is not statistically significant. However, the increased return comovement, $\Delta\beta_1$, of 0.489 is economically large and highly significant at the 1% level. The grand net change, $\Delta\beta$, of -0.548 is mainly contributed by the increase in return comovement with other leveraged stocks and equal to 90% of the grand net change of -0.615 reported for all leverage initiators in Panel C of Table 3. This finding indicates that first-time leverage initiation has a large effect on the shift in return comovement. The results for the difference between the L1L0 firms and their matched firms also show a significant change in return comovement one year after the full deleverage initiation. All post – pre changes are expectedly and significantly positive (negative) for the portfolio of zero-leverage (leveraged) stocks. The grand net change, $\Delta\beta$, of 0.493 is statistically and economically significant and quite similar to that of 0.518 in Table 3. Therefore, the results for both L0L1 and L1L0 samples suggest that first-time leverage and deleverage initiators strongly attract the interest of corresponding financial leverage clienteles, which leads to a significant shift in return comovement.

4.4 Stability of Excess Return Comovement

The previous sections show that a shift in leverage induces a significant change in stock return comovement one year after the leverage change. In this section, we test whether the shift in return comovement is completed within year $t + 1$ or continues after that. We re-estimate model (3) for each of our L0L1 and L1L0 firms in the years $t + 2$, $t + 3$, $t + 4$, and $t + 5$ and report them in Table A4 in the appendix. In Panel A, the results for the L0L1 sample firms show that the average return comovements with zero-leverage stocks, β_{0i}, and leveraged stocks, β_{1i}, are highly statistically significant during five years after the leverage event year and that the comovements with leveraged stocks, β_{1i}, are statistically larger than those with zero-leverage stocks. Importantly, the mean tests for the comovement difference between two consecutive years show insignificant results, suggesting that the change in return comovement is stable in the years after the leverage initiation. The results for firms that fully deleverage are reported in Panel B. While the return comovement with their new peers, i.e., zero-leverage stocks, is statistically significant in each of the five years post deleverage, it indicates an increase for the years t + 3 and a small decrease in year t + 4. The results for the return comovement with leveraged stocks indicates that the comovement change is stable after the event year.

5. Turnover Comovement and Mutual Fund Holdings

5.1 Comovement in Turnover

In this section, we further investigate the effect of financial leverage clienteles by examining the comovement in the trading activity of our samples of leverage and deleverage initiators. Evidence on the trading comovement would reinforce our results for the return comovement in that investors indeed trade stocks based on their leverage style. We use turnover as a proxy for trading activity and follow Lo and Wang (2000), Karolyi, Lee, and van Dijk (2012), and Hameed and Xie (2019) to compute a firm's daily turnover, as in Eq. (6) below.

$$TOVER_{j,d} \equiv \log\left(1 + \frac{VOLUME_{j,d}}{NOSH_{j,t}}\right) - \frac{1}{N}\sum_{k=1}^{100} \log\left(1 + \frac{VOLUME_{j,d-k}}{NOSH_{j,t}}\right) \qquad (7)$$

where $TOVER_{j,d}$ and $VOLUME_{j,d}$ are the turnover and trading volume of stock j on day d, respectively. $NOSH_{j,t}$ is the total number of shares outstanding at the beginning of year t. Eq. (7) converts the raw non-stationary turnover, measured as $VOLUME_{j,d}$ / $NOSH_{j,t}$, into a stationary detrended series.

Next, we follow Hameed and Xie (2019) and remove the impacts of returns on turnover by regressing $TOVER_{j,d}$ on absolute returns on stock j and the market returns within each month, as shown in Eq. (8) below.

$$TOVER_{j,d} = \gamma_{0j} + \gamma_{1j}|R_{j,d}| + \gamma_{2j}|MR_d| + \gamma_{3j}|R_{j,d-1}| + \gamma_{4j}|MR_{d-1}| + \varphi_j \sum_{\tau=1}^{4} D_\tau + RTO_{j,d} \tag{8}$$

where $|R_{j,d}|$ and $|MR_d|$ are the absolute returns on stock j and the market index on day d while $|R_{j,d-1}|$ and $|MR_{d-1}|$ are the absolute returns on stock j and the market index on day d - 1, respectively. We also include a set of dummy variables, D_τ, to control for differences across trading days in the week. $RTO_{i,d}$ is the series of residual turnover after filtering out the effects of returns and days of the week.

We then use $RTO_{i,d}$ to examine the comovement in residual turnover of our (de)leverage firms and the two benchmark portfolios of zero-leverage and leveraged firms. Specifically, we follow Hameed and Xie (2019) and run the following regression:

$$RTO_{i,d} = \alpha_i + \sum_{\tau=-1}^{1} \beta_{T0i,\tau} RTO0_{d+\tau} + \sum_{\tau=-1}^{1} \beta_{T1i,\tau} RTO1_{d+\tau} + \vartheta_d \tag{9}$$

where $RTO_{i,d}$ is the daily residual turnover of a leverage initiator, L0L1, or a deleverage initiator, L1L0, in our sample. $RTO0_d$ and $RTO1_d$ are the equal-weighted averages of daily residual turnover of zero-leverage and leveraged stocks on day d, respectively. We estimate model (9) for each sample stock during year t – 1 and year t + 1 relative to the (de)leverage initiation year. The turnover comovement coefficient is the sum of coefficients corresponding to days -1, 0, and +1; that is, $\beta_{T0i} = \beta_{T0i,-1} + \beta_{T0i,0} + \beta_{T0i,+1}$ and $\beta_{T1i} = \beta_{T1i,-1} + \beta_{T1i,0} + \beta_{T1i,+1}$. Hence, β_{T0i} (β_{T1i}) represents the comovement of a sample stock i's residual turnover with the average residual turnover of zero-leverage (leveraged) stocks. We also run Eq. (9) for each of the control firms and obtain their corresponding turnover comovement coefficients, denoted as β_{T0c} and β_{T1c}.

We report the results in Table 10. Panel A shows the turnover comovements for both samples of leverage and deleverage initiators, and Panel B presents the results after adjusting for the turnover comovements of the control firms. In general, our findings are consistent with the results for the return comovements. Panel A shows that firms that change from a zero-leverage firm to leveraged one exhibit a significant reduction in β_{T0i}, the correlation between their trading activities and those of zero-leverage stocks, while there is a significant increase in β_{T1i}, the turnover comovement with other leveraged stocks. The net change in turnover comovement of -0.851 is statistically significant and economically large. In the opposite direction, firms that shred off all their long-term debt display a significant increase in turnover comovement with other zero-leverage stocks, whereas their trading activities covary a lot less with their previous leveraged peers. The net change in turnover comovement for this group of L1L0 firms is 0.547 statistically significant at the 1% level and economically meaningful.

[Insert Table 10 Here]

In Panel B, the turnover comovement coefficients of the sample firms are adjusted for the corresponding coefficients of their matched peers. While the unreported results for the control firms, on average, do not show any statistically significant change in turnover comovement, their adjustment weakens the statistical significance of the comovement changes of the L0L1 firms. However, the grand net change, $\Delta\beta_T$, of -0.885 is slightly larger than the net unadjusted value of -0.851 in Panel A. The adjusted comovement coefficients for the L1L0 firms are relatively larger in magnitude, and the changes between the pre- and post-event periods remain statistically significant at the 5% level. The net adjusted change of 0.666 is approximately 22% higher in size than the net unadjusted change of

0.547 in Panel A. Overall, the results for turnover comovement suggest that investors consider leveraged or zero-leverage stocks as an investment category and hence trade them in accordance with their leverage preferences.

5.2 Mutual Fund Holdings

In this section, we focus on changes in mutual fund holdings to provide more direct evidence on the financial leverage clienteles. While the traditional Proposition I of Modigliani and Miller (1958) assumes that investors have unlimited access to borrowing, the reality is that many individual and institutional investors face leverage constraints. Frazzini and Pedersen (2014), Christoffersen and Simutin (2017), Boguth and Simutin (2018), and Jylha (2018) show that constrained investors, including mutual funds, pension funds, and retail investors, tilt their investment portfolios towards high equity beta stocks to achieve the level of leverage they desire. Since financial leverage is a dominant factor that is positively correlated with equity beta (Gomes and Schmid, 2010), Cornaggia, Simin, and Sonmez-Leopold (2019) report that leverage-constrained investors could be better off if they overweight firms with high financial leverage in their portfolios.[19] Therefore, if a change in a firm's leverage induces a change in the stock's holdings by mutual funds, it would be a clear indication of investor preference for leverage.

To address this, we first extract holdings data for all U.S. equity mutual funds from Thomson Reuters CDA/Spectrum database and fund flows from the CRSP Survivor-Bias-Free Mutual Fund database. We use MFLINKS tables to merge these two databases together and aggregate share class

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[19] Since equity beta is a function of asset beta and leverage, $\beta_E = \beta_A * (1 + D/E)$, an investor who adds a leveraged firm to her investment portfolio rather than a zero-leverage firm with the same equity beta, benefits from the lower covariance of the leveraged firm's assets with the market portfolio (see Cornaggia, Simin, and Sonmez-Leopold, 2019, p.10).

observations to the fund level. Our analysis includes all equity funds that have at least 65% of their assets in common stocks (e.g., Cremers and Petajisto, 2009; Amihud and Goyenko; 2013). Next, we classify mutual funds into groups of relative preference for leverage based on the stocks they hold. Specifically, we employ the following equation to measure the average leverage across all stocks owned by fund *f* in year *t*.

$$MFLV_{f,t} = \Sigma\, w_{f,i,t} * LEV_{i,t} \tag{10}$$

where $MFLV_{f,t}$ is the fund-level leverage in year *t*; $w_{f,i,t}$ is the investment weight of stock *i* held by fund *f* in year *t*; and $LEV_{i,t}$ is the debt-to-assets ratio of stock *i* in year *t*. The summation represents all common stocks held by fund *f* in year *t*. The higher the value of $MFLV_{f,t}$ the more likely that the fund has a strong preference for leverage. We then sort all funds into quintiles based on their yearly *MFLV* values. For each (de)leverage initiator in our sample, we calculate the change in its holding by mutual fund *f* from the year before to the year after the (de)leverage initiation, i.e., $\Delta w_{f,i,t+1} = w_{f,i,t+1} - w_{f,i,t}$.[20] We then aggregate the holding changes across all sample stocks for fund *f* in year *t*. We also compute the holding changes for the matched control firms in the same manner.

Table 11 report these mutual fund holdings results. Panel A shows the results for our leverage changing firms across mutual fund quintiles. As expected, we find that in the pre-event year, leverage favored mutual funds hold less of the leverage initiators, L0L1, whereas leverage-unfavored funds own relatively more of these L0L1 stocks. However, in the year after the leverage initiation, funds that prefer highly leveraged stocks, *HI_MFLV*, significantly increase their holdings of L0L1 stocks

[20] We follow the literature (e.g., Hameed and Xie, 2019) and use the investment weight in the first quarter of the year to proxy for the yearly weight. In addition, we use the weight at the end of the first quarter of year *t* as the pre-event holding weight for stock *i*.

by 0.343 percentage points while funds that prefer stocks with low leverage, *LO_MFLV*, significantly decrease their holdings of these L0L1 stocks by 0.199 percentage points. The difference in the post – pre holding change between the *HI_MFLV* and *LO_MFLV* funds is 0.542 is statistically significant at the 1% level, which is consistent with investors' differential preferences for leverage. The monotonic increase in the mutual fund holdings of the leverage initiators further confirms the existence of financial leverage clienteles. For the deleverage initiators, L1L0, the results in the right section of Panel A show a remarkable opposite pattern. *HI_MFLV* (*LO_MFLV*) mutual funds hold more (less) of these stocks in the year before the event; however, their holdings reduce (increase) significantly in the year after the full deleverage. These changes are monotonic across the *MFLV* fund quintiles, and the magnitude of the *HI_MFLV* – *LO_MFLV* difference is statistically significant and economically meaningful. In Panel B, we report the results for the matched control firms and find that while fund holdings of these control firms follow similar patterns as the treated firms in the pre-event year, there is no evidence that mutual funds significantly change their holdings of these firms. The results in Panel C confirm those in Panel A even after adjusting for the holdings of the control firms by mutual funds.

[Insert Table 11 Here]

5.3 Mutual Fund Flows and Return Comovement

The evidence on mutual fund holding changes in the previous section implies that prices of zero-leverage and leveraged stocks should be affected by the capital flows of mutual funds conditional on the funds' preferences for leverage. We explore this conjecture by employing a similar framework as Lou (2012) and Hameed and Xie (2019). First, we compute flow-induced trading for each stock i in mutual fund f in month m, $FIT_{f,i,m}$, as follows:

$$FIT_{f,i,m} = FLOW_{f,m} * \frac{SHR_{f,i,m}}{\sum_{k \in N} SHR_{k,i,m}} \tag{11}$$

where $SHR_{f,i,m}$ is the number of shares of stock i held by mutual fund f, and $SHR_{k,i,m}$ is the number of shares of stock i in fund kth in our sample of N domestic equity funds[21]. $FLOW_{f,m}$ is the dollar flow to fund f in month m, measured as in Eq. (12):

$$FLOW_{f,m} = \frac{TNA_{f,m} - TNA_{f,m-1}(1 + R_{f,m}) - MergeTNA_{f,m}}{TNA_{f,m-1}} \tag{12}$$

where TNA is the total net asset at the end of the month; R is the fund's monthly return; and $MergeTNA$ is to adjust for the increase in TNA due to mergers in the month. Next, based on the fund-level leverage in quarter q, $MFLV_{f,q}$, we classify all funds into leverage-favored funds (leverage-unfavored funds) if the $MFLV_{f,q}$ is higher (lower) than the median value in that quarter. We then aggregate the flow-induced trading of stock i, $FIT_{f,i,m}$, across funds in the same leverage preference groups and denote them as $FIT\_LF_{i,m}$ and $FIT\_LU_{i,m}$, respectively.

We expect that when leverage-favored funds experience an increase in dollar inflow, they will invest the inflow in their existing holdings. This capital allocation has a larger effect on the returns of leveraged stocks than those of zero-leverage stocks. In contrast, the effect will be stronger on zero-leverage stocks' returns when leverage-unfavored funds undergo an increase in capital inflow. Each

[21] Since mutual fund holdings are reported on a quarterly basis, we use holdings in the latest quarter to proxy for holdings in a given month.

year, we regress the monthly stock returns in years $t + 1$ and $t + 2$ on the two measures of monthly flow-induced trading and the four Fama-French-Carhart risk factors. We also control for the stock's monthly industry returns, measured as a value-weighted return across all stocks in the same Fama-French 48 industries, and lagged values of the flow-induced trading measures.[22] We then obtain the yearly average coefficients for all leveraged and zero-leverage stocks separately and report the time-series average of these coefficients with the Newey-West adjusted *t*-statistics in Table 12.

The results are consistent with the expectations. Leveraged stocks' returns are positive and significantly correlated with the flows of leverage-favored mutual funds. The *FIT_LF* coefficient in column (1) is 0.159 statistically significant at the 1% level. Its magnitude in column (3) remains the same after further controlling for lagged flow-induced trading and industry returns. The *FIT_LU* coefficient, however, is not significant, suggesting that the flows of leverage-unfavored mutual funds do not have an impact on the returns of leveraged stocks. The results for zero-leverage stocks are in contrast with those of leveraged stocks in that there is a significant effect of leverage-unfavored fund flows on the returns of zero-leverage stocks while leverage-favored fund flows do not display any significant influence. This result is robust across the three regression specifications of (4) – (6). Therefore, the findings in Table 11 further confirm our evidence of financial leverage clienteles.

[Insert Table 12 Here]

[22] We require 24 monthly observations for each regression. In unreported results, we also include the value-weighted returns of all leveraged (zero-leverage) stocks in the same industry as stock *i*. These additional controls do not change our results in Table 12.

6. Conclusion

In this paper, we address the research question of whether financial leverage is seen as an investment style. If so, when a firm changes its leverage level, it will attract a different financial leverage clientele, which subsequently affects the covariance between the firm's returns and the returns of other firms in the old and new leverage groups. We use two samples of U.S. firms: one L0L1 sample including 1,234 firms that move from a zero-leverage firm to a leveraged one, and another L1L0 sample consisting of 2,291 firms that change from a leveraged firm to a zero-leverage one. We employ a propensity matching score method to find a control firm for each of our (de)leverage initiators. Our analyses show that after controlling for the return comovements of the matched firms, the L0L1 firms display a significant increase in return comovement with the portfolio of leveraged stocks while their return comovement with the portfolio of zero-leverage stocks reduces significantly one year surrounding the leverage initiation year. The L1L0 firms, on the other hand, see their returns covary more with zero-leverage stocks and less with leveraged ones.

Our results are robust when we use the FED's bank lending standards, the leverage factor of Adrian, Etula, and Muir (2014), the TED spread, and various other events as exogenous shocks to the firm's leverage decision. Our results are consistent when we employ univariate regressions as an alternative method, after we exclude the potential confounding effect of dividend initiation, or when we focus on first-time (de)leverage initiators. We also find that a relatively larger absolute change in leverage triggers a relatively larger absolute change in return comovement. Our findings of turnover comovements provide evidence to our hypothesis that leverage is an investment style, and investors will induce a change in comovement while restructuring their portfolio in accordance with their leverage preferences. Finally, our analyses of mutual fund holdings and flows strengthen the evidence of leverage-style investment by showing that mutual funds tend to restructure their holdings of leverage changing stocks around the event year and that funds allocate capital flows following their investors' preferences for leverage. This paper contributes to the well-established literature of financial leverage clienteles and capital structure, and the growing literature on style investment due to investors' limited ability to process information.

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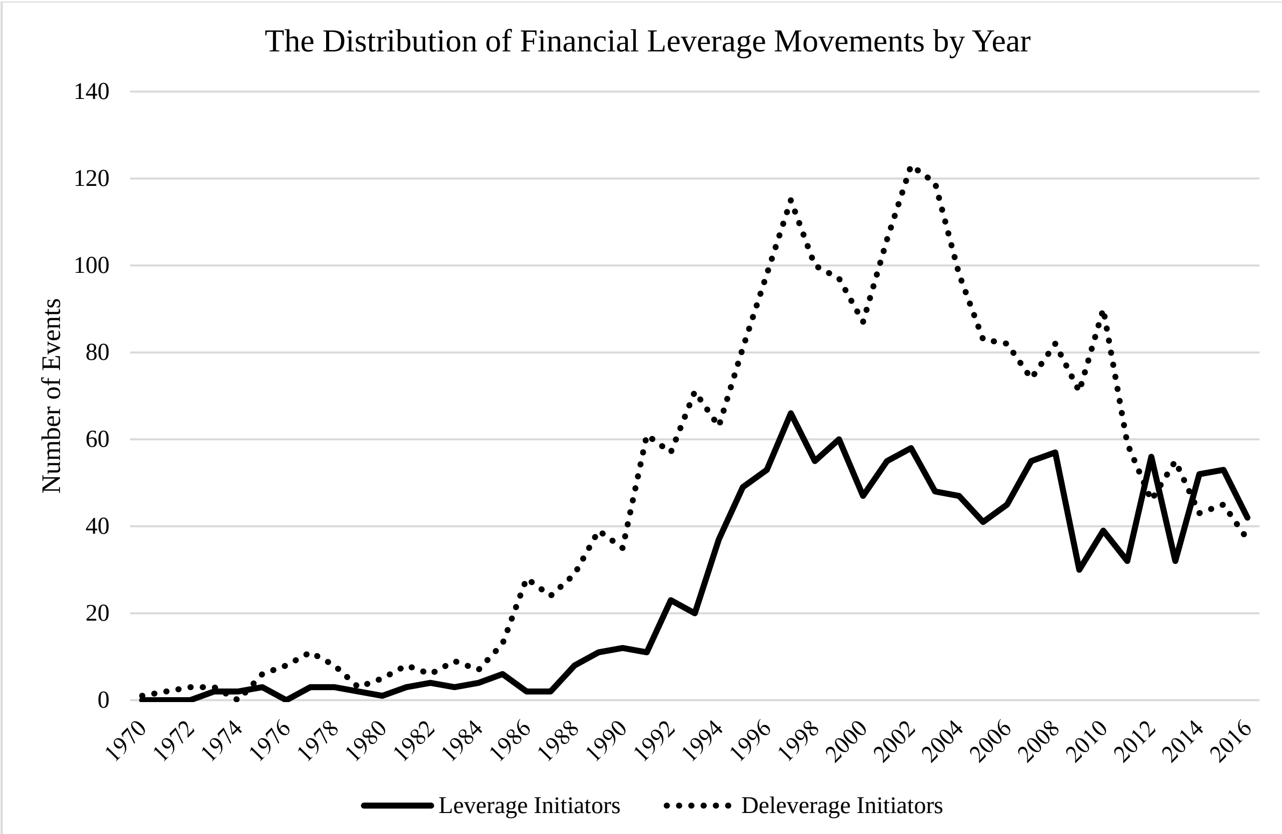

Figure 1: This figure presents the distributions of leverage initiations (L0L1) and deleverage initiations (L1L0) over the sample period of 1970 – 2016.

TABLE 1
Leverage and Deleverage Initiations by Industry and Year

Panel A: Distribution by 12 Fama-French Industries

	L0L1 Firms		L1L0 Firms	
	N	Leverage (*t*)	N	Leverage (*t*-1)
Business Equipment	493	0.106	758	0.057
Chemicals	4	0.023	33	0.117
Consumer Durables	13	0.161	43	0.064
Consumer Nondurables	23	0.058	104	0.062
Energy	17	0.115	83	0.136
Finance	72	0.100	106	0.083
Healthcare	323	0.165	449	0.074
Manufacturing	53	0.088	203	0.065
Other	132	0.102	250	0.086
Shops	97	0.118	231	0.073
Telecommunication	7	0.144	31	0.070
Utilities	0	_-	0	_-

Panel B: Distribution by 5-Year Periods

	L0L1 Firms		L1L0 Firms	
	N	Leverage (*t*)	N	Leverage (*t*-1)
1970-1975	7	0.049	15	0.049
1976-1980	9	0.083	35	0.027
1981-1985	20	0.049	43	0.066
1986-1990	35	0.072	155	0.053
1991-1995	140	0.088	333	0.068
1996-2000	281	0.118	497	0.074
2001-2005	249	0.125	529	0.062
2006-2010	226	0.109	399	0.079
2011-2016	267	0.161	285	0.093

This table presents the distributions of leverage initiations (L0L1) and deleverage initiations (L1L0) by 12 Fama-French industries and 5-year periods. Leverage (*t*) is the average leverage level that the L0L1 firms take up in the event year. Leverage (*t*-1) is the average leverage level that the L1L0 firms discard to become zero-leverage firms in the event year.

TABLE 2
Characteristics of Sample Firms and Control Firms

Panel A: For Leverage Initiating Firms, L0L1.

	L0L1 Firms			PSM Matched Firms			Difference Tests	
	N	Mean (1)	Median (2)	N	Mean (3)	Median (4)	Mean (1-3)	Median (2-4)
Profitability	1,234	0.089	0.066	1,234	0.084	0.053	0.005	**0.013***
Firm size	1,234	4.584	4.501	1,234	4.601	4.536	-0.017	-0.035
Tangible assets	1,234	0.136	0.089	1,234	0.136	0.087	0.000	0.002
Market-to-book ratio	1,234	4.527	2.549	1,234	4.555	2.426	-0.029	0.117
Cash volatility	1,234	0.154	0.080	1,234	0.157	0.077	-0.002	0.003
Dividend payer	1,234	0.201	0.000	1,234	0.183	0.000	0.018	0.000
Capital expenditure	1,234	0.043	0.027	1,234	0.041	0.026	0.001	0.001
R&D expenditure	1,234	0.125	0.067	1,234	0.134	0.072	-0.009	-0.005
Cash holding	1,234	0.341	0.289	1,234	0.335	0.280	0.006	0.008
Asset Sale	1,234	0.057	0.000	1,234	0.063	0.000	-0.005	0.000
Tax	1,234	0.019	0.005	1,234	0.018	0.005	0.001	0.001
Share repurchases	1,234	0.022	0.000	1,234	0.021	0.000	0.001	0.000

Panel B: For Deleverage Initiating Firms, L1L0.

	L1L0 Firms			PSM Matched Firms			Difference Tests	
	N	Mean (1)	Median (2)	N	Mean (3)	Median (4)	Mean (1-3)	Median (2-4)
Profitability	2,291	0.095	0.090	2,291	0.096	0.080	-0.001	**0.009***
Firm size	2,291	4.319	4.261	2,291	4.331	4.234	-0.012	0.026
Tangible assets	2,291	0.182	0.131	2,291	0.179	0.130	0.003	0.001
Market-to-book ratio	2,291	3.654	2.054	2,291	3.85	1.989	-0.196	0.065
Cash volatility	2,291	0.121	0.067	2,291	0.131	0.068	**-0.010***	-0.002
Dividend payer	2,291	0.206	0.000	2,291	0.197	0.000	0.009	0.000
Capital expenditure	2,291	0.047	0.030	2,291	0.046	0.029	0.001	0.001
R&D expenditure	2,291	0.093	0.031	2,291	0.095	0.028	-0.001	0.002
Cash holding	2,291	0.265	0.211	2,291	0.267	0.202	-0.002	0.010

Asset Sale	2,291	0.048	0.000	2,291	0.044	0.000	0.004	0.000
Tax	2,291	0.021	0.010	2,291	0.02	0.008	0.001	0.002
Share repurchases	2,291	0.015	0.000	2,291	0.016	0.000	-0.001	0.000

This table presents the mean and median characteristics of leverage initiators (L0L1) and deleverage initiators (L1L0), and their matched peers. L0L1 include firms that change from a zero-leverage firm in years *t* - 2 and *t* - 1 to a leveraged firm in year *t*, and L1L0 firms are those that fully deleverage, i.e., moving from a leveraged firm in years *t* - 2 and *t* - 1 to a zero-leverage firm in year *t*. For each of our (de)leverage initiating firms, we find a matched firm using the propensity score matching (PSM) method. Specifically, in each year *t* we first select all L0L1 firms and those that remain zero-leverage in the current year and the previous two years *t* - 2 and *t* - 1. Then we run the following logit model on the propensity to become a leveraged firm:

$$Pr(L0L1\_DUM_i = 1) = logit(a + b_1 PROFIT_i + b_2 lnSIZE_i + b_3 TANG_i + b_4 MB_i + b_5 CFVOL_i + b_6 DIV_i + b_7 CAPEX_i + b_8 RD_i + b_9 CASH_i + b_{10} ASSET\_SALE_i + b_{11} TAX_i + b_{12} REPUR_i) + e_i \quad (1)$$

where *L0L1_DUM* is equal one if a firm is a zero-leverage firm in years *t* - 2 and *t* - 1 and leveraged firm in year *t*, and zero otherwise. *PROFIT* is the operating income before depreciation (Compustat item 13) divided by total assets (item 6); *lnSIZE* is the log of total assets; *TANG* is the net total property, plant, and equipment (item 8) scaled by total assets; *MB* is market-to-book ratio calculated as the market value of equity (items 24 * 25) divided by total stockholders' equity (item 216); *CFVOL* is the standard deviation of operating income (item 308); *DIV* is a dummy variable equal to one for dividend-paying firms and zero otherwise; *CAPEX* is captial expenditures (item 128) divided by total assets; *RD* is the ratio of research and development expenses (item 46) to sales (item 12); *CASH* is the ratio of cash holdings (item 1) to total assets; *ASSET_SALE* is asset sales (item 107 + item 109) divided by total assets; *TAX* is the ratio of income tax (item 16) to total assets; and *REPUR* is the ratio of share repurchases (item 115) to total assets. Each of the L0L1 treated firms is matched to a control firm with the same three-digit SIC code and a propensity score within 0.01 caliper. We create a matched set of control firms for the L1L0 treated firms in a similar way by replacing the dependent variable in Eq. (1) with another dummy, *L1L0_DUM*, which is equal one for firms that change from a leveraged firm in years *t* - 2 and *t* - 1 to a zero-leverage firm in year *t*, and zero for firms that remain leveraged in three years *t* - 2, *t* - 1, and *t*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 3
Return Comovement of Leverage Initiating Firms

Panel A: Return Comovement of L0L1 Firms

	PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0i})	0.510***	0.369***	-0.141***
	(0.036)	(0.029)	(0.046)
Leverage Portfolio (β_{1i})	0.172***	0.730***	0.558***
	(0.047)	(0.063)	(0.078)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	0.338***	-0.361***	-0.699***
	(0.059)	(0.069)	(0.101)

Panel B: Return Comovement of Control Firms

	PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0c})	0.744***	0.694***	-0.050
	(0.028)	(0.027)	(0.039)
Leverage Portfolio (β_{1c})	0.194***	0.231***	0.037
	(0.062)	(0.060)	(0.086)
$\Delta\beta_c = \beta_{0c} - \beta_{1c}$	0.550***	0.463***	-0.084
	(0.068)	(0.066)	(0.103)

Panel C: Difference in Return Comovement between L0L1 Firms and Control Firms

	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.234***	-0.325***	-0.092*
	(0.045)	(0.040)	(0.054)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	-0.022	0.499***	0.523***
	(0.078)	(0.087)	(0.107)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.212**	-0.827***	-0.615***
	(0.100)	(0.104)	(0.135)

This table presents the average return sensitivity for leverage initiators, L0L1, and their PSM matched peers (see Table 2 for detail on the PSM method) to two benchmark portfolios of zero-leverage and leveraged stocks. Specifically, in each year *t* we run the following regression model:

$$R_{i,d} = \alpha_i + \beta_{0i}BMK0_{res,d} + \beta_{1i}BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Similarly, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. *PRE* and *POST* represent year $t-1$ and $t+1$ surrounding the leverage initiation year. There are 1,234 leverage initiations. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 4
Return Comovement of Deleverage Initiating Firms

Panel A: Return Comovement of L1L0 Firms

	PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0i})	0.295***	0.381***	0.086**
	(0.022)	(0.026)	(0.034)
Leverage Portfolio (β_{1i})	0.680***	0.226***	-0.453***
	(0.042)	(0.033)	(0.054)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	-0.385***	0.155***	0.540***
	(0.048)	(0.042)	(0.071)

Panel B: Return Comovement of Control Firms

	PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0c})	0.304***	0.304***	0.000
	(0.027)	(0.026)	(0.037)
Leverage Portfolio (β_{1c})	0.623***	0.600***	-0.023
	(0.032)	(0.032)	(0.045)
$\Delta\beta_c = \beta_{0c} - \beta_{1c}$	-0.319***	-0.296***	0.022
	(0.042)	(0.041)	(0.066)

Panel C: Difference in Return Comovement between L1L0 Firms and Control Firms

	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.010	0.077**	0.087*
	(0.035)	(0.037)	(0.048)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.057	-0.374***	-0.431***
	(0.053)	(0.045)	(0.064)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.067	0.451***	0.518***
	(0.071)	(0.066)	(0.091)

This table presents the average return sensitivity for deleverage initiators, L1L0, and their PSM matched peers (see Table 2 for detail on the PSM method) to two benchmark portfolios of zero-leverage and leveraged stocks. Specifically, in each year *t* we run the following regression model:

$$R_{i,d} = \alpha_i + \beta_{0i}BMK0_{res,d} + \beta_{1i}BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our deleverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Similarly, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. *PRE* and *POST* represent year $t-1$ and $t+1$ surrounding the deleverage initiation year. There are 2,291 deleverage initiations. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 5
Return Comovement Using Bank Lending Standards

Panel A: Return Comovement of Sample Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0i})	0.530***	0.369***	-0.161***	0.354***	0.428***	0.074
	(0.047)	(0.032)	(0.056)	(0.040)	(0.048)	(0.063)
Leverage Portfolio (β_{1i})	0.162***	0.674***	0.511***	0.760***	0.153***	-0.607***
	(0.060)	(0.081)	(0.101)	(0.080)	(0.053)	(0.096)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	0.368***	-0.304***	-0.672***	-0.406***	0.275***	0.681***
	(0.076)	(0.087)	(0.128)	(0.090)	(0.071)	(0.131)

Panel B: Difference in Return Comovement between Sample Firms and Control Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.236***	-0.335***	-0.098*	0.038	0.046	0.007
	(0.058)	(0.047)	(0.056)	(0.063)	(0.069)	(0.090)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	-0.003	0.537***	0.539***	0.085	-0.418***	-0.503***
	(0.098)	(0.111)	(0.132)	(0.098)	(0.076)	(0.115)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.234*	-0.871***	-0.637***	-0.047	0.463***	0.510***
	(0.126)	(0.130)	(0.166)	(0.131)	(0.118)	(0.167)

This table presents the average return sensitivity for leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method) to two benchmark portfolios of zero-leverage and leveraged stocks. Specifically, in each year *t*, we run the following regression model:

$$R_{i,d} = \alpha_i + \beta_{0i}BMK0_{res,d} + \beta_{1i}BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Similarly, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. We compute yearly changes in the FED's lending standards since 1990 and divide them into tightening and loosening standards years. We then restrict our leverage initiators to the years of loosening standards and the deleverage initiators to the years of tightening standards. There are 780 leverage initiations and 720 deleverage initiations. *PRE* and *POST* represent year $t - 1$ and $t + 1$ surrounding the (de)leverage initiation year. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 6
Return Comovement under Different Event Shocks

Panel A: Loan Rating Introduction as an Exogenous Shock to Loan Demand

L0L1 Firms Only				Difference between L0L1 Firms and Control Firms			
	PRE	POST	POST - PRE		PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0i})	0.286***	0.075	-0.211**	$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.307***	-0.576***	-0.268**
	(0.085)	(0.060)	(0.104)		(0.109)	(0.087)	(0.132)
Leverage Portfolio (β_{1i})	0.320***	0.765***	0.445***	$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.030	0.500***	0.470**
	(0.095)	(0.133)	(0.164)		(0.181)	(0.184)	(0.230)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	-0.033	-0.689***	-0.656***	$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.337	-1.076***	-0.739**
	(0.128)	(0.146)	(0.213)		(0.231)	(0.221)	(0.298)

Panel B: Tax Cuts as Exogenous Shocks to L1L0 Firms

L1L0 Firms Only				Difference between L1L0 Firms and Control Firms			
	PRE	POST	POST - PRE		PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0i})	0.115*	0.293***	0.178*	$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.105	0.177*	0.282**
	(0.064)	(0.073)	(0.097)		(0.101)	(0.109)	(0.138)
Leverage Portfolio (β_{1i})	0.954***	0.149*	-0.805***	$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.249	-0.497***	-0.746***
	(0.135)	(0.086)	(0.160)		(0.162)	(0.129)	(0.188)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	-0.839***	0.144	0.983***	$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.354*	0.674***	1.028***
	(0.149)	(0.113)	(0.213)		(0.218)	(0.190)	(0.268)

Panel C: Aggregate Shocks to Credit Supply

L1L0 Firms Only				Difference between L1L0 Firms and Control Firms			
	PRE	POST	POST - PRE		PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0i})	0.342***	0.319***	-0.022	$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.065	-0.069	-0.004
	(0.039)	(0.043)	(0.058)		(0.062)	(0.062)	(0.085)
Leverage Portfolio (β_{1i})	0.661***	0.089*	-0.572***	$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.089	-0.443***	-0.532***
	(0.079)	(0.053)	(0.095)		(0.099)	(0.077)	(0.115)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	-0.319***	0.230***	0.549***	$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.154	0.373***	0.528***

	(0.089)	(0.068)	(0.126)		(0.130)	(0.111)	(0.163)

This table presents the average return sensitivity for leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method) to two benchmark portfolios of zero-leverage and leveraged stocks. Specifically, in each year *t*, we run the following regression model:

$$R_{i,d} = \alpha_i + \beta_{0i} BMK0_{res,d} + \beta_{1i} BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Similarly, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. In Panel A, we limit our L0L1 firms to the 1995 – 1998 period since the 1995 introduction of syndicated bank loan ratings by Moody's and S&P. In Panel B, we use 83 tax cuts in 27 U.S. states between 1989 and 2016 and restrict our L1L0 firms headquartered in these affected states to years *t*, *t* + 1, and *t* + 2 relative to the tax cut year. In Panel C, we restrict our L1L0 firms to the 1990 – 1993, 2004 – 2007, and 2007 – 2009 periods reflecting the post periods of the collapse of Drexel Burnham Lambert, the SEC's suspension of short-sale price tests in 2004, and the global financial crisis, respectively. There are 223 leverage initiations in Panel A, and 257 and 714 deleverage initiations in Panels B and C, respectively. *PRE* and *POST* represent year *t* – 1 and *t* + 1 surrounding the (de)leverage initiation year. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 7
Financial (De)Leverage and Return Comovement Using Univariate Regressions

Panel A: Return Comovement of Sample Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{0i})	0.609***	0.441***	-0.168***	0.375***	0.491***	0.117***
	(0.031)	(0.024)	(0.039)	(0.018)	(0.022)	(0.029)
Leverage Portfolio (β_{1i})	0.375***	0.873***	0.497***	0.872***	0.367***	-0.505***
	(0.035)	(0.047)	(0.059)	(0.034)	(0.025)	(0.042)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	0.234***	-0.432***	-0.666***	-0.497***	0.124***	0.622***
	(0.047)	(0.053)	(0.054)	(0.038)	(0.034)	(0.040)

Panel B: Difference in Return Comovement between Sample Firms and Control Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.051	-0.192***	-0.143***	-0.020	0.081***	0.101***
	(0.038)	(0.033)	(0.043)	(0.026)	(0.029)	(0.036)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.036	0.536***	0.499***	0.248***	-0.243***	-0.491***
	(0.050)	(0.059)	(0.070)	(0.042)	(0.034)	(0.049)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.087*	-0.729***	-0.642***	-0.268***	0.324***	0.592***
	(0.049)	(0.051)	(0.068)	(0.039)	(0.034)	(0.050)

This table presents the average return sensitivity for leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method) to two benchmark portfolios of zero-leverage and leveraged stocks. Specifically, in each year *t* we run the following regression models:

$$R_{i,d} = \alpha_i + \beta_{0i} BMK0_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (6a); \qquad R_{i,d} = \alpha_i + \beta_{1i} BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (6b)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Similarly, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. *PRE* and *POST* represent year $t - 1$ and $t + 1$

surrounding the (de)leverage initiation year. There are 1,234 leverage initiations and 2,291 deleverage initiations. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 8
Return Comovement for Different Absolute Changes in Leverage

Panel A: Low Jump in (De)Leverage Initiation						
	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.276***	-0.351***	-0.076	0.002	0.069*	0.067*
	(0.051)	(0.045)	(0.061)	(0.037)	(0.039)	(0.041)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.096	0.577***	0.484***	0.056	-0.328***	-0.384***
	(0.089)	(0.098)	(0.122)	(0.057)	(0.049)	(0.069)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.372***	-0.932***	-0.560***	-0.054	0.397***	0.451***
	(0.114)	(0.118)	(0.153)	(0.076)	(0.071)	(0.099)
Panel B: High Jump in (De)Leverage Initiation						
	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.097	-0.195**	-0.098	-0.085	0.108	0.193*
	(0.096)	(0.083)	(0.114)	(0.097)	(0.105)	(0.120)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	-0.399**	0.249	0.648***	0.034	-0.423***	-0.457**
	(0.161)	(0.185)	(0.223)	(0.148)	(0.124)	(0.178)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	0.301	-0.445**	-0.746***	-0.118	0.532***	0.650***
	(0.207)	(0.222)	(0.285)	(0.200)	(0.182)	(0.248)

This table presents the average differences in return sensitivity between leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method). Specifically, every year we classify leveraged firms in the cross-section into low and high leverage groups based on the median leverage. We then run the following regression to estimate the excess return comovements of each sample firm with the portfolio of zero-leverage stocks and a portfolio of leveraged stocks corresponding to the size of the leverage taken up by the firm.

$$R_{i,d} = \alpha_i + \beta_{0i} BMK0_{res,d} + \beta_{1i} BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns on day *d* of the zero-leverage portfolio and the portfolio of stocks within a similar leverage group respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Using a similar model, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. *PRE* and *POST* represent year $t - 1$ and $t + 1$ surrounding the (de)leverage initiation year. There are 939 (1,963) and 295 (328) leverage (deleverage) initiations in Panels A and B, respectively. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 9
Return Comovement for Subsamples

Panel A: Excluding Dividend Initiators

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.168***	-0.274***	-0.107*	-0.023	0.095**	0.119**
	(0.051)	(0.045)	(0.061)	(0.039)	(0.041)	(0.054)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.006	0.570***	0.566***	0.125**	-0.358***	-0.484***
	(0.087)	(0.098)	(0.119)	(0.059)	(0.051)	(0.072)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.174	-0.848***	-0.673***	-0.149*	0.454***	0.602***
	(0.112)	(0.118)	(0.151)	(0.080)	(0.074)	(0.102)

Panel B: First Time (De)Leverage Initiators

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.248***	-0.305***	-0.059	-0.019	0.075*	0.093*
	(0.049)	(0.043)	(0.058)	(0.039)	(0.041)	(0.054)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	-0.001	0.485***	0.489***	0.074	-0.326***	-0.399***
	(0.084)	(0.094)	(0.116)	(0.059)	(0.051)	(0.072)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.246**	-0.794***	-0.548***	-0.092	0.401***	0.493***
	(0.108)	(0.112)	(0.146)	(0.080)	(0.074)	(0.102)

This table presents the average differences in return sensitivity between leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method). Specifically, in each year *t* we run the following regression model:

$$R_{i,d} = \alpha_i + \beta_{0i} BMK0_{res,d} + \beta_{1i} BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Similarly, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. *PRE* and *POST* represent year $t - 1$ and $t + 1$ surrounding the (de)leverage initiation year. Panel A reports the results after removing firm-year observations where firms change their leverage structure and dividend policy at the same time. Panel B displays the results for only first-time (de)leverage initiators. There are 1,025 (1,915) and

1,066 (1,864) leverage (deleverage) initiations in Panels A and B, respectively. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 10
Financial (De)Leverage and Turnover Comovement

Panel A: Turnover Comovement of Sample Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
Zero-Leverage Portfolio (β_{T0i})	0.573***	0.264***	-0.309**	0.254***	0.520***	0.266***
	(0.095)	(0.093)	(0.133)	(0.065)	(0.055)	(0.085)
Leverage Portfolio (β_{T1i})	0.238**	0.779***	0.541***	0.820***	0.539***	-0.281**
	(0.117)	(0.119)	(0.166)	(0.105)	(0.088)	(0.137)
$\Delta\beta_{Ti} = \beta_{T0i} - \beta_{T1i}$	0.335**	-0.516***	-0.851***	-0.566***	-0.020	0.547***
	(0.150)	(0.151)	(0.279)	(0.123)	(0.104)	(0.179)

Panel B: Difference in Turnover Comovement between Sample Firms and Control Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_{T0} = \beta_{T0i} - \beta_{T0c}$	-0.220	-0.685***	-0.465*	-0.037	0.279***	0.316**
	(0.159)	(0.190)	(0.243)	(0.122)	(0.078)	(0.144)
$\Delta\beta_{T1} = \beta_{T1i} - \beta_{T1c}$	-0.147	0.273*	0.420*	0.090	-0.260**	-0.350**
	(0.204)	(0.165)	(0.256)	(0.136)	(0.120)	(0.176)
$\Delta\beta_{T} = \Delta\beta_{T0} - \Delta\beta_{T1}$	-0.073	-0.958***	-0.885*	-0.127	0.539***	0.666**
	(0.341)	(0.318)	(0.456)	(0.234)	(0.183)	(0.292)

This table presents the average turnover sensitivity for leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method) to two benchmark portfolios of zero-leverage and leveraged stocks. Specifically, in each year *t* we run the following regression:

$$RTO_{i,d} = \alpha_i + \sum_{\tau=-1}^{1} \beta_{T0i,\tau} RTO0_{d+\tau} + \sum_{\tau=-1}^{1} \beta_{T1i,\tau} RTO1_{d+\tau} + \vartheta_d \quad (9)$$

where $RTO_{i,d}$ is the daily residual turnover of a leverage initiator, L0L1, or a deleverage initiator, L1L0, in our sample. $RTO0_d$ and $RTO1_d$ are the equal-weighted averages of daily residual turnover of zero-leverage and leverage stocks on day *d*, respectively. Residual daily turnover is obtained after accounting for the impacts of stock returns and days of the week. The turnover comovement coefficient is the sum of coefficients corresponding to days -1, 0, and +1; that is, $\beta_{T0i} = \beta_{T0i,-1} + \beta_{T0i,0} + \beta_{T0i,+1}$ and $\beta_{T1i} = \beta_{T1i,-1} + \beta_{T1i,0} + \beta_{T1i,+1}$. Therefore, β_{T0i} (β_{T1i}) represents the comovement of a sample stock *i*'s residual turnover with the average residual turnover of zero-leverage (leveraged) stocks. Similarly, we obtain the corresponding β_{T0c} and β_{T1c} for control firm *c* in the same year. *PRE* and *POST* represent year t – 1 and t + 1 surrounding the (de)leverage initiation year. There are 1,234 leverage initiations and 2,291 deleverage initiations. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 11
Financial (De)Leverage and Mutual Fund Holdings

Panel A: Mutual Fund Holdings of Sample Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
Fund Leverage Quintile, *MFLV*	PRE	POST	POST - PRE	PRE	POST	POST - PRE
1 (LO_MFLV)	1.557	1.358	-0.199***	1.066	1.337	0.271***
2	1.100	0.984	-0.115***	1.120	1.228	0.108***
3	1.055	1.084	0.030	1.309	1.357	0.048*
4	0.947	1.169	0.221***	1.339	1.276	-0.063*
5 (HI_MFLV)	0.940	1.283	0.343***	1.406	1.218	-0.188***
HI_MFLV - LO_MFLV			0.542***			-0.459***

Panel B: Mutual Fund Holdings of Control Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
Fund Leverage Quintile, *MFLV*	PRE	POST	POST - PRE	PRE	POST	POST - PRE
1 (LO_MFLV)	1.506	1.501	-0.005	1.074	1.093	0.019
2	1.014	1.045	0.030	1.033	1.015	-0.018
3	1.074	1.076	0.002	1.310	1.272	-0.038
4	0.927	0.911	-0.016	1.340	1.366	0.026
5 (HI_MFLV)	0.936	0.891	-0.045	1.417	1.519	0.102
HI_MFLV - LO_MFLV			-0.040			0.082*

Panel C: Difference in Mutual Fund Holdings between Sample Firms and Control Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
Fund Leverage Quintile, *MFLV*	PRE	POST	POST - PRE	PRE	POST	POST - PRE
1 (LO_MFLV)	0.051	-0.143***	-0.194***	-0.009	0.243***	0.252***
2	0.085***	-0.06***	-0.146***	0.087***	0.213***	0.126***
3	-0.019	0.009	0.028	-0.001	0.084***	0.086***
4	0.020	0.257***	0.237***	-0.001	-0.090***	-0.089**
5 (HI_MFLV)	0.004	0.393***	0.388***	-0.011	-0.301***	-0.290***
HI_MFLV - LO_MFLV			0.582***			-0.541***

This table presents the results of mutual fund holdings for leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method). We classify mutual funds into groups of relative preference for leverage based on the stocks they hold. Specifically, we employ the following equation to measure the average leverage across all stocks owned by fund *f* in year *t*.

$$MFLV_{f,t} = \Sigma\ w_{f,I,t} * LEV_{i,t} \qquad (10)$$

where $MFLV_{f,t}$ is the fund-level leverage in year *t*; $w_{f,i,t}$ is the investment weight of stock *i* held by fund *f* in year *t*; and $LEV_{i,t}$ is the debt-to-assets ratio of stock *i* in year *t*. The summation represents all common stocks held by fund *f* in year *t*. The higher the value of $MFLV_{f,t}$ the more likely that the fund has a strong preference for leverage. We then sort all funds into quintiles based on their yearly *MFLV* values. For each (de)leverage initiator in our sample, we calculate the change in its holding by mutual fund *f* from the year before to the year after the (de)leverage initiation and then aggregate the holding changes across all sample stocks for fund *f* in year *t*. We also compute the holding changes for the matched control firms in the same manner. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 12
The Mutual Fund Flow-Induced Trading Effects on Stock Returns

	Leveraged Firms			Zero-Leverage Firms		
	(1)	(2)	(3)	(4)	(5)	(6)
FIT_LF	0.159***	0.249***	0.162**	-0.011	0.17	0.165
	(2.78)	(4.38)	(2.32)	(-0.11)	(1.17)	(0.62)
FIT_LU	0.043	-0.006	-0.173	0.478***	0.37***	0.48***
	(0.77)	(-0.11)	(-1.14)	(5.94)	(3.13)	(2.69)
R_IND		0.383***	0.374***		0.317***	0.298***
		(24.88)	(22.35)		(12.15)	(9.07)
LagFIT_LF			-0.092			-0.264
			(-1.21)			(-0.78)
LagFIT_LU			-0.278***			-0.193
			(-5.79)			(-1.44)
MKT	0.969***	0.587***	0.595***	0.939***	0.619***	0.64***
	(71.23)	(24.32)	(24.51)	(49.77)	(20.52)	(18.17)
SMB	0.685***	0.593***	0.592***	0.853***	0.702***	0.697***
	(35.3)	(26.93)	(26.37)	(24.38)	(14.3)	(11.83)
HML	0.244***	0.226***	0.228***	-0.032	0.012	0.009
	(7.55)	(7.79)	(7.37)	(-0.9)	(0.26)	(0.18)
UMD	-0.09***	-0.06***	-0.053***	-0.055**	-0.048*	-0.038
	(-6.61)	(-5.06)	(-4.1)	(-2.29)	(-1.76)	(-1.53)
Intercept	-0.024	-0.047	-0.133*	-0.227	-0.544	0.055
	(-1.34)	(-1.08)	(-1.71)	(-1.05)	(-1.02)	(1.39)
R-Squared	0.410	0.470	0.533	0.386	0.433	0.500

This table presents the regression results of monthly stock returns on mutual fund flow-induced trading measures and other control variables. First, we compute flow-induced trading for each stock *i* in mutual fund *f* in month *m*, $FIT_{f,i,m}$, as follows:

$$FIT_{f,i,m} = FLOW_{f,m} * \frac{SHR_{f,i,m}}{\sum_{k \in N} SHR_{k,i,m}} \quad (11)$$

where $SHR_{f,i,m}$ is the number of shares of stock *i* held by mutual fund *f*, and $SHR_{k,i,m}$ is the number of shares of stock *i* in fund *kth* in our sample of *N* domestic equity funds. $FLOW_{f,m}$ is the dollar flow to fund *f* in month *m*, measured as in Eq. (12) in the text. Next, based on the fund-level leverage in quarter *q* (see Table 10 description) we classify all funds into leverage-favored funds (leverage-unfavored funds) if the fund-level leverage is higher (lower) than the median value in that quarter. We then aggregate the flow-induced trading of stock *i*, $FIT_{f,i,m}$, across funds in the same leverage preference groups and denote them as $FIT\_LF_{i,m}$ and $FIT\_LU_{i,m}$, respectively. Each year, we regress the monthly stock returns in years $t + 1$ and $t + 2$ on the two measures of monthly flow-induced trading and the four Fama-French-Carhart risk factors. We also control for the stock's monthly industry returns, *R_IND*, measured as a value-weighted return across all stocks in the same Fama-French 48 industries, and lagged values of the flow-induced trading measures. We then obtain the yearly average coefficients for all leveraged and zero-leverage stocks separately and report the time-series average of these coefficients with the Newey-West adjusted *t*-statistics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Appendix

TABLE A1
Return Comovement Using Alternative Leverage Measures

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
Panel A: Leverage = (Total Long-Term Debt + Debt in Current Liabilities) / Total Assets						
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.325***	-0.449***	-0.124**	0.033	0.105***	0.072*
	(0.048)	(0.045)	(0.058)	(0.034)	(0.034)	(0.046)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	-0.054	0.47***	0.524***	0.073	-0.394***	-0.467***
	(0.094)	(0.104)	(0.127)	(0.057)	(0.048)	(0.068)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.271**	-0.919***	-0.648***	-0.04	0.499***	0.539***
	(0.116)	(0.123)	(0.156)	(0.073)	(0.066)	(0.093)
Panel B: Leverage = Total Liabilities / Total Assets						
	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.206***	-0.288***	-0.082	0.009	0.032	0.023
	(0.058)	(0.050)	(0.068)	(0.048)	(0.049)	(0.066)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.079	0.543***	0.464***	-0.086	-0.392***	-0.306***
	(0.092)	(0.101)	(0.127)	(0.068)	(0.058)	(0.080)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.285**	-0.831***	-0.546***	0.095	0.424***	0.329***
	(0.121)	(0.122)	(0.164)	(0.094)	(0.087)	(0.121)

This table presents the average differences in return sensitivity between leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method). Specifically, in each year *t* we run the following regression model:

$$R_{i,d} = \alpha_i + \beta_{0i} BMK0_{res,d} + \beta_{1i} BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Similarly, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. *PRE* and *POST* represent year $t - 1$ and $t + 1$ surrounding the (de)leverage initiation year. Panel A presents the results using total long-term debt (Compustat item 8) plus debt in current liabilities (item 34) divided by total assets (item 6) as a proxy for leverage while Panel B results are based on the leverage proxy of total liabilities (item 181) divided by total assets (item 6). There are 661 (1,070) and 828 (1,904) leverage (deleverage) initiations in Panels A and B, respectively. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A2
Return Comovement Using Leverage Factor or TED Spread as Exogenous Shocks

Panel A: Using Adrian, Etula, and Muir's (2014) Leverage Factor

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.247***	-0.416***	-0.171***	-0.036	0.113*	0.149*
	(0.055)	(0.046)	(0.066)	(0.070)	(0.072)	(0.090)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.088	0.533***	0.447***	0.155	-0.557***	-0.712***
	(0.095)	(0.104)	(0.130)	(0.115)	(0.092)	(0.134)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.335***	-0.953***	-0.618***	-0.191	0.670***	0.861***
	(0.123)	(0.124)	(0.165)	(0.147)	(0.129)	(0.187)

Panel B: Using Changes in TED Spread

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta\beta_0 = \beta_{0i} - \beta_{0c}$	-0.307***	-0.405***	-0.100*	0.009	0.068	0.059
	(0.070)	(0.059)	(0.060)	(0.049)	(0.052)	(0.067)
$\Delta\beta_1 = \beta_{1i} - \beta_{1c}$	0.032	0.489***	0.461***	0.077	-0.485***	-0.561***
	(0.116)	(0.136)	(0.168)	(0.080)	(0.061)	(0.091)
$\Delta\beta = \Delta\beta_0 - \Delta\beta_1$	-0.340**	-0.901***	-0.561***	-0.067	0.553***	0.620***
	(0.152)	(0.159)	(0.214)	(0.105)	(0.093)	(0.129)

This table presents the average return sensitivity for leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method) to two benchmark portfolios of zero-leverage and leveraged stocks. Specifically, in each year *t*, we run the following regression model:

$$R_{i,d} = \alpha_i + \beta_{0i} BMK0_{res,d} + \beta_{1i} BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. β_{0i} and β_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. Similarly, we obtain the corresponding β_{0c} and β_{1c} for control firm *c* in the same year. We use the leverage factor from Adrian, Etula, and Muir (2014) in Panel A and TED spread in Panel B to classify our sample period into funding tightening and relaxing years. There are 834

(507) and 517 (1186) leverage (deleverage) initiations in Panels A and B, respectively. *PRE* and *POST* represent year t – 1 and t + 1 surrounding the (de)leverage initiation year. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A3
Return Comovement Using Univariate Regressions - R-Squared Results

Panel A: R-Squared of Sample Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
Zero-Leverage Portfolio ($R2_{0i}$)	0.146***	0.135***	-0.012**	0.116***	0.138***	0.022***
	(0.004)	(0.003)	(0.005)	(0.002)	(0.003)	(0.004)
Leverage Portfolio ($R2_{1i}$)	0.135***	0.145***	0.011**	0.128***	0.127***	-0.001
	(0.003)	(0.004)	(0.005)	(0.003)	(0.002)	(0.004)
$\Delta R2_i = R2_{0i} - R2_{1i}$	0.012**	-0.011**	-0.022***	-0.012***	0.011***	0.023***
	(0.005)	(0.005)	(0.002)	(0.003)	(0.004)	(0.001)

Panel B: Difference in R-Squared between Sample Firms and Control Firms

	Zero-Leverage to Leveraged Firms - L0L1			Leveraged to Zero-Leverage Firms - L1L0		
	PRE	POST	POST - PRE	PRE	POST	POST - PRE
$\Delta R2_0 = R2_{0i} - R2_{0c}$	-0.004	-0.021***	-0.017***	-0.001	0.01**	0.011***
	(0.006)	(0.005)	(0.005)	(0.003)	(0.004)	(0.003)
$\Delta R2_1 = R2_{1i} - R2_{1c}$	-0.012**	-0.007	0.005	0.011***	-0.002	-0.013***
	(0.005)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)
$\Delta R2 = DR2_0 - DR2_1$	0.008***	-0.014***	-0.022***	-0.011***	0.012***	0.024***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)

This table presents the average R-squared (R2) for leverage (deleverage) initiators, L0L1 (L1L0), and their PSM matched peers (see Table 2 for detail on the PSM method). Specifically, in each year *t* we run the following regression models:

$$R_{i,d} = \alpha_i + \beta_{0i}BMK0_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (6a); \qquad R_{i,d} = \alpha_i + \beta_{1i}BMK1_{res,d} + \gamma_i X_d + \varepsilon_{i,d} \quad (6b)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. $R2_{0i}$ and $R2_{1i}$ represent the R2s of Eq. (6a) and Eq. (6b) for firm *i* in year *t*, respectively. Similarly, we obtain the corresponding $R2_{0c}$ and $R2_{1c}$ for control firm *c* in the same year. *PRE* and *POST* represent year *t* – 1 and *t* + 1 surrounding the (de)leverage initiation year. There are 1,234 (2,291) leverage (deleverage) initiations. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A4
Return Comovement Stability After (De)Leverage Initiation Year

Panel A: Return Comovement of L0L1 Firms

	$t+1$	$t+2$	$t+3$	$t+4$	$t+5$	$(t+2)$ - $(t+1)$	$(t+3)$ - $(t+2)$	$(t+4)$ - $(t+3)$	$(t+5)$ - $(t+4)$
Zero-Leverage Portfolio (β_{0i})	0.369***	0.376***	0.388***	0.360***	0.355***	0.006	0.012	-0.028	-0.005
	(0.029)	(0.030)	(0.030)	(0.030)	(0.031)	(0.041)	(0.042)	(0.042)	(0.044)
Leverage Portfolio (β_{1i})	0.730***	0.811***	0.734***	0.695***	0.745***	0.081	-0.077	-0.039	0.051
	(0.063)	(0.059)	(0.063)	(0.059)	(0.064)	(0.086)	(0.086)	(0.086)	(0.087)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	-0.361***	-0.436***	-0.346***	-0.335***	-0.390***	-0.075	0.089	0.011	-0.055
	(0.069)	(0.066)	(0.069)	(0.066)	(0.071)	(0.104)	(0.104)	(0.105)	(0.106)

Panel B: Return Comovement of L1L0 Firms

	$t+1$	$t+2$	$t+3$	$t+4$	$t+5$	$(t+2)$ - $(t+1)$	$(t+3)$ - $(t+2)$	$(t+4)$ - $(t+3)$	$(t+5)$ - $(t+4)$
Zero-Leverage Portfolio (β_{0i})	0.381***	0.368***	0.583***	0.485***	0.499***	-0.012	0.214***	-0.098**	0.014
	(0.026)	(0.026)	(0.029)	(0.027)	(0.029)	(0.036)	(0.038)	(0.039)	(0.039)
Leverage Portfolio (β_{1i})	0.226***	0.165***	0.189***	0.199***	0.199***	-0.061	0.024	0.010	0.000
	(0.033)	(0.036)	(0.034)	(0.034)	(0.033)	(0.049)	(0.050)	(0.048)	(0.048)
$\Delta\beta_i = \beta_{0i} - \beta_{1i}$	0.155***	0.203***	0.394***	0.286***	0.300***	0.048	0.191***	-0.108	0.015
	(0.042)	(0.044)	(0.045)	(0.043)	(0.044)	(0.070)	(0.072)	(0.071)	(0.071)

This table presents the yearly average return sensitivity for leverage (deleverage) initiators, L0L1 (L1L0), after the (de)leverage event year. Specifically, in each year *t* we run the following regression model:

$$R_{i,d} = a_i + b_{0i}BMK0_{res,d} + b_{1i}BMK1_{res,d} + g_i X_d + e_{i,d} \quad (3)$$

where $R_{i,d}$ is the return on our (de)leverage firm *i* on day *d*. $BMK0_{res,d}$ and $BMK1_{res,d}$ are the residual returns of the zero-leverage portfolio and leverage portfolio on day *d* respectively after adjusting for their dependence on the Fama–French–Carhart (FFC) model. X_d is the four factors in the FFC model. b_{0i} and b_{1i} represent the excess return comovements of firm *i* in year *t* with the portfolios of zero-leverage and leveraged stocks, respectively. The right panels report the test for the mean difference between two consecutive years. Standard errors are in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.