Internet Appendix

Initial Margin Requirements and Market Efficiency

Internet Appendix A.1. Quotes of Federal Officials and Major Market Participants citing Excess Speculation as a Rationale for Increasing Margin Requirements

This Appendix provides several quotes from the *Wall Street Journal* during our sample period, which document that Federal officials and major market participants often cited speculative activity as an important motivation for the Federal Reserve to increase margin requirements.

WSJ date: February 22, 1936

News headline: "Market Absorbs Effect of Recent Margin Increase"

Quote: "With the subject of stock market activity arousing interest in official Washington quarters, considerable attention was paid to a weekend speech of SEC Chairman James M. Landis before the national alumni association meeting at Princeton University. Mr. Landis said that the two great problems involved in the regulation of stock exchanges were the elimination of unfair methods of dealing and the **curbing of excessive speculation.** … A second device, he continued, consists in a grant of power to government to make **something in the nature of a flank attack upon speculation** through its control over the quantity and nature f credit that may be used to purchase or carry securities."

WSJ date: March 11, 1955

News headline: "McCloy, Eccles Agree Stock Rise Calls for Caution but Disagree on Taxes, Margins"

Quote: "Sen. Fulbright asked Mr. McCloy: "Assuming something should be done to **curb speculative activity**, don't you agree an increase in margins is better than an increase in interest rates?"

WSJ date: April 25, 1955

News headline: "Trading in Stocks Starts Today with Margin Requirements Raised to 70%"

Quote: "This is the second time in less than four months the Reserve Board has ordered an increase in stock margins to "prevent the excessive use of credit" in stock buying. On January 5 it put into effect a 60% requirement – 10 points higher than previously. At that time, spokesmen considered the margin boost merely as a 'warning' to investors against **undue speculation in the stock market boom**."

WSJ date: October 2, 1967

News headline: "Abreast of the Market"

Quote: "In explanation, Lucien O. Hooper of W. E. Hutton & Co. says: 'If the Federal Reserve Board is as concerned about the behavior of the stock market as its chairman, William McChesney Martin, several times has hinted, the theory that an increase in margin requirements is coming is logical. The purpose of this would be to **tame or warn against speculation** rather than to prevent too great use of credit in the stock market.' "

WSJ date: June 27, 1968

News headline: "Abreast of the Market"

Quote: "But some brokers feel that the matter of margin requirements has only receded as a market concern, rather than vanished, and that much will depend on how the next recovery phase of the market progresses. **If speculative fires flare up again**, they say, the Reserve Board may well consider further restrictions."

WSJ date: November 24, 1972

News headline: "Rate of Margin for Stock Boosted To 65% From 55%"

Quote: " 'The Fed,' said another executive, 'tends to kid itself that the margin change has an impact. In this view, the move is simply a 'psychological instrument' that warns the professionals and the public that it's time to 'watch out.' But it won't **prevent the public from speculating**,' he said."

Internet Appendix A.2. Interaction of Margin Requirements and Macroeconomic or Stock Market Conditions

The Securities Exchange Act of 1934 authorized the Federal Reserve to set the minimum margin required for U.S. investors, through Regulation T. The Fed used its power to change margin requirements 22 times during the period between 1934 and 1975. Similar to Jylhä (2018), our use of margin requirements as an instrument to proxy for changes in leverage constraints requires that we: (i) examine whether changes in margin requirements actually impact the amount of margin credit used by investors, and (ii) ensure that the level of margin requirements is not simply proxying for other prevailing financial market and macroeconomic conditions that may also affect our results, which pertain to investors' reaction to earnings announcements.

Jylhä (2018) summarizes the following major reasons for the Fed to change margin requirements: recent changes in stock market credit, stock prices, and speculative activity. In Table A3, we reproduce Jylhä's (2018) analysis of these and other potential determinants of the Fed's margin policy actions. This analysis shows that the Fed's decision to increase margin requirements is significantly impacted by recent increases in credit growth, and recent declines in industrial production growth. This evidence is consistent with the Fed acting to curb excessive use of credit and counteract declines in economic activity. Moreover, margin changes respond positively to past market returns and volatility, suggesting that the Fed acted to curb stock market inflation and volatility. No other variables are significant at the .05 level in Table A3.

It is noteworthy that past credit growth arises as an essential factor in the Fed's decisions to change margin requirements. Our use of margin requirements as a proxy for leverage constraints requires us to document that this policy tool indeed restricted investors' ability to obtain leverage during our sample period. In this light, we regress the change in margin credit on lagged changes in the margin requirement and the call spread, along with other control variables, following Hsieh and Miller (1990) and Jylhä (2018). The relevant results appear in Table A4, and show that recent changes in margin credit extended to investors are significantly negatively related to recent changes in margin requirements. We conclude that margin requirements served as a binding leverage constraint during our sample period. This analysis also shows that the change in the call spread, our proxy for the cost of leverage during our sample period, did not significantly affect the amount of credit used by investors. In our robustness tests, we further document that controlling for the call spread does not affect our main results and conclusions.

Next, in Table A5, we examine the potential effects of the Fed's margin policy changes on other aspects of the market and macroeconomic conditions. In particular, we separately regress seven different financial market and macroeconomic variables on the lagged change in margin requirements. These variables include the stock market return, the standard deviation and skewness of daily market returns, average value-weighted aggregate daily share turnover, inflation, the change in the money supply (M1), and industrial production measured over the past one-month and 12-month periods. We find no significant evidence to suggest that changes in margin requirements affected these financial market and macroeconomic conditions during our sample period. This evidence confirms the findings of Hsieh and Miller (1990), Jylhä (2018), and The Federal Reserve System (1984).

Internet Appendix A.3. The Timing of the Earnings Announcement Day

It is critical to accurately identify the date of the earnings announcement, to ensure that our empirical strategy captures the market's initial versus subsequent reaction to earnings news. Our choice of the earnings announcement day (0) is the date that the firm's earnings are published in the Wall Street Journal (e.g., April 14, 1937, in Figure 2). In the following subsections of Internet Appendix A.3., we justify this choice in several ways.

A.3.a. The Wall Street Journal Publication Date is the Day Most Investors Learn about Earnings

We begin by emphasizing that, during the period of this study (1934 – 1975), the NYSE compelled listed firms to ensure timely disclosure regarding any financial data or corporate action that could affect stock prices. For example, the NYSE required its listed companies to share any relevant information immediately with the New York City newspapers that regularly publish financial news.[1] During this period, competition among newswires also helped to ensure the timely reporting of financial news, and the WSJ was the leading news source for earnings information.[2] The following quote from a video documentary about the NYSE published in 1932 hints at this competition: "… towards the end of the trading day, great Metropolitan newspapers and news services are working at breakneck speed to assemble the day's quotations."[3] For these

[1] See Zarb and Kerekes (1970, p. 38 and p. 99).
[2] Besides the WSJ, the *New York Times* and *Tribune* were the other major financial newspapers popular in New York during the period of our study. However, while these two outlets also provided general financial news, they were not regarded as comprehensive or reliable in their coverage, compared to the WSJ. Baker, Bloom, Davis, and Sammon (2021, p. 7) also verify that the WSJ had, "the most thorough coverage of financial news and had the most complete archive back to 1900."
[3] https://archive.org/details/0474_Nations_Market_Place_01_11_58_00

reasons, we are confident that, during the period analyzed in this study, the vast majority of investors first learned about a firm's earnings when this information was reported in the WSJ.

This discussion supports our reliance on the publication date of the Current Earnings Report in the WSJ as the day most investors received this information, and therefore as our earnings announcement date throughout the period analyzed in this study. We note that, until May 1966, the WSJ also reported the date that companies disclosed their earnings to the public, which was typically one day earlier than the news was published in the WSJ (e.g., Tuesday, April 13, 1937, in Figure 2). Between 1934 and May 1966, the number of days between the WSJ publication date and the date companies disclosed their earnings is one for 94.58% of announcements in our sample, and two for another 3.58%. For the remaining 1.84% of announcements in our sample, there are three or four days between the firm's earnings disclosure date and the WSJ publication date of the Current Earnings Report. When we repeat our analysis after eliminating the 1.84% of announcements that are published in the WSJ more than two days after the firm's earnings disclosure date reported by the WSJ, our main results are unchanged.[4]

A.3.b. Abnormal Trading Volume over the Eleven-Day Window covering Days (-5,+5)

We further check the empirical validity of our choice of the WSJ publication date as the earnings announcement day, by examining average daily abnormal trading volume around this choice for day 0. A substantial literature documents that abnormal volume spikes when new information is revealed to the market, such as earnings announcements.[5] In line with this work,

[4] After May 1966, the format of the Current Earnings Report changed, and the WSJ no longer reported the firm's earnings disclosure date. After 1966, we assume that the WSJ continued its highly reliable practice of this timely disclosure of firms' earnings on the next day, over the remainder of our hand-collected sample between 1966 and 1972.

[5] For theory and evidence regarding the general increase in abnormal trading volume on the days around earnings announcements, see Akbas (2016), Atiase and Bamber (1994), Bamber (1987), Bamber, Barron, and Stober (1997), Berkman et al. (2009), Garfinkel and Sokobin (2006), Kim and Verrecchia (1994), Landsman and Maydew (2002), Morse (1990), and Ziebart (1990). Bamber, Barron and Stevens (2010) provide an excellent survey.

we examine average daily abnormal trading volume over the eleven-day window covering days (-5,+5) around the publication of the Current Earnings Reports in the WSJ (on day 0). If the two-day CAR(0,+1) is truly capturing the market's response to new information on these days, then trading volume should spike mainly on these two days (0 and +1).

Figure A1 from this Internet Appendix plots the average daily abnormal volume that occurs each day over the eleven-day window covering days (-5,+5) around the earnings announcement date, where day 0 is the date that the WSJ publishes the Current Earnings Report. For each firm, abnormal trading volume on any day *t*, AVOL[*t*], is defined as the difference between the log dollar volume and the firm's average log dollar volume over days -60 to -11, prior to day 0. For every earnings announcement date (day 0) where a Current Earnings Report is published in the WSJ, we compute the abnormal daily volume for every announcing firm, over each day (*t*) of the eleven-day window (*t* = -5,+5).

Panel A of Figure A1 plots the resulting pattern in daily abnormal trading volume averaged across the entire sample of earnings announcements, for each day during this window (*t* = -5,+5). Panel B plots the analogous patterns for the two subsets of earnings announcements that occur during regimes with high (above 75%) versus low (below 55%) margin requirements. Panel A of Figure A1 shows that abnormal volume mainly spikes between days -1 and +1, suggesting that the majority of earnings information is revealed over these three days. It is noteworthy that the WSJ publication date (day 0) has the largest mean abnormal volume by far, while the next day (+1) has the second highest mean abnormal volume. This evidence supports our assumption that the vast majority of investors learn about the firms' earnings on the day this information is published in the WSJ (i.e., our choice for day 0). On the other hand, Figure A1 also indicates that pre-announcement trading volume begins to spike on day -1, suggesting that some investors begin to trade on the earnings news when it is first disclosed by firms, one day before it is reported in the WSJ. The small values for mean abnormal volume prior to day -1 indicate little evidence of prior information leakage that might spawn earlier trading on earnings news before it is first disclosed by firms (on day -1).

Panel B of Figure A1 reinforces the result in Panel A that abnormal volume mainly spikes between days -1 and +1 around the WSJ publication date on day 0. But Panel B further reveals that, for the subset of announcements disclosed when margin requirements are high (> 75%), abnormal trading volume is substantially muted and largely confined to days -1 to +1. In contrast, when margin requirements are low (< 55%), abnormal volume is much larger and lingers beyond day +1 after the announcement. This evidence further reinforces our choice of day 0 as the earnings announcement date. In section A.4.c.(ii) below, we document robust results when we explore alternative return windows that extend earlier before day 0 and after day +1 for the initial response to earnings news, as well as alternative windows that begin later (after day +1) for post-announcement drift.

Internet Appendix A.4. Additional Robustness Tests

A.4.a. Controlling for Macroeconomic and Credit Market Conditions

In this subsection, we investigate whether the impact of margin requirements on investor under-reaction is robust when we control for macroeconomic variables that capture six different aspects of credit market conditions that may be associated with the Fed's margin policy. These variables include inflation, the change in the call spread, credit growth, money supply growth, industrial production growth, and a dummy variable for NBER recessions. To the extent that these macroeconomic conditions might influence the behavior of arbitrageurs around earnings announcements, our results could simply be driven by an economic channel operating through these factors, rather than by the Fed's margin policy (see Jylhä, 2018).

In Table A6 at the end of this Internet Appendix, we present the relevant results from estimating an expanded version of Equation (1) that adds these six macroeconomic variables separately, as well as their respective interactions with adjusted SUE. In this expanded model the coefficient for our main variable, the interaction between Margin and Adj_SUE (β_3), continues to indicate a significantly smaller initial reaction (CAR(0,+1)) followed by significantly larger post-announcement drift (CAR(+2,+61)), when margin requirements are higher. This evidence corroborates our main finding in Figure 1 and Table II, after controlling for these macroeconomic conditions that may be associated with changes in the Fed's margin policy.

A.4.b. Controlling for Stock Market Conditions

In this subsection, we investigate whether our main results are robust when we include variables that capture five different aspects of stock market conditions that may also be associated with the Federal Reserve's changes in margin policy. These variables include aggregate market-wide volatility, turnover, and illiquidity, as well as past market returns and the change in the market's overall price-to-dividend ratio. During our sample period, it is possible that the Fed used margin requirements to influence one or more of these market conditions, in order to lower market-wide volatility, improve liquidity, or normalize investor sentiment, all of which may affect investors' reaction to earnings surprises (see Jylhä, 2018).

In Table A7 at the end of this Internet Appendix, we control for these market-wide factors by estimating an alternative expanded version of Equation (1) that includes the above five stock market variables, as well as their interactions with Adj_SUE. Once again, our main results continue to be robust in Table A7. When we control for these five stock market variables, the coefficient of the interaction term variable (β_3) remains significantly negative in the specification for the initial market reaction (CAR(0,+1)) and significantly positive for PEAD (CAR(+2,+61)). This evidence further establishes that higher margin requirements result in greater under-reaction to earnings surprises (i.e., a significantly smaller initial response and significantly larger drift), after controlling for aggregate stock market conditions that may be associated with changes in the Fed's margin policy.[6]

A.4.c. Alternative Windows around the Earnings Announcement

Panel A of Table A8 at the end of this Internet Appendix suggests that the total price reaction to earnings announcements (from day 0 to day +61) may vary across high versus low margin regimes. Summing up CAR(0,+1) and CAR(+2,+61), it appears that high-SUE stocks outperform low-SUE stocks by a total CAR(0,+61) of 7.18% during the low margin periods. In contrast, during high margin periods, this total outperformance is somewhat larger, at 8.54%. This evidence suggests that part of what now looks like a stronger post-earnings announcement drift during high margin periods may actually be driven by the total price reaction simply being larger in these times. We address this issue in several ways.

A.4.c.(i) The Total Response to Earnings News under Low versus High Margin Regimes

First, Panel A of Table A8 documents that the mean total return (CAR(0,+1) + CAR(+2,+61)) around earnings announcements is indeed 1.36% larger (i.e., 8.54% - 7.18%) under high margin regimes, compared to low margin regimes. However, this difference of mean CARs is not statistically significant (t-ratio = 1.59). Furthermore, this Panel also reveals that the difference between total mean announcement returns under high versus low margin periods becomes smaller as we expand the initial market return window to include earlier days -2 and -1 prior to the WSJ announcement on day 0. For example, the difference between the mean total returns under high versus low margin regimes, from day -2 to day +61 (CAR(-2,+61)) is an

[6] In Table A9 of the Internet Appendix, we re-estimate Equation (1) after excluding all earnings announcements within 60 days around margin changes, and further show that our results are not driven by potential changes in financial market and macroeconomic conditions that may tend to manifest around the time of these policy changes.

insignificant 0.40% (t-statistic = 0.45). This analysis indicates that the apparent difference in the market's total reaction under high versus low margin regimes becomes smaller in magnitude, and even less significant, when we consider alternative return windows that capture more of the pre-announcement period on days -2 and -1. This outcome suggests that the apparent difference in the average total market response around earnings announcements, across high versus low margin regimes, is less of a concern when we incorporate the market's earlier response to earnings news on days -2 and -1.

A.4.c.(ii) Robustness of Regression Results using Alternative Announcement Windows

Second, we further examine the robustness of our main regression results in Table II, when we consider wider windows that begin earlier for the initial response to earnings news, and narrower windows that begin later for the post-announcement drift. In this light, we analyze the following alternative windows that begin earlier, when we analyze the initial market response: CAR(-3,+1), CAR(-3,+2), CAR(-2, +2), CAR(-1,+1), and AR(0). In addition, we consider the following windows that begin later, when we analyze the subsequent drift: CAR(+3,+61), CAR(+4,+61), and CAR(+5,+61).

These regression results are presented in Panels B and C of Table A8 at the end of this Internet Appendix, for these alternative windows to measure the initial response and the PEAD, respectively. For each window examined in Panels B and C of Table A.8, our main results regarding the initial response and the subsequent drift remain robust (i.e., β_3 is significantly negative for the initial response in Panel B, and significantly positive for the PEAD in Panel C). This analysis further corroborates our main results, reinforcing the conclusion that higher margin requirements are significantly associated with a smaller initial response and a larger PEAD, when we consider alternative windows to measure the initial versus subsequent market response to earnings news.

A.4.c.(iii) Initial Response versus PEAD as Percent of Total Response to Earnings News

Third, we analyze alternative measures of the initial versus subsequent market reaction to earnings news, which take into account the magnitude of the total price reaction. In particular, we examine the proportion of the market's total average response to earnings news that is embodied in the initial market reaction versus the PEAD (i.e., CAR(0,+1) / CAR(0,+61) versus CAR(+2,+61) / CAR(0,+61)). In Figure 1, the solid **blue** (dashed **orange**) line tracks the proportion of the total mean announcement return that is realized each day from the announcement up to day *t*; *t* = 0, …, +61, for the subset of earnings announcements that occurs when margin requirements are high (low). These plots reveal that, while an average of 58.1% of the total return over days (0,+61) is realized in the first two days (0,+1) under low margin regimes, only 36.2% of the average total return is realized during the same two days under high margin regimes. This analysis establishes that the initial reaction to earnings news is muted while PEAD is exacerbated, when margin requirements are higher, after accounting for the total mean response to earnings news that varies across low versus high margin regimes. This additional analysis helps to ensure that our main results are really driven by margin requirements affecting the process of information incorporation, rather than margin being correlated with the total amount of information contained in earnings announcements across regimes.

A.4.d. Earnings Announcements that Occur Near a Change in Margin Requirements

In Table A9, we re-estimate Equation (1) for the subset of our original sample of earnings announcements over the period, 1934 – 1975, that remains after excluding all announcements that occur within the 60 days *before or after* any *change* in margin requirements. The main results (β_3) are robust, indicating that our main results are not due to these periods of potential excess speculation by investors just *before or after* the Fed changes margin requirements.

In Table A10, we repeat the above analysis in Table A9, but we only exclude earnings announcements that occur *before* an *increase* in margin requirements. In particular, we re-estimate Equation (1) for the subset of our original sample of earnings announcements after excluding all announcements that occur within the 45, 60, or 90 days *before* an *increase* in margin requirements. Once again, the main results (β_3) are robust, indicating that higher margin requirements remain associated with a significantly smaller initial response to earnings surprises (CAR(0,+1)) and significantly larger PEAD (CAR(+2,+61)), when these three alternative periods of likely high overall speculation are excluded from our main sample.

In Panels A and B of Table A11, we further examine the possible undue influence of these periods of perceived excess speculation, by repeating the analysis presented in Table VI after redefining the Before_Increase dummy variable to indicate all earnings announcements made within 45 or 90 days *before* an *increase* in margin requirements. Once again, our main results and conclusions from Table VI remain unchanged when we apply this dummy variable approach to consider the potential undue influence of these alternative periods of presumed high speculation, just before the Fed raised margin requirements.

A.4.e. Sensitivity of Results to Concern that Errors May Be Clustered on Different Dimensions

It is important to carefully assess the robustness of our findings with respect to potential correlations between error terms along different dimensions, in order to firmly establish a strong link between margin requirements and earnings announcement returns. In our main regression analysis in Table II and throughout the paper, we estimate pooled regressions with fixed effects for day-of-the-week, and standard errors adjusted for heteroscedasticity and clustered by the day of the announcement (day 0). In this subsection, we further assess whether our main results are subject to inflated t-statistics, due to potential correlation between error terms along different dimensions.

A.4.e.(i) Simulation to Examine Impact of Error Correlation on Inflated T-Statistics for β_3

We propose that a simulation exercise is perhaps the most compelling way to address whether our main results are subject to inflated t-statistics due to possible correlation between error terms along different dimensions. In the first step of this simulation, we repeat the regressions in the second and fourth columns of Table II, and estimate the coefficients documented in this table. Second, we generate the predicted values of the CARs using these coefficients, but assuming the interaction coefficient (β_3) equals zero. Third, we multiply the residuals from the original analysis by Rademacher weights (i.e., multiply the residuals by +1 or -1 with equal probability). Finally, we generate pseudo-CARs by adding these weighted residuals to the predicted values. This method is proposed in Cameron, Gelbach, and Miller (2008), and its validity is verified in Djogbenou, MacKinnon, and Nielsen (2019).[7]

We repeat this process 1000 times to generate 1000 different simulated samples of pseudo-CARs over the two windows of interest around earnings announcements, the initial market reaction covering days (0,+1) and the PEAD covering days (+2,+61). For each simulated sample of pseudo-CARs, we then re-estimate the original model specifications presented in columns (2) and (4) of Table II, and we retrieve the t-value for the coefficient of the interaction term between Adj_SUE and Margin (β_3). If the resulting variance across this sample of 1000 t-statistics is close to 1.0, then such evidence would indicate that the current standard errors are appropriate and the t-statistics are not inflated.

For the simulation involving the initial market reaction, CAR(0,+1), the variance across the 1000 t-statistics for β_3 is 1.028. For the analogous simulation involving PEAD, CAR(+2,+61), the analogous variance across the 1000 t-statistics for β_3 is 1.037. This evidence

[7] This procedure is a generalization of the ordinary wild bootstrap (WB), which was developed in Liu (1988) for the case of non-clustered heteroskedastic errors, following the recommendation in Wu (1986) and the related commentary by Beran (1986).

implies that the current t-statistics for β_3 are not inflated. This simulation analysis goes a long way to alleviate concerns about potential inflation in the t-statistics presented in Table II, which might be due to possible correlation between the error terms along different dimensions.

A.4.e.(ii) Possible Correlation between Errors for CAR(0,+1) across Announcements Made on Consecutive Days

Our measure of the market's initial response to earnings announcements (CAR(0,+1)) is based on a multi-day window that spans days 0 and +1. Thus, two different announcements that occur on consecutive days have half of their CAR(0,1)s based on a common day's return, but their errors are assumed to be independent when we cluster by the earnings announcement date (i.e., day 0). We address this issue by revisiting our analysis of the initial response to earnings news, but instead of examining the two-day CAR(0,+1)'s, we separately examine the one-day abnormal return on the announcement day, AR(0). The results are provided in column (5) of Panel B from Table A8 at the end of this Internet Appendix. This analysis of AR(0) yields robust results for the coefficient of the interaction term (β_3) with respect to our main analysis in Table II.[8] This analysis establishes that our main results and conclusions are robust when we eliminate the possibility of clustering due to a common day's return involved in the analysis of CAR(0,+1) associated with pairs of earnings announcements made on consecutive days.

These robust results for the one-day return on the announcement day (AR(0)) alleviate the concern about potential clustering associated with two-day CAR(0,+1)'s for announcements made on consecutive days. However, we cannot use the same approach when we analyze the 60-day PEAD (CAR(+2,+61)). Instead, in Panels B and C of Table A8 discussed above (in section

[8] When we analyze the one-day abnormal return on the announcement day, AR(0), the coefficient of the interaction term is β_3 = -0.014 (t-ratio = -4.97).

A.4.c of this Internet Appendix), we show that our main results for both the initial response (CAR(0,+1)) and PEAD (CAR(+2,+61)) are robust when we consider several alternative windows over each period. Furthermore, we again emphasize that the simulation discussed in A.4.e.(i) above alleviates concerns about potential inflation in the t-statistics for β_3 associated with both CAR(0,+1) and CAR(+2,+61), which might be due to possible correlation between the error terms along various dimensions, and reduces the need for further analysis of this issue.

A.4.e.(iii) Clustered Standard Errors by Firm, Industry, Day, or Quarter of the Announcement

Finally, in addition to the simulation, we have conducted an extensive search of the literature on the time-series properties of earnings announcement returns, and we establish that only a few alternative methods have been widely used to address clustering on just a few dimensions. While most prior studies of earnings announcement returns use the earnings announcement date as the clustering variable (e.g., see Hirshleifer and Sheng, 2019, DellaVigna and Pollet, 2009, and Kottimukkalur, 2019), a few papers cluster standard errors at both the firm and the announcement date levels (e.g., see Guest, Kothari, and So, 2022). We perform additional analysis of Equation (1) where we cluster standard errors by: (i) firm, (ii) industry, (iii) quarter, (iv) firm and earnings announcement date, (v) firm and quarter, (vi) industry and earnings announcement date, and (vii) industry and quarter. The results are provided in Table A12 at the end of this Internet Appendix. Once again, this evidence establishes that our main results (β_3) remain robust and highly significant when we consider all these alternative choices for clustering variables.

A.4.f. Robustness of Regression Results for Positive versus Negative Earnings Surprises

It is important to assess the robustness of our findings with respect to potential differential investor responses to positive versus negative earnings news. It is possible that short selling restrictions may have resulted in a differential market response to positive versus negative earnings news during our sample period. This issue calls for some background information regarding the institutional features that applied to short selling during the period of our study.

Like today, short sellers were active in the early periods of the last century covering our sample period, 1934 - 1975.[9] Boehmer, Jones, and Zhang (2008) show that short sellers tend to earn excess returns when they short stocks, and thus appear to be well-informed about the prospects for future firm fundamental performance. During our sample period, short sellers were under close scrutiny by market regulators such as the SEC. In addition to margin requirements, the regulators implemented several other policy rules aimed at limiting short selling activity, such as the uptick rule in 1938. Prior to November 1937, the initial margin required on short positions was determined by the broker, and these requirements were subject to NYSE regulation for Big Board issues. After November 1937, margin requirements on both stock purchases and short selling were dictated by Regulation T. Between November 1937 and February 1945, the minimum margin required on short sales was 50%, whereas the margin requirement on purchases was lower, at 40%. After February 1945, the initial margin on short sales was identical to that required for stock purchases, throughout the rest of our sample period.

This historical time-series variation in initial margin requirements that pertains to both stock purchases and short selling suggests that these two classes of investors were similarly affected by changes in margin regulation over our sample period. Of course, investors who already hold a stock are also able to sell when they experience negative earnings news. On the

[9] See Jones and Lamont (2002) for a discussion of the prominence of short sellers during this early period, especially in 1920s and 1930s.

other hand, the literature clearly establishes that short sellers play a vital role in helping markets to incorporate negative information contained in earnings announcements (Boehmer and Wu, 2013), as well as embracing the short legs of a broad range of anomalies (Stambaugh, Yu, and Yuan, 2012).

In Table A13, we estimate an expanded version of Equation (1) that separately accounts for earnings surprises that are large and positive versus large and negative. This expanded model includes two dummy variables labeled 'Surprise_Pos' and 'Surprise_Neg,' which are assigned a value of one for the two subsets of announcements in the top three SUE deciles, or the bottom three SUE deciles each quarter, respectively. We also include the interaction of each dummy variable with the level of margin requirements (i.e., Surprise_Pos*Margin and Surprise_Neg*Margin). We provide two columns of results to analyze the impact of margin requirements on the market's initial response (CAR(0,+1)) and drift (CAR(+2,+61)), respectively, following these subsets of announcements with positive versus negative earnings news.

The results in Table A13 provide further support for our main analysis and conclusions, indicating that higher margin requirements attenuate the initial market response to earnings news while exacerbating PEAD, albeit in opposite directions, for earnings surprises that are more positive versus more negative. In particular, the coefficient on the interaction terms (β_3) is significantly different from zero, and of opposite signs, for the subsets of large positive versus large negative earnings surprises, respectively. These findings are consistent with the view that higher margin requirements limit the ability of arbitrageurs to trade, including both short sellers and stock purchasers, and thereby delay the timely incorporation of both negative and positive earnings news into stock prices.

Internet Appendix A.5. Capital Scarcity and Investor Under-reaction to Earnings News, after Excluding Earnings Announcements that Occur during NBER Recessions

In Table A14, we address the contrasting results in the last column of each Panel in Table VII, which imply *greater* efficiency (i.e., *less* under-reaction) around earnings announcements when we analyze the alternative indirect measure of capital scarcity from Hu, Pan, and Wang (2013), using data since 1988. Guest, Kothari, and So (2022) propose an argument to explain this finding based on a flight to quality earnings in times of greater capital scarcity. According to their argument, investors switch from riskier assets to safer assets when arbitrage capital becomes more scarce. Since firms with a positive earnings surprise are less risky than firms with a negative surprise, investors face lower margin requirements and lower capital costs when they invest in stocks with positive earnings news. As a result, investors have an incentive to move their limited capital from firms with a negative earnings surprise to firms with a positive surprise, in times of scarce capital. The resulting capital flows should push prices down (up) for firms with a negative (positive) earnings surprise, which should accelerate the typically delayed reaction to earnings surprises.

We draw attention to notable discrepancies between our study and that of Guest, Kothari, and So (2022), which become especially relevant during economic recessions. First, there are profound differences between the capital scarcity measure of Hu, Pan, and Wang (2013) and margin requirements (as well as the other five indirect measures), as alternative proxies for the capital constraints that are actually faced by investors. Margin requirements reflect a direct limitation on investors' access to capital that is mandated by the Fed. In contrast, the capital scarcity measure of Hu, Pan, and Wang (2013) is based on noisiness or discontinuities in the yield curve that presumably reflects a lack of arbitrage activity at any particular time. However, this noisiness in the yield curve may reflect not only the scarcity of arbitrage capital at any given time, but also arbitrageur's investment preferences that are endogenous to their portfolio choice problem, which is profoundly affected by recessions.

Consistent with this view, Figure 2 of Hu, Pan, and Wang (2013) shows that their capital scarcity measure is highly sensitive to liquidity crises that often accompany recessions. Under such difficult economic conditions, greater scarcity of capital is likely to spawn dramatic changes in investors' risk preferences, causing them to flee from risky assets to safe assets. Such changes in risk preferences could enhance price efficiency around earnings announcements, by prompting capital flows from firms with a negative earnings surprise to firms with a positive surprise.[10]

Finally, another force behind this linkage between market crises and the capital scarcity measure of Hu, Pan, and Wang (2013) is the limited attention of informed investors, which becomes more intensely focused on earnings information in difficult economic circumstances. At such times, earnings become a major venue of information that investors rely on to understand the financial health of stocks. As investors become more attentive to earnings news during a severe recession, this increased focus could also lead to a more timely market reaction to both good and bad earnings surprises. This outcome of increased attention to earnings news during recessions may also intensify investors' flight from risky assets to safe assets, and thus contribute to the contrasting results we find for the capital scarcity measure of Hu, Pan, and Wang (2013).[11]

We examine these implications of the divergent results for the capital scarcity measure versus the other five indirect measures of leverage constraints, as well as our direct measure of margin requirements, by repeating our regression analysis after excluding NBER recessions.

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[10] The correlation between our NBER recession indicator and the capital scarcity measure of Hu, Pan, and Wang (2013) is 0.54, while the other indirect measures of leverage constraints have smaller correlations, ranging from -0.08 to 0.21. Also, as shown in Table A6, the interaction term between our NBER dummy and Adj_SUE is positive for the initial reaction (CAR(0,+1)), and significantly negative for PEAD (CAR(+2,+61)). This evidence also helps to reconcile the seemingly conflicting results for the capital scarcity measure that are driven by recessions.

[11] See Hirshleifer, Lim, and Teoh (2009) for a detailed argument regarding how increased investor attention can attenuate investors' under-reaction to earnings announcements.

This exclusion should help to eliminate the confounding effects of economic downturns on investor attention and changes in risk preferences, as well as the undue influence of outliers in the capital scarcity measure. This analysis should thus enable us to better capture the impact of leverage constraints on arbitrageurs' under-reaction to earnings announcements under normal circumstances, for all six indirect measures as well as our direct measure of margin requirements.

The results of this analysis are provided in Table A14. The first six columns of each Panel present the analysis for the six indirect measures of leverage constraints that encompasses recent years, while the seventh column provides the analogous results for margin requirements during our early sample period. Once again, Panel A presents the evidence for the initial reaction to earnings surprises (CAR(0,+1)), while Panel B gives the results for PEAD (CAR(+2,+61)).

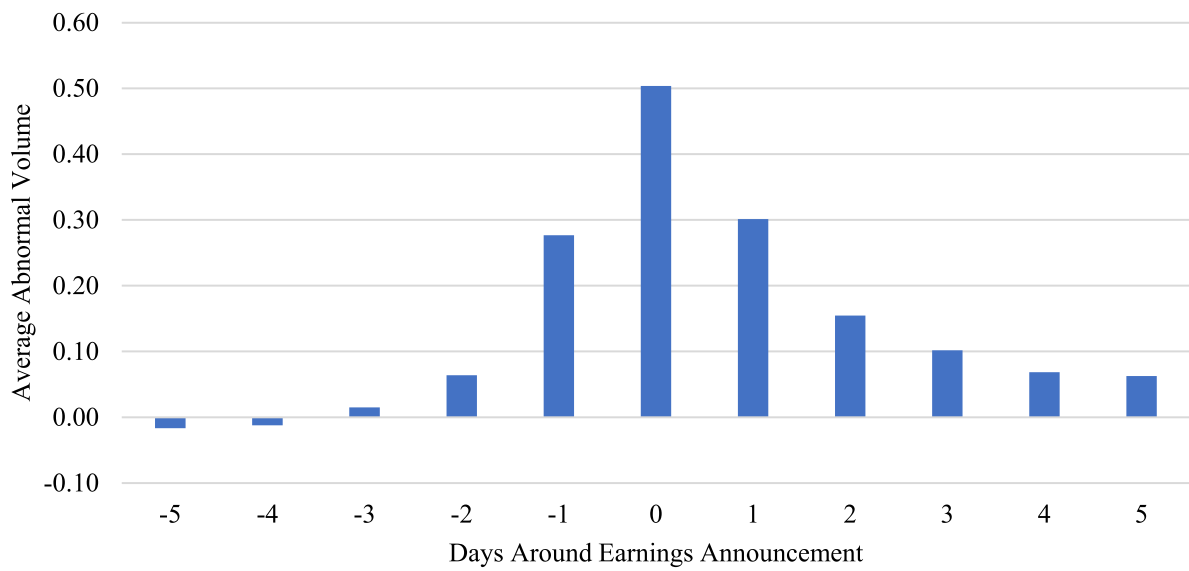
In both Panels of Table A14, when we omit NBER recessions, the evidence is unchanged for the first five indirect measures of leverage constraints in columns (1) to (5), as well as for margin requirements in column (7). Once again, Panel A (Panel B) reveals a significant negative (positive) coefficient of the interaction term (β_3) for four of the first five indirect measures of leverage constraints, as well as for margin requirements. Furthermore, when we omit recessions from the analysis, the coefficient of the interaction term (β_3) involving the capital scarcity measure of Hu, Pan, and Wang (2013) becomes negative and significant in column (6) of Panel A, while it becomes positive but insignificant in column (6) of Panel B. This evidence also supports our conjecture above, by establishing that the relation between this last capital scarcity measure and the market's under-reaction to earnings news reverses in signs when we omit recessions.

Thus, after excluding recessions, our main results hold up when we analyze all six indirect measures of leverage constraints using more recent data since 1974, as well as our direct measure of margin requirements over the earlier sample period. This analysis provides further dramatic and independent corroboration of our main results, by indicating that various measures of tighter leverage constraints analyzed over different sample periods consistently result in greater under-reaction to earnings news by limiting capital available to arbitrageurs.

Figure A1. Average Daily Abnormal Volume around the Earnings Announcement Date

This figure plots the average daily abnormal volume that occurs over the eleven-day window covering days (-5, +5) around the earnings announcement date, where day 0 is the date that the WSJ publishes the Current Earnings Report. For each firm, abnormal trading volume on any day *t*, AVOL[*t*], is defined as the difference between the log dollar volume and the firm's average log dollar volume over days -60 to -11, prior to day 0. For every earnings announcement date (day 0) where a Current Earnings Report is published in the WSJ, we compute the abnormal daily volume for every announcing firm, over each day (*t*) of the eleven-day window (*t* = -5, +5). Panel A plots the resulting pattern in daily abnormal trading volume averaged across the entire sample of earnings announcements, for each day in this window (*t* = -5, +5), while Panel B plots the analogous patterns for the two subsets of earnings announcements that occur during regimes with high (above 75%) versus low (below 55%) margin requirements.

Panel A. All Announcements



Panel B. Subsets of Announcements under High versus Low Margin Regimes

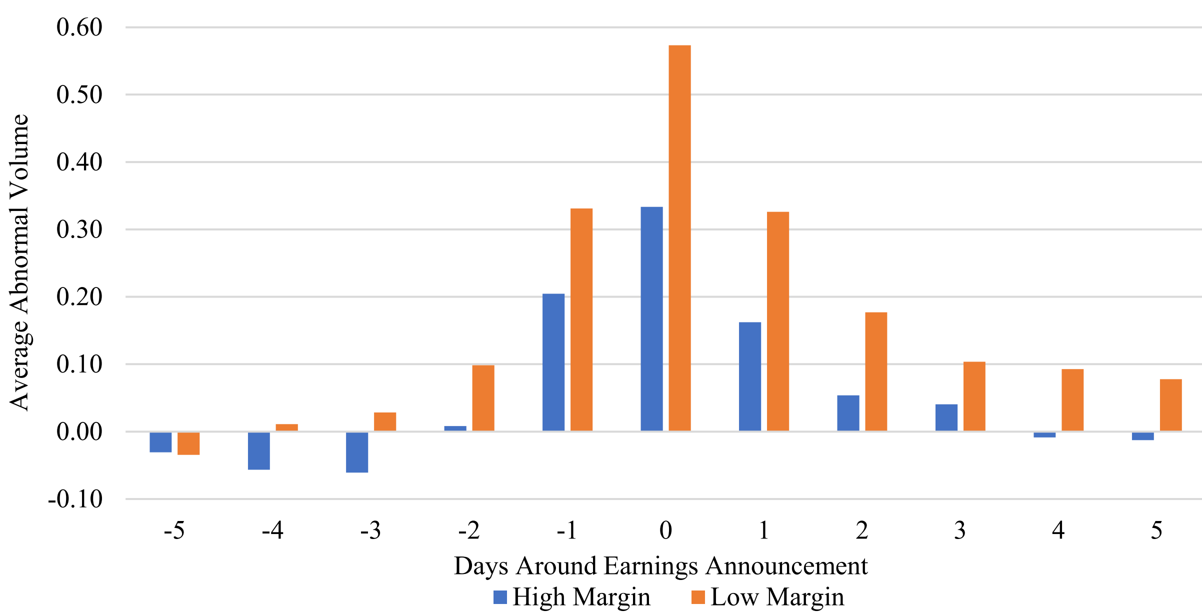


Table A1. The Number of Firms with Earnings Announcements in Our Sample versus CRSP, and Sample Statistics for Announcing Firms

Panel A provides the number of distinct firms with earnings announcements in our sample and the CRSP universe, respectively, for every year of our sample period, 1934 – 1975. We present the total number of distinct firms with earnings announcements disclosed in the daily *Wall Street Journal* each year, for which all variables required for our analysis are available, as well as the analogous number of CRSP stocks. The ratio of the number of firms in our final sample to the number of stocks in the CRSP universe indicates the extent to which our sample covers the universe of CRSP firms. Panel B provides summary statistics for the control variables in our final sample of announcing firms versus the CRSP sample. Here we provide time-series averages of the monthly cross-sectional means for all variables.

Panel A. Annual Number of Firms in our Sample versus the CRSP Sample

Year	Our Sample	CRSP Sample	% Coverage
1934	216	579	37%
1935	284	595	48%
1936	306	593	52%
1937	329	603	55%
1938	341	632	54%
1939	362	669	54%
1940	372	654	57%
1941	400	669	60%
1942	378	690	55%
1943	409	708	58%
1944	426	710	60%
1945	420	730	58%
1946	445	735	61%
1947	465	777	60%
1948	490	833	59%
1949	509	871	58%
1950	553	894	62%
1951	578	920	63%
1952	606	935	65%
1953	607	953	64%
1954	676	914	74%
1955	638	927	69%
1956	664	919	72%
1957	684	913	75%
1958	718	902	80%
1959	715	915	78%
1960	728	898	81%
1961	739	896	82%
1962	755	1011	75%
1963	826	1011	82%
1964	839	1274	66%
1965	902	1324	68%
1966	966	1524	63%
1967	1074	1561	69%
1968	1117	1577	71%
1969	1275	1666	77%
1970	1385	1787	78%
1971	1508	1919	79%
1972	1443	2016	72%
1973	1640	2070	79%
1974	1902	2112	90%
1975	2061	2234	92%

Table A1, continued

Panel B. Summary Statistics for our Sample Firms versus the CRSP Sample

Variables	Our Sample	CRSP Sample
Market Capitalization (Millions of $)	135.23	120.23
Share Turnover (%)	2.57%	2.58%
Market beta	1.26	1.24
IVOL	2.23%	2.27%
Illiquidity	0.08	0.11
Book-to-market	1.61	1.65

Table A2. Variable Definitions

	Dependent Variables
CAR $[a, b]_{i,t}$	Cumulative abnormal return for stock *i* from day *d* = *a* to *b*, following the earnings announcement in quarter *t*. Abnormal returns are calculated as the difference between compounded daily returns for stock *i* (Ret_{id}) and the CRSP value-weighted market index ($VWRet_{md}$) between days *a* and *b*. $\prod_{d=a}^{d=b}(1 + Ret(i,d)) - \prod_{d=a}^{d=b}(1 + VWRet(m, d))$
	Independent Variables
SUE	Standardized unexpected earnings (SUE) is based on the definition of Foster, Olsen, and Shevlin (1984). SUE = $(EPS_{i,q} - EPS_{i,q-4}) / \sigma_{q-8,q-1}$ where $EPS_{i,q}$ and $EPS_{i,q-4}$ are firm *i*'s earnings per share in quarters *q* and *q-4*, and $\sigma_{q-8,q-1}$ is the standard deviation of $EPS_{i,q} - EPS_{i,q-4}$ over the past eight quarters.
Adj_SUE	Adjusted Rank of SUE, constructed by sorting the cross-section of earnings announcements each quarter into deciles (0 – 9), and then dividing each decile rank by 9. The adjusted rank ranges from 0 for the lowest SUE decile to +1 for the top SUE decile.
Abs_SUE	Decile rank of the absolute value of SUE.
Ret [-11, -2]	The cumulative return for stock *i* over days *t-11* to *t-2*.
IVOL	The standard deviation of returns for stock *i* over days *t-11* to *t-2.*
Illiquidity	The average daily Amihud illiquidity measure, computed as the ratio of the daily absolute return to the dollar trading volume for stock *i* in month *t-1*, multiplied by 10^4.
Turnover	The logarithm of average daily turnover (i.e., the percentage of shares outstanding traded) for stock *i* over days *t-11* to *t-2*.
BM	The logarithm of the book-to-market ratio for firm *i* for the most recent period prior to day *t*.
Size	The logarithm of the market capitalization for stock *i* in the month prior to day *t*.
Beta	The market beta of stock *i*, estimated by regressing monthly returns for stock *i* against the CRSP value-weighted market index over months *t-36* to *t-1*.
AVOL [0, 1]	Average abnormal volume on the earnings announcement day (*t*) and the next day (*t+1*), where abnormal volume for stock *i* on day *t* (or *t+1*) is the difference between log dollar volume for stock *i* on day *t* (or *t+1*) and its average log dollar volume over days *t-60* to *t-11*.
Margin	The level of prevailing initial minimum margin requirement on day *t*.
Call Spread	Difference between broker's call money rate and 3-month Treasury Bill rate in month *t*.
Inflation	Change in the natural log of the CPI from month *t-13* to *t-1*.
Credit Growth	Change in the natural log of aggregate margin credit available from month *t-13* to *t-1*.
M1 Growth	Change in the natural log of the money supply (M1) from month *t-13* to *t-1*.
IP Growth	Change in the natural log of industrial production from month *t-13* to *t-1*.
Market PD	The stock market price-dividend ratio measured at the end of month *t-1*.
Sentiment	A dummy variable that equals one if the sentiment measure during year *t-1* from Baker and Wurgler (2006, pg. 1671) is above the median for the entire sample period.

Table A3. Determinants of the Federal Reserve's Changes in Margin Requirements

This table presents the results of regressing the change in margin requirements in month *t* on the various lagged financial market and macroeconomic variables. The sample period encompasses the 22 changes in margin requirements over the period, October 1934 to September 1975. Control variables include the percent change in aggregate margin credit from month *t-13* to month *t-1*, the cumulative market return from month *t-12* to *t-1* and from month *t-36* to *t-13*, the standard deviation and skewness of daily market returns from month *t-12* to *t-1*, the average value-weighted aggregate daily share turnover from month *t-12* to *t-1*, the market price-dividend ratio measured at the end of month *t-1*, and the percent changes in the CPI, the money supply (M1), and industrial production from month *t-13* to *t-1*. Robust t-ratios are provided in parentheses beneath the parameter estimates (Newey and West, 1987, with twelve monthly lags).

Variables	OLS Change	Multinomial Logit Increase	Multinomial Logit Decrease
	(1)	(2)	(3)
Constant	0.00	-4.87***	-4.82***
	(0.54)	(-8.08)	(-7.59)
Credit Growth	0.01***	1.97***	-1.12
	(2.90)	(3.06)	(-1.54)
Market Return 1-12	0.00**	0.51	-1.22*
	(2.44)	(1.36)	(-1.79)
Market Return 13-36	0.00	0.56	-0.05
	(0.73)	(1.40)	(-0.14)
Market Volatility	0.01**	0.87	-1.20*
	(2.34)	(1.31)	(-1.84)
Market Skewness	0.00	0.47	0.04
	(0.70)	(0.99)	(0.09)
Share Turnover	0.00	0.12	0.31
	(0.11)	(0.27)	(0.60)
Market P/D	0.00	0.08	-0.34
	(0.36)	(0.17)	(-0.61)
Inflation	0.00	0.27	-0.41
	(1.62)	(0.55)	(-1.02)
M1 Growth	-0.00	0.02	0.15
	(-0.46)	(0.05)	(0.46)
IP Growth	-0.01**	-0.74***	0.15
	(-2.34)	(-2.65)	(0.32)
Adjusted R-squared	0.043	0.189	0.189

Table A4. Determinants of Changes in Margin Credit

This table presents results from regressing the change in margin credit on the lagged changes in the minimum margin requirement and the call spread, along with other control variables. The sample period encompasses the Fed's 22 changes in margin requirements over the period, October 1934 to September 1975. In columns (1) to (4) below, the dependent variable is the percent change in aggregate margin credit measured over the past month. In columns (5) to (8), the dependent variable is the percent change in margin credit over the past 12 months. The call spread is defined as the difference between the broker's call money rate and the three-month Treasury bill rate. Control variables include cumulative market returns from month *t-12* to *t-1* and from month *t-36* to *t-13*, the standard deviation and skewness of daily market returns from month *t-12* to *t-1*, the average value-weighted aggregate daily share turnover from month *t-12* to *t-1*, the market price-dividend ratio measured at the end of month *t-1*, and the percent changes in the CPI, the money supply (M1), and industrial production from month *t-13* to *t-1*. Robust t-ratios are provided in parentheses beneath the parameter estimates (Newey and West, 1987, with twelve monthly lags).

Variables	1 Month				12 Months			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04
	(0.99)	(0.97)	(1.00)	(1.19)	(1.07)	(1.03)	(1.07)	(1.19)
Margin Change	-0.13**		-0.13**	-0.14**	-0.79**		-0.79**	-0.60**
	(-2.15)		(-2.18)	(-2.44)	(-2.53)		(-2.53)	(-2.33)
Call Spread change		-0.83	-0.88	-0.54		-0.21	-0.58	-0.33
		(-1.33)	(-1.37)	(-0.79)		(-0.06)	(-0.19)	(-0.12)
Controls	N	N	N	Y	N	N	N	Y
Adjusted R-squared	0.017	0.0004	0.018	0.086	0.018	-0.002	0.017	0.219

Table A5. Effect of Changes in Margin Requirements on Macroeconomic Variables

This table presents the results of regressing changes in the various financial market and macroeconomic variables on the lagged change in margin requirements. The sample period encompasses the 22 changes in margin requirements over the period, October 1934 to September 1975. The dependent variables appearing in the left column of this table include the stock market return, the standard deviation and skewness of daily market returns, average value-weighted aggregate daily share turnover, inflation, changes in the money supply (M1), and industrial production, measured over two time frames that span one month (the first three columns) and 12 months (the last three columns). Robust t-ratios are provided in parentheses beneath the parameter estimates (Newey and West, 1987, with twelve monthly lags).

Variables	1 Month			12 Months		
	Constant	Change in Margin	R-squared	Constant	Change in Margin	R-squared
	(1)	(2)	(3)	(4)	(5)	(6)
Market Return	-0.000	0.047	-0.001	0.000	-0.045	-0.001
	(-0.11)	(0.83)		(0.02)	(-0.66)	
Market Volatility	-0.000	0.003	-0.0003	0.000	0.005	-0.0002
	(-0.13)	(0.73)		(0.09)	(1.00)	
Market Skewness	-0.001	0.704	-0.001	0.003	-0.926	-0.0003
	(-0.05)	(0.68)		(0.06)	(-0.80)	
Share Turnover	0.001	-0.024	-0.002	0.003	-0.196	-0.0003
	(0.20)	(-0.15)		(0.15)	(-0.46)	
Inflation	0.003***	-0.007	0.001	0.034***	0.039	0.0001
	(5.73)	(-1.18)		(6.06)	(0.76)	
M1 Growth	0.002***	-0.002	-0.001	0.000	-0.003	-0.001
	(8.10)	(-0.63)		(0.25)	(-0.45)	
IP Growth	0.004***	-0.010	-0.002	0.049***	0.102	-0.001
	(2.81)	(-0.23)		(3.16)	(0.81)	

Table A6. Controlling for Changes in Macroeconomic and Credit Market Conditions

This table presents results from estimating an expanded version of Equation (1) that controls for six different aspects of macroeconomic conditions, including inflation, the change in the call spread, credit growth, money supply growth, industrial production growth, and an indicator variable for NBER recessions during month *t-1*. We also include the six interaction terms between each macroeconomic variable and the adjusted rank of SUE (e.g., Adj_SUE x Inflation, etc.). The dependent variable is CAR(0,1) or CAR(2,61). We only provide the results for the relevant variables and interaction terms for brevity. We also include the other controls in Equation (1), as well as fixed effects for day-of-the-week. The sample period covers October 1934 through September 1975. Standard errors are adjusted for heteroscedasticity and clustered by the day of the earnings announcement. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Variables		CAR [0, 1] (1)	CAR [2, 61] (2)
Adj_SUE	(β_1)	0.036*** (11.92)	0.009 (0.74)
Margin	(β_2)	0.004 (1.53)	-0.041*** (-3.83)
Adj_SUE x Margin	**(β_3)**	**-0.012*** (-2.87)**	**0.053*** (3.56)**
Adj_SUE x Inflation		0.129*** (7.24)	0.258*** (3.82)
Adj_SUE x ΔCall Spread		0.160 (0.89)	-0.405 (-0.68)
Adj_SUE x Credit Growth		-0.002 (-0.78)	0.006 (0.59)
Adj_SUE x M1 Growth		0.015 (1.17)	-0.040 (-0.91)
Adj_SUE x IP Growth		-0.009 (-1.37)	0.019 (0.82)
Adj_SUE x NBER		0.002 (1.44)	-0.016*** (-2.79)
Constant		-0.018*** (-7.26)	0.017 (1.61)
Controls		Y	Y
Observations		79,062	79,062
Adjusted R-squared		0.069	0.023

Table A7. Controlling for Stock Market Conditions

This table presents results from estimating an alternative expanded version of Equation (1) that controls for five different aspects of stock market conditions. These stock market conditions include the mean daily aggregate stock market return volatility (Aggregate Volatility), turnover (Aggregate Turnover), and Amihud illiquidity (Aggregate Illiquidity) during month *t-1*, as well as cumulative market returns over months *t-12* to *t-1*, and the change in the market's price-to-dividend ratio from month *t-1*. We also include the five respective interaction terms between each market variable and the adjusted rank of SUE (e.g., Adj_SUE x Volatility, etc.). The dependent variable is CAR(0,1) or CAR(2,61). We only provide the results for the relevant variables and interaction terms for brevity. We also include the other controls in Equation (1), as well as fixed effects for day-of-the-week. The sample period covers October 1934 through September 1975. Standard errors are adjusted for heteroscedasticity and clustered by the day of the earnings announcement. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Variables		CAR [0, 1] (1)	CAR [2, 61] (2)
Adj_SUE	(β_1)	0.044*** (14.87)	0.008 (0.80)
Margin	(β_2)	0.003 (1.27)	0.002 (0.24)
Adj_SUE x Margin	**(β_3)**	**-0.013*** (-3.12)**	**0.036*** (2.58)**
Adj_SUE x Aggregate Volatility		-0.015 (-0.68)	-0.006 (-0.15)
Adj_SUE x Aggregate Turnover		0.070 (1.49)	0.723*** (4.25)
Adj_SUE x Aggregate Illiquidity		-0.002 (-0.69)	-0.015 (-1.27)
Adj_SUE x Market Returns		-0.026*** (-8.10)	-0.003 (-0.26)
Adj_SUE x Change in Market's Price / Dividend Ratio		-0.001 (-1.28)	-0.006** (-2.42)
Constant		-0.020*** (-8.05)	-0.015 (-1.59)
Controls		Y	Y
Observations		79,062	79,062
Adjusted R-squared		0.068	0.022

Table A8. Margin Requirements and Earnings Announcement Returns: Alternative Return Windows for the Initial Market Response and the PEAD

Panel A of this table presents the mean cumulative abnormal returns (CARs) for the SUE hedge portfolio measured over various time frames, around two subsets of earnings announcements that occur during regimes with high versus low margin requirements. High margin regimes include all earnings announcements that occur when the prevailing margin requirement on the earnings announcement day is above 75%, while low margin regimes include announcements made when the margin requirement is below 55%. We provide these results over the following alternative time frames around the earnings release on day 0: CAR(0,+1), CAR(+2,+61), CAR(0,+61), CAR(-1,+61), and CAR(-2,+61), as well as for the sum of CAR(0,+1) and CAR(+2,+61). For each time frame, we compute the average CARs across all earnings announcements during periods of high versus low margin requirements. For each window considered, we also provide the difference in mean CARs across the two margin regimes, along with the mean difference t-test for the null hypothesis that these mean CARs are identical.

Panels B and C provide the results from estimating Equation (1), using alternative windows of time to examine the influence of margin requirements on the initial response to earnings announcements and post-announcement drift, respectively. In Panel B, we report these regression results for the initial response, where the dependent variable is the cumulative abnormal return for stock *i* compounded over the following windows: (-3,+1), (-3,+2), (-2,+2), (-1,+1), and (0) around the *Wall Street Journal* publication date (day 0). In Panel C, we present the analogous regression results for PEAD, using the following alternative windows: (+3,+61), (+4,+61), and (+5,+61). Control variables are defined in Table A2, and include the firm's lagged SUE, the number of same-day announcements, the firm's lagged return over days -11 to -2, book-to-market, beta, size, standard deviation of returns over days -11 to -2, turnover for these same days, and illiquidity. We include fixed effects for day-of-the-week. The sample covers October 1934 through September 1975. Standard errors are adjusted for heteroscedasticity and clustered by the day of the announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Mean CARs for SUE Hedge Portfolio Measured over Various Time Frames, for Subsets of Earnings Announcements that Occur during High versus Low Margin Regimes

SUE Hedge Portfolio Return	High Margin		Low Margin		Difference High – Low Margin	
	CAR	t-stat	CAR	t-stat	CAR	t-stat
CAR[0,+1]	3.17%	15.10	3.70%	25.60	-0.53%	-2.07
CAR[+2,+61]	5.37%	8.09	3.48%	6.93	1.89%	2.27
CAR[0,+1] + CAR [+2,+61]	8.54%	12.47	7.17%	13.81	1.36%	1.59
CAR[0,+61]	8.41%	12.41	7.41%	14.03	1.00%	1.16
CAR[-1,+61]	9.99%	14.63	9.11%	16.95	0.87%	1.01
CAR[-2,+61]	10.29%	14.86	9.89%	17.99	0.40%	0.45

Table A8, continued

Panel B. Regression Analysis: Alternative Return Windows to Measure the Initial Response to Earnings News

Variables		CAR [-3, +1] (1)	CAR [-3, +2] (2)	CAR [-2, +2] (3)	CAR [-1, +1] (4)	CAR [0] (5)
Adj_SUE	(β_1)	0.071***	0.075***	0.074***	0.063***	0.035***
		(19.89)	(19.56)	(20.49)	(20.60)	(18.35)
Margin	(β_2)	0.015***	0.015***	0.012***	0.005*	0.004**
		(4.42)	(4.25)	(3.78)	(1.95)	(2.25)
Adj_SUE * Margin	**(β_3)**	**-0.027*** **	**-0.029*** **	**-0.028*** **	**-0.019*** **	**-0.014*** **
		(-5.00)	**(-5.18)**	**(-5.33)**	**(-4.05)**	**(-4.97)**
Controls		Y	Y	Y	Y	Y
Constant		-0.031***	-0.033***	-0.032***	-0.024***	-0.015***
		(-9.53)	(-9.28)	(-9.88)	(-9.12)	(-8.83)
Observations		79062	79062	79062	79062	79062
Adjusted R-squared		0.112	0.102	0.085	0.101	0.064

Panel C. Regression Analysis: Alternative Return Windows to Measure Post-Earnings Announcement Drift

Variables		CAR [3, 61] (1)	CAR [4, 61] (2)	CAR [5, 61] (3)
Adj_SUE	(β_1)	0.006	0.005	0.005
		(0.73)	(0.54)	(0.62)
Margin	(β_2)	-0.039***	-0.040***	-0.039***
		(-4.32)	(-4.40)	(-4.41)
Adj_SUE * Margin	**(β_3)**	**0.064*** **	**0.067*** **	**0.066*** **
		(4.86)	**(5.06)**	**(5.00)**
Controls		Y	Y	Y
Constant		0.001	0.002	0.004
		(0.10)	(0.22)	(0.50)
Observations		79062	79062	79062
Adjusted R-squared		0.016	0.017	0.017

Table A9. Margin Requirements and Earnings Announcement Returns: Excluding Announcements in the 60 days before or after a Change in Margin Requirements

This table presents the results from re-estimating Equation (1) after excluding earnings announcements that occur within (+ or -) 60 days of each of the Federal Reserve's 22 changes in margin requirements. The dependent variable is the cumulative abnormal return for stock *i*, compounded over two time frames: the initial announcement return on days (0,+1) and the 60-day post-announcement drift covering days (+2,+61) following the earnings announcement in quarter *t* (on day 0). The coefficient of Adj_SUE (β_1) reflects the sensitivity of announcement returns to moving from the lowest SUE decile to the highest SUE decile. The coefficient of the interaction term, Adj_SUE x Margin (β_3) reflects the impact of margin requirements on the sensitivity of returns to Earnings News. We also include the other control variables in Equation (1), as well as fixed effects for day-of-the-week. The sample period covers October 1934 through September 1975. Standard errors are adjusted for heteroscedasticity and clustered by the day of the announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables		CAR [0, 1] (1)	CAR [2, 61] (2)
Adj_SUE	(β_1)	0.047***	0.010
		(17.08)	(1.06)
Margin	(β_2)	0.008***	-0.044***
		(3.20)	(-4.60)
Adj_SUE x Margin	**(β_3)**	**-0.020*****	**0.060*****
		(-4.81)	**(4.16)**
Lagged SUE		-0.000***	-0.001***
		(-4.78)	(-3.44)
#Ann		-0.043***	-0.001
		(-11.86)	(-0.04)
Ret [-11, -2]		0.003***	0.013***
		(8.98)	(10.66)
BM		-0.001*	-0.006***
		(-1.69)	(-3.45)
Beta		-0.000	0.001***
		(-0.18)	(2.86)
Size		0.018	0.356***
		(0.57)	(3.92)
IVOL		-0.000	0.000
		(-1.48)	(1.17)
Turnover		0.005	0.016***
		(1.02)	(2.81)
Illiquidity		-0.023***	-0.001
		(-9.29)	(-0.16)
Constant		0.047***	0.010
		(17.08)	(1.06)
Observations		66,725	66,725
Adjusted R-squared		0.067	0.017

Table A10. Excluding Earnings Announcements Made during the 45, 60, or 90 Days before an Increase in Margin Requirements

This table presents the results from re-estimating Equation (1) after excluding earnings announcements that occur within the 45, 60, or 90 days before an increase in margin requirements. The dependent variable is the cumulative abnormal return for stock *i*, compounded over two time frames: the initial announcement return on days (0,+1) and the 60-day post-announcement period covering days (+2,+61) following the earnings announcement in quarter *t* (on day 0). The coefficient of Adj_SUE (β_1) reflects the sensitivity of announcement returns to moving from the lowest SUE decile to the highest SUE decile. The coefficient of the interaction term, Adj_SUE x Margin (β_3), measures the impact of margin requirements on the sensitivity of returns to earnings news. We also include the other control variables in Equation (1), as well as fixed effects for day-of-the-week. The sample period covers October 1934 through September 1975. Standard errors are adjusted for heteroscedasticity and clustered by the day of the announcement. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

		CAR [0,1]			CAR [2,61]		
Variables		45 days	60 days	90 days	45 days	60 days	90 days
		(2)	(3)	(4)	(6)	(7)	(8)
Adj_SUE	(β_1)	0.046***	0.046***	0.047***	0.009	0.011	0.016*
		(17.81)	(17.72)	(17.64)	(1.05)	(1.18)	(1.74)
Margin	(β_2)	0.006**	0.006**	0.006**	-0.043***	-0.043***	-0.037***
		(2.46)	(2.44)	(2.56)	(-4.63)	(-4.61)	(-3.96)
Adj_SUE x Margin	**(β_3)**	**-0.018*** **	**-0.018*** **	**-0.019*** **	**0.061*** **	**0.059*** **	**0.052*** **
		(-4.67)	**(-4.64)**	**(-4.76)**	**(4.52)**	**(4.35)**	**(3.79)**
Constant		-0.022***	-0.022***	-0.023***	0.002	0.0005	-0.008
		(-9.49)	(-9.52)	(-9.45)	(0.17)	(0.05)	(-0.91)
Controls		Y	Y	Y	Y	Y	Y
Observations		76,401	75,762	74,205	76,401	75,762	74,205
Adjusted R-squared		0.066	0.066	0.067	0.016	0.016	0.016

Table A11. Using Dummy Variable to Account for Periods of Potential Excess Speculation during the 45 or 90 Days before an Increase in Margin Requirements

In this table, we reproduce the analysis in Table VI, using two alternative time frames for the dummy variable, Before_Increase. In particular, we estimate an expanded version of Equation (1) that separately accounts for earnings announcements that are made during two alternative periods just before the Federal Reserve increased margin requirements, when the Fed commonly stated that they were especially concerned about excess market speculation. This expanded model includes a dummy variable labeled 'Before_Increase,' which is assigned a value of one for any earnings announcements made within 45 days (in Panel A) or 90 days (in Panel B) before the Fed increased margin requirements, along with its interaction with Adj_SUE. We estimate two versions of this model, one that omits the two independent variables that capture the influence of margin requirements (i.e., Margin and Adj_SUE x Margin), and another that includes these two independent variables. The left side of each panel provides the results when the dependent variable is CAR(0,1), while the right side presents the evidence for (CAR(2,61)). In each model estimated, we include fixed effects for day-of-the-week. The sample period covers October 1934 through September 1975. Standard errors are adjusted for heteroscedasticity and clustered by the day of the earnings announcement. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Panel A. Dummy Variable (Before_Increase) for Earnings Announcements made in the 45 Days before an Increase in Margin Requirements

Variables		CAR [0,1]		CAR [2,61]	
		(1)	(2)	(3)	(4)
Adj_SUE	(β_1)	0.035***	0.046***	0.048***	0.009
		(58.45)	(18.00)	(23.80)	(1.02)
Margin	(β_2)		0.006***		-0.040***
			(2.64)		(-4.33)
Adj_SUE x Margin	**(β_3)**		**-0.018*****		**0.062*****
			(-4.76)		**(4.58)**
Before_Increase	(β_4)	0.002	0.002	-0.013*	-0.015***
		(0.92)	(1.08)	(-1.94)	(-2.18)
Adj_SUE x Before_Increase	**(β_5)**	**-0.0001**	**-0.001**	**0.007**	**0.010**
		(-0.03)	**(-0.32)**	**(0.69)**	**(0.99)**
Constant		-0.018***	-0.022***	-0.024***	0.001
		(-10.97	(-9.68)	(-3.75)	(0.07)
Controls		Y	Y	Y	Y
Observations		79,062	79,062	79,062	79,062
Adjusted R-squared		0.066	0.066	0.016	0.017

Table A11, continued

Panel B. Dummy Variable (Before_Increase) for Earnings Announcements made in the 90 Days before an Increase in Margin Requirements

Variables		CAR [0,1]		CAR [2,61]	
		(1)	(2)	(3)	(4)
Adj_SUE	(β_1)	0.035***	0.047***	0.049***	0.012
		(57.51)	(17.90)	(24.05)	(1.33)
Margin	(β_2)		0.007***		-0.035***
			(2.81)		(-3.83)
Adj_SUE x Margin	**(β_3)**		**-0.019*****		**0.059*****
			(-4.82)		**(4.34)**
Before_Increase	(β_4)	0.003**	0.003***	0.015***	0.013**
		(2.13)	(2.39)	(2.79)	(2.39)
Adj_SUE x Before_Increase	**(β_5)**	**-0.001**	**-0.002**	**-0.013***	**-0.010**
		(-0.60)	**(-1.08)**	**(-1.68)**	**(-1.25)**
Constant		-0.019**	-0.023***	-0.027	-0.005
		(-11.12)	(-9.84)	(-4.12)	(-0.54)
Controls		Y	Y	Y	Y
Observations		79,062	79,062	79,062	79,062
Adjusted R-squared		0.066	0.067	0.016	0.017

Table A12. Margin Requirements and Earnings Announcement Returns: Clustering along Alternative Dimensions

This table analyzes the robustness of our main results from estimating Equation (1), when we consider alternative clustering variables to account for possible correlation between the error terms along different dimensions. In Panel A, we report the results for our analysis of the initial market response (CAR(0,+1)), where standard errors are clustered by firm, industry, quarter, firm and earnings day, firm and quarter, industry and earnings day, and industry and quarter, respectively. In Panel B, we present the analogous results for our analysis of PEAD (CAR(+2,+61)). Control variables are defined in Table A2, and include the firm's lagged SUE, the number of same-day announcements, the firm's lagged return over days -11 to -2, book-to-market, beta, size, standard deviation of returns over days -11 to -2, turnover for these same days, and illiquidity. We include fixed effects for day-of-the-week. The sample covers October 1934 through September 1975. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The difference in sample sizes for the models involving industry clustering is due to missing industry codes for 244 observations.

Panel A. Alternative Clusters: Analysis of Initial Response to Earnings News, CAR(0,+1)

Variables		Firm (1)	Industry (2)	Quarter (3)	Firm and Earnings Day (4)	Firm and Quarter (5)	Industry and Earnings Day (6)	Industry and Quarter (7)
Adj_SUE	(β_1)	0.046***	0.046***	0.046***	0.046***	0.046***	0.046***	0.046***
		(18.35)	(13.66)	(9.18)	(17.29)	(9.08)	(13.29)	(8.62)
Margin	(β_2)	0.006***	0.006***	0.006	0.006**	0.006*	0.006**	0.006
		(2.73)	(2.81)	(1.50)	(2.58)	(1.51)	(2.67)	(1.62)
Adj_SUE * Margin	**(β_3)**	**-0.018*** **	**-0.018*** **	**-0.018** **	**-0.018*** **	**-0.018** **	**-0.018*** **	**-0.018** **
		(-4.94)	**(-4.76)**	**(-2.58)**	**(-4.65)**	**(-2.57)**	**(-4.54)**	**(-2.66)**
Controls		Y	Y	Y	Y	Y	Y	Y
Constant		-0.022***	-0.022***	-0.022***	-0.022***	-0.022***	-0.022***	-0.022***
		(-9.90)	(-6.00)	(-6.45)	(-9.47)	(-6.40)	(-5.93)	(-5.00)
Observations		79062	78818	79062	79062	79062	78818	78818
Adjusted R-squared		0.066	0.066	0.066	0.067	0.067	0.067	0.067

Table A12, continued

Panel B. Alternative Clusters: Analysis of Post-Announcement Drift, CAR(+2,+61)

Variables		Firm (1)	Industry (2)	Quarter (3)	Firm and Earnings Day (4)	Firm and Quarter (5)	Industry and Earnings Day (6)	Industry and Quarter (7)
Adj_SUE	(β_1)	0.010	0.009	0.010	0.010	0.010	0.010	0.010
		(1.25)	(0.68)	(0.54)	(1.15)	(0.55)	(0.66)	(0.44)
Margin	(β_2)	-0.038***	-0.039**	-0.038	-0.038***	-0.038	-0.039**	-0.039
		(-5.23)	(-2.66)	(-1.32)	(-4.14)	(-1.32)	(-2.51)	(-1.28)
Adj_SUE * Margin	**(β_3)**	**0.061*** **	**0.063*** **	**0.061** **	**0.061*** **	**0.061** **	**0.063*** **	**0.063** **
		(4.92)	**(3.51)**	**(2.19)**	**(4.54)**	**(2.19)**	**(3.40)**	**(2.16)**
Controls		Y	Y	Y	Y	Y	Y	Y
Constant		-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
		(-0.13)	(-0.05)	(-0.05)	(-0.11)	(-0.05)	(-0.05)	(-0.03)
Observations		79062	78818	79062	79062	79062	78818	78818
Adjusted R-squared		0.016	0.016	0.016	0.017	0.017	0.017	0.017

Table A13. Margin Requirements and Earnings Announcement Returns: Positive versus Negative Earnings News

In this table, we estimate an expanded version of Equation (1) that separately accounts for earnings surprises that are more positive versus more negative. This expanded model includes two dummy variables labeled 'Surprise_Pos' and 'Surprise_Neg,' which are assigned a value of one for the subsets of earnings announcements in the top three SUE deciles, or the bottom three SUE deciles each quarter, respectively. We also include the interaction of each dummy variable with the level of margin requirements (i.e., Surprise_Pos*Margin and Surprise_Neg*Margin). We provide two columns of results to analyze the impact of margin requirements on the market's initial response to earnings news (CAR(0,+1)) and post-announcement drift (CAR(+2,+61)). The regression model includes the same control variables as Equation (1), as well as fixed effects for day-of-the-week. The sample period covers October 1934 through September 1975. Standard errors are adjusted for heteroscedasticity and clustered by the day of the earnings announcement. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Variables	CAR[0,+1] (1)	CAR[+2,+61] (2)
Surprise_Pos	0.015*** (8.14)	0.007 (1.03)
Surprise_Neg	-0.020*** (-10.87)	0.002 (0.35)
Margin	-0.003* (-1.86)	-0.006 (-0.73)
Surprise_Pos * Margin	**-0.007**** **(-2.53)**	**0.022**** **(2.21)**
Surprise_Neg * Margin	**0.006**** **(2.25)**	**-0.030***** **(-3.16)**
Controls	Y	Y
Constant	0.002 (0.91)	0.000 (0.03)
Observations	79062	79062
Adjusted R-squared	0.060	0.016

Table A14. Analyzing Indirect Measures of Leverage Constraints: Excluding Recessions

In this table, we repeat the analysis in Tables II and VII, after excluding all months during NBER recessions. The first six columns present the results from re-estimating Equation (1) with the six alternative indirect measures of leverage constraints analyzed in Table VII, while the last column presents the results using our margin requirement measure. The six indirect measures include the TED spread, the Feds Fund rate, the measure of leverage constraints from Boguth and Simutin (2018), the shadow cost of leverage constructed by Lu and Qin (2020), the margin debt measure of Assness, Frazzini, Gormsen, and Pedersen (2020), and the capital scarcity measure of Hu, Pan, and Wang (2013). The TED spread, the Fed Funds Rate, the shadow cost of leverage from Lu and Qin (2020), and the capital scarcity measure of Hu, Pan, and Wang (2013) are measured over the two-day earnings announcement window (TED[0,1], FFR[0,1], PSI[0,1], and Cap Scarcity [0,1]). The leverage constraint measure from Boguth and Simutin (2018) is their six-month moving average measure (LCT_{MA6}). The margin debt measure is the negative of the measure from Assness, Frazzini, Gormsen, and Pedersen (2020), which aligns the interpretation of this measure with the other measures. In this revised version of Equation (1), we include each measure of leverage constraints separately, along with its respective interaction with the adjusted rank of SUE. In Panel A, the dependent variable is CAR(0,1), while in Panel B, the dependent variable is CAR(2,61). We only provide the results for the relevant variables and interaction terms for brevity. In both panels, we also include the other controls in Equation (1), as well as fixed effects for day-of-the-week. The sample period corresponding to each measure is given at the bottom of each panel. Standard errors are adjusted for heteroscedasticity and clustered by the day of the earnings announcement. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Panel A. Indirect Measures of Leverage Constraints and CAR [0, 1]: Excluding Recessions

		CAR [0,1]						
Variables		LCT_{MA6}	PSI [0, 1]	Margin $Debt_t$	TED [0, 1]	FFR [0, 1]	Cap Scarcity [0, 1]	Margin $Requirement_t$
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Adj_SUE	(β_1)	0.087***	0.052***	0.023***	0.049***	0.044***	0.048***	0.039***
		(11.85)	(52.85)	(22.94)	(56.59)	(83.88)	(37.52)	(14.08)
Leverage Constraints	(β_2)	0.010**	-0.001*	0.211***	0.043	0.00003***	0.001*	0.004*
		(2.30)	(-1.76)	(7.85)	(0.89)	(7.02)	(1.77)	(1.67)
Adj_SUE x Leverage Constraints	**(β_3)**	**-0.043*****	**0.001**	**-0.647*****	**-0.418*****	**-0.0001*****	**-0.001*****	**-0.009****
		(-6.27)	**(1.06)**	**(-15.85)**	**(-6.72)**	**(-14.12)**	**(-3.56)**	**(-2.30)**
Constant		-0.016***	-0.014***	-0.004***	-0.006***	-0.011***	-0.005**	-0.017***
		(-3.27)	(-3.47)	(-2.76)	(-3.09)	(-7.12)	(-2.49)	(-7.37)
Controls		Y	Y	Y	Y	Y	Y	Y
Observations		350,848	102,593	472,371	359,263	468,330	302,689	61,063
Adjusted R-squared		0.030	0.038	0.032	0.032	0.032	0.032	0.070
Sample Period		1981-2014	2006-2016	1933-2017	1986-2018	1954-2018	1988-2014	1934-1975

Table A14, continued

Panel B. Indirect Measures of Leverage Constraints and CAR [2,61]: Excluding Recessions

Variables		CAR [2, 61]						
		LCT_{MA6}	PSI [0, 1]	Margin $Debt_t$	TED [0, 1]	FFR [0, 1]	Cap Scarcity [0, 1]	Margin $Requirement_t$
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Adj_SUE	(β_1)	-0.052**	0.034***	0.062***	0.038***	0.039***	0.044***	0.010
		(-2.07)	(13.89)	(20.02)	(16.15)	(27.10)	(9.41)	(1.08)
Leverage Constraints	(β_2)	-0.103***	0.002	-0.405***	-1.470***	-0.0002***	-0.0003	-0.029***
		(-5.75)	(1.43)	(-3.98)	(-7.61)	(-11.70)	(-0.22)	(-3.02)
Adj_SUE x Leverage Constraints	**(β_3)**	**0.093***	**-0.002**	**0.583***	**0.563***	**0.0002***	**0.0006**	**0.061***
		(4.03)	**(-0.65)**	**(4.77)**	**(2.60)**	**(10.02)**	**(0.37)**	**(4.34)**
Constant		0.123***	0.007	-0.009	0.028***	0.017***	0.025***	0.007
		(5.96)	(0.71)	(-1.57)	(3.86)	(2.86)	(3.06)	(0.76)
Controls		Y	Y	Y	Y	Y	Y	Y
Observations		350,848	102,593	472,371	359,263	468,330	302,689	61,063
Adjusted R-squared		0.009	0.017	0.011	0.009	0.011	0.008	0.015
Sample Period		1981-2014	2006-2016	1933-2017	1986-2018	1954-2018	1988-2014	1934-1975

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