Capital structure around the S&P 500 index additions: Evidence of window dressing

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Abstract

We examine the capital structure of firms that are newly added to the S&P 500 index. Leverage gradually decreases during the two-year pre-addition period and then increases during the two-year post-addition period. This trend is attributable to debt issuance and cannot be explained by mechanical effects. We explain these findings as corporate window-dressing efforts to increase the probability of being added to the index. Consistent with this explanation, the leverage trend is more pronounced in financially weak firms and firms facing intense competition for addition to the index. The post-addition reversion of leverage is consistent with the existence of a target capital structure.

Keywords: S&P 500 index, capital structure, trade-off theory, target leverage

JEL classification: G30, G32

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1. Introduction

The S&P 500 index is a stock market index based on the market capitalization of 500 large companies that have common stock listed on the NYSE or NASDAQ. It is one of the most commonly followed equity indices and is often considered the best representation of the U.S. stock market. Being added to the index is known to bring significant changes to a firm, such as a higher stock price (Shleifer (1986), Chen et al. (2004)), institutional ownership (Pruitt and Wei (1989), Chen et al. (2004)), analyst following (Yu, 2008), and reduced cost of equity (Chen et al. (2004), Baran and King (2012)). While exerting significant impact on a newly added firm, the addition decision made by S&P is uncertain from the firm-level perspective because a number of firms qualify the criteria disclosed by the S&P for index additions. For example, David M. Blitzer, chair of the S&P index committee, said in an interview with ETF.com in January, 2000 that there are typically five to fifteen candidate stocks for each index that are approved by the committee and ready for inclusion at any time.[1] The existence of multiple candidates may incentivize firms to improve in ways that are deemed desirable by focusing on specific attributes.[2] In this paper, we investigate financial leverage, one of the most frequently studied corporate financial policies, but one that is not yet included among the criteria for being added to the S&P 500 index.[3] In particular, we study leverage in firms that are newly added to the S&P 500 index (hereafter, "added firms") during the pre-addition period to examine whether they reduce leverage prior to be added to the index and during the post-addition period to determine whether reduced leverage is maintained or reverses.

We find that leverage in added firms gradually decreases before they are added to the index,

[1] "Here, At The S&P 500", Jan 01, 2000, ETF.com
http://www.etf.com/publications/journalofindexes/joi-articles/1153.html?nopaging=1.

[2] The assumption is that firms wish to be added to the S&P 500 index. We discuss this in Section 5.2.

[3] The first year in which we find balance sheet leverage to be included in the official criteria is 2012. It is included as a component of financial viability. Unlike other criteria, however, the S&P does not provide a clear requirement regarding balance sheet leverage. For example, the criterion on earnings, the primary measure of financial viability among the official criteria, is objectively stated: the sum of the most recent four consecutive quarters' reported earnings should be positive, as should earnings in the most recent quarter. On the other hand, balance sheet leverage is required to be operationally justifiable in the context of both a firm's industry peers and its business model (S&P U.S. Indices Methodology, 2014)

but then increases once being added to the index, resulting in a U-shaped trend. The U-shaped trend in leverage is concentrated within a four-year period, starting two years before additions and ending two years after additions. We illustrate this phenomenon in Figure I. The horizontal axis represents time and 0 indicates the fiscal quarter in which a firm is added to the S&P 500 index. The vertical axis represents the book leverage and the market leverage in Panels A and B, respectively. The blue solid line plots leverage in added firms, whereas the red dotted line plots leverage in added firms' industry peers.[4] Panel A (B) shows that the average book (market) leverage of added firms decreases from 0.20 (0.15) to 0.18 (0.12) during the two-year pre-addition period, but increases to 0.20 (0.16) during the two-year post-addition period. On the other hand, leverage in industry firms exhibits a gradual, small increase over the four-year period. The results presented in Panels C and D, which are drawn by a non-parametric method, support what we document in Panels A and B. The results of our statistical analyses confirm the U-shaped trend in leverage of added firms after controlling for observable firm characteristics, macroeconomic conditions, and firm and time fixed effects.

A decrease in leverage during the pre-addition period is consistent with firms' improving their financial health. Post-addition reversion of leverage suggests that the pre-addition-period reduction in leverage is motivated by window-dressing incentives.[5] Moreover, it is consistent with the existence of a target capital structure and thus supports the trade-off theory of capital structure: firms find their leverage to be off-equilibrium after reducing leverage for window-dressing purposes. After being added to the S&P 500 index, such window-dressing incentives disappear and thus firms increase leverage toward the initial (optimal) leverage.

To determine the driving force of the U-shaped leverage trend, we examine equity and debt issuance of newly added firms. Our results indicate that the U-shaped leverage trend is attributable to debt issuance, but not to equity issuance. Added firms' debt issuance is significantly higher during the post-addition period compared with the pre-addition period.

[4]We define industry peers as firms that belong to the same two-digit SIC code.

[5]Window-dressing incentives arise only when a firm considers itself a candidate for S&P 500 index addition. In Section 5.1, we discuss how a firm may learn that it is a candidate.

In particular, net debt issuance increases by 0.89% of total assets during the post-addition period compared with the pre-addition period, accounting for 16.4% of the standard deviation of net debt issuance. On the other hand, net equity issuance decreases during the post-addition period, but the decrease is neither statistically nor economically significant. This result suggests that our findings are unlikely to be attributable to changing demand for external financing: if changing demand for external financing is driving security issuance, debt issuance and equity issuance should follow similar trends.

To strengthen our window-dressing explanation, we conduct two sets of analyses. First, we exploit variations in financial health and repeat the analyses of leverage and security issuance. A firm that is perceived as financially unhealthy (hereafter, an "unhealthy firm") would have stronger incentives to engage in window dressing financial health compared with a firm that is perceived as financially healthy (hereafter, a "healthy firm"). Therefore, unhealthy firms' leverage is expected to exhibit a more prominent U-shaped trend. Employing credit ratings, Altman's Z-scores, and leverage as of two years prior to being added to the S&P 500 index as proxies for financial health, we find empirical support for this expectation. Second, we split sample firms based on competitiveness for index addition and repeat the analyses. The logic is that firms facing severe competition for addition have stronger incentives to engage in window dressing than firms facing less severe competition. Our empirical results are consistent with this logic.

For our window-dressing explanation to be valid, the S&P should consider leverage an important factor for index addition despite not listing it as one of the criteria. Suggestive evidence for this comes from Blitzer's comment on *IndexologyBlog*, in which he states that investors do not like unexpected turnover caused by failing stocks.[6] Because bankruptcies occasionally trigger deletion from the S&P 500 index, the S&P likely has an incentive to select financially healthy firms. The S&P indeed lists financial viability, which is defined using quarterly earnings, as one of the criteria for addition. More direct evidence is found in a news article published by Reuters

[6]http://www.indexologyblog.com/2013/07/09/inside-the-sp-500-selecting-stocks/

on January 31, 2007. According to that article, the S&P stated that its measure of financial viability would also include an assessment of balance sheet leverage.[7][8] Although balance sheet leverage was not added to the official criteria until 2012, the article suggests that the S&P considers leverage when selecting stocks to add to the index. Furthermore, the result of our logit analysis is consistent with the notion that leverage is one of the important determinants of additions among firms that satisfy the official criteria for the S&P 500 index addition. Lastly, firms that are not included in the index but have characteristics similar to those of added firms as of two years prior to additions do not exhibit a U-shaped leverage trend. Leverage in these firms exhibits a gradual increase over the four-year period, a trend similar to leverage in industry firms that are not included in the index. This result suggests that reducing leverage may increase the likelihood of being added to the index.

We address alternative explanations to our findings. We first attempt to explain the U-shaped leverage trend using major theories of capital structure, namely the pecking order, trade-off, and market-timing explanations. We find that none of these theories can explain the U-shaped leverage trend we document. We next consider explanations based on mechanical effects. For example, certain firm characteristics included in the criteria for addition, such as earnings and market capitalization, may be negatively associated with leverage and thus firms that satisfy the criteria systematically experience a decrease in leverage. After being added to the index, leverage may increase due to mechanical mean reversion. To test this possibility, we analyze leverage in firms that belong to the same industry as an added firm that satisfy all the criteria for index addition except for the public float requirement at the time of index revision.[9] Because public floats are not among the factors that are known to affect leverage, such firms also should exhibit a U-shaped trend leverage if the correlation between leverage and the criteria for addition along with mechanical mean reversion drive the leverage trend

[7]https://www.reuters.com/article/sp500-changes/sp-500-criteria-changes-to-add-polo-ralph-lauren-idUSN3132792220070131

[8]We repeat the leverage analysis using firms added to the S&P 500 index prior to 2007 (2012) and the results remain qualitatively the same, consistent with the proposition that leverage had been an important factor even before 2007 (2012).

[9]According to S&P U.S. Indices Methodology, a public float should include at least 50% of a firm's stock.

we document. We find, however, that these firms do not exhibit a U-shaped leverage trend. We also show, employing a simulation method used in Chang and Dasgupta (2009), that the post-addition-period increase in leverage of added firms is not a result of mechanical mean reversion.

Our paper contributes to the literature on the determinants of capital structure. Our results imply that capital structure is affected by temporary incentives such as window dressing and thus may deviate from the optimal level. In this regard, this paper is consistent with Kisgen (2006, 2009), who provides empirical evidence that firms deviate from optimal leverage to target credit rating, in that we show that firms deviate from optimal leverage to target the S&P 500 index addition.

Our paper is related and contributes to discussions of the existence of a target capital structure. If there is a target capital structure as trade-off theory suggests, a firm would rebalance leverage toward the target when deviation occurs. While several studies show evidence consistent with rebalancing of capital structure (Flannery and Rangan (2006), Fama and French (2002), Leary and Roberts (2005), Hovakimian (2006)), others provide contrary evidence (Baker and Wurgler (2002), Welch (2004), Chang and Dasgupta (2009)). The U-shaped leverage trend that we document is consistent with the existence of a target capital structure: a firm finds itself to have deviated from the target capital structure once it has been added to the S&P 500 index. It then rebalances its leverage by reversing debt issuance activity.

Our paper is relevant to studies providing evidence of window dressing in the financial sector. Morey and O'Neal (2006) document that bond funds hold significantly more government bonds during disclosure periods than nondisclosure periods, presumably to present a safer portfolio to shareholders. Agarwal et al. (2014) study window dressing by mutual fund managers. Lakonishok et al. (1991) show that pension fund managers oversell stocks that have performed especially poorly in the fourth quarter, when funds' portfolios are closely examined by sponsors. He et al. (2004) find similar results. To the best of our knowledge, Jain and Kini (1994) is the only paper studying window dressing by non-financial firms. They document a decline

in the post-issue operating performance of IPO firms and suggest window dressing as one of the explanations: managers attempt to window-dress their accounting numbers prior to going public, which leads to overstated pre-IPO performance and understated post-IPO performance. We add to this literature by providing evidence of window dressing by public non-financial firms.

Our paper differs from existing studies that examine the effects of the S&P 500 index additions on firm characteristics (Dhillon and Johnson (1991), Pruitt and Wei (1989), Chen et al. (2004)) or that employ S&P 500 index additions as an instrument for changes in firm characteristics (Aghion, Van Reenen, and Zingales (2013), Faulkender and Petersen (2006), Yu (2008)). These studies generally impose an implicit assumption that the S&P 500 index additions are exogenous events to added firms. On the other hand, we provide empirical evidence that firms strategically adjust leverage around S&P 500 index additions. As such, our results suggest that we need to be cautious in drawing conclusions regarding the effects of an S&P 500 index addition. Lastly, this result suggests that firms may window dress other aspects of firm characteristics, not only those included among the criteria but also those not included among the criteria but implicitly affects addition decisions.

The remainder of this paper proceeds as follows. Section 2 illustrates the data and variables we use in this paper. We present empirical results in section 3. In section 4, we consider alternative explanations. In section 5, we discuss possible channels through which firms learn that they are candidates for addition to the S&P 500 index, reasons for which firms start leverage adjustment far ahead of actually being added, and corporate incentives for S&P 500 index addition. We conclude in section 6.

2. Data and summary statistics

In this section, we describe the data used in this study as well as the summary statistics.

2.1. Data and variables

Our sample consists of firms added to the S&P 500 index from 1986 through 2014 and firms that belong to the same two-digit SIC code as added firms. We exclude firms that operate in the financial services (SIC codes 6000-6999) and utilities (SIC codes 4900-4999) industries. We filter out addition events that are potentially related to corporate restructuring, such as spin-offs, mergers and acquisitions, liquidations, or bankruptcies. Similar to Denis et al. (2003), we remove addition events of firms whose asset growth rate is higher than 100% or lower than -50% over a two-quarter period. We also remove addition events that are a result of a name change.[10] We restrict our sample to firms that have all variables required for the analyses. For each episode of new S&P 500 index addition, we form an event-time panel starting two years before the event and ending two years after the event. We define a variable, T, which indicates a time period relative to the S&P 500 index addition. For example, T=0 indicates a quarter a firm is newly added to the S&P 500 index and T=-1 (T=1) indicates a quarter previous to (following) T=0, and so on. T is assigned an integer between -8 and 8 and T^2 is defined as a squared value of T.

We define *Book leverage* as total debt, which is defined as long-term debt (Compustat item $DLTTQ$) plus debt in current liabilities ($DLCQ$), divided by total assets (ATQ). We define *Market leverage* as the ratio of total debt to the sum of total debt and the market value of equity ($CSHOQ$ x $PRCCQ$). *Net debt issue* is defined as total debt minus lagged total debt scaled by lagged total assets. *Net equity issue* is defined as sales of common and preferred stock ($SSTKY$) minus purchases of common and preferred stock ($PRSTKCY$) scaled by lagged total assets. *Profitability* is defined as operating income before depreciation ($OIBDPQ$) divided by lagged total assets. *Market/book* is defined as the book value of total liabilities (LTQ) plus the market value of equity, scaled by total assets. *Fixed assets* is defined as net property, plant, and equipment ($PPENTQ$) scaled by total assets. *Investment* is defined as capital

[10]For this study, we analyze the reasons behind each addition event obtained from two data sources: Excel file from the website of Jeffrey Wurgler and a report from the Credit Suisse(`https://research-doc.credit-suisse.com/docView?language=ENG&format=PDF&sourceid=em&document_id=1070991801&serialid=TqtAPA%2FTEBUW%2BgCJnJNtlkenIBO4nHiIyPL7Muuz0FI%3D`)

expenditures ($CAPXY$) divided by lagged total assets, and *Cash* is defined as cash and short-term investments ($CHEQ$) scaled by total assets. *Size* is the natural logarithm of total assets, and sales growth is defined as sales ($SALEQ$) minus lagged sales scaled by lagged sales. All variables are defined in Appendix A and are winsorized at 1% in both tails of the distribution.

2.2. Summary statistics

In Table I, we provide summary statistics of the added firms during a pre- and post-addition periods, respectively. Pre-addition period is defined as T between -8 and -1 and post-addition period is defined as T between 1 and 8. *Book* (*Market*) *leverage* is slightly lower (higher) during the post-addition period compared with the pre-addition period. However, the difference in *Book* (*Market*) *leverage* is economically insignificant, accounting for approximately 2.65% (7.64%) of the sample standard deviation of *Book* (*Market*) *leverage*. Net debt issuance increases from 0.7% of assets during the pre-addition period to 0.8% during the post-addition period. Net equity issuance decreases from -0.1% of assets during the pre-addition period to -0.6% of assets during the post-addition period. Sample firms hold on average 13% of total assets in cash and invest approximately 4.8% of total assets. The summary statistics on *Profitability* suggest that our sample firms are profitable and those on *Size* suggest that our sample firms are large in terms of total assets, consistent with the market-capitalization requirements for the index additions.

TABLE I ABOUT HERE

3. Empirical results

3.1. Financial leverage

In this section, we investigate financial leverage in added firms around S&P 500 index additions. Like Aghion et al. (2005), we use linear and squared terms of T to test statistical significance of the U-shape leverage trend. The results of the analysis are presented in Table

II. The dependent variable is *Book leverage* in columns (1)-(3) and *Market leverage* in columns (4)-(6). *Book leverage* and *Market leverage* are presented in percentages (%). The main variable of interest is T^2 in all columns. In columns (2) and (5), we control for the linear time trend, T. In columns (3) and (6), we additionally control for the median value of industry firms' leverage ratios to address time-varying industry effects on leverage. We control for firm fixed effects and time fixed effects in all columns and standard errors are clustered at the firm level.

The coefficient on T^2 is positive and statistically significant in all columns, confirming the U-shaped leverage trend after controlling for factors known to affect leverage. Although the statistical and economic significance of the coefficients on T^2 are larger in market leverage regressions than in book leverage regressions, the positive and statistically significant coefficients on T^2 in columns (1)-(3) indicate that the U-shaped leverage trend is not driven solely by changes in the market value of equity, but are attributable to equity and/or debt issuance. Regardless of whether the driver of the U-shaped leverage trend is equity or debt issuance, these results suggest that firms decrease leverage prior to additions and then reverse their capital structure decisions after being added to the index.

TABLE II ABOUT HERE

3.2. Security issuance

To determine the force driving the U-shaped leverage trend, we examine net debt issuance and net equity issuance in added firms during the pre-addition and post-addition periods. The results are reported in Table III. *After* is an indicator variable that is equal to 1 for the post-addition period and 0 otherwise. Firm fixed effects and time fixed effects are controlled for in all regressions and standard errors are clustered at the firm level. The dependent variable is *Net debt issue*$_t$ in columns (1) and (2). Previous studies find both the amount and probability of debt issuance to be higher when interest rates are low (Barry et al. (2008, 2009), Ooi et al. (2010), Doukas et al. (2011)). Thus, we additionally control for interest rates along with a

Recession dummy, which is assigned a value of one if all three months in a quarter are designated as recession by the NBER and zero otherwise, to control for market conditions in columns (2) and (4). The coefficient on *After* is statistically and economically significant in columns (1) and (2). This result indicates that added firms issue significantly more debt during the post-addition period than during the pre-addition period. In particular, net debt issuance increases by 0.89% of total assets during the post-addition period, accounting for 16.4% of the standard deviation of *Net debt issue*. The coefficient on *Fixed asset*$_{t-1}$ is positive and statistically significant, consistent with collateral being positively associated with debt capacity (Rajan and Zingales (1995)).

The dependent variable is *Net equity issue*$_t$ in columns (3) and (4). As seen in both columns, the coefficient on *After* is negative and neither statistically nor economically significant, suggesting that net equity issuance does not change significantly around the addition. The positive coefficient on *Market/book*$_{t-1}$ is consistent with firms' issuing equity when they face good investment opportunities or are overvalued. The overall results presented in this table indicate that the U-shaped leverage trend is attributable to debt issuance. In addition, the fact that net equity issuance does not follow the same pattern as debt issuance suggests that our findings are unlikely to be attributable to changing demand for external financing: if changing demand for external financing is driving security issuance, debt issuance and equity issuance should follow similar trends.

Table III About Here

3.3. Window dressing incentives

To strengthen our window-dressing explanation that firms reduce leverage prior to being added to the S&P 500 index and reverse their capital structure after addition, we conduct two sets of cross-sectional analyses. First, we split sample firms based on financial health and repeat the analyses described above. If a firm is financially unhealthy, it has stronger

incentives for improving financial health; if it is financially healthy, it has weaker incentives to improve financial health. Consequently, financially unhealthy firms' leverage would exhibit a more pronounced U-shaped leverage trend if the U-shaped leverage trend is attributable to window-dressing incentives. To test this logic, we employ credit ratings, leverage, and Altman's Z-scores, as of two years prior to an S&P 500 index addition (T=-8) as proxies for financial health. A firm is classified as healthy (unhealthy) if its S&P Domestic Long-Term Issuer Credit Rating is above (below) BBB-, its book leverage is below (above) the industry-median value, and its Altman's Z-score is above (below) the median value.[11] We then examine leverage and security issuance separately for financially healthy and unhealthy firms. For classification based on credit ratings, we restrict the sample to firms that have credit ratings. Similarly, we restrict the sample to firms that have all the variables needed to compute an Altman's Z-score for the classification based on Altman's Z-scores.

Table IV presents the results. In Panels A, B, C, and D, we report the results of regressions of book leverage, market leverage, debt issuance, and equity issuance, respectively. In each panel, we report the results of regressions using unhealthy (healthy) firms based on credit ratings, leverage, and Altman's Z-scores in columns (1), (3), and (5) ((2), (4), and (6)), respectively. In Panel A, the dependent variable is *Book leverage*. Regardless of the proxy for financial health, the coefficients on T^2 of unhealthy firms is positive and statistically significant, whereas those of healthy firms are not. This result suggests that the U-shaped trend in book leverage is attributable to financially unhealthy firms. In Panel B, the dependent variable is *Market leverage*. As in Panel A, the coefficient T^2 is statistically significant and positive in columns (1), (3), and (5). Unlike in Panel A, however, the coefficient on T^2 is statistically significant and positive for healthy firms in columns (2) and (6). However, the statistical and economic significance of the coefficients is greater for unhealthy firms regardless of the proxies used. As such, the results shown in Panel B suggest that the U-shaped leverage trend is more pronounced in financially unhealthy firms.

[11]The results remain qualitatively the same when we use market leverage instead of book leverage to classify firms.

In panel C, we present the results of regressions of net debt issuance. The dependent variable is *Net debt issue* in all columns. The coefficient on *After* is positive in all columns. However, the statistical and economical significance is greater for unhealthy firms regardless of the proxies used. This result suggests that the results shown in columns (1) and (2) of Table III are attributable to financially unhealthy firms. In Panel D we report the results of regressions of net equity issuance. The dependent variable is *Net equity issue* in all columns. In all columns, the coefficient on *After* is negative and statistically insignificant, suggesting that equity issuance does not change after the additions regardless of financial health. All in all, the results shown in Table IV indicate that the U-shaped leverage trend is more pronounced among financially unhealthy firms and thus consistent with the window-dressing explanation.

Table IV About Here

As a second test of the validity of our window-dressing explanation, we split added firms based on competitiveness for index additions. A firm facing more intense competition for addition is expected to have stronger incentives for window dressing than a firm that faces less severe competition. As a proxy for the competitiveness of index additions, we compute the number of industry firms that satisfy the official criteria for being added to the S&P 500 index two years prior to index revisions, which we call competitors. The eligibility criteria include market capitalization, liquidity, domicile, public float, sector classification, financial viability, treatment of IPOs, and eligible securities (S&P U.S. Indices Methodology, 2012). For this analysis, we restrict the sample to firms that were added after 2003 as we could not obtain all the official criteria prior to 2003. We separate firms into two groups based on the median value of the number of competitors, which is 26.[12]

Table V reports the results. In Panel A, we present the results of the analysis of leverage. The dependent variables are *Book leverage* in columns (1) and (2) and *Market leverage* in columns (3) and (4). In columns (1) and (3) ((2) and (4)), we report the results of regres-

[12]As explained in the introduction, the S&P generally has five to fifteen candidates, which is smaller than the number of firms that satisfy the criteria. This suggests that there are other, implicit criteria the S&P applies.

sions using firms that belong to the high- (low-) competition group. The coefficient on T^2 is statistically and economically more significant for the competitive group, consistent with the notion that firms facing severe competition engage in window dressing to a greater extent. In Panel B, we report the results of the security-issuance analysis. The dependent variable is *Net debt issue*$_t$ and *Net equity issue*$_t$ in columns (1)-(2) and (3)-(4), respectively. In columns (1) and (3) ((2) and (4)), we report the results of the analysis using firms that belong to the high- (low-) competition group. The coefficient on *After* is positive in both columns. However, it is statistically and economically significant in column (1) but not in column (2). This result suggests that the post-addition increases in debt issuance are more pronounced among firms that face severe competition for addition. The coefficient on *After* in column (1) indicates that net debt issuance increases by 1.5% of total assets during the post-addition period compared with the pre-addition period, accounting for 27.8% of the sample standard deviation of *Net debt issue*. The coefficient on *After* is negative in column (3). This result suggests that firms that face severe competition issue more equity during the pre-addition period than during the post-addition period although the effect is statistically insignificant. The coefficient on *After* is almost zero in column (4), suggesting that equity issuance does not change around addition for firms that face less severe competition. As such, the overall results of this table are consistent with the proposition that firms that face more severe competition for addition engage in window-dressing to a greater extent.

Table V About Here

3.4. Is leverage an important determinant of index additions?

For our window-dressing explanation to be valid, the S&P should indeed consider leverage an important factor when determining S&P 500 index additions despite not listing it as one of the official criteria. Aside from the suggestive evidence described in the introduction, we conduct two analyses to test the importance of leverage in the S&P 500 index additions. First,

we conduct a logit analysis to determine whether leverage is an important factor of the S&P 500 index additions. For the analysis, we use added firms and non-S&P 500 firms that satisfy all the criteria for addition and belong to the same industry as the added firms. Second, we examine leverage of a group of industry firms that are not included in the index but have characteristics similar to the added firms at T=-8 (hereafter, "matched firms"). If leverage is an important determinant of index additions, matched firms might not have been added to the index because they reduced leverage to a lesser extent by the time of index revision compared with the added firm.

Table VI presents the results of the logistics analysis. We consider leverage, size, ROA, market-to-book ratio, fixed assets, cash holdings, sales growth, and institutional ownership as potential additional determinants of index additions. The table reports the odds ratio and the independent variables are scaled by their own standard deviations. The results of the analysis indicate that leverage has a significant effect on index additions. Among the firm characteristics we consider, leverage is the third most important factor following size and market-to-book ratio.[13] In particular, the coefficient on *Market leverage*, 0.35, indicates that a one-standard-deviation decrease in leverage is associated with an increase in the odds ratio of index additions of approximately 65%. The largest effect of size is consistent with the fact that market capitalization is an important determinant of the S&P 500 index addition. Overall the results presented in this table suggest that, despite not being listed as a criterion for index additions until 2012, leverage is one of the most important determinants of index additions. As such, it appears that having low leverage positively affects a firm's chances of being added to the S&P 500 index, consistent with our window-dressing explanation.

TABLE VI ABOUT HERE

For the second analysis, we conduct a propensity score matching analysis. We select matched firms based on size, market-to-book ratio, profitability, cash, institutional ownership, and mar-

[13]Firms may also window dress size and market-to-book ratio, which we do not test in this paper. However, it may be more difficult for a firm to control size and market-to-book ratio compared to leverage.

ket leverage. Figure II illustrates leverage of matched firms. As in Figure I, the horizontal axis represents time and 0 indicates the fiscal quarter in which a firm is added to the S&P 500 index. The vertical axis represents the book leverage and the market leverage in Panels A and B, respectively. The blue solid line plots leverage in added firms, whereas the red dotted line plots leverage in matched firms. Both book and market leverage exhibit a gradual, small increase over the four-year period, a trend similar to industry firms that are not included in the index.

FIGURE II ABOUT HERE

Table VII reports the results of the statistical analysis of leverage in the matched firms. The dependent variables are *Book leverage* in columns (1) and (3) and *Market leverage* in columns (2) and (4). In columns (1) and (2), we report the results of regressions using only matched firms. The coefficient on T^2 is insignificant in both columns, suggesting that leverage in matched firms does not exhibit a U-shaped trend. In columns (3) and (4), we report the results of regressions using both matched and added firms. *Added* is an indicator variable that is assigned a value of one for added firms and zero otherwise. The coefficient on *Added* x T^2 is statistically significant but T^2 is not, confirming that only added firms exhibit U-shaped trend in leverage. The fact that firms that exhibited reduced leverage during the two-year pre-addition period were selected to the index over otherwise similar firms at T=-8, is consistent with the proposition that leverage is an important determinant of index additions.

TABLE VII ABOUT HERE

4. Alternative explanations

In this section, we discuss whether the most well-known theories of capital structure can explain the leverage trend we document. We also consider whether our findings can be explained by mechanical effects.

4.1. Capital structure theories

We first consider the three most frequently studied capital structure theories; pecking order, trade-off, and market timing. Myers's (1984) and Myers and Majluf's (1984) pecking-order theory implies that external financing is costly due to information asymmetry between managers and outside investors. Because equity involves a higher level of information asymmetry than debt, firms should prefer debt to equity. Bharath et al. (2009) directly test the association between the extent of information asymmetry and capital structure decisions and find that firms with greater information asymmetry issue more debt than equity. If the level of information asymmetry increases after being added to the S&P 500 index, the post-addition increase in debt issuance would be consistent with the pecking-order theory. However, the degree of information asymmetry during the post-addition period is expected to decrease rather than increase after addition. For example, analyst following and institutional ownership increase following S&P 500 index addition. Because analysts distribute public and private information to investors, information asymmetry problems associated with equity would be less serious after addition. Similarly, institutional ownership would mitigate information asymmetry problems because institutions gather information and make trades based on that information. As such, the adverse selection costs of equity would likely decline rather than increase following addition to the S&P 500 index.

Traditional trade-off theory, in which the costs of financial distress and tax benefits determine the optimal level of leverage, also cannot explain our findings. To explain our findings within the framework of traditional trade-off theory, a firm's cost of financial distress should increase (decrease) and/or the tax benefits of debt should decrease (increase) during the two-year pre- (post)- addition period, which would reduce (increase) the target leverage ratio. However, the costs of financial distress and tax benefits are not expected to change accordingly around additions.

Lastly, we consider the market-timing explanation. A firm that expects to be added to the S&P 500 index in the near future could delay security issuance if being added decreases the costs

of security. However, market timing does not seem to explain our findings. Although a number of studies document the market timing of equity issuance (Baker and Wurgler (2002), DeAngelo, DeAngelo, and Stulz (2010)), studies on debt issuance find little support for market timing (Kerr and Ozel (2015), Lee (2018)). Even if firms time debt issuance, market timing would predict increases in equity issuance rather than debt issuance after additions because previous studies find that the cost of equity, but not the cost of debt, falls significantly following the S&P 500 index addition (Baran and King (2012), Brisker et al. (2013)). As such, the most well-known theories of capital structure fail to explain the U-shaped leverage trend we document.

4.2. Mechanical effects

We next consider explanations that are based on mechanical effects. For example, certain firm characteristics included in the criteria for addition, such as earnings and market capitalization, may be negatively associated with leverage and thus firms that satisfy the criteria systematically experience a decrease in leverage. After being added to the index, leverage may increase due to mechanical mean reversion. To test this possibility, we first examine leverage of industry firms that satisfy all the criteria for the S&P 500 index addition except for the public float requirement (hereafter, "non-candidate firms"). Because public float is not one of the factors known to affect leverage, non-candidate firms would also exhibit a U-shaped leverage trend if the U-shaped leverage trend of added firms were driven by the correlation between leverage and firm characteristics included in the criteria along with mechanical mean reversion after addition.

Table VIII reports the results of our analyses of leverage in non-candidate firms. The dependent variables are *Book leverage* in columns (1) and (3) and *Market leverage* in columns (2) and (4). In columns (1) and (2), we report the results of regressions using the non-candidate firms. The coefficient on T^2 is insignificant in both columns, suggesting that the non-candidate firms do not exhibit the U-shaped leverage trend despite satisfying all the criteria for addition except for one that is unlikely to affect leverage. In columns (3) and (4), we report the results of

regressions using the non-candidate and added firms. The coefficient on *Added* x T^2 is positive and statistically significant but that on T^2 is not. This result confirms that only the added firms exhibit the U-shaped leverage trend and firms that would not target index additions in the first place do not exhibit a similar trend in leverage. Overall, the results shown in this table suggest that the U-shaped leverage trend of added firms is unlikely to be attributable to correlations between leverage and criteria for index additions and mechanical mean reversion.

TABLE VIII ABOUT HERE

Next, we test the possibility of mechanical mean reversion of leverage in added firms during the post-addition period by employing a simulation method used in Chang and Dasgupta (2009). We take two approaches. We first take all variables, including financing deficit, directly from the data except for debt issuance and equity issuance. We then randomly draw a number from a uniform distribution between 0 and 1 (-1 and 0) when the financing deficit is positive (negative) and assign it to debt issuance and equity issuance. This sample construction reflects the idea that a firm issues or retires debt and equity with equal probability, so-called "random financing." In the second analysis, we randomize not only debt and equity issuance but also financing deficits. We draw financing deficits from normal distributions with the same mean and standard deviation as those in the data (mean: 0.056 and standard deviation: 0.162). Using these simulated data, we conduct the debt and equity issuance analyses.

Table IX reports the results. Columns (1)-(4) report the results of the first analysis, in which only debt and equity issuance are randomized. The coefficient on *After* is statistically insignificant in all columns. These results suggest that what we document is unlikely to be attributable to mechanical mean reversion. Columns (5)-(8) report the results of the second analysis, in which financing deficit is also randomized. Again, none of the coefficient on *After* is statistically significant. As such, we find no evidence of mechanical mean reversion during the post-addition period among the added firms. This result also supports the existence of target leverage and thus is consistent with the trade-off theory.

TABLE IX ABOUT HERE

5. Discussion

5.1. Why do firms start reducing leverage two years in advance?

Our findings suggest that added firms learn that they are candidates for addition to the S&P 500 index on average approximately two years prior to addition decisions. How do firms learn that they are candidates? According to the above-mentioned interview of Blitzer by ETF.com, the S&P actively interacts with firms regarding index revisions. Therefore, it appears that firms can learn whether they are candidates from these interactions. According to the interview, the S&P also interacts with third parties, who occasionally issue publicly available reports on potential stocks to be added the index. Therefore, firms can also learn whether they are candidates from these reports. For example, a report published by a PaineWebber in March 1999 provides a list of "Possible new recruits for the S&P 500."[14] Eight of the twelve companies that are recommended in this report were indeed added to the index within approximately two years of the publication date.

If there is a target capital structure, as the post-addition leverage trend indicates, firms are better off reducing leverage shortly before S&P 500 index revision because it is costly to maintain off-equilibrium leverage. Then why do firms start reducing leverage far ahead of revisions? First, firms do not know exactly when the S&P will revise the index. This is because revision is done as needed rather than on a specified schedule. In addition, it may take time to adjust leverage in the presence of adjustment costs (Leary and Roberts (2005)). Therefore, even if a firm knows that no revision will be made in the near future, it likely will begin adjusting its leverage ahead of time. Indeed, we find sample firms' speed of adjustment (SOA) of leverage to be 20%, similar to figures documented in previous studies on the existence of a target capital

[14] What is the S&P 500?, March 14, 1999, PaineWebber
http://andreisimonov.com/N4106/pdf/EMK%20What%20is%20the%20S&P%20500.pdf

structure (Huang and Ritter (2009)).

5.2. Corporate incentives for S&P 500 index additions

We discuss several incentives for being added to the S&P 500 index based on existing studies: increases in analyst following and institutional ownership, improvement in stock liquidity, and investor awareness. Previous studies suggest that institutional ownership and analyst following contribute to higher firm value due to monitoring and alleviation of information asymmetry problems (Hartzell and Starks (2003), McConnell and Servaes (1990), Bowen et al. (2010), Bradley et al. (2014), Kelly and Ljungqvist (2012)). Therefore, firms likely have incentives to increase analyst following and institutional ownership, which is promoted by S&P 500 index additions (Pruitt and Wei (1989)).[15] Consistent with this expectation, we find that both analyst following and institutional ownership increase after S&P 500 index inclusion in our sample firms. In particular, analyst following and institutional ownership increase by 17.27% and 3.93%, respectively, in the two-year post-addition period compared with the two-year pre-addition period. Next, improvement in stock liquidity following the S&P 500 index addition may reduce the cost of equity and in turn increase firm value (Hegde and McDermott (2003)). In addition, Chen et al. (2004) show a permanent increase in the price of added firms' stock, which they explain by reference to greater investor awareness. Lastly, addition to the S&P 500 index may enhance the reputation of both a manager and his or her firm.

6. Conclusion

We show that financial leverage in firms newly added to the S&P 500 index gradually decreases during the two-year pre-addition period but then increases during the two-year post-addition period. The resulting U-shaped trend in leverage is consistent with the proposition that these firms engage in window dressing prior to addition by improving their financial health. Consistent with the window-dressing explanation, our findings are pronounced among firms

[15] Aghion, Van Reenen, and Zingales (2013) and Michaely and Vincent (2013) use addition to the S&P 500 index as an instrument for institutional holdings.

with poor financial health prior to additions and firms facing severe competition for additions. As such, our results imply that capital structure is affected by temporary incentives such as window dressing and thus may deviate from the optimal level. We also contribute to the literature on window dressing by providing empirical evidence of non-financial firms' window-dressing efforts. Lastly, our paper contributes to discussions of the existence of a target capital structure by documenting the reversion of leverage following index addition, which is consistent with the existence of a target capital structure.

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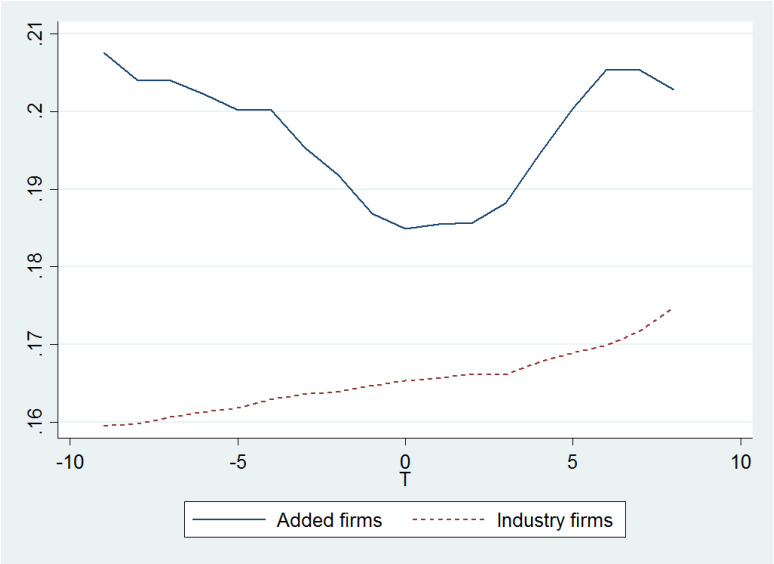
Appendix A: Variable Definitions

Dependent Variables	
Book leverage$_t$	(Long-term debt(dlttq$_t$) + debt in current liabilities(dlcq$_t$)) / total assets(atq$_t$)
Market leverage$_t$	(Long-term debt(dlttq$_t$) + debt in current liabilities(dlcq$_t$)) / (long-term debt(dlttq$_t$) + debt in current liabilities(dlcq$_t$) + market value of equity(prccq$_t$ x cshoq$_t$))
Net debt issue$_t$	(Long-term debt(dlttq$_t$) + debt in current liabilities(dlcq$_t$) - lagged long-term debt(dlttq$_{t-1}$) - lagged debt in current liabilities(dlcq$_{t-1}$))/ lagged total assets(atq$_{t-1}$)
Net equity issue$_t$	(Sales of common and preferred stock(sstky$_t$)- purchases of common and preferred stock(prstkcy$_t$)) / lagged total assets(atq$_{t-1}$)
Independent Variables	
T	A series of integers from -8 to 8. 0 indicates the fiscal quarter in which a firm is added to the S&P 500 index
T^2	A squared value of T
After	An indicator variable that is assigned a value of one for the post-addition period and zero otherwise
Added	An indicator variable that is assigned a value of one for added firms and zero otherwise
Size$_t$	The natural logarithm of total assets(atq$_t$)
Cash$_t$	Cash and short-term investments(cheq$_t$) / total assets(atq$_t$)
Profitability$_t$	Operating income before depreciation(oibdpq$_t$) / total assets(atq$_t$)
ROA$_t$	Income before extraordinary items (ibq$_t$) / lagged total assets(atq$_{t-1}$)
Fixed asset$_t$	Net property, plant and equipment(ppentq$_t$) / total assets(atq$_t$)
Makret/book$_t$	(Total liabilities(ltq$_t$) + market value of equity(prccq$_t$ x cshoq$_t$)) / total assets(atq$_t$)
Sales growth$_t$	(Sales(saleq$_t$) - lagged sales (saleq$_{t-1}$))/ lagged sales(saleq $_{t-1}$)
Investment$_t$	Capital expenditures(capxy$_t$) / total assets(atq$_t$)
Institutional ownership$_t$	Fraction of shares owned by institutional investors (Glushkov, Moussawi, and Palacios, 2009)
Term Spread$_t$	The average of differences in the monthly yields of ten-year treasuries and one-year treasuries

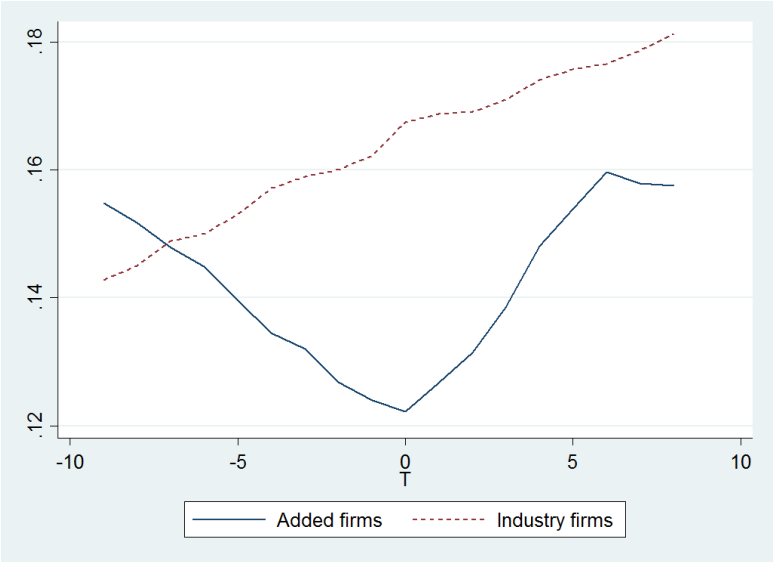
Recession$_t$	=1 if all three months in a quarter are designated as recession by the NBER and zero otherwise
Median Book leverage$_t$	Median value of book leverage in firms that belong to the same two-digit SIC code
Median Market leverage$_t$	Median value of market leverage in firms that belong to the same two-digit SIC code
Altman Z-score$_t$	(3.3*pretax income(piq$_t$)+Net sales(saleq$_t$)+1.4*Retained Earnings(req$_t$)+1.2*(Current Assets(actq$_t$)-Current Liabilities(lctq$_t$))) / total assets(atq$_t$)
Financing deficit$_t$	Frank and Goyal (2003)

Figure 1: Leverage around the S&P 500 index addition

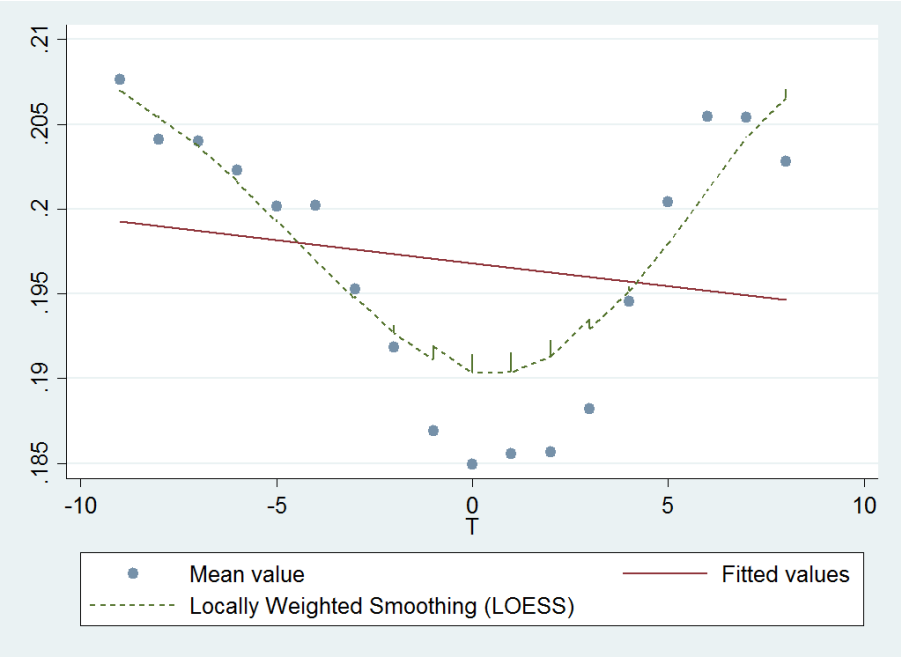
This figure presents the book and market leverage of firms newly added to the S&P 500 index. The horizontal axis (T) represents a time period relative to the S&P 500 index addition. For example, T=0 indicates a quarter a firm is newly added to the S&P 500 index and T=-1 (T=1) indicates a quarter previous to (following) T=0, and so on. The vertical axis represents book leverage ratio and market leverage ratio in Panels A and B, respectively. The blue solid line plots leverage of added firms, whereas the red dotted line plots leverage of added firms' industry peers, which are define as firms that belong to the same two-digit SIC code. Panels C and D, which are drawn by a non-parametric method, support what we document in Panel A and B. The smooth curve in Panel C and D is a combination of all estimates from a locally weighted regression based on low-degree polynomial (Yu (2011) and Defusco (2018)).



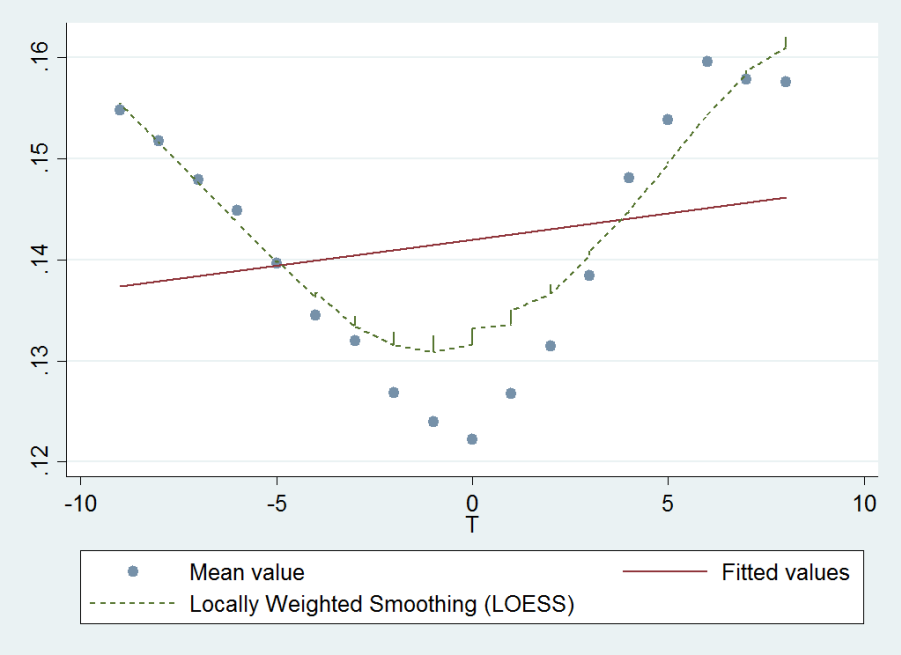
(a) Panel A:Book leverage



(b) Panel B:Market leverage



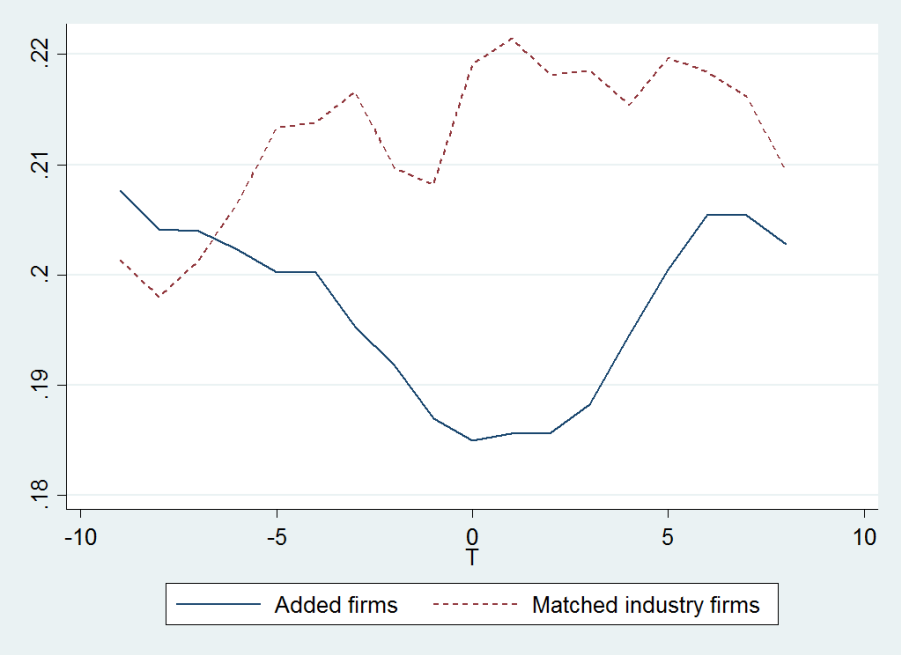
(c) Panel C: Book leverage, locally weighted scatterplot smoothing



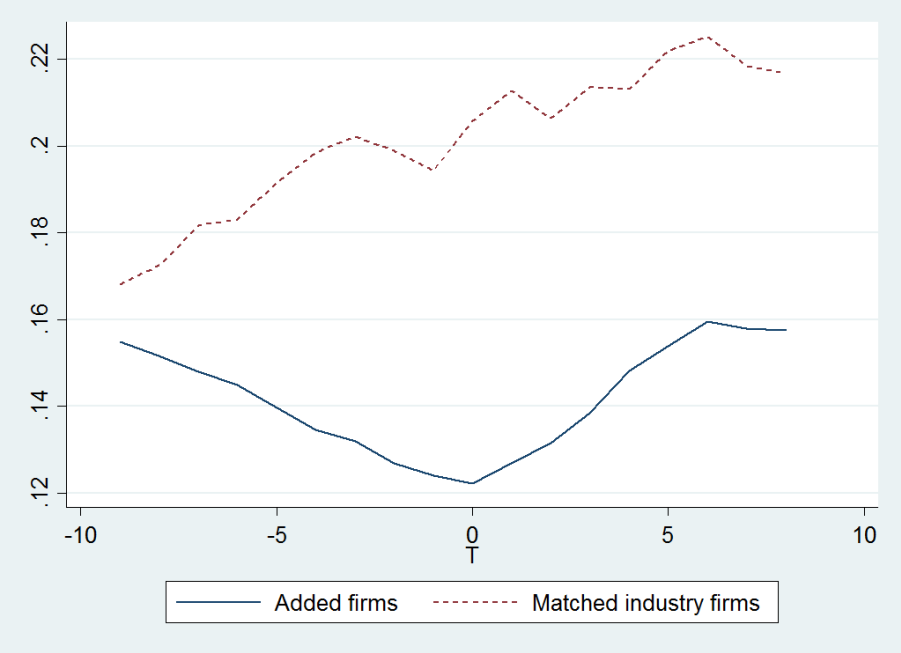
(d) Panel D: Market leverage, locally weighted scatterplot smoothing

Figure 2: Book leverage and Market leverage : matched firms

Figure II illustrates leverage of matched firms. Matched firms are selected based on size, market-to-book ratio, profitability, cash, institutional ownership, and market leverage. The horizontal axis (T) represents time and 0 indicates the fiscal quarter in which a firm is added to the S&P 500 index. The vertical axis represents the book leverage and the market leverage in Panels A and B, respectively. The blue solid line plots leverage in added firms, whereas the red dotted line plots leverage in matched firms.



(a) Panel A:Book leverage



(b) Panel B:Market leverage

Table 1: Summary statistics

This table provides summary statistics of sample firms. Our sample consists of firms added to the S&P 500 index from 1986 through 2014. We exclude firms that operate in the financial services (SIC codes 6000-6999) and utilities (SIC codes 4900-4999) industries. We filter out addition events that are potentially related to corporate restructuring, such as spin-offs, mergers and acquisitions, liquidations, or bankruptcies. Like Denis et al. (2003), we remove addition events of firms whose asset growth rate is higher than +100% or lower than -50% over a two-quarter period. We also remove addition events that are a result of a name change. For each episode of new S&P 500 index addition, we form an event-time panel starting two years before the event and ending two years after the event. We define a variable indicating the time period, T, which indicates a time period relative to S&P addition. For example, T=0 is a quarter a firm is added to the S&P 500 index and T=-1 (T=1) is a quarter previous to (following) T=0, and so on. T is assigned an integer value between -8 and 8. Pre-addition period is defined as T between -8 and -1 and post-addition period is defined as T between 1 and 8. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution.

	Total				Pre-addition period($T < 0$)				Post-addition period($T > 0$)			
VARIABLES	N	mean	p50	sd	N	mean	p50	sd	N	mean	p50	sd
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Book leverage	2,653	0.214	0.196	0.151	1,296	0.216	0.200	0.154	1,357	0.212	0.192	0.149
Market leverage	2,653	0.154	0.118	0.144	1,296	0.149	0.118	0.135	1,357	0.160	0.118	0.152
Net debt issue	2,653	0.008	0.000	0.054	1,296	0.007	-0.000	0.056	1,357	0.008	0.000	0.053
Net equity issue	2,653	-0.004	0.000	0.050	1,296	-0.001	0.001	0.056	1,357	-0.006	0.000	0.044
Cash	2,653	0.128	0.078	0.142	1,296	0.127	0.078	0.139	1,357	0.129	0.079	0.145
Fixed asset	2,653	0.316	0.249	0.231	1,296	0.318	0.249	0.229	1,357	0.315	0.249	0.233
Investment	2,653	0.048	0.031	0.050	1,296	0.050	0.033	0.051	1,357	0.046	0.030	0.048
Market/book	2,653	2.573	1.961	1.880	1,296	2.653	1.999	2.041	1,357	2.498	1.927	1.709
Profitability	2,653	0.050	0.046	0.030	1,296	0.051	0.047	0.029	1,357	0.048	0.045	0.030
Sales growth	2,653	0.050	0.036	0.211	1,296	0.064	0.043	0.213	1,357	0.036	0.025	0.207
Size	2,653	7.794	7.861	0.990	1,296	7.581	7.621	1.013	1,357	7.997	8.081	0.924

Table 2: Leverage

This table reports the results of the U-shaped leverage trend test for added firms. The dependent variable is *book leverage* in columns (1) through (3) and *market leverage* in columns (4) through (6). *Book leverage* is defined as long-term debt plus debt in current liabilities, divided by total assets. *Market leverage* is defined as long-term debt plus debt in current liabilities(total debt), divided by the market value of equity plus total debt. T is a series of natural number from -8 to 8 excluding 0. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and year fixed effects in all regressions and standard errors are clustered at the firm level. Standard errors are reported in parentheses. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Book leverage(%)			*Market leverage(%)*		
	(1)	(2)	(3)	(4)	(5)	(6)
T^2	0.021**	0.021**	0.018*	0.047***	0.046***	0.039***
	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)
T		-0.054	-0.113		0.181*	-0.076
		(0.133)	(0.128)		(0.109)	(0.101)
$Profitability_{t-1}$	-49.288***	-49.129***	-43.778***	-48.854***	-49.394***	-44.479***
	(13.275)	(13.326)	(13.237)	(10.534)	(10.595)	(10.239)
$Market/book_{t-1}$	-0.836***	-0.835**	-0.785**	-0.771***	-0.774***	-0.588***
	(0.321)	(0.322)	(0.322)	(0.187)	(0.188)	(0.174)
$Fixed\ asset_{t-1}$	-0.037	0.067	-1.588	5.141	4.788	2.516
	(9.477)	(9.574)	(9.538)	(8.289)	(8.287)	(8.064)
$Investment_{t-1}$	3.799	3.576	1.684	3.943	4.698	0.527
	(6.870)	(7.028)	(6.810)	(5.122)	(5.239)	(4.733)
$Cash_{t-1}$	-5.441	-5.400	-5.517	-12.180***	-12.318***	-12.685***
	(6.090)	(6.106)	(6.120)	(4.412)	(4.403)	(4.357)
$Size_{t-1}$	-0.811	-0.758	-0.860	2.740**	2.561*	2.832**
	(1.885)	(1.953)	(1.946)	(1.368)	(1.394)	(1.341)
$Book\ lev\ median_t$			0.485***			
			(0.105)			
$Market\ lev\ median_t$						0.435***
						(0.063)
Firm FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	2,653	2,653	2,653	2,653	2,653	2,653
R-squared	0.814	0.814	0.821	0.831	0.831	0.845

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Debt and equity Issues

This table reports the results of analyses of net security issuance. In Columns (1) and (2), we report the regression results for net debt issuance while columns (3) and (4) present the regression results for net equity issuance. *Net debt issue* is defined as total debt(long-term debt plus debt in current liabilities) minus lagged total debt, scaled by lagged total assets, divided by lagged total assets. *Net equity issue* is defined as aggregate equity issuance minus aggregate equity repurchase, divided by lagged total assets. After is an indicator variable that is assigned a value of zero for $T = -8$ through -1 and one for $T = 1$ through $T = 8$. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and year fixed effects in all regressions and standard errors are clustered at the firm level. Standard errors are reported in parentheses. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Net debt		*Net equity*	
	(1)	(2)	(3)	(4)
After	0.009***	0.009***	-0.002	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)
$Size_{t-1}$	-0.016***	-0.017***	-0.008	-0.007
	(0.005)	(0.005)	(0.006)	(0.006)
$Cash_{t-1}$	0.008	0.009	-0.014	-0.023
	(0.029)	(0.030)	(0.022)	(0.022)
$Profitability_{t-1}$	-0.237***	-0.241***	-0.124*	-0.110
	(0.077)	(0.077)	(0.072)	(0.069)
$Fixed\ asset_{t-1}$	0.116***	0.119***	-0.024	-0.029
	(0.040)	(0.040)	(0.038)	(0.038)
$Market\ lev_{t-1}$	-0.185***	-0.187***	0.004	0.001
	(0.025)	(0.024)	(0.019)	(0.019)
$Market/book_{t-1}$	0.000	0.000	0.003**	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
$Sales\ growth_{t-1}$	-0.003	-0.002	0.021**	0.020**
	(0.011)	(0.011)	(0.010)	(0.010)
$Investment_{t-1}$	0.054	0.048	-0.017	-0.012
	(0.043)	(0.043)	(0.054)	(0.054)
$Term\ spread_t$		-0.000		0.004**
		(0.001)		(0.002)
$Recession\ dummy_t$		0.006*		-0.005*
		(0.003)		(0.003)
Firm FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	2,653	2,653	2,653	2,653
R-squared	0.143	0.144	0.407	0.411

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Window dressing incentives

This table reports the results of analyses of window dressing incentives. The dependent variables are *book leverage, market leverage, net debt issue, and net equity issue* in panel A, B, C, and D, respectively. In all panels, sample firms are categorized into financially healthy and unhealthy groups based on credit ratings, book leverage, and Altman $Z-score$ as of two years before the addition (T=-8) in columns (1) and (2), (3) and (4), and (5) and (6), respectively. In particular, a firm is classified as healthy(unhealthy) if its S&P Domestic Long Term Issuer Credit Rating is above(below) BBB−, its book leverage is below(above) the median value, or its Altman's Z-score is above(below) the median value. For the classification based on credit ratings, we restrict the sample firms to those that have credit ratings. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and year(quarter) fixed effects for the leverage(issuance) test. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

(a) Panel A: Book leverage(%)

	Credit rating		Leverage level		Z score	
	unhealthy	healthy	unhealthy	healthy	unhealhty	healhty
	(1)	(2)	(3)	(4)	(5)	(6)
T^2	0.094***	0.014	0.041***	-0.003	0.029*	-0.001
	(0.032)	(0.015)	(0.015)	(0.014)	(0.016)	(0.017)
T	-0.658*	-0.197	-0.208	0.049	-0.156	-0.132
	(0.347)	(0.148)	(0.165)	(0.175)	(0.174)	(0.206)
$Profitability_{t-1}$	18.806	-58.656***	-31.789**	-61.329***	-45.089***	-38.251***
	(25.539)	(15.488)	(12.851)	(19.183)	(16.801)	(14.076)
$Market/book_{t-1}$	-2.262***	-1.785**	-1.249***	-0.362	-0.665***	-0.897**
	(0.393)	(0.774)	(0.411)	(0.393)	(0.245)	(0.449)
$Fixed\ asset_{t-1}$	13.165	7.183	4.442	-16.856	7.188	-21.114
	(14.432)	(12.746)	(11.971)	(11.628)	(13.563)	(14.280)
$Investment_{t-1}$	13.177	8.753	6.220	5.635	9.698	7.204
	(15.635)	(7.479)	(6.412)	(9.007)	(8.899)	(7.139)
$Cash_{t-1}$	-11.513	-8.311	5.154	-17.133***	-8.875	-8.588
	(7.811)	(10.705)	(7.869)	(5.503)	(9.079)	(6.161)
$Size_{t-1}$	2.769	4.651*	-3.104	1.612	-3.105	3.518
	(5.531)	(2.580)	(2.249)	(2.367)	(2.451)	(2.956)
$Book\ lev\ median_t$	-0.062	0.529***	0.348***	0.552***	0.242**	0.618***
	(0.208)	(0.114)	(0.130)	(0.156)	(0.113)	(0.111)
Firm FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	547	843	1,363	1,290	1,259	1,156
R-squared	0.838	0.855	0.789	0.672	0.825	0.783

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(b) Panel B: Market leverage(%)

	Credit rating		Leverage level		Z score	
	unhealthy	healthy	unhealthy	healthy	unhealhty	healhty
	(1)	(2)	(3)	(4)	(5)	(6)
T^2	0.102***	0.025*	0.065***	0.014	0.057***	0.021**
	(0.030)	(0.015)	(0.016)	(0.009)	(0.017)	(0.009)
T	-0.366*	0.062	0.038	-0.038	0.021	-0.164
	(0.202)	(0.192)	(0.158)	(0.129)	(0.154)	(0.121)
$Profitability_{t-1}$	-19.435	-73.491***	-37.020**	-54.202***	-48.834***	-33.696***
	(18.692)	(20.407)	(15.219)	(11.856)	(17.296)	(7.244)
$Market/book_{t-1}$	-2.246**	-3.587**	-1.541***	-0.208	-0.822***	-0.436**
	(1.021)	(1.632)	(0.477)	(0.150)	(0.305)	(0.190)
$Fixed\ asset_{t-1}$	10.722	9.197	11.059	-14.371**	10.760	4.032
	(18.362)	(20.362)	(11.860)	(6.452)	(13.199)	(9.901)
$Investment_{t-1}$	4.726	3.142	8.523	0.411	4.687	0.411
	(12.951)	(5.495)	(6.876)	(4.899)	(6.806)	(4.092)
$Cash_{t-1}$	-11.654	-23.216**	-5.316	-18.210***	-14.381	-8.790**
	(7.165)	(9.654)	(6.979)	(3.489)	(8.900)	(3.665)
$Size_{t-1}$	7.480	6.064**	2.408	2.437*	1.669	4.902***
	(4.781)	(2.728)	(1.910)	(1.378)	(1.946)	(1.401)
$Market\ lev\ median_t$	0.427**	0.298***	0.408***	0.395***	0.505***	0.306***
	(0.189)	(0.099)	(0.094)	(0.079)	(0.102)	(0.070)
Firm FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	547	843	1,363	1,290	1,259	1,156
R-squared	0.798	0.832	0.820	0.791	0.824	0.829

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(c) Panel C: Net debt issue

	Credit rating		Leverage level		Z score	
	unhealthy	healthy	unhealthy	healthy	unhealhty	healhty
	(1)	(2)	(3)	(4)	(5)	(6)
After	0.018**	0.005	0.011**	0.007*	0.012***	0.007*
	(0.008)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$Size_{t-1}$	-0.033*	-0.025***	-0.027***	-0.005	-0.023***	-0.011
	(0.017)	(0.008)	(0.009)	(0.006)	(0.007)	(0.008)
$Cash_{t-1}$	0.032	0.147	-0.006	0.005	-0.054	0.040
	(0.079)	(0.093)	(0.058)	(0.028)	(0.040)	(0.038)
$Profitability_{t-1}$	-0.019	-0.478**	-0.262**	-0.215**	-0.291**	-0.273***
	(0.112)	(0.204)	(0.108)	(0.107)	(0.118)	(0.101)
$Fixed\ asset_{t-1}$	0.167**	0.132*	0.151***	0.060	0.158***	0.117
	(0.079)	(0.075)	(0.051)	(0.059)	(0.037)	(0.071)
$Market\ lev_{t-1}$	-0.141***	-0.158***	-0.190***	-0.193***	-0.181***	-0.251***
	(0.041)	(0.041)	(0.034)	(0.035)	(0.032)	(0.041)
$Market/book_{t-1}$	-0.003	0.005	0.000	0.000	-0.002	0.001
	(0.005)	(0.007)	(0.003)	(0.001)	(0.002)	(0.001)
$Sales\ growth_{t-1}$	-0.001	0.015	-0.001	-0.003	0.020	-0.012
	(0.016)	(0.026)	(0.014)	(0.011)	(0.016)	(0.010)
$Investment_{t-1}$	0.062	0.147**	0.009	0.090*	0.030	0.074
	(0.112)	(0.063)	(0.073)	(0.054)	(0.067)	(0.053)
$Term\ spread_t$	-0.003	-0.000	-0.001	0.000	-0.001	0.000
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$Recession\ dummy_t$	0.004	0.008**	0.007	0.004	0.011*	0.002
	(0.006)	(0.003)	(0.006)	(0.004)	(0.006)	(0.004)
Firm FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	547	843	1,363	1,290	1,259	1,156
R-squared	0.147	0.175	0.166	0.118	0.168	0.150

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(d) Panel D: Net equity issue

	Credit rating		Leverage level		Z score	
	unhealthy	healthy	unhealthy	healthy	unhealhty	healhty
After	-0.003	-0.000	-0.003	-0.003	-0.000	-0.006
	(0.006)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
$Size_{t-1}$	-0.022*	-0.009	-0.012**	-0.001	-0.013**	0.006
	(0.011)	(0.010)	(0.006)	(0.011)	(0.006)	(0.013)
$Cash_{t-1}$	0.044	0.026	-0.011	-0.032	-0.005	-0.026
	(0.036)	(0.057)	(0.031)	(0.033)	(0.041)	(0.026)
$Profitability_{t-1}$	-0.334*	-0.093	-0.043	-0.240	-0.098	0.016
	(0.196)	(0.143)	(0.060)	(0.153)	(0.076)	(0.088)
$Fixed\ asset_{t-1}$	-0.036	0.043	-0.032	-0.044	-0.060	0.046
	(0.069)	(0.079)	(0.042)	(0.069)	(0.054)	(0.050)
$Market\ lev_{t-1}$	-0.046	0.028	0.002	-0.028	0.012	-0.016
	(0.033)	(0.025)	(0.017)	(0.050)	(0.018)	(0.048)
$Market/book_{t-1}$	0.005	0.003	0.003	0.004**	0.002	0.003
	(0.004)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)
$Sales\ growth_{t-1}$	0.021*	0.042**	0.011	0.036*	0.040**	0.006
	(0.012)	(0.020)	(0.011)	(0.019)	(0.016)	(0.009)
$Investment_{t-1}$	0.097	-0.071*	-0.011	-0.001	0.040	-0.096
	(0.111)	(0.041)	(0.054)	(0.085)	(0.054)	(0.076)
$Term\ spread_t$	0.008*	0.005**	0.005***	0.001	0.004**	0.002
	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
$Recession\ dummy_t$	-0.001	-0.006**	-0.003	-0.006	-0.003	-0.007
	(0.006)	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)
Firm FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	547	843	1,363	1,290	1,259	1,156
R-squared	0.361	0.413	0.390	0.433	0.376	0.466

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Competition for index additions

This table reports the results of analyses of the intensity of competition for S&P 500 index addition. We measure intensity of competition as the number of competitors for available index additions. We define competitors as industry firms that satisfy the official criteria for addition to the S&P 500 index as of two years prior to index revisions. For this analysis, we restrict the sample to firms that were added since 2003 as we could not obtain all the official criteria prior to 2003. We separate firms into two groups based on the median value of the number of competitors, which is 26. Panel A reports the results of leverage analyses and panel B reports the results of security issuance analyses. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and year(quarter) fixed effects for the leverage(issuance) test. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

(a) Panel A: competition level and leverage

	Book leverage(%)		*Market leverage(%)*	
	High competition	Low competition	High competition	Low competition
	(1)	(2)	(3)	(4)
T^2	0.052*	0.007	0.065***	0.012
	(0.026)	(0.018)	(0.024)	(0.020)
T	-0.075	0.115	-0.209	-0.138
	(0.251)	(0.176)	(0.166)	(0.190)
$Profitability_{t-1}$	-102.094**	-26.553*	-49.920	-67.800***
	(40.340)	(14.013)	(30.154)	(18.521)
$Market/book_{t-1}$	-0.668	0.235	-0.664	-0.289
	(0.725)	(0.406)	(0.696)	(0.402)
$Fixed\ asset_{t-1}$	-42.064	9.160	-45.397*	37.213***
	(26.009)	(14.310)	(23.617)	(12.489)
$Investment_{t-1}$	7.041	6.050	-2.469	-0.841
	(19.760)	(7.176)	(15.233)	(6.970)
$Cash_{t-1}$	-30.932***	-17.225**	-28.339***	1.294
	(10.445)	(7.773)	(9.609)	(7.854)
$Size_{t-1}$	0.555	-5.350**	6.688	4.605
	(4.673)	(2.612)	(4.149)	(4.043)
$Book\ lev\ median_t$	-0.293	0.455***		
	(0.303)	(0.158)		
$Market\ lev\ median_t$			0.843**	0.552***
			(0.317)	(0.145)
Firm FE	Y	Y	Y	Y
Time FE	Y	Y	Y	YY
Observations	548	574	548	574
R-squared	0.742	0.893	0.709	0.873

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(b) Panel B: competition level and issue

	Net debt issue		*Net equity issue*	
	High competition	Low competition	High competition	Low competition
	(1)	(2)	(3)	(4)
After	0.015**	0.006	-0.009	0.000
	(0.006)	(0.007)	(0.008)	(0.007)
$Size_{t-1}$	-0.024*	-0.022	-0.013	-0.002
	(0.012)	(0.021)	(0.015)	(0.024)
$Cash_{t-1}$	-0.017	-0.024	-0.040	0.079
	(0.048)	(0.088)	(0.054)	(0.070)
$Profitability_{t-1}$	-0.059	-0.187***	0.085	-0.109
	(0.122)	(0.064)	(0.128)	(0.105)
$Fixed\ asset_{t-1}$	-0.025	0.206***	0.010	0.001
	(0.142)	(0.055)	(0.099)	(0.078)
$Market\ lev_{t-1}$	-0.120***	-0.196***	0.028	0.013
	(0.036)	(0.039)	(0.036)	(0.029)
$Market/book_{t-1}$	0.002	-0.003	-0.002	-0.002
	(0.004)	(0.002)	(0.003)	(0.002)
$Sales\ growth_{t-1}$	-0.004	-0.003	0.032***	0.023
	(0.014)	(0.010)	(0.005)	(0.019)
$Investment_{t-1}$	-0.213	0.086	-0.020	-0.145*
	(0.185)	(0.072)	(0.112)	(0.082)
$Term\ spread_t$	0.001	0.000	0.007**	0.003
	(0.003)	(0.002)	(0.003)	(0.003)
$Recession\ dummy_t$	0.003	0.005	-0.016**	0.000
	(0.005)	(0.004)	(0.007)	(0.005)
Firm FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	548	574	548	574
R-squared	0.118	0.174	0.446	0.445

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Determinants of addition to the S&P 500 index

This table reports the results obtained from a cross-sectional multivariate logistic regression model with a dichotomous dependent variable using added firms and non-S&P 500 firms that belong to the same industry as the added firms and satisfy all the criteria for addition before the first year of addition (T<1). We consider leverage, size, ROA, market-to-book ratio, fixed assets, cash holdings, sales growth, and institutional ownership as potential additional determinants of index additions. The table reports the odds ratio and the independent variables are scaled by their own standard deviations. The results of the analysis indicate that leverage has a significant effect on index additions. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution. Robust standard errors are reported in parentheses and clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Odds ratio
Size	17.80***
	(12.80)
Market leverage	0.348***
	(-5.28)
ROA	1.594***
	(3.26)
Market/book	1.905***
	(5.60)
Fixed asset	0.835
	(-1.48)
Cash	0.772
	(1.25)
Sales growth	0.929
	(-0.54)
Institutional ownership	1.348
	(-1.86)
Observations	11,788

Table 7: Matched non-added firms

This table reports the results of the analysis of leverage in firms that have similar characteristics similar to those of added firms at T=-8, but not added to the S&P 500 index (matched firms). Matched firms are selected based on size, market to book ratio, profitability, cash, and institutional ownership. The dependent variables are book leverage in columns (1) and (3), and market leverage in columns (2) and (4). In columns (1) and (2), we report the results of regressions using the matched firms. In columns (3) and (4), we report the results of difference-in-differences regressions using the matched and added firms. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and year(quarter) fixed effects for the leverage(issuance) test. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Non-added firms		All firms	
	Book leverage(%)	Market leverage(%)	Book leverage(%)	Market leverage(%)
	(1)	(2)	(3)	(4)
Added x T^2			0.053**	0.072***
			(0.021)	(0.024)
T^2	-0.023	-0.017	-0.024	-0.017
	(0.015)	(0.019)	(0.015)	(0.019)
T	-0.188	0.028	-0.119	0.112
	(0.153)	(0.148)	(0.118)	(0.117)
$Size_{t-1}$	2.694	0.730	-1.891	-0.125
	(3.112)	(3.110)	(2.198)	(1.680)
$Cash_{t-1}$	-13.910***	-11.710**	-10.877*	-14.030***
	(3.882)	(5.621)	(6.107)	(4.758)
$Profitability_{t-1}$	-27.799***	-55.800***	-39.975***	-49.460***
	(9.897)	(18.488)	(9.912)	(13.087)
$Fixed\ asset_{t-1}$	-6.115	-31.746***	-15.031*	-29.729***
	(9.159)	(11.668)	(8.604)	(9.506)
$Market/book_{t-1}$	0.784*	-0.367	-0.198	-0.492*
	(0.403)	(0.560)	(0.257)	(0.272)
$Investment_{t-1}$	6.950*	10.032	4.766	8.860*
	(4.087)	(7.472)	(3.867)	(5.168)
$Book\ leverage\ median_t$	0.242		0.142	
	(0.148)		(0.125)	
$Market\ leverage\ median_t$		0.491***		0.412***
		(0.155)		(0.090)
Firm FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	1,008	1,008	1,970	1,970
R-squared	0.930	0.902	0.884	0.869

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Leverage and criteria for index additions

This table reports the results of leverage and issuance analyses of firms that satisfy all conditions except for the public float requirement for S&P 500 index additions (non-candidate firms). The dependent variables are *book leverage* in columns (1) and (3), and *market leverage* in columns (2) and (4). In columns (1) and (2), we report the results of regressions using the non-candidate firms. In columns (3) and (4), we report the results of difference-in-differences regressions using both the non-candidate and added firms. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and year(quarter) fixed effects for leverage(issuance) test. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Non-added firms		All firms	
	Book leverage(%)	*Market leverage(%)*	*Book leverage(%)*	*Market leverage(%)*
	(1)	(2)	(3)	(4)
Added x T^2			0.038**	0.039**
			(0.019)	(0.018)
T^2	0.015	-0.001	0.001	-0.001
	(0.011)	(0.011)	(0.011)	(0.010)
T	0.049	-0.046	0.063	-0.065
	(0.146)	(0.108)	(0.104)	(0.090)
$Size_{t-1}$	4.525**	1.779	1.017	3.867**
	(1.951)	(1.562)	(1.993)	(1.690)
$Cash_{t-1}$	6.059	-0.071	-3.217	-4.803
	(5.318)	(4.491)	(5.319)	(4.327)
$Profitability_{t-1}$	-24.088**	-49.573***	-36.115***	-57.201***
	(9.486)	(8.007)	(8.390)	(8.210)
$Fixed\ asset_{t-1}$	39.901***	5.246	22.830**	6.887
	(8.481)	(8.891)	(9.224)	(7.678)
$Market/book_{t-1}$	-1.423	-1.172	-0.673	-0.861
	(1.355)	(0.950)	(0.825)	(0.536)
$Investment_{t-1}$	15.102**	10.858*	12.354**	6.295
	(6.927)	(5.480)	(4.856)	(4.695)
$Book\ lev\ median_t$	0.668***		0.444***	
	(0.239)		(0.145)	
$Market\ lev\ median_t$		0.901***		0.671***
		(0.159)		(0.112)
Firm FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	1,486	1,486	2,608	2,608
R-squared	0.859	0.875	0.832	0.849

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Simulation : net security issuance

This table reports the results of simulation analyses of debt issuance and equity issuance. Following Chang and Dascupta (2009), columns (1)- (2) report the results when only issue values are randomly chosen with 1/2 probability based on actual financial deficit values. Columns (3)-(4) present the results when both issue values and financial deficit values are random. All variables are defined in the appendix and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and year(quarter) fixed effects for the leverage(issuance) test. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Random issuance with 1/2 probability		Both financial deficit and issuance are random	
	Net debt	*Net equity*	*Net debt*	*Net equity*
	(1)	(2)	(3)	(4)
After	0.012	0.008	0.010	0.006
	(0.023)	(0.017)	(0.021)	(0.018)
$Size_{t-1}$	0.020	-0.015	0.036	0.002
	(0.033)	(0.022)	(0.027)	(0.028)
$Cash_{t-1}$	-0.207	0.139	-0.178	0.168
	(0.178)	(0.109)	(0.140)	(0.121)
Profitability $_{t-1}$	0.083	0.114	0.461	0.492
	(0.472)	(0.317)	(0.483)	(0.334)
$Fixed\ asset_{t-1}$	-0.147	0.243	-0.353	0.038
	(0.233)	(0.159)	(0.256)	(0.208)
$Market\ lev_{t-1}$	-0.159	0.055	-0.124	0.090
	(0.127)	(0.088)	(0.125)	(0.106)
$Market/book_{t-1}$	0.004	-0.010*	0.013**	-0.000
	(0.008)	(0.006)	(0.006)	(0.006)
$Sales\ growth_{t-1}$	0.006	-0.037	0.033	-0.010
	(0.041)	(0.030)	(0.044)	(0.034)
$Investment_{t-1}$	0.363	0.292	-0.236	-0.307
	(0.340)	(0.185)	(0.345)	(0.284)
$Term\ spread_t$	-0.002	-0.007	0.009	0.003
	(0.010)	(0.008)	(0.010)	(0.008)
$Recession\ dummy_t$	0.047	0.023	-0.003	-0.027
	(0.030)	(0.018)	(0.028)	(0.020)
Firm FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Observations	2,553	2,553	2,553	2,553
R-squared	0.138	0.184	0.087	0.080

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1