Strategic adjustment of capital structure: Evidence from firms newly added to the S&P 500 index

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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, resulting in a U-shaped trend. This trend is more pronounced in financially weak firms and firms facing intense competition for index addition and is established primarily by modifying debt policies. A similar U-shaped leverage trend exists among firms that compete for addition to the index but not among firms that do not compete for addition that are otherwise similar to added firms. The leverage trend cannot be explained by mechanical mean reversion of leverage or changes in the cost of capital. The overall results are consistent with firms' strategically reducing leverage to improve financial health temporarily prior to index revisions.

Keywords: S&P 500 index, capital structure

JEL classification: G30, G32

Declarations of interest: none

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Abstract

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1. Introduction

Traditional standard theories of capital structure propose that firms determine their capital structures by considering costs associated with asymmetric information or by balancing the tax benefits of debt against the expected costs of financial distress. Recent studies, however, provide evidence that firms make capital structure decisions strategically by incorporating factors beyond these financial considerations to appear, at least temporarily, financially (un)stable to related parties. For example, Kisgen (2006) finds that firms reduce leverage to support (avoid) credit rating upgrades (downgrades). Matsa (2010), on the other hand, shows that firms increase leverage to improve their bargaining positions against labor unions and Smith (2016) finds that firms increase leverage to limit expropriation by corrupt local officials. In this paper, we investigate whether a firm strategically adopts a conservative capital structure prior to an important corporate event, namely, addition to the S&P 500 index.

Firms appear to regard being added to the S&P 500 index as an important event, often referring to it as a "milestone" in corporate history.[1] Firms also disclose index addition as a strategic goal on financial statements.[2] This seemingly strong interest in being included in the S&P 500 index is substantiated by the academic literature, which shows that being added to the index brings positive changes to a firm, such as increasing institutional ownership (Pruitt and Wei (1989), Chen, Noronha, and Singal (2004)) and analyst following (Yu (2008)), reducing the cost of equity (Chen, Noronha, and Singal (2004), Baran and King (2012)), and, most importantly, increasing firm value (Shleifer (1986), Chen, Noronha, and Singal (2004)).[3] While exerting a significant impact on a newly added firm, an S&P addition decision is uncertain from the firm-level perspective because a number of firms satisfy the eligibility criteria disclosed by S&P for index additions. Indeed, according to David M. Blitzer, chair of the S&P index com-

[1] In Accenture's announcement on June 26, 2001, Pamela Craig, Accenture's CFO, said, "Accenture's inclusion in the S&P 500, ..., is an exciting milestone."

[2] For example, McEwen Mining stated that their goal is "to qualify for inclusion in the S&P 500 by..." on Form 8-K of January 15, 2013. Praxair Inc., on their Form 8-K of June 1, 2017, noted that they sought "inclusion in the S&P 500..."

[3] On the news of Twitter Inc's joining the S&P 500 index on June 5, 2018, the company's stock price increased by five percent.

mittee, typically five to fifteen candidate stocks for each index are approved by the committee and ready for inclusion at any time.[4]

Given multiple candidates, even firms that satisfy all eligibility criteria may have incentives to improve specific attributes that are likely to favorably affect the committee's index addition decisions. One such attribute may be financial leverage, a commonly used measure of financial health. According to Blitzer's comment on *IndexologyBlog*, investors do not like unexpected index turnover caused by failing stocks,[5] and bankruptcies are occasional reasons for deletions from the index. Therefore, S&P likely has incentives to select financially healthy firms. S&P indeed lists financial viability as one of the eligibility criteria for S&P 500 index additions. Although the S&P's primary measure of financial viability is earnings, it has explicitly listed balance sheet leverage as a secondary measure of financial viability several times.[6] As such, we examine whether firms that perceive themselves to be candidates for S&P 500 index addition strategically choose a conservative capital structure.

It is challenging to identify firms that perceive themselves as candidates for S&P 500 index addition because such perceptions are unobservable. In this paper, we focus primarily on firms that are newly added to the S&P 500 index (hereafter, "added firms"). This is because these firms are likely aware of being considered candidates for new index addition. First, firms can easily check whether they satisfy the eligibility criteria disclosed by S&P for index additions. Second, the financial press often mentions potential candidate firms' names in their news articles. In addition, investment banks or brokerage firms occasionally publish reports on possible changes in S&P index constituents. In Appendix A we summarize news articles and

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

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

[6] According to a news article published in 2007, S&P stated that its measure of financial viability would also include an assessment of balance sheet leverage (https://www.reuters.com/article/sp500-changes/sp-500-criteria-changes-to-add-polo-ralph-lauren-idUSN3132792220070131). However, the first year for which we observe balance-sheet leverage to be included among the eligibility criteria is 2012. Unlike with other criteria, however, S&P does not provide a clear requirement regarding balance-sheet leverage. For example, the criterion tied to earnings 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.

research reports that pertain to potential S&P 500 index additions.[7]

Although added firms likely learn about their candidacies prior to being added to the index, the timing of an addition is harder to predict because revision of the index is carried out as needed, mostly when an existing S&P 500 firm is removed.[8] If firms knew the exact timing of a revision and leverage adjustment were costless, they could reduce leverage shortly before the revision. However, firms that did not know when a revision would take place or face adjustment costs of leverage (Leary and Roberts (2005)) would be more likely to gradually adjust their leverage. Therefore, we analyze leverage trends in added firms over several quarters prior to index additions. We also study the post-addition period to determine whether pre-addition changes in leverage, if any, are maintained or are reversed. We then compare leverage trends in added firms with corresponding trends in other groups of firms to check the validity of our strategic-adjustment explanation.

We find that leverage in added firms gradually decreases before they are added to the index, but then increases after they are added, resulting in a U-shaped trend. This trend 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. We plot the pointwise 95% confidence interval at each time point along with the average values of leverage for added firms and industry peers. The vertical axes in panels A and B represent, respectively, average values of book leverage and average values of market leverage. Both graphs display statistically different leverage patterns between added firms and industry firms around addition events.[9] The results reported in panel A (B) show that the average book (market) leverage in added

[7]For example, a report published by PaineWebber in March 1999 provides a list of "possible new recruits for the S&P 500"(`http://andreisimonov.com/N4106/pdf/EMK%20What%20is%20the%20S&P%20500.pdf`). Eleven of the twelve companies that were suggested as viable candidates in this report were indeed added to the index. At least one-third of the firms that were added to the index after May 1998 were mentioned as potential additions.

[8]For the firms covered in Appendix A, 686 days on average passed between publication of relevant news articles and actual addition to the index. In cases where a firm is mentioned in multiple articles, we count the days that pass following the publication date of the earliest article.

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

firms decreases from 0.215 (0.160) to 0.195 (0.129) during the two-year pre-addition period, but increases to 0.214 (0.166) during the two-year post-addition period.[10] Such a change in leverage is economically significant as the pre-addition decrease of 0.020 (0.031) in book (market) leverage accounts for 13.22% (21.13%) of its standard deviation. A pre-addition decrease in leverage is consistent with firms' reducing leverage prior to index additions to improve financial health. A post-addition increase in leverage suggests that such an improvement in financial health is temporary, consistent with the occurrence of strategic adjustment of leverage for the sake of receiving a favorable index-addition decision.[11] In contrast, leverage in industry peers exhibits a small increase over the four-year period.

We show that the U-shaped leverage pattern is statistically significant after controlling for firm characteristics that are known in the literature to affect leverage along with firm and time fixed effects. We also find that the main instrument for leverage adjustment around addition is debt. In particular, added firms retire debt and reduce debt issuance during the two years prior to addition, but then reverse their debt-financing activities after addition. The role of equity issuance, dividend payments, and retained earnings are economically and statistically insignificant.

The strategic-adjustment hypothesis predicts that firms exhibit more pronounced U-shaped leverage trends when they have stronger incentives to improve financial health prior to index additions. To test this prediction, we consider two groups of firms with potentially stronger incentives to do so: those that are perceived as financially unhealthy and those that face severe competition for index addition. 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 that the U-shaped leverage trend is attributable mostly to financially unhealthy firms. In addition, we find that the U-shaped leverage pattern is significant only for firms that face

[10] We find similar results when we estimate leverage in added firms by locally estimated scatterplot smoothing (LOESS) based on low-degree polynomials, as in Yu (2011) and Defeusco (2018). See Figure A.I.

[11] This strategy will work only if reversing leverage after being added to the index does not cause a firm to be deleted from the index. This appears to be the case as our sample firms remained in the index for a long period of time. In addition, the most common reasons for deletions are associated with mergers and acquisitions, spinoffs, bankruptcy, and lack of representation.

intense competition for index addition.

We consider alternative explanations. We first address the possibility that the post-addition increase in leverage is attributable to the consequences of an index addition. As noted above, addition to the S&P 500 index is followed by significant changes in firm characteristics, which may cause firms to increase leverage. To test this possibility, we investigate leverage in added firms' industry peers that are eligible for index addition but are not eventually added to the index (hereafter, "competitors"). These firms are likely similar to added firms in the sense that they also meet all the criteria. Because competitors are not added to the index, however, their leverage trends should differ from those in added firms if the consequences of the index addition are the driving force behind the U-shaped leverage trend.[12] We find that competitors exhibit a U-shaped leverage trend that is similar to leverage in added firms, suggesting that the post-addition increase in added firms' leverage may not be attributable to the consequences of the index addition. Moreover, the pre-addition decrease in leverage is consistent with strategic adjustment of leverage: because these firms compete for index addition, they have incentives to improve financial health prior to index revisions.

Second, we consider the possibility that the U-shaped leverage trend is attributable to mechanical correlation between leverage and the eligibility criteria for index addition. For example, certain firm characteristics included in the criteria, such as earnings and market capitalization, may be negatively associated with leverage and thus firms that satisfy the criteria mechanically experience decreasing leverage independently of strategic efforts to reduce leverage. To test this possibility, we analyze leverage in added firms' industry peers that likely satisfy most of the eligibility criteria for index addition but do not perceive themselves as potential candidates for addition. In particular, we consider firms that satisfy all of the eligibility criteria for index addition except for the public float requirement[13] (hereafter, "non-competitors") and those

[12]Competitors' post-addition leverage trends may differ from those of added firms for reasons unrelated to the consequences of index addition. For example, competitors may maintain low leverage to increase their chances of being selected in the next revision. However, firms likely reverse their leverage if maintaining lower leverage is costly given that the average turnover of an industry firm in the S&P 500 index is approximately nine years.

[13]We choose the public float requirement because public floats are not among the factors that are known to affect leverage.

that are already included in the S&P 500 index (hereafter, "S&P industry peers"). We do not find a U-shaped leverage trend for these firms, suggesting that the abovementioned mechanical correlation is less likely to be the channel.

Third, we show, employing the simulation method used in Chang and Dasgupta (2009), that the post-addition increase in leverage is unlikely to be a result of mechanical mean reversion. Fourth, we consider the possibility that a firm that expects to be added to the S&P 500 index in the near future delays debt issuance, as the cost of debt decreases after addition. We find, however, that the cost of equity decreases significantly but the cost of debt does not change after addition.

Our paper contributes to the literature on determinants of capital structure by showing that capital structure is affected by incentives for addition to the S&P 500 index. Our results suggest that firms strategically choose conservative capital structures before being added to the S&P 500 index to appear financially healthy and thereby to positively influence S&P's addition decisions. In this regard, this paper is closely related to Kisgen (2006, 2009), who provides empirical evidence that firms reduce leverage to positively affect a credit rating agency's perception of the firm's financial health. More generally, the results of this paper suggest that firms may strategically adjust leverage before important corporate evaluations.

Our paper adds to studies that provide evidence of window dressing. A number of studies show evidence of window dressing in the financial industry (Agarwal, Gay, and Ling (2014), Hu et al. (2014), Morey and O'Neal (2006), Lakonishok et al. (1991)). Studies on window dressing in non-financial sectors focus mostly on earnings management (Teoh, Welch, and Wong (1998), Rangan (1998), Cohen and Zarowin (2010)). Chen, Cohen, and Lou (2016), on the other hand, show that managers engage in sales management. We add to these studies by providing evidence that firms employ window-dressing strategies that involve leverage management.

Our paper is also related to Chattopadhyay, Shaffer, and Wang (2020), who show that ROE to Japanese firms improve after Japan introduced the JPX-Nikkei 400 in 2014, which selects the 400 most profitable of its large and liquid firms. The results suggest that the reputation-driven

desire for index inclusion can motivate changes in corporate behavior even without significant benefits from product markets, capital markets or compensation.

The remainder of this paper proceeds as follows. In Section 2 we describe the data and present the variables we use in this paper. We present empirical results in section 3. We conclude in section 4.

2. Data and summary statistics

2.1. Data and variables

Our sample consists of firms added to the S&P 500 index over a period running from 1986 through 2013 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 and M&As. We remove addition events involving firms whose asset growth rate is higher than 100% or lower than -50% over a two-quarter period. We also remove addition events that result from name changes.[14] We restrict our sample to firms that have all variables required for the analyses. This procedure results in 196 addition events.

For each episode involving a 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 in which 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^2 is defined as a squared value of T.

Accounting information is obtained from Compustat and information on public float is manually obtained from 10-K filings. Data on stock returns are obtained from the Center for

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

Research in Security Prices (CRSP) and debt structure variables are obtained from Capital IQ. We use the Loan Pricing Corporation (LPC) Dealscan database and SDC Platinum Global New Issues database to compute the cost of debt.

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 minus purchases of common and preferred stock scaled by lagged total assets. *Dividend* is defined as cash dividends 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 market value of equity scaled by book equity. *Tangibility* is defined as net property, plant, and equipment (*PPENTQ*) scaled by total assets. *Investment* is defined as capital expenditures 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 (*ATQ*), and *Sales growth* is defined as sales (*SALEQ*) minus lagged sales scaled by lagged sales. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution.

2.2. Summary statistics

In Table I we report summary statistics on the added firms in our sample during pre- and post-addition periods, respectively. A pre-addition period is defined as T between -8 and -1 and a post-addition period is defined as T between 1 and 8. *Book* and *Market leverage* both slightly increase after addition from 21.5% to 21.6% and 15.2% to 16.8%, respectively. The increments account for approximately 0.6% and 10.9% of the sample standard deviations of *Book leverage* and *Market leverage*, respectively. Net debt issuance increases from 0.6% of assets during a pre-addition period to 0.9% of assets during a post-addition period. Net equity issuance decreases from 0.0% of assets during a pre-addition period to -0.2% of assets during

a post-addition period. As such, sample firms, on average, issue debt and repurchase equity throughout the sample period. Sample firms hold on average 12.5% of total assets in cash and invest approximately 2.1% of total assets each quarter. The summary statistics on *Profitability* suggest that our sample firms are profitable and those on *Size* suggest that our sample firms are large, consistent with the financial-viability and market-capitalization requirements for 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. As in Aghion et al. (2005), we use linear and squared terms of T to test the statistical significance of the U-shape leverage trend. The results of the analysis are presented in Table II. In columns (1)-(4), the dependent variable is *Book leverage* and is presented in percentages (%). Firm fixed effects and time fixed effects are included in all columns and standard errors are clustered at the firm level.

The main variable of interest is T^2 in all columns. The coefficient of interest shown in column (1) is positive and statistically significant, suggesting a strong correlation between T^2 and *Book leverage*. Column (2) confirms the existence of the U-shaped trend in book leverage after controlling for factors known to affect leverage, such as *Profitability*, *Market/book*, *Tangibility*, *Investment*, *Cash*, and *Size*. We also control for the linear time trend, T, to obtain the results reported in column (3). The coefficient on T^2 remains statistically and economically the same as that shown in column (2), whereas the coefficient on T is statically insignificant. This implies that the lowest point in the U-shaped trend in book leverage is likely to occur at T=0. We also control for *Book lev median*$_t$, which is defined as the median value of industry firms' book leverage ratios, to address time-varying industry effects on leverage in column (4).

The statistical significance and economic magnitude of the coefficient on T^2 remain similar. In columns (5)-(8), the dependent variable is *Market leverage*. The coefficient of interest, T^2, is seen to be positive and statistically significant in all columns, suggesting the U-shaped trend in market leverage. These results are consistent with the proposition that firms decrease leverage prior to index addition to appear financially healthy and reverse their capital structure decisions after being added to the index.

Turning to the control variables, the coefficients on *Book lev median*$_t$ and *Market lev median*$_t$ are positive and statistically significant, consistent with the industry effect on leverage. The negative coefficient on *Profitability*$_{t-1}$ is consistent with previous studies' findings (Rajan and Zingales (1995)). The overall results presented in this table confirm the U-shaped trend in both book and market leverage around S&P 500 index addition, as documented in Figure I.

TABLE II ABOUT HERE

3.2. Incentives for improving financial health

The strategic-adjustment explanation predicts that a firm should exhibit a more pronounced U-shaped leverage trend when it has stronger incentives for improving financial health prior to index revisions. To test this prediction, we consider two groups of firms with potentially stronger incentives to do so: those that are perceived as financially unhealthy and those that face severe competition for index addition.

First, we split the sample firms based on pre-addition financial health and repeat the analyses described above. The idea is that if a firm is financially unhealthy, it has stronger incentives to improve its financial health prior to an index revision; if it is financially healthy, though, it has weaker incentives to improve its financial health prior to such a revision. In our analysis 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. 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, and its Altman's Z-score is above (below) the median value.[15] We then repeat the leverage analysis separately for financially healthy and unhealthy firms. To classify firms based on credit ratings, we restrict the sample to firms that have been assigned 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.

The results are presented in Table III. Panels A and B report the results of the analyses of book leverage and market leverage, 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 are positive and statistically significant, as shown in columns (1), (3), and (5), whereas those of healthy firms are positive but statistically insignificant, as shown in columns (2), (4), and (6). These results suggest that the U-shaped trend in book leverage documented in Table II is mostly attributable to financially unhealthy firms. In panel B, the dependent variable is *Market leverage*. As in panel A, the coefficient on 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 as shown in columns (2), (4) and (6). The statistical and economic significance of the coefficients is, however, greater for unhealthy firms regardless of the proxies used, suggesting that the U-shaped market leverage trend is more pronounced in financially unhealthy firms. All in all, the results shown in this table indicate that the U-shaped leverage trend is more pronounced among financially weak firms and thus are consistent with the strategic adjustment of leverage around the index revisions.

TABLE III ABOUT HERE

As a second test of the validity of our strategic-adjustment explanation, we split added firms

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

based on competitiveness for index additions. The idea is that a firm facing more intense competition for addition is expected to have stronger incentives to engage in strategic adjustment of leverage than a firm that faces less severe competition. As a proxy for the competitiveness of index additions, we compute the number of competitors, i.e., industry firms that are not included in the index but satisfy the eligibility criteria for index addition as of two years prior to index revisions.[16] For this analysis, we restrict the sample to firms for which we can identify competitors using the eligibility criteria, as we could not obtain the eligibility criteria that were in place early in our sample period. We separate firms into two groups based on the median number of competitors, which is 15.

Table IV reports the results. The dependent variables are *Book leverage* in columns (1) and (2) and *Market leverage* in columns (3) and (4). In columns (1) and (3) we report the results of regressions using firms that belong to the high-competition group, whereas in columns (2) and (4) we report the results of regressions using firms that belong to the low-competition group. The coefficient on T^2 is shown to be statistically and economically significant in columns (1) and (3), whereas the coefficient on T^2 is shown to be statistically and economically insignificant in columns (2) and (4). These results are consistent with the notion that firms facing severe competition reduce leverage to a greater extent prior to index revision and reverse after addition. As such, the results shown in Table III and Table IV support the explanation that the U-shaped leverage trend is attributable to strategic adjustment resulting from incentives for index addition.

TABLE IV ABOUT HERE

[16]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). However, the eligibility criteria change over time. We use the most recent eligibility criteria in defining competitors for each year.

3.3. What drives this change in the leverage trend?

So far, we have found that leverage decreases gradually before addition but increases after addition over the four-year sample period. In this section, we investigate drivers of the sharp shift in the direction of the leverage trend. For this analysis we extend our sample period to an eight-year period (four years before addition and four years after addition) and divide it into four two-year periods: 16 to 9 quarters prior to addition, 8 to 1 quarters prior to addition, 1 to 8 quarters after addition, and 9 to 16 quarters after addition. $T_{-8\sim-1}$ is an indicator variable that is assigned the value of one for 8 to 1 quarters before addition and zero otherwise. Similarly, $T_{1\sim8}$ is an indicator variable that is assigned the value of one for 1 to 8 quarters after addition and zero otherwise, and $T_{9\sim16}$ is an indicator variable that is assigned the value of one for 9 to 16 quarters after addition and zero otherwise.

Following Leary and Roberts (2005), we define four types of financing "spikes": debt issuance, debt retirement, equity issuance, and equity repurchase. In addition, we add three factors that can affect leverage: dividend payments, an increase in retained earnings, and a decrease in retained earnings. We set financing spikes as binary variables that equal one if the financing amount relative to an asset is above the cutoff and zero otherwise. Following Leary and Roberts (2005), spike cutoffs for equity issuance, debt issuance, and debt retirement are 5%, while those for equity repurchases are 1.25%.[17] In particular, *Debt issuance* D_t (*Debt retirement* D_t) is an indicator variable that is assigned the value of one if changes in debt from quarter t-1 to t relative to the total assets at the end of quarter t-1 is larger (smaller) than 5% (-5%) and zero otherwise. *Equity issuance* D_t is an indicator variable that is assigned the value of one if sales of common and preferred stock in quarter t exceed 5% of the total assets at the end of quarter t-1 and zero otherwise. Similarly, *Equity repurchase* D_t is an indicator variable that is assigned the value of one if purchases of common and preferred stock in quarter t exceed 1.25% of the total assets at the end of quarter t-1 and zero otherwise. We additionally define spikes in dividend payments and changes in retained earnings. We use the 75th percentile to

[17] Leary and Roberts (2005) use 1.25% because it is the 75th percentile in their sample. Our sample firms' 75th percentile is also approximately 1.25%. Our results are robust across multiple thresholds.

define spikes for these variables. *Dividend* D_t is an indicator variable that is assigned the value of one if cash dividends at quarter t exceed 0.4% (the 75th percentile) of total assets at the end of quarter t-1 and zero otherwise. *Inc RE* D_t (*Dec RE* D_t) is an indicator variable that is assigned the value of one if changes in retained earnings from quarter t-1 to t are greater (smaller) than 3.13% (-3.28%) of the total assets at the end of quarter t-1 and zero otherwise.[18]

We estimate logit regressions of financing spikes on dummy variables for three two-year dummy variables and the control variables and report the results in Table V. The reference period is 16 to 9 quarters prior to index addition. Panel A reports the results for debt issuance and equity issuance. The dependent variable for column (1) is *Debt issuance D*. The coefficient on $T_{-8\sim-1}$ is negative and statistically and economically significant, indicating that added firms are less likely to issue debt between T=-8 and T=-1 than they are between T=-16 and T=-9. On the other hand, the coefficients on $T_{1\sim8}$ and $T_{9\sim16}$ are statistically and economically insignificant, which indicates that the added firms are as likely to issue debt after addition as they are between T=-16 and T=-9. The dependent variable for column (2) is *Debt retirement D*. The coefficient on $T_{-8\sim-1}$ is positive and statistically and economically significant, indicating that added firms are more likely to retire debt between T=-8 and T=-1 than between T=-16 and T=-9. On the other hand, the statistically insignificant coefficients on the other two-year-period indicator variables imply that added firms are as likely to retire debt after index addition as they are between T=-16 and T=-9. The results reported in columns (1) and (2) imply that added firms are likely to issue less debt and retire more debt during the two-year period before index addition but, once they are added, the frequency of debt-financing spikes reverts back to the frequency that occurred between T=-16 and T=-9. Columns (3) and (4) show the results of logit regressions of equity financing spikes. In both columns, the coefficients on $T_{-8\sim-1}$, $T_{1\sim8}$, and $T_{9\sim16}$ are statistically insignificant, suggesting that equity financing does not change significantly around additions.

Panel B reports the results for changes in dividends and retained earnings. The dependent

[18] 3.13% is the 75th percentile among samples showing positive changes in retained earnings, whereas -3.28% is the 25th percentile among samples showing negative changes in retained earnings.

variable is *Dividend* D_t in column (1). None of the coefficients for three two-year dummies is economically or statistically significant, indicating that there are no significant changes in dividend payments around additions. We report similar results in columns (2) and (3), for which the dependent variables are *Dec RE* D_t and *Inc RE* D_t, respectively. None of the coefficients for three two-year dummies is economically or statistically significant, indicating that the frequency of spikes in changes in retained earnings remains similar around additions. Overall, the results reported in Panel B suggest that neither dividends nor earnings drive changes in leverage around index additions. As such, the results reported in this table suggest that firms adjust leverage primarily by changing debt financing.

TABLE V ABOUT HERE

3.4. Alternative explanations

We now consider alternative explanations of the U-shaped leverage trend in added firms. First, we consider the possibility that the post-addition increase in leverage is a consequence of index addition. We next examine whether the U-shaped leverage trend is attributable to mechanical correlation between leverage and certain firm characteristics that are included in the eligibility criteria for addition. We also consider whether the post-addition increase in leverage can be explained by mechanical mean reversion of leverage. Lastly, we examine whether our results can be explained by changes in the cost of capital.

3.4.1. The consequences of index addition

As explained in the introduction, being added to the S&P 500 index brings significant changes to a firm, such as greater analyst following and higher levels of institutional ownership. We consider the possibility that changes in firm characteristics caused by index addition are associated with an increase in leverage. To test this possibility, we investigate competitors' leverage trends. As defined earlier, competitors are the industry peers of the added firms that

meet all the criteria but are not eventually added to the S&P 500 index. Because competitors are not added to the index, their post-revision leverage trends should differ from those of added firms if the changes in firm characteristics following the index addition are the driving force behind the post-addition increase in leverage in added firms. We first repeat the leverage analysis using competitors. We next compare the leverage trends of competitors to those of added firms around index revisions.

Table VI reports the results. The dependent variables are *Book leverage* in columns (1), (3) and (5) and *Market leverage* in columns (2), (4) and (6). In columns (1) and (2), we report the results of regressions using only competitors. The coefficient on T^2 is significant and positive in both columns, suggesting that both book leverage and market leverage in competitors exhibit U-shaped trends. In columns (3) through (6), we report the results of the comparison between added firms and competitors. *Added* is an indicator variable that is assigned the value of one for added firms and zero for competitors. The coefficients on T^2 are statistically significant but that on *Added* x T^2 is not, indicating that added firms and competitors indeed exhibit similar leverage trends. In columns (5) and (6), we additionally control for *Added* x T in the regression. The coefficients on *Added* x T^2 and T^2 remain qualitatively the same. The results shown in this table help to rule out the possibility that consequences of index additions drive the U-shaped leverage trends. In addition, the pre-revision decrease in competitors' leverage is consistent with the strategic-adjustment explanation: because these firms compete for index addition, they have incentives to improve their financial health prior to index revisions that are similar to those of added firms.

Table VI About Here

3.4.2. Mechanical correlation between leverage and eligibility criteria

We next consider the possibility that the pre-addition decrease in leverage may arise mechanically regardless of strategic adjustment. For example, certain firm characteristics included

in the eligibility criteria for addition, such as earnings and market capitalization, may be negatively correlated with leverage and thus firms that satisfy the criteria systematically experience a decrease in leverage independently of strategic reduction in leverage. After being added to the index, leverage may increase for reasons unrelated to strategic adjustment. To test this possibility, we first examine leverage in non-competitors, which are firms that satisfy all of the eligibility criteria for index addition except for the public float requirement.[19] We choose the public float requirement because public floats are not among factors known to affect leverage. Therefore, if the above-mentioned mechanical correlation is the driving force behind the U-shaped leverage trends, non-competitors also should exhibit similar U-shaped leverage trends. On the other hand, non-competitors do not qualify for inclusion in the S&P 500 index and thus are unlikely to compete for index addition. Therefore, if the incentives for index addition drive the U-shaped leverage trends, non-competitors should not exhibit U-shaped leverage trends. We first repeat the leverage analysis using non-competitors and then compare the leverage trends of non-competitors with those of added firms around index revisions.

Table VII reports the results of the analyses. The dependent variables are *Book leverage* in columns (1), (3) and (5) and *Market leverage* in columns (2), (4) and (6). In columns (1) and (2), we report the results of regressions using only non-competitors. The coefficient on T^2 is insignificant in both columns, suggesting that non-competitors do not exhibit U-shaped leverage trends despite satisfying most of the criteria for addition. In columns (3) through (6), we report the results of comparison between added firms and non-competitors. *Added* is an indicator variable that is assigned the value of one for added firms and zero for non-competitors. The coefficient on *Added* x T^2 is positive and statistically significant but that on T^2 is not. In columns (5) and (6), we additionally control for *Added* x T in the regression. The coefficients on *Added* x T^2 and T^2 remain qualitatively the same. These results suggest that firms that are likely to target index addition exhibit U-shaped leverage trends while firms that are unlikely to target index addition in the first place but are otherwise similar do not exhibit the U-shaped

[19]For this analysis, we restrict the sample to firms for which we can identify non-competitors using the eligibility criteria, as we could not obtain the eligibility criteria that were in place early in our sample period.

leverage trend. As such, the results reported in this table imply that the U-shaped trend in added firms' leverage is not likely due to mechanical correlation between leverage and firm characteristics that are included in the eligibility criteria for index addition.

TABLE VII ABOUT HERE

Next, we analyze leverage in S&P industry peers. These firms are representative of the industry, large, liquid, and likely satisfy most of the eligibility criteria and thus are similar to added firms. Therefore, if the U-shaped leverage trend in added firms is attributable to mechanical correlation between such firm characteristics and leverage, S&P industry peers should also exhibit the U-shaped leverage trend. On the other hand, S&P industry peers do not have incentives to be added to the index. Therefore, if the U-shaped leverage trend in added firms is attributable to incentives for index addition, S&P industry peers should not exhibit a U-shaped leverage trend. We first repeat the leverage analysis using S&P industry peers and then compare the leverage trend of S&P industry peers with that of added firms around index revisions.

Table VIII reports the results of the analyses. The dependent variables are *Book leverage* in columns (1), (3) and (5) and *Market leverage* in columns (2), (4) and (6). In columns (1) and (2), we report the results of regressions using only S&P industry peers. The coefficient on T^2 is shown to be statistically and economically insignificant in both columns, suggesting that S&P industry peers do not exhibit the U-shaped leverage trend. In columns (3) and (4), we report the results of regressions using S&P industry peers and added firms. *Added* is an indicator variable that is assigned the value of one for newly added firms and zero for the S&P industry peers. The coefficient on *Added* x T^2 is shown to be positive and statistically significant but that on T^2 is not. This result does not change when we include *Added* x T, as shown in columns (5) and (6). These results confirm that firms that are candidates for index addition exhibit the U-shaped leverage trend, while firms that already have index membership and thus would not target index additions do not exhibit the U-shaped leverage trend. Overall, the results shown

in Table VII and Table VIII suggest that the U-shaped leverage trend in added firms is unlikely to be attributable to mechanical correlations between leverage and certain firm characteristics that are included in the eligibility criteria for index additions.

Table VIII About Here

3.4.3. Mechanical mean reversion

Chang and Dasgupta (2009) show that the results of some well-known tests of target leverage in the literature can be replicated with random financing in which capital-structure decisions are made independently of decisions about target leverage. Of greatest relevance to our paper is their replication of Alti (2006), which shows that hot-market initial public offerings (IPO) firms issue significantly more equity and immediately issue more debt after going public than cold-market IPO firms. We examine whether the post-addition patterns we observe regarding added firms' capital structures can be replicated using Chang and Dasgupta's (2009) approach. We assume that, as of two years before the addition (T=-8), all firms in the simulation test have the same initial asset and book debt as firms in the actual data. We take all other variables, except for debt issuance and equity issuance directly from the data. We assume that firms issue (retire) debt or equity to equal the financial deficit if it is positive (negative). The decision regarding debt or equity is determined by a coin toss to reflect the idea that a firm issues or retires debt and equity with equal probability. We define *Simulated net debt issues* and *Simulated net equity issues* as simulated values of net debt issuance and net equity issuance, respectively. Like Chang and Dasgupta (2009), we examine the persistence of the effects of index addition on leverage using the following regressions:

$$\frac{\text{Simulated Book Debt}_t}{\text{Simulated Book Asset}_t} - \frac{\text{Actual Book Debt}_{-8}}{\text{Actual Book Asset}_{-8}} = a_0 + a_1 AfterAddition_{M,t} + Control_{t-1} + a_2 \frac{\text{Actual Book Debt}_{-8}}{\text{Actual Book Asset}_{-8}} + \epsilon_t (t \geq 1) \quad (1)$$

$$\frac{\text{Simulated Book Debt}_t}{\text{Simulated Book Asset}_t} - \frac{\text{Simulated Book Debt}_{t-1}}{\text{Simulated Book Asset}_{t-1}} \tag{2}$$
$$= b_0 + b_1 AfterAddition_{M,t} + Control_{t-1} + b_2 LowLev_{t-1} + b_2 HighLev_{t-1} + \xi_t (t \geq 1)$$

In equation (1), the dependent variable is simulated book leverage minus *Book leverage*$_{-8}$. *Simulated book asset*$_t$ equals the sum of *Simulated book asset*$_{t-1}$, *Simulated net debt issues*$_t$, *Simulated net equity issues*$_t$, and changes in retained earnings at t. *Simulated book debt*$_t$ equals *Simulated book debt*$_{t-1}$ plus *Simulated net debt issues*$_t$. *AfterAddition*$_{M,t}$ is a dummy variable that equals 1 when t=M and 0 otherwise. We select 1, 4, and 8 for M to estimate the coefficients on *AfterAddition*$_{M,t}$. These coefficients capture cumulative changes in leverage from two years before addition to M quarters after addition. Capital structure rebalancing by added firms in the post-addition period will result in a negative coefficient on *AfterAddition*$_{M,t}$, which weakens over time. Therefore, if the U-shaped leverage trend is driven by mechanical mean reversion, the simulated data also should yield a negative coefficient on *AfterAddition*$_{M,t}$ that weakens over time.

The dependent variable in equation (2) is a quarterly change in simulated book leverage. *LowLev* (*HighLev*) equals 1 if the leverage ratio is below 0.1 (above 0.8) and 0 otherwise. These variables incorporate the idea that leverage tends to rebound when it is close to 0 or 1. Chang and Dasgupta (2009) interpret a positive coefficient sign on *AfterAddition*$_{M,t}$ as evidence of mechanical mean reversion.

We report the results in Table IX. The reported parameter estimates are the average coefficients obtained from 500 replications of the simulation and p-values are reported in parentheses. All regressions include industry fixed effects. As control variables we use *Market/book*, *Profitability*, *Size*, *Tangibility*, *R&D/Sale*, which is the ratio of research and development expenses to sales, and *RDD*, an indicator variable that is assigned the value of one for missing R&D and zero otherwise.[20] Panel A reports the results obtained with Equation (1). The variables of interest for columns (1), (2), and (3) are *AfterAddition*$_{1,t}$, *AfterAddition*$_{4,t}$, and *AfterAddi-*

[20]Quarterly R&D starts from 1989. We divide annual R&D expenditure equally into four quarters prior to 1989.

$tion_{8,t}$, respectively. None of the coefficients of interest is statistically significant. In addition, the coefficient of interest is positive in column (1) but negative in columns (2) and (3). Furthermore, the absolute value of the coefficient is larger in column (3) than in column (2), indicating divergence from the reference point at T=-8. These results do not support the proposition that the post-addition increase in added firms' leverage can be explained by mechanical mean reversion of leverage.

Panel B reports the results obtained with Equation (2). The coefficient of interest is negative in columns (2) and (3), inconsistent with the idea that mechanical mean reversion of leverage causes the post-addition increase in added firms' leverage. On the other hand, the coefficients on *HighLev* and *LowLev* have the correct signs, suggesting that mechanical mean reversion occurs at extreme values of leverage in the simulated data. The coefficient of *LowLev*, though, is economically and statistically insignificant. In addition, in the actual data, extremely high values of leverage are rare: there are no incidents of leverage higher than 0.8. The results shown in Table IX suggest overall that mechanical mean reversion cannot account for the post-addition increase in leverage.

Table IX About Here

3.4.4. Cost of capital

We consider whether our results can be explained by changes in the cost of capital. A firm that expects to be added to the S&P 500 index in the near future could delay security issuance if the cost of capital decreases after addition. To be consistent with the U-shaped leverage trend, the cost of debt should decrease significantly after addition. Previous studies find, however, that the cost of equity, but not the cost of debt, falls significantly following an S&P 500 index addition (Baran and King (2012), Brisker, Colak, and Peterson (2013), Chen, Noronha, and Singal (2004)).[21] We examine changes in the cost of equity and debt among our

[21]Brisker, Colak, and Peterson (2013) document a decrease in spreads for 1–5 year maturity bonds but an increase in spreads for longer-term bonds.

sample of added firms and find results similar to those reported in prior studies.

The results are presented in Table X. Both the cost of equity and the cost of debt are annualized values. In panel A we report the estimated cost of equity using three models-a market model, Fama-French's (1993) three-factor model and Carhart's (1997) four-factor model. In so doing, we follow Baran and King (2012), who examine changes in the cost of equity to firms that are added to or removed from the S&P 500 index. The cost of equity as estimated by all methods is consistently higher in the pre-addition period than in the post-addition period. For example, the cost of equity estimated using the market model is 32.19% before addition. It decreases by 22.51 percentage points after addition, though, and the decrease is statistically significant at the 1% level. We find similar results when we use other methods. Added firms experience a significant drop in the estimated cost of equity of 22.92 (22.75) percentage points when we employ the three- (four-) factor model to estimate the cost of equity. The decrease is significant at the 1% (1%) level.

In panel B we report the results of the analyses of the cost of debt. We use three methods to compute the cost of debt. In the first row, following Frank and Shen (2016), we report the average cost of total debt, including bonds and loans, which we define as total interest and related expenses divided by the sum of long-term debt and short-term notes. The pre-addition cost of debt is 7.78% and the post-addition cost of debt is 7.52%. The decrease is neither statistically nor economically significant. The second row presents the average all-in-spread drawn of bank loans, which we calculate as an interest rate spread over LIBOR inclusive of all fees from DealScan following prior studies (Drucker and Puri (2005), Qian and Strahan (2007), Nadauld and Weisbach (2012)). The pre-addition all-in-spread is 103 basis points over the LIBOR and the post-addition spread is 112 basis points over the LIBOR. The increase is neither statistically nor economically significant.

In the third row, we analyze bond-yield spreads. Following prior studies, we estimate an average bond cost for each year using bond yields at the time of the bond issue (Duffie (1998), Campbell and Taksler (2003), Maxwell and Stephens (2003), Qi, Roth, and Wald (2010), and

Eisenthal-Berkovitz, Feldhütter, and Vig (2020)). The bond-yield spread for fixed-rate bonds is defined as the difference between the yield-to-maturity on a corporate bond and the yield-to-maturity on its maturity-matched Treasury yield. We obtain information on corporate bonds from the SDC Platinum Global New Issues Database and information on Treasury yields from the Federal Reserve Board. If there is no maturity-matched Treasury security available, the yield-to-maturity on the Treasury security is calculated as the linear interpolation between the two closest maturity matches. We restrict our sample to newly issued fixed-rate bonds with maturity equal to or less than 30 years. The pre-addition average bond yield spread is 164 basis points over the maturity-matched Treasury yield and the post-addition average spread is 189 basis points over the maturity-matched Treasury yield. The increase is neither statistically nor economically significant.

It might be argued that loan spreads may be an incomplete proxy for the actual cost of debt as they may ignore some loan-pricing components. For example, Berg, Saunders, and Steffen (2015) show that the pricing structure of a loan commitment includes a variety of fees and then suggest a new measure they call Total-Cost-of Borrowing (TCB). The TCB measure differentiates between credit lines and term loans and incorporates the various fees paid to lenders, spreads, and the likelihood that they will have to be paid.[22] We repeat the analyses of the cost of debt using the total cost of borrowing suggested in Berg, Saunders, and Steffen (2015). We report the results in panel C.[23] The results indicate that average TCB before addition is 71 basis points whereas after addition it is 76. The difference, 5, is statistically insignificant. As such, the results of analyses that include TCB suggest that the cost of debt did not drop after addition to the S&P 500 index. The overall results reported in this table confirm the findings of prior studies that the cost of equity decreases significantly following S&P 500 index addition but the cost of debt is not affected significantly. As such, it is unlikely that the U-shaped leverage trend is attributable to firms' reducing debt issuance during the pre-

[22]See Berg, Saunders and Steffen (2015) for additional details on TCB.
[23]We obtain information on TCB from Tobias Berg's website.

addition period as they expect to see a reduction in the cost of debt following index addition.[24]

TABLE X ABOUT HERE

3.5. Is leverage an important determinant of index additions?

One of the key conditions for our proposition that firms strategically reduce leverage to enhance the probability of index addition is that S&P does consider leverage an important factor when adding firms to the S&P 500 index. We conduct a logit analysis using added firms and competitors to investigate whether leverage is an important factor in S&P 500 index additions.

We report the results in Table XI. The dependent variable is an indicator variable such that one signifies that a firm is included in the index in a given quarter. We consider financial viability, size, market-to-book ratio, tangibility, cash holdings, sales growth, and liquidity as potential additional determinants of index additions. In this table, we report the odds ratios and the independent variables are scaled by their own standard deviations. As a measure of financial viability, we use market leverage to obtain the results reported in column (1). The results of the analysis indicate that market leverage has a significant effect on index additions. Among the firm characteristics we consider, market leverage is the second most important factor following size. In the context of the added firms in our sample, when the added firms decrease their market leverage from 0.160 to 0.129 (see Figure 1), the odds of being added to the index increases by 36%. The largest effect of size is consistent with the fact that market capitalization is an important determinant of S&P 500 index addition. The results are similar when we use book leverage as a measure of financial viability, as shown in column (2). Among the firm characteristics we consider, book leverage is the third most important factor following

[24]We also examined whether credit ratings and index addition are related. Consistent with the results reported in this table, added firms' credit ratings do not change significantly around index addition.

size and the market-to-book ratio.[25] In the context of the added firms in our sample, when the added firms decrease their book leverage from 0.215 to 0.195 (see Figure 1), the odds of being added to the index increases by 10%.

We next consider ROA as the measure of financial viability because S&P regards earnings as the primary measure of financial viability among the eligibility criteria for index additions. The results are shown in column (3). The coefficient estimate on ROA_{t-1} is greater than one and is statistically significant at the 10% level, suggesting that earnings are important determinants of index additions. In particular, among the firm characteristics we consider, earnings are the second most important factor following size, although the statistical significance of its coefficient is lower than that of $Market/book_{t-1}$. To obtain the results we report in columns (4) and (5), we consider both ROA and financial leverage. As can be seen in both columns, the coefficients on ROA_{t-1} lose statistical significance and their magnitudes decrease significantly. On the other hand, the statistical and economic significance of the coefficients on $Market\ leverage_{t-1}$ and $Book\ leverage_{t-1}$ remain similar, respectively, to those of the coefficients shown in columns (1) and (2). These results suggest that leverage plays a more important role than earnings in index additions. Overall, the results presented in this table suggest that leverage is one of the most important determinants of index additions.

Table XI About Here

3.6. Does debt structure change after S&P 500 index additions?

Although we document increases in leverage after a firm is added to the S&P 500 index, it is possible that firms change their debt structures. For example, analyzing international data, Goyal, Urban, and Zhao (2017) find that leverage increases after exogenous additions to stock indices and this trend is attributable to increases in the use of public debt. To test

[25] Firms could also strategically adjust their sizes and market-to-book ratios, but we do not test this possibility in this paper. It may, however, be more difficult for a firm to change its size and market-to-book ratio than to change its leverage.

whether the results presented in Goyal, Urban, and Zhao (2017) hold in our sample, we first examine changes in the proportion of total debt accounted for by public debt. To further examine whether the post-addition increase in leverage is attributable to certain types of debt, we analyze debt specialization, which is defined as a normalized Herfindahl-Hirschman index of debt type usage (hereafter, *HHI*) around index additions.[26] We restrict the sample to added firms that have debt structure variables required for the analysis.

The results are presented in Table XII. We control for firm fixed effects and time fixed effects in all columns and additionally control for firm characteristics in even numbered columns. In columns (1) and (2), the dependent variable is *PublicDebt/Debt*, which is defined as the proportion of total debt accounted for by public debt. The coefficient on *After* is shown to be negative and statistically insignificant in both columns. These results suggest that the proportion of total debt that is public debt does not change significantly after index addition. The dependent variable is *HHI* in columns (3) and (4). The coefficient on *After* is shown to be positive but it is statistically insignificant in both columns, suggesting that the level of debt concentration does not change significantly after index addition. As such, the results reported in this table indicate that overall debt structure does not change after S&P 500 index additions.

Table XII About Here

4. Conclusion

We show that financial leverage in firms that have been 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 strategically reduce leverage prior to index addition to temporarily improve their financial health. Consistent with this explanation, our findings are pronounced among firms with poor financial health prior to additions and firms facing severe competition

[26]For detailed information on this variable, refer to Colla, Ippolito, and Li (2013).

for addition. We show that the U-shaped trend in leverage is driven mostly by debt issuance and retirement, and cannot be explained by the consequences of index addition, mechanical correlation between the index eligibility criteria and leverage, mechanical mean reversion of leverage, or changes in the cost of capital. The results imply overall that capital structure is affected by strategic incentives such as addition to the S&P 500 index. More generally, the results of this paper suggest that firms may strategically adjust leverage before other important corporate evaluations.

References

Aghion, P., Bloom, N., Blundell, R., Griffith, R., Howitt, P., 2005. Competition and innovation: An inverted-U relationship. *Quarterly Journal of Economics* 120, 701–728.

Alti, A., 2006. How persistent is the impact of market timing on capital structure? *Journal of Finance* 61, 1681-1710.

Baran, L., King, T.D., 2012. Cost of equity and S&P 500 index revisions. *Financial Management* 41, 457–481.

Berg, T., Saunders, A. and Steffen, S., 2016. The Total Cost of Corporate Borrowing in the Loan Market: Don't Ignore the Fees. *Journal of Finance* 71, 1357-1392.

Blitzer, D., 2013. Inside the S&P 500: Selecting Stocks. Indexology Blog July 9. (Available at: `http://www.indexologyblog.com/2013/07/09/inside-the-sp-500-selecting-stocks`).

Brisker, E.R., Colak, G., Peterson, D.R., 2013. Changes in cash holdings around the S&P 500 additions. *Journal of Banking & Finance* 37, 1787–1807.

Carhart, M., 1997. On persistence in mutual fund performance. *Journal of Finance* 52, 57–82.

Campbell, J., Taksler, G., 2003. Equity volatility and corporate bond yields, *Journal of Finance* 58, 2321–2349.

Chang, X., Dasgupta, S., 2009. Target behavior and financing: how conclusive is the evidence? *Journal of Finance* 64, 1767–1796.

Chattopadhyay, A., Shaffer, M. D., Wang, C.Y., 2020. Governance through shame and aspiration: Index creation and corporate behavior, *Journal of Financial Economics* 135, 704–724.

Chen, H., Noronha, G., Singal, V., 2004. The price response to the S&P 500 additions and deletions: Evidence of asymmetry and a new explanation. *Journal of Finance* 59, 1901–1929.

Cohen, D., Zarowin, P., 2010. Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of Accounting and Economics* 50, 1–33.

Colla, P., Ippolito, F., Li, K., 2013. Debt specialization. *Journal of Finance* 68, 2117–2141.

Defusco, A.A., 2018. Homeowner borrowing and housing collateral: new evidence from expiring price controls. *Journal of Finance* 73, 523–573.

Drucker, S., Puri, M., 2005. On the benefits of concurrent lending and underwriting, *Journal of Finance* 60, 2763–2799.

Duffie, G., 1998. The relation between treasury yields and corporate bond yield spreads, *Journal of Finance* 53, 2225–2241.

Eisenthal-Berkovitz,Y., Feldhütter, P., Vig, V., 2020, Leveraged buyouts and bond credit spreads, *Journal of Financial Economics* 135, 577–601.

ETF.com Staff, 2000. Here, At The S&P 500, ETF.com Jan 01. (Available at: `http://www.etf.com/publications/journalofindexes/joi-articles/1153.html?nopaging=1`).

Fama, E., French, K.,1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33, 3–56.

Frank, Murray Z., Goyal, V.K., 2003. Testing the pecking order theory of capital structure, *Journal of Financial Economics* 67, 217–248.

Frank, M. Z., Shen, T., 2016. Investment and the weighted average cost of capital. *Journal of Financial Economics* 119, 300–315.

Goyal, V.K., Urban, D., Zhao, W., 2017. Index membership and capital structure: international evidence. *Unpublished working paper.* Hong Kong University of Science & Technology (HKUST). Hong Kong.

Kisgen, D.J., 2006. Credit ratings and capital structure. *Journal of Finance* 61, 1035–1072.

Kisgen, D.J., 2009. Do firms target credit ratings or leverage levels? *Journal of Financial and Quantitative Analysis* 44, 1323–1344.

Lakonishok, J., Shleifer, A., Thaler, R., Vishny, R.W., 1991. Window dressing by pension fund managers. *American Economic Review, Papers and Proceedings* 81, 227–231.

Leary, M.T., Roberts, M.R., 2005. Do firms rebalance their capital structures? *Journal of Finance* 60, 2575–2619.

Lemmon, M.L., Roberts, M.R., Zender, J.F., 2008. Back to the beginning: persistence and the cross-section of corporate capital structure. *Journal of Finance* 63, 1575–1608.

Matsa, D., 2010. Capital structure as a strategic variable: evidence from collective bargaining. *Journal of Finance* 65, 1197–1232.

Maxwell, W. F., Stephens, C. P., 2003. The wealth effects of repurchases on bondholders, *Journal of Finance* 58, 895–919.

Morey, M.R., O'Neal, E.S., 2006. Window dressing in bond mutual funds. *Journal of Financial Research* 29, 325–347.

Nadauld, T. D., Weisbach, M. S., 2012. Did securitization affect the cost of corporate debt? *Journal of Financial Economics* 105, 332–352.

Pruitt, S.W., Wei, K.C.J., 1989. Institutional ownership and changes in the S&P 500. *Journal of Finance* 44, 509–513.

Qi, Y., Roth, L., Wald, J. K., 2010, Political rights and the cost of debt, *Journal of Financial Economics* 95, 202–226.

Qian, J., Strahan, P., 2007. How laws and institutions shape financial contracts: The case of bank loans, *Journal of Finance* 62, 2803–2834.

Rajan, R.G., Zingales, L., 1995. What do we know about capital structure? some evidence from international data. *Journal of Finance* 50, 1421–1460.

Rangan, S., 1998. Earnings management and the performance of seasoned equity offerings. *Journal of Financial Economics* 50, 101–122.

Reuters, 2007. S&P 500 criteria changes, to add Polo Ralph Lauren. Jan 31. (Available at: `https://www.reuters.com/article/sp500-changes/sp-500-criteria-changes-to-add-polo-ralph-lauren-idUSN3132792220070131`).

S&P Dow Jones Indices: S&P U.S. Indices Methodology (2012).

Shleifer, A., 1986. Do demand curves for stocks slope down? *Journal of Finance* 41, 579–590.

Smith, J., 2016. US political corruption and firm financial policies. *Journal of Financial Economics* 121, 350–367.

Standard and Poor's Corporation. S&P U.S. Indices Methodolgy. (Available at: `https://www.standardandpoors.com`).

Teoh, S. H., Welch, I., Wong, T., 1998. Earnings management and the long-run market performance of initial public offerings. *Journal of Finance* 53, 1935–1974.

Yu, F., 2008. Analyst coverage and earnings management. *Journal of Financial Economics* 88, 245–271.

Yu, J., 2011. Disagreement and return predictability of stock portfolios. *Journal of Financial Economics* 99, 162–183.

Appendix A: News articles about potential additions to the S&P 500 index

Sample Firm	Company name	News Publish Date	Addition Date	News Title
	B.A.T. Industries	21-May-1986		Picking Stocks For S.&P. 500
	Bell Canada Enterprises	21-May-1986		
	British Petroleum	21-May-1986		
	Carolina Power and Light	21-May-1986	31-Aug-1989	
	Farmers Group	21-May-1986		
	First Union	21-May-1986	28-Feb-1989	
	Genentech	21-May-1986	31-Jul-1986	
	General Re	21-May-1986	30-Apr-1988	
	Glaxo Holdings	21-May-1986		
	Hitachi Ltd.	21-May-1986		
	Honda Motor	21-May-1986		
	ITO Yokado	21-May-1986		
	Loews Corporation	21-May-1986	10-May-1995	
	Matsushita Electric	21-May-1986		
	Plessey Ltd.	21-May-1986		
	Security Pacific	21-May-1986	30-Apr-1988	
	Sony	21-May-1986		
	Suntrust Banks	21-May-1986	31-May-1988	
	Union Electric	21-May-1986	19-Sep-1991	
1	United Telecommunications	21-May-1986	31-Jul-1989	
	AmSouth Bancorp	2-May-1998	10-Mar-1999	Bank Candidates for the S&P 500 Could Pay Dividends for Investors
	First Tennessee National	2-May-1998	6-May-2002	
	Regions Financial	2-May-1998	28-Aug-1998	
	SouthTrust Corp	2-May-1998		
	Union Planters	2-May-1998	1-Oct-1998	
	Bear Stearns & Co	26-May-1998	1-Jul-1998	A Stock-Picker's Tip: Watch Candidates for S&P 500 Club
	Capital One Financial Corp	26-May-1998	1-Jul-1998	
	Crestar Financial Corp	26-May-1998		
	Donaldson, Lufkin & Jenrette Inc	26-May-1998		
	Firstar Corp	26-May-1998		
	Marshall & Illsley Corp	26-May-1998	11-Feb-2002	
	PaineWebber Inc	26-May-1998	4-Jun-1999	
	Sallie Mae	26-May-1998		
	Star Banc Corp	26-May-1998		
	AES CORP	26-May-1998	2-Oct-1998	Traders Aim to Predict Next Additions to S&P 500
	AFLAC INC	26-May-1998	28-May-1999	
	America Online	26-May-1998	4-Jan-1999	
	BMC Software	26-May-1998	1-Oct-1998	
	Cadence Design Sys	26-May-1998	18-Sep-2017	
1	Coca-Cola Enterprises	26-May-1998	8-Oct-1998	
	Compuware	26-May-1998	4-Jan-1999	
	Kohl's	26-May-1998	14-Aug-1998	
1	McKesson	26-May-1998	13-Jan-1999	
	USA Waste Services	26-May-1998	17-Jul-1998	
	First American Bancorp	19-Feb-1999		10 Banking Companies Seen In Line for S&P 500 Listing
	First Security Bancorp	19-Feb-1999		
	M&T Bancorp	19-Feb-1999	27-Feb-2004	
	North Fork Bancorp	19-Feb-1999	17-Jul-2002	
	Old Kent Financial	19-Feb-1999	2-Dec-1999	
	Popular Inc	19-Feb-1999		
	Zions Bancorp	19-Feb-1999	25-Jun-2001	
1	Cintas Corp	22-Feb-1999	1-Mar-2001	Pacholder adds assets with addition of high-yield fund
1	Harley-Davidson Inc	22-Feb-1999	31-Jan-2000	
1	Best Buy Co Inc	14-Mar-1999	30-Jun-1999	What is the S&P 500?
1	Biogen	14-Mar-1999	31-Jan-2000	
1	LEXMARK INTL INC -CL A	14-Mar-1999	13-Aug-1999	
	Linear Technology Corp	14-Mar-1999	3-Apr-2000	
	MAXIM INTEGRATED PRODUCTS INC	14-Mar-1999	10-May-2000	
1	NETWORKS ASSOCIATES INC	14-Mar-1999	23-Dec-2008	
1	Office Depot Inc	14-Mar-1999	24-Jun-1999	
1	STARWOOD HOTELS&RESORTS WRLD	14-Mar-1999	17-Nov-2000	

	Altera	29-Apr-1999	18-Apr-2000	SMARTMONEY.COM: Who's Next For The S&P 500?
	E Trade Group	29-Apr-1999	1-Apr-2004	DOWJONES. (1999)
	Qualcomm	29-Apr-1999	22-Jul-1999	Retrieved April 29, 1999, from Factiva database
1	Starbucks	29-Apr-1999	8-Jun-2000	
1	Xilinx	29-Apr-1999	8-Nov-1999	
	Yahoo	29-Apr-1999	8-Dec-1999	
1	VERITAS SOFTWARE CORP	13-Mar-2000	3-Apr-2000	New Beats Old Again as Nasdaq Tops 5000, Dow Falls
	Agilent Technologies	15-May-2000	5-Jun-2000	Wall Street: Technology shares close off highs; Dell leads gains
	Palm Inc	22-Jul-2000	28-Jul-2000	Palm Inc. may soon be added to Standard & Poor's 500 Index
1	UNITED PARCEL SERVICE INC	9/28/2000	22-Jul-2002	ON THE MONEY
1	VALERO ENERGY CORP	7-May-2001	29-Apr-2004	Valero/Ultramar: Combined Company May Land In S&P 500. DOWJONES. (2001). Retrieved May 7, 2001, from Factiva database.
	Genzyme Corp.'s General Division	14-May-2001	14-Dec-2001	Standard & Poor's considers M&T
1	Jones Apparel Group Inc	14-May-2001	17-Dec-2001	
	Apartment Investment & Management	27-Aug-2001	14-Mar-2003	Is It Time to Put REITs in the S&P?
	Archstone Communities	27-Aug-2001	20-Dec-2004	
	Arden Realty	27-Aug-2001		
	Avalon Bay Communities	27-Aug-2001	10-Jan-2007	
	Boston Properties	27-Aug-2001	3-Apr-2006	
	CarrAmerica Realty	27-Aug-2001		
	Crescent Real Estate Equities	27-Aug-2001		
	Duke Realty	27-Aug-2001	26-Jul-2017	
	Equity Office Properties	27-Aug-2001	10-Oct-2001	
	Equity Residential Properties	27-Aug-2001	3-Dec-2001	
	General Growth Properties	27-Aug-2001	2-Jul-2007	
	Health Care Property Investors	27-Aug-2001	31-Mar-2008	
	Host Marriott	27-Aug-2001	20-Mar-2007	
	Kimco Realty	27-Aug-2001	3-Apr-2006	
	Liberty Property Trust	27-Aug-2001		
1	Plum Creek Timber	27-Aug-2001	17-Jan-2002	
	ProLogis Trust	27-Aug-2001	17-Jul-2003	
	Public Storage	27-Aug-2001		
	ROUSE PROPERTIES INC	27-Aug-2001		
	Simon Property Group	27-Aug-2001	26-Jun-2002	
	Vornado Realty Trust	27-Aug-2001	12-Aug-2005	
	D S T SYSTEMS INC DEL	16-Oct-2001		Lehman lists 20 potential additions to S&P 500.
	Ebay Inc	16-Oct-2001	22-Jul-2002	Reuters. (2001).
	LABORATORY CORP AMERICA HLDGS	16-Oct-2001	1-Nov-2004	Retrieved October 16, 2001, from Factiva database.
1	LAUDER ESTEE COS INC	16-Oct-2001	5-Jan-2006	
	LIBERTY MEDIA CORP NEW	16-Oct-2001		
1	QUEST DIAGNOSTICS INC	16-Oct-2001	12-Dec-2002	
1	REYNOLDS AMERICAN INC	16-Oct-2001	4-Sep-2002	
1	SUNGARD DATA SYSTEMS INC	16-Oct-2001	22-Jul-2002	
	TELEPHONE & DATA SYSTEMS INC	16-Oct-2001		
	ULTRAMAR DIAMOND SHAMROCK CORP	16-Oct-2001		
1	VERISIGN INC	16-Oct-2001	1-Feb-2006	
1	WATERS CORP	16-Oct-2001	2-Jan-2002	
	CAREMARK RX INC	12-Feb-2004	25-Mar-2004	Goldman Sachs
	News Corp	7-Apr-2004	1-Jul-2013	News Corp's move to US aimed at improving access MARKET INSIGHT
1	Gilead Sciences	10-Jun-2004	1-Jul-2004	Gilead joins S&P 500
	CIT group inc	14-Jun-2004	27-Oct-2004	
1	COACH INC	14-Jun-2004	1-Sep-2004	
	Abercrombie & Fitch	19-Jul-2005	29-Mar-2007	indexArb(website)
	Banknorth Group	19-Jul-2005		
	Chico's FAS	19-Jul-2005		
	Cognizant Technology	19-Jul-2005	17-Nov-2006	
	Commerce Bancorp	19-Jul-2005	6-Jun-2006	
	Coventry Health Care	19-Jul-2005	30-Aug-2005	
1	Dean Foods	19-Jul-2005	3-Apr-2006	
	Developers Diversified Realty	19-Jul-2005	23-Mar-2007	
1	ENSCO International	19-Jul-2005	4-Jan-2007	
	Fidelity National Financial	19-Jul-2005	10-Nov-2006	
	GOOGLE INC	19-Jul-2005	3-Apr-2006	
	Harman Intl.	19-Jul-2005	1-Feb-2006	
	Legg Mason Inc	19-Jul-2005	24-Apr-2006	
	Lennar	19-Jul-2005	4-Oct-2005	

	Lyondell Chemical	19-Jul-2005		
1	Microchip Technology	19-Jul-2005	7-Sep-2007	
1	Murphy Oil	19-Jul-2005	15-Aug-2005	
1	Noble Energy	19-Jul-2005	8-Oct-2007	
	Peabody Energy	19-Jul-2005	20-Nov-2006	
	Pioneer Natural Resources	19-Jul-2005	24-Sep-2008	
1	Precision Castparts	19-Jul-2005	1-Jun-2007	
	Republic Services	19-Jul-2005	5-Dec-2008	
	Sepracor	19-Jul-2005		
	Smith International	19-Jul-2005	2-Oct-2006	
	Toll Brothers	19-Jul-2005		
1	Whole Foods Market	19-Jul-2005	3-Jan-2006	
	HUDSON CITY BANCORP INC	27-Sep-2005	15-Feb-2007	Hudson City Bancorp getting noticed
	Amazon.com Inc	1-Nov-2005	21-Nov-2005	Fed Hikes Rate to 4%; Commodity Sectors Outperform
1	SANDISK CORP	1-Nov-2005	20-Apr-2006	
1	DirecTV	21-Sep-2006	4-Dec-2006	CORRECT: DirecTV cut at Lehman Bros on valuation
	Associated Banc-Corp	6-Oct-2006		In Brief: 5 Candidates Seen For S&P 500 Spots
	Mercantile Bankshares Corp	6-Oct-2006		
	New York Community Bancorp Inc	6-Oct-2006		
1	HORMEL FOODS CORP	16-Nov-2006	4-Mar-2009	IACI, HRL, WFR, LYO, NIHD, STR, VAR, EXPD: Recommendations
	IAC INTERACTIVECORP	16-Nov-2006	1-Dec-2006	
1	M E M C ELECTRONIC MATERIALS INC	16-Nov-2006	31-May-2007	
	N I I HOLDINGS INC	16-Nov-2006		
	QUESTAR CORP	16-Nov-2006	1-Dec-2006	
	Accenture	24-May-2007	6-Jul-2011	ACN, AMT, PCP, GRMN, NRG, EXPD, GGP,
	American Tower	24-May-2007	19-Nov-2007	HCP, LYO, PMCS, SANM: Recommendations
1	Expeditors	24-May-2007	10-Oct-2007	
	Garmin Ltd	24-May-2007	12-Dec-2012	
	NRG Energy	24-May-2007	29-Jan-2010	
	Berkshire	3-Nov-2009	16-Feb-2010	Berkshire Hathaway's Telltale Stock Split
	AMB Property	25-May-2010		Potential Additions to the S&P 500
	Eaton Vance	25-May-2010		
	Federal Realty Investment Trust	25-May-2010	1-Feb-2016	
	Jefferies Group	25-May-2010		
	Macerich	25-May-2010	9-May-2013	
	Nationwide Health Properties	25-May-2010		
	SEI Investments	25-May-2010		
	SL GREEN REALTY CORP	25-May-2010	23-Mar-2015	
	Ashland Inc	1-Sep-2010		Deutsche Bank Out With Potential Additions To S&P 500
1	BorgWarner Inc	1-Sep-2010	19-Dec-2011	(WLT, ASH, BWA, JEF, CXO)
	Cablevision Systems Corp	1-Sep-2010	20-Dec-2010	
	Cimarex Energy Co	1-Sep-2010	23-Jun-2014	
	Concho Resources Inc/Midland TX	1-Sep-2010	22-Feb-2016	
	Cooper Industries PLC	1-Sep-2010	23-Nov-2011	
1	Covidien PLC	1-Sep-2010	1-Mar-2011	
1	Edwards Lifesciences Corp	1-Sep-2010	1-Apr-2011	
	F5 Networks Inc	1-Sep-2010	20-Dec-2010	
1	Ingersoll-Rand PLC	1-Sep-2010	17-Nov-2010	
1	Joy Global Inc	1-Sep-2010	28-Feb-2011	
	Marvell Technology Group Ltd	1-Sep-2010		
1	NetFlix Inc	1-Sep-2010	20-Dec-2010	
1	Newfield Exploration Co	1-Sep-2010	20-Dec-2010	
	Noble Corp	1-Sep-2010	18-Jan-2011	
	Seagate Technology PLC	1-Sep-2010	2-Jul-2012	
	Transocean Ltd	1-Sep-2010	29-Oct-2013	
1	TYCO INTERNATIONAL PLC	1-Sep-2010	27-Aug-2010	
	Walter Energy Inc	1-Sep-2010		
	ALEXION PHARMACEUTICALS INC	6-Oct-2011	25-May-2012	LVS, LYB, MRVL, ALXN, GMCR, RCL,
1	Dollar Tree	6-Oct-2011	19-Dec-2011	DLTR, BWA, TEL, NYB: Recommendations
	GREEN MOUNTAIN COFFEE ROASTERS INC	6-Oct-2011	24-Mar-2014	
	Las Vegas Sands	6-Oct-2011		
1	LyondellBasell	6-Oct-2011	5-Sep-2012	
	Royal Caribbean	6-Oct-2011	5-Dec-2014	
	AMETEK INC	2-Mar-2012	23-Sep-2013	GMCR, MNST, KSU, AME: General news
1	Fossil	2-Mar-2012	4-Apr-2012	
1	Kansas City Southern	2-Mar-2012	24-May-2013	
	Monster Beverage	2-Mar-2012	29-Jun-2012	

	Realty Income	10-Sep-2012	7-Apr-2015	$3B acquisition of REIT sets 'speed record'
	GM	1-May-2013		GM Redemption Seen Culminating in Return to S&P 500 Index
	AFFILIATED MANAGERS GRP INC	30-Jul-2013	1-Jul-2014	Credit Suisse Identifies the Next 10 Stocks
	American Capital agency	30-Jul-2013		Likely to Join the S&P 500 Index
	Annaly capital management	30-Jul-2013		
	EQUINIX INC	30-Jul-2013	23-Mar-2015	
	Hertz global holdings	30-Jul-2013		
	HUNT (JB) TRANSPRT SVCS INC	30-Jul-2013	1-Jul-2015	
	VERISK ANALYTICS INC	30-Jul-2013	8-Oct-2015	
	Facebook	4-Dec-2013	23-Dec-2013	UBS Sees Facebook As Possible Candidate
	Liberty Media	4-Dec-2013		To Replace Molex In S&P 500, Shares Moving Higher
	LULULEMON ATHLETICA INC	4-Dec-2013		
	Tractor Supply	4-Dec-2013	24-Jan-2014	
	Illumina Inc	22-Apr-2014	19-Nov-2015	Deutsche Bank Identifies
	LinkedIn Corp	22-Apr-2014		Next S&P 500 Candidates
	Tesla Motors Inc	22-Apr-2014		
	United Continental Holdings Inc	22-Apr-2014	3-Sep-2015	
	Ally Financial Inc	1-Jul-2015		ALLY: Recommendations
	Canopy Growth Corp	1-Jun-2018		3 Cannabis Stocks Might Have
	Cree Inc	1-Jun-2018		What It Takes to Join the Ranks of the S&P 500 Index
	Scotts Miracle-Gro	1-Jun-2018		

Appendix B: Variable Definitions

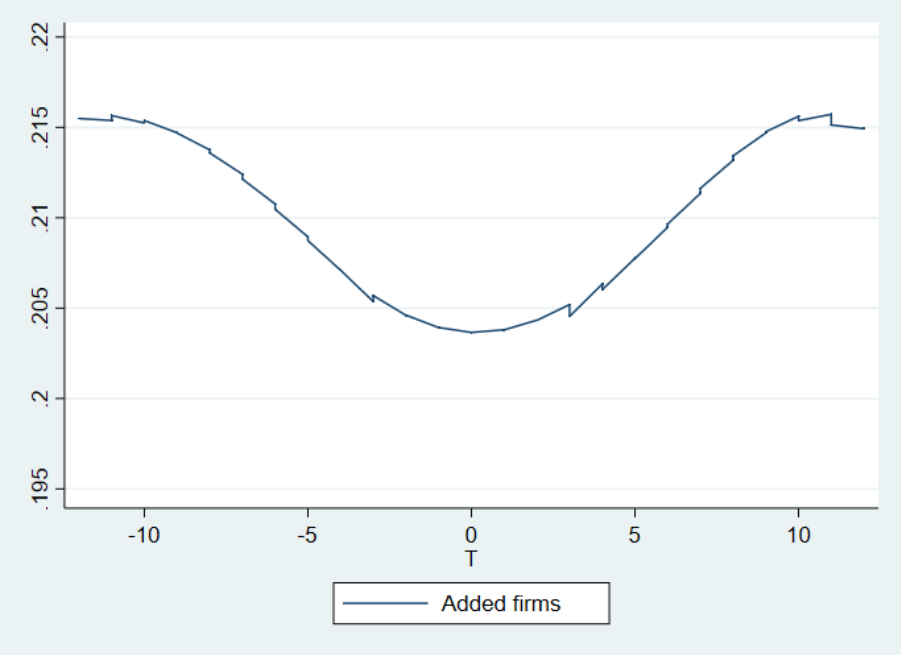
Dependent Variables	
Book leverage$_t$	(Long-term debt(dlttq$_t$) + debt in current liabilities(dlcq$_t$)) / total assets(atq$_t$)
Market leverage$_t$	(Long-term debt(dlttq$_t$) + debt in current liabilities(dlcq$_t$)) / (long-term debt(dlttq$_t$) + debt in current liabilities(dlcq$_t$) + market value of equity(prccq$_t$ x cshoq$_t$))
Debt issuance D_t	An indicator variable that is assigned the value of one if the change in the total value of debt from quarter t-1 to t exceeds 5% of the total assets at the end of quarter t-1 and zero otherwise
Debt retirement D_t	An indicator variable that is assigned the value of one if the change in the total value of debt from quarter t-1 to t is below -5% of the total assets at the end of quarter t-1 and zero otherwise
Equity issuance D_t	An indicator variable that is assigned the value of one if sales of common and preferred stock in quarter t exceed 5% of the total assets at the end of quarter t-1 and zero otherwise
Equity repurchase D_t	An indicator variable that is assigned the value of one if purchases of common and preferred stock in quarter t exceed 1.25% of the total assets at the end of quarter t-1 and zero otherwise
Dividend D_t	An indicator variable that is assigned the value of one if cash dividends at quarter t exceed 0.4% (the 75th percentile) of total assets (atq) at the end of quarter t-1 and zero otherwise
Inc RE D_t	An indicator variable that is assigned the value of one if the change in retained earnings (req) from quarter t-1 to t exceeds 3.13% (the 75th percentile) of the total assets at the end of quarter t-1 and zero otherwise
Dec RE D_t	An indicator variable that is assigned the value of one if the change in retained earnings (req) from quarter t-1 to t is below -3.28% (the 25th percentile) of the total assets at the end of quarter t-1 and zero otherwise
Public debt/Total debt$_t$	Sum of senior bonds and notes and subordinated bonds and notes from Capital IQ divided by total debt, which is the sum of commercial paper, drawn credit lines, term loans, senior bonds and notes, subordinated bonds and notes, capital leases, and other assets
Debt concentration (HHI)$_t$	(Sum of square term of seven debt type ratios relative to total debt - 1/7) / (1-1/7)
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 the value of one for the post-addition period and zero otherwise.
Added	An indicator variable that is assigned the value of one for added firms and zero otherwise.
$T_{-8\sim-1}$	An indicator variable that is assigned the value of one for 8 to 1 quarters before additions and zero otherwise.
$T_{1\sim8}$	An indicator variable that is assigned the value of one for 1 to 8 quarters after additions and zero otherwise.
$T_{9\sim16}$	An indicator variable that is assigned the value of one for 9 to 16 quarters after additions and zero otherwise.
$AfterAddition_{M,t}$	An indicator variable that is assigned the value of one for t=M and 0 otherwise, where M is the number of quarters after addition. We specifically consider 1, 4, and 8 quarters after index addition (M=1, 4, 8).
$Size_t$	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})
$Tangibility_t$	Net property, plant and equipment($ppentq_t$)/total assets(atq_t)
$Market/book_t$	Market value of equity($prccq_t$ x $cshoq_t$))/ book equity$_t$
$Book\ equity_t$	Total shareholders' equity($seqq_t$) + deferred taxes, investment tax credit($txditcq_t$) - book value of preferred stock($pstkq_t$)
$Sales\ growth_t$	(Sales($saleq_t$) - lagged sales($saleq_{t-1}$))/lagged sales($saleq_{\ t-1}$)
$Investment_t$	Capital expenditures$_t$/total assets(atq_t)
$Term\ Spread_t$	The average of differences in the monthly yields of ten-year treasuries and one-year treasuries
$Book\ lev\ median_t$	Median value of book leverage in firms that belong to the same two-digit SIC code
$Market\ lev\ median_t$	Median value of market leverage in firms that belong to the same two-digit SIC code
$\Delta Book\ leverage_t$	Change in book leverage over the past two years

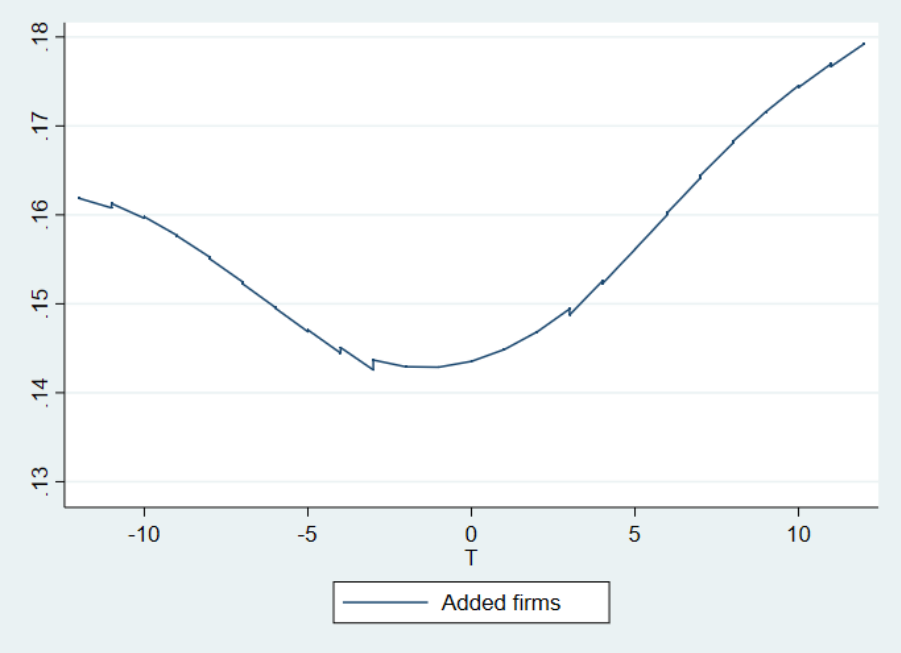
Δ*Market leverage*$_t$	Change in market leverage over the past two years
Altman Z-score$_t$	(3.3 x pretax income(piq_t) + Net sales($saleq_t$) + 1.4 x Retained Earnings(req_t) + 1.2 x (Current Assets($actq_t$) - Current Liabilities($lctq_t$))) / total assets(atq_t)
Liquidity$_t$	The ratio of the annual dollar value traded to market capitalization
R&D/Sale$_t$	The ratio of research and development expenses to sales
RDD$_t$	An indicator variable that is assigned the value of one for missing R&D and zero otherwise.
Simulated net debt (equity) issues$_t$	Simulated values of net debt (equity) issues using Chang and Dasgupta's (2009) approach.
LowLev$_t$	An indicator variable that is assigned the value of one if simulated book leverage is below 0.1 and 0 otherwise.
HighLev$_t$	An indicator variable that is assigned the value of one if simulated book leverage is above 0.8 and 0 otherwise.
Simulated book asset$_t$	The sum of *Simulated book asset*$_{t-1}$, *Simulated net debt issues*$_t$, *Simulated net equity issues*$_t$, and changes in retained earnings at t.
Simulated book debt$_t$	*Simulated book debt*$_{t-1}$ plus *Simulated net debt issues*$_t$.

Figure A.I
Non-parametric estimation

This figure plots the book and market leverage of firms newly added to the S&P 500 index estimated by a locally weighted regression (LOESS) that is based on low-degree polynomials, as in Yu (2011) and Defeusco (2018). The horizontal axis (T) represents a time period relative to an S&P 500 index addition. For example, T=0 indicates a quarter in which 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 the book leverage ratio and the market leverage ratio in Panels A and B, respectively.



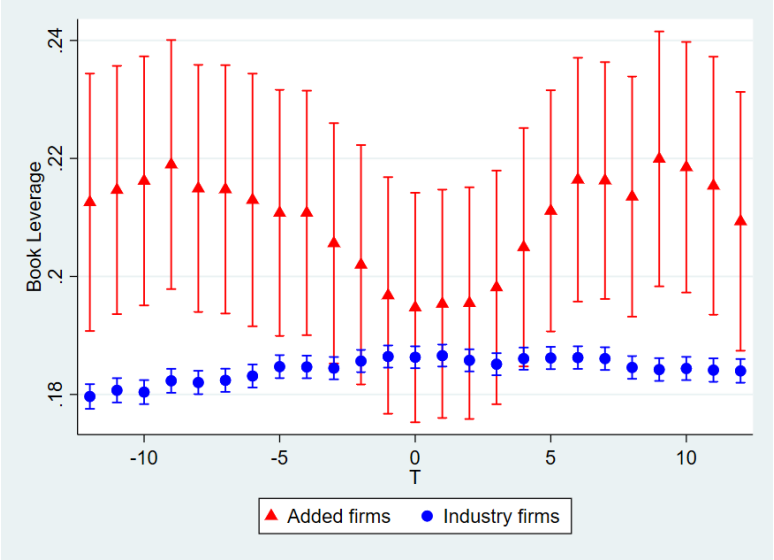
(a) Book leverage: LOESS



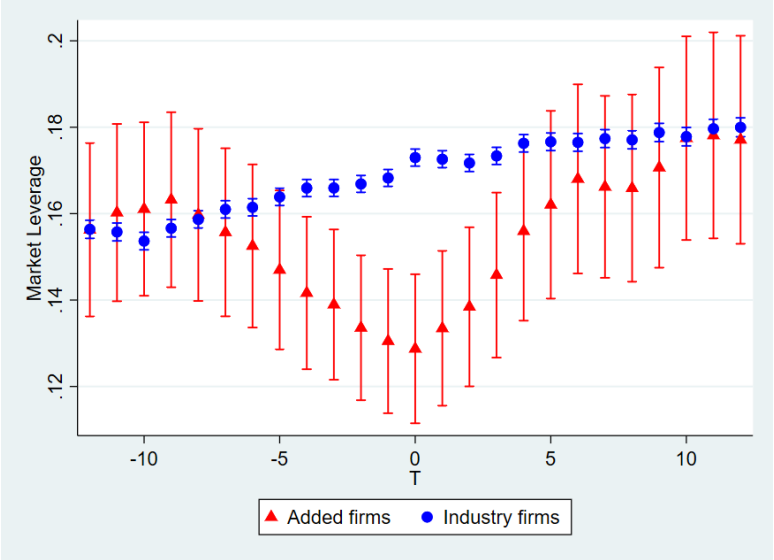
(b) Market leverage: LOESS

Figure I
Leverage around S&P 500 index additions

This figure plots 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 an S&P 500 index addition. For example, T=0 indicates a quarter in which 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 the book leverage ratio and the market leverage ratio in Panels A and B, respectively. The red line plots leverage in added firms, whereas the blue line plots leverage in added firms' industry peers, which are defined as firms that belong to the same two-digit SIC code.



(a) Book leverage



(b) Market leverage

Table I
Summary statistics

In this table we report summary statistics for the sample firms. Our sample consists of firms added to the S&P 500 index from 1986 through 2013. 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 and M&As. We remove addition events involving firms whose asset growth rates are higher than +100% or lower than -50% over a two-quarter period. We also remove addition events resulting from name changes. For each episode of a 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 T as a time period relative to S&P addition. For example, T=0 is a quarter in which 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. The pre-addition period is defined as T between -8 and -1 and the post-addition period is defined as T between 1 and 8. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution.

	Total				Pre-addition period($T < 0$)				Post-addition period($T > 0$)			
	N	mean	median	sd	N	mean	median	sd	N	mean	median	sd
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Book leverage	2,239	0.216	0.200	0.151	1,117	0.215	0.200	0.153	1,122	0.216	0.200	0.149
Market leverage	2,239	0.160	0.127	0.147	1,117	0.152	0.124	0.136	1,122	0.168	0.129	0.156
Net debt issue	2,239	0.008	0.000	0.057	1,117	0.006	-0.000	0.058	1,122	0.009	0.000	0.057
Net equity issue	2,239	-0.001	0.000	0.030	1,117	0.000	0.000	0.033	1,122	-0.002	0.000	0.026
Cash	2,239	0.125	0.075	0.143	1,117	0.124	0.075	0.138	1,122	0.127	0.076	0.148
Tangibility	2,239	0.329	0.259	0.236	1,117	0.327	0.258	0.232	1,122	0.332	0.261	0.241
Investment	2,239	0.021	0.015	0.020	1,117	0.021	0.015	0.020	1,122	0.020	0.015	0.019
Market/book	2,239	3.762	2.697	3.873	1,117	3.895	2.859	4.430	1,122	3.628	2.539	3.220
Profitability	2,239	0.050	0.046	0.030	1,117	0.052	0.047	0.030	1,122	0.048	0.044	0.030
Sales growth	2,239	0.048	0.037	0.181	1,117	0.061	0.043	0.186	1,122	0.035	0.030	0.175
Size	2,239	7.794	7.897	1.037	1,117	7.575	7.644	1.057	1,122	8.011	8.121	0.969
Term spread	2,239	1.331	1.270	1.071	1,117	1.159	0.997	1.012	1,122	1.502	1.580	1.101

Table II
U-shaped leverage trend

In this table we report the results of the U-shaped leverage trend test for added firms. The dependent variable is *Book leverage* in columns (1) through (4) and *Market leverage* in columns (5) through (8). *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, divided by the market value of equity plus total debt. T is assigned an integer between -8 and 8 and T^2 is defined as a squared value of T. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and time fixed effects in all regressions. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Book leverage(%)				*Market leverage(%)*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
T^2	0.040***	0.031***	0.031***	0.027**	0.063***	0.053***	0.052***	0.046***
	(0.012)	(0.011)	(0.011)	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)
T			0.047	-0.040			0.217*	-0.101
			(0.157)	(0.146)			(0.129)	(0.114)
$Profitability_{t-1}$		-71.101***	-71.171***	-67.130***		-60.850***	-61.174***	-52.963***
		(17.275)	(17.305)	(17.042)		(12.862)	(12.863)	(12.312)
$Market/book_{t-1}$		0.080	0.080	0.111		-0.183**	-0.185**	-0.141*
		(0.169)	(0.169)	(0.173)		(0.075)	(0.076)	(0.073)
$Tangibility_{t-1}$		-2.378	-2.418	-3.666		7.059	6.878	4.573
		(10.877)	(10.920)	(10.721)		(9.578)	(9.560)	(9.368)
$Investment_{t-1}$		13.657	13.743	10.694		9.170	9.567	7.018
		(24.337)	(24.374)	(24.169)		(20.080)	(20.107)	(18.801)
$Cash_{t-1}$		-7.241	-7.267	-7.646		-13.039**	-13.160**	-13.819***
		(7.063)	(7.072)	(7.156)		(5.354)	(5.346)	(5.287)
$Size_{t-1}$		-0.167	-0.193	-0.292		3.088**	2.967*	3.107**
		(2.060)	(2.106)	(2.067)		(1.545)	(1.569)	(1.486)
Book lev median$_t$				0.486***				
				(0.109)				
Market lev median$_t$								0.411***
								(0.073)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,239	2,239	2,239	2,239	2,239	2,239	2,239	2,239
R^2	0.808	0.816	0.816	0.823	0.821	0.836	0.836	0.848

Table III
Financial health and leverage trend

In this table we report the results of analyses of the U-shaped trend in leverage and financial health. The dependent variables are *Book leverage* and *Market leverage* in panels A and B, respectively. For both panels, sample firms are categorized into financially unhealthy and healthy groups based on credit ratings, book leverage, and Altman's Z-scores as of two years before the addition (T=-8), as shown 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 classifications based on credit ratings, we restrict the sample firms to those that have credit ratings. 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. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and time fixed effects in all regressions. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: *Book leverage(%)*						
	Credit rating		Leverage		Altman Z-score	
	unhealthy	healthy	unhealthy	healthy	unhealhty	healhty
	(1)	(2)	(3)	(4)	(5)	(6)
T^2	0.108***	0.025	0.053***	0.004	0.040**	0.008
	(0.037)	(0.016)	(0.018)	(0.016)	(0.018)	(0.019)
T	-0.363	-0.310	-0.229	0.154	-0.167	-0.198
	(0.320)	(0.202)	(0.211)	(0.229)	(0.209)	(0.217)
$Profitability_{t-1}$	-1.125	-79.247***	-38.693**	-84.324***	-54.255***	-73.341***
	(16.881)	(18.942)	(16.458)	(26.581)	(20.143)	(25.148)
$Market/book_{t-1}$	-0.168	-0.173	0.105	0.099	0.392	0.112
	(0.239)	(0.404)	(0.209)	(0.185)	(0.290)	(0.153)
$Tangibility_{t-1}$	9.568	14.584	3.354	-17.377	7.259	-27.265**
	(20.563)	(15.176)	(13.020)	(13.536)	(14.836)	(13.674)
$Investment_{t-1}$	40.383	34.913	19.499	30.843	25.405	-25.572
	(50.234)	(28.229)	(25.543)	(31.045)	(35.389)	(39.468)
$Cash_{t-1}$	-16.247	-3.652	3.365	-20.671***	-1.952	-16.100**
	(14.698)	(13.387)	(9.712)	(5.667)	(11.992)	(7.558)
$Size_{t-1}$	6.135	5.673*	-1.873	1.599	-0.050	1.289
	(6.163)	(2.921)	(2.476)	(2.541)	(2.866)	(3.184)
Book lev median$_t$	-0.096	0.548***	0.452***	0.528***	0.287**	0.691***
	(0.232)	(0.139)	(0.147)	(0.190)	(0.130)	(0.134)
Firm FE	Y	Y	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y	Y	Y
Observations	446	731	1,159	1,080	1,101	948
R^2	0.879	0.861	0.798	0.691	0.831	0.766

Panel B: *Market leverage(%)*

	Credit rating		Leverage		Altman Z-score	
	unhealthy	healthy	unhealthy	healthy	unhealhty	healhty
	(1)	(2)	(3)	(4)	(5)	(6)
T^2	0.124***	0.040**	0.075***	0.022**	0.067***	0.029***
	(0.041)	(0.018)	(0.021)	(0.010)	(0.021)	(0.010)
T	-0.362	0.093	0.000	-0.078	-0.057	-0.269**
	(0.388)	(0.285)	(0.254)	(0.141)	(0.235)	(0.130)
$Profitability_{t-1}$	-46.545*	-73.727***	-42.846**	-64.633***	-47.103**	-46.379***
	(27.054)	(21.801)	(20.776)	(14.962)	(19.396)	(11.109)
$Market/book_{t-1}$	-0.479	-2.039***	-0.324***	-0.028	-0.349*	-0.020
	(0.375)	(0.620)	(0.102)	(0.053)	(0.208)	(0.053)
$Tangibility_{t-1}$	12.870	18.808	13.108	-16.038**	10.418	-2.630
	(24.263)	(22.295)	(13.974)	(7.862)	(13.965)	(10.158)
$Investment_{t-1}$	99.791*	7.699	6.586	23.756	21.086	-24.114
	(55.297)	(28.762)	(28.512)	(19.849)	(28.328)	(22.917)
$Cash_{t-1}$	-20.346	-14.782	-5.615	-20.331***	-4.717	-16.814***
	(13.792)	(12.381)	(9.241)	(4.096)	(9.516)	(4.241)
$Size_{t-1}$	12.686*	7.375**	2.902	2.474	2.610	3.535**
	(6.930)	(2.825)	(2.179)	(1.555)	(2.142)	(1.577)
$Market\ lev\ median_t$	0.200	0.297**	0.372***	0.361***	0.406***	0.283***
	(0.266)	(0.117)	(0.124)	(0.084)	(0.126)	(0.078)
Firm FE	Y	Y	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y	Y	Y
Observations	446	731	1,159	1,080	1,101	948
R^2	0.829	0.855	0.824	0.808	0.826	0.854

Table IV
Competition for index addition and leverage trend

In this table we report the results of analyses of the U-shaped trend in leverage and the intensity of competition for S&P 500 index addition. We measure intensity of competition as the number of competitors for S&P 500 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 eligibility criteria prior to 2003. We separate firms into two groups based on the number of competitors. The dependent variables are *Book leverage* in columns (1) and (2) and *Market leverage* in columns (3) and (4). In columns (1) and (3) we report the results of regressions using firms that belong to the high-competition group, whereas in columns (2) and (4) we report the results of regressions using firms that belong to the low-competition group. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and time fixed effects in all regressions. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Book leverage(%)		*Market leverage(%)*	
	High competition	Low competition	High competition	Low competition
	(1)	(2)	(3)	(4)
T^2	0.079**	0.023	0.070**	0.023
	(0.031)	(0.017)	(0.031)	(0.025)
T	-0.220	0.260	-0.288	-0.342
	(0.412)	(0.213)	(0.348)	(0.232)
$Profitability_{t-1}$	-136.132**	-27.228*	-72.443*	-63.843**
	(57.604)	(15.477)	(40.101)	(23.939)
$Market/book_{t-1}$	0.738**	0.513***	-0.466	0.161
	(0.329)	(0.140)	(0.404)	(0.142)
$Tangibility_{t-1}$	-48.792*	3.500	-46.789	36.213**
	(27.839)	(19.008)	(27.948)	(17.058)
$Investment_{t-1}$	-23.102	58.411*	18.947	22.433
	(62.137)	(33.861)	(61.321)	(46.254)
$Cash_{t-1}$	-41.019***	-18.002	-32.700***	-2.250
	(12.193)	(10.825)	(10.549)	(9.481)
$Size_{t-1}$	3.850	-4.145	9.317*	4.930
	(4.839)	(2.507)	(4.938)	(3.820)
Book lev median$_t$	-0.323	0.523**		
	(0.408)	(0.194)		
Market lev median$_t$			0.253	0.495***
			(0.223)	(0.178)
Firm FE	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y
Observations	435	486	435	486
R^2	0.728	0.913	0.708	0.885

Table V
What drives changes in the leverage trend?

In this table we report the results of analyses of net security issuance, dividend payments, and retained earnings for added firms using logit regressions. The dependent variables for Panel A are *Debt issuance D*, *Debt retirement D*, *Equity issuance D*, and *Equity repurchase D*. The dependent variables for Panel B they are *Dividend D*, *Dec RE D*, and *Inc RE D*. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We control for industry fixed effects and time fixed effects in all regressions. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Security issuance				
	Debt issuance D	*Debt retirement D*	*Equity issuance D*	*Equity repurchase D*
	(1)	(2)	(3)	(4)
$T_{-8\sim-1}$	-0.421**	0.501**	0.071	0.325
	(0.196)	(0.255)	(0.288)	(0.203)
$T_{1\sim8}$	-0.162	0.553*	0.251	0.277
	(0.212)	(0.317)	(0.406)	(0.254)
$T_{9\sim16}$	-0.052	0.126	-0.213	0.464
	(0.229)	(0.327)	(0.455)	(0.285)
$Size_{t-1}$	-0.263**	-0.452**	-0.590***	0.017
	(0.126)	(0.177)	(0.204)	(0.144)
$Cash_{t-1}$	-3.390***	1.099	-0.735	-0.299
	(0.926)	(0.962)	(1.246)	(0.789)
$Profitability_{t-1}$	-3.296	0.737	-7.645	14.866***
	(3.509)	(4.764)	(5.107)	(3.486)
$Tangibility_{t-1}$	-0.019	-2.396***	1.589*	-0.997
	(0.511)	(0.739)	(0.959)	(0.624)
$Market\ lev_{t-1}$	-0.517	5.160***	2.875**	-2.933***
	(0.705)	(0.736)	(1.293)	(1.033)
$Market/book_{t-1}$	0.062**	0.111***	0.138***	-0.043
	(0.028)	(0.040)	(0.054)	(0.030)
$Sales\ growth_{t-1}$	0.087	0.352	0.774	-0.951***
	(0.470)	(0.513)	(0.538)	(0.354)
$Term\ spread_{t-1}$	-0.199	0.134	-0.106	0.411*
	(0.200)	(0.281)	(0.529)	(0.213)
Industry FE	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y
Observations	2,045	1,503	1,632	3,838
Pseudo R^2	0.125	0.179	0.140	0.184

Panel B: Dividend and retained earnings			
	Dividend D	*Dec RE D*	*Inc RE D*
	(1)	(2)	(3)
$T_{-8\sim-1}$	-0.207	0.418	0.005
	(0.213)	(0.411)	(0.186)
$T_{1\sim8}$	-0.357	-0.038	-0.237
	(0.326)	(0.454)	(0.239)
$T_{9\sim16}$	-0.085	0.167	-0.067
	(0.373)	(0.437)	(0.241)
$Size_{t-1}$	0.985***	0.260	-0.513***
	(0.294)	(0.234)	(0.153)
$Cash_{t-1}$	-2.251	2.728**	0.971
	(1.649)	(1.101)	(0.704)
$Profitability_{t-1}$	7.609	-12.763**	31.544***
	(5.341)	(5.484)	(5.222)
$Tangibility_{t-1}$	2.414**	-1.365	-1.313**
	(1.192)	(1.367)	(0.641)
$Market\ lev_{t-1}$	-9.155***	-1.880*	-2.480***
	(1.749)	(1.054)	(0.842)
$Market/book_{t-1}$	0.039	0.120*	0.152***
	(0.055)	(0.065)	(0.030)
$Sales\ growth_{t-1}$	-1.380***	0.453	0.281
	(0.371)	(0.545)	(0.444)
$Term\ spread_{t-1}$	-0.108	-0.161	-0.348*
	(0.130)	(0.536)	(0.203)
Industry FE	Y	Y	Y
Year*quarter FE	Y	Y	Y
Observations	3,723	485	3,079
Pseudo R^2	0.310	0.197	0.353

Table VI
Leverage trend in competitors

In this table we report the results of analyses of the U-shaped leverage trend in competitors. We define competitors as industry firms that satisfy the eligibility 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 eligibility criteria prior to 2003. The dependent variables are *Book leverage* in columns (1), (3), and (5), and *Market leverage* in columns (2), (4), and (6). In columns (1) and (2), we report the results of regressions using only competitors, while we report the results of the difference-in-differences analyses in columns (3)–(6). *Added* is an indicator variable that is assigned the value of one for added firms and zero for competitors. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and time fixed effects in all regressions. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Competitors		Competitors and added firms			
	Book leverage(%)	*Market*	*Book*	*Market*	*Book leverage*(%)	*Market*
	(1)	(2)	(3)	(4)	(5)	(6)
Added x T^2			0.028	0.022	0.028	0.023
			(0.018)	(0.017)	(0.018)	(0.016)
T^2	0.018***	0.020***	0.017***	0.019***	0.017***	0.020***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Added x T					-0.019	-0.140
					(0.128)	(0.122)
T	-0.174***	-0.189***	-0.167***	-0.194***	-0.166***	-0.188***
	(0.055)	(0.049)	(0.053)	(0.048)	(0.054)	(0.048)
$Profitability_{t-1}$	-47.814***	-61.365***	-49.348***	-62.137***	-49.296***	-61.706***
	(6.105)	(5.287)	(6.001)	(5.200)	(5.994)	(5.174)
$Market/book_{t-1}$	0.182	0.001	0.214**	0.004	0.214**	0.004
	(0.111)	(0.077)	(0.109)	(0.073)	(0.109)	(0.073)
$Tangibility_{t-1}$	4.001	10.136**	2.643	9.434**	2.673	9.648**
	(5.723)	(4.770)	(5.488)	(4.565)	(5.490)	(4.573)
$Investment_{t-1}$	-3.246	-7.565	0.170	-5.905	0.142	-6.128
	(8.168)	(7.341)	(7.926)	(7.142)	(7.927)	(7.156)
$Cash_{t-1}$	-6.588***	-5.632***	-7.239***	-6.156***	-7.231***	-6.088***
	(1.923)	(1.588)	(1.881)	(1.555)	(1.880)	(1.555)
$Size_{t-1}$	7.934***	9.249***	7.442***	9.088***	7.449***	9.133***
	(0.823)	(0.911)	(0.813)	(0.882)	(0.811)	(0.880)
Book leverage median$_t$	0.277***		0.306***		0.306***	
	(0.066)		(0.063)		(0.063)	
Market leverage median$_t$		0.514***		0.508***		0.510***
		(0.048)		(0.046)		(0.046)
Firm FE	Y	Y	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y	Y	Y
Observations	17,577	17,577	18,498	18,498	18,498	18,498
R^2	0.842	0.833	0.839	0.831	0.839	0.832

Table VII
Leverage trend in non-competitors

In this table we report the results of analyses of leverage among industry firms that satisfy all the criteria for the S&P 500 index addition except for the public float requirement (non-competitors), which is not one of the factors known to affect leverage. The dependent variables are *Book leverage* in columns (1), (3), and (5), and *Market leverage* in columns (2), (4), and (6). In columns (1) and (2), we report the results of regressions using the non-competitors. In columns (3)–(6), we report the results of regressions using both the non-competitors and added firms. *Added* is an indicator variable that is assigned the value of one for added firms and zero for non-competitors. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and time fixed effects in all regressions. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Non-competitors		Non-competitors and added firms			
	Book leverage(%)	*Market leverage*(%)	*Book*	*Market*	*Book leverage*(%)	*Market*
	(1)	(2)	(3)	(4)	(5)	(6)
Added x T^2			0.046**	0.045**	0.047**	0.046**
			(0.020)	(0.020)	(0.020)	(0.019)
T^2	0.013	-0.004	0.004	-0.001	0.004	-0.001
	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)
Added x T					-0.171	-0.097
					(0.148)	(0.143)
T	0.058	-0.252	0.036	-0.250**	0.109	-0.210
	(0.192)	(0.198)	(0.133)	(0.121)	(0.153)	(0.144)
$Profitability_{t-1}$	-33.208***	-54.567***	-45.285***	-62.085***	-44.034***	-61.267***
	(9.359)	(8.500)	(9.087)	(8.708)	(8.798)	(8.347)
$Market/book_{t-1}$	0.074	-0.150	0.346*	-0.112	0.352*	-0.107
	(0.198)	(0.141)	(0.191)	(0.107)	(0.187)	(0.106)
$Tangibility_{t-1}$	34.573***	1.824	16.310*	3.895	16.949*	4.082
	(9.064)	(10.630)	(9.459)	(9.071)	(9.351)	(9.135)
$Investment_{t-1}$	25.901*	27.999*	27.078*	19.133	28.559**	19.967
	(14.265)	(15.708)	(13.861)	(14.752)	(13.799)	(14.747)
$Cash_{t-1}$	0.792	-4.217	-8.895	-10.473**	-8.529	-10.297**
	(5.883)	(4.965)	(5.491)	(4.421)	(5.451)	(4.451)
$Size_{t-1}$	6.442**	1.930	3.567	4.710**	3.932*	4.912**
	(2.946)	(2.085)	(2.284)	(1.948)	(2.282)	(1.941)
Book lev median$_t$	0.639***		0.482***		0.446***	
	(0.240)		(0.152)		(0.145)	
Market lev median$_t$		0.951***		0.611***		0.611***
		(0.164)		(0.131)		(0.130)
Firm FE	Y	Y	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y	Y	Y
Observations	1,351	1,351	2,272	2,272	2,272	2,272
R^2	0.864	0.876	0.839	0.849	0.840	0.849

Table VIII
Leverage trend in S&P 500 index industry peers

In this table we report the results of analyses of leverage in firms that are already members of the S&P 500 index and belong to the same industry as added firms (S&P industry peers). The dependent variables are *Book leverage* in columns (1), (3), and (5), and *Market leverage* in columns (2), (4), and (6). In columns (1) and (2), we report the results of regressions using S&P industry peers, while we report the results of regressions using both S&P industry peers and added firms in columns (3)–(6). *Added* is an indicator variable that is assigned the value of one for added firms and zero for the S&P industry peers. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and time fixed effects in all regressions. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	S&P industry peers		S&P industry peers and added firms			
	Book leverage(%)	*Market leverage*(%)	*Book*	*Market*	*Book leverage*(%)	*Market*
	(1)	(2)	(3)	(4)	(5)	(6)
Added x T^2			0.031***	0.043***	0.032***	0.044***
			(0.011)	(0.010)	(0.011)	(0.010)
T^2	0.002	-0.001	0.001	-0.002	0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Added x T					-0.159**	-0.195***
					(0.077)	(0.067)
T	0.159***	0.116***	0.143***	0.108***	0.155***	0.121***
	(0.036)	(0.038)	(0.035)	(0.036)	(0.036)	(0.036)
$Profitability_{t-1}$	-45.618***	-58.765***	-50.611***	-60.624***	-50.182***	-60.057***
	(4.929)	(4.485)	(4.980)	(4.295)	(4.993)	(4.285)
$Market/book_{t-1}$	0.200**	-0.128***	0.199**	-0.134***	0.201**	-0.132***
	(0.096)	(0.046)	(0.090)	(0.044)	(0.090)	(0.044)
$Tangibility_{t-1}$	5.165	6.438*	3.230	5.235*	3.807	5.931*
	(3.599)	(3.332)	(3.452)	(3.150)	(3.446)	(3.138)
$Investment_{t-1}$	-19.564*	-31.972***	-14.617	-25.926**	-15.032	-26.453***
	(10.812)	(10.937)	(10.440)	(10.096)	(10.455)	(10.093)
$Cash_{t-1}$	-9.382***	-11.714***	-9.534***	-12.113***	-9.347***	-11.881***
	(1.856)	(1.526)	(1.817)	(1.448)	(1.819)	(1.449)
$Size_{t-1}$	1.491**	4.364***	0.834	3.707***	1.070*	3.995***
	(0.642)	(0.631)	(0.626)	(0.574)	(0.627)	(0.578)
Book lev median$_t$	0.041		0.118***		0.114***	
	(0.037)		(0.039)		(0.040)	
Market lev median$_t$		0.352***		0.357***		0.359***
		(0.029)		(0.027)		(0.027)
Firm FE	Y	Y	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y	Y	Y
Observations	25,616	25,616	27,855	27,855	27,855	27,855
R^2	0.875	0.879	0.869	0.876	0.869	0.876

Table IX
Mechanical mean reversion of leverage

In this table we report the results of simulation analyses of changes in book leverage. We employ a simulation method used in Chang and Dasgupta (2009). We assume that all firms in the simulation test have the same initial asset and book debt as firms in the actual data as of two years before the addition. We take all other variables, except for debt issuance and equity issuance directly from the data. We assume that firms issue (retire) debt or equity as much as the financial deficit if it is positive (negative). We assume that the decision regarding debt or equity is determined by a coin toss. The dependent variable is simulated book leverage minus *Book leverage*$_{-8}$ for Panel A and a quarterly change in simulated book leverage for Panel B. All variables are defined in Appendix B. The reported parameter estimates are the average coefficients obtained from 500 replications of the simulation and p-values are reported in parentheses.

Panel A			
Simulated book leverage minus *Book leverage*$_{-8}$.			
	(1)	(2)	(3)
AfterAddition$_{1,t}$	0.035		
	(0.000)		
AfterAddition$_{4,t}$		-0.003	
		(0.737)	
AfterAddition$_{8,t}$			-0.018
			(0.035)
Market/book$_{t-1}$	-0.017	-0.016	-0.016
	(0.000)	(0.000)	(0.000)
Profitability$_{t-1}$	0.127	0.147	0.132
	(0.278)	(0.215)	(0.261)
Size$_{t-1}$	-0.003	-0.004	-0.004
	(0.505)	(0.334)	(0.387)
Tangibility$_{t-1}$	0.015	0.013	0.013
	(0.630)	(0.677)	(0.696)
R&D/Sale$_{t-1}$	0.339	0.336	0.338
	(0.000)	(0.000)	(0.000)
RDD$_{t-1}$	0.018	0.017	0.017
	(0.115)	(0.138)	(0.132)
Book leverage$_{-8}$	-0.217	-0.215	-0.216
	(0.000)	(0.000)	(0.000)
Ind FE	Y	Y	Y
Observations	1,066	1,066	1,066

Panel B			
Quarterly change in simulated book leverage			
	(1)	(2)	(3)
$AfterAddition_{1,t}$	0.020		
	(0.005)		
$AfterAddition_{4,t}$		-0.003	
		(0.682)	
$AfterAddition_{8,t}$			-0.008
			(0.259)
$Market/book_{t-1}$	-0.003	-0.003	-0.003
	(0.145)	(0.194)	(0.178)
$Profitability_{t-1}$	-0.052	-0.038	-0.047
	(0.608)	(0.703)	(0.640)
$Size_{t-1}$	0.002	0.001	0.002
	(0.585)	(0.734)	(0.691)
$Tangibility_{t-1}$	0.022	0.021	0.020
	(0.423)	(0.451)	(0.458)
$R\&D/Sale_{t-1}$	0.500	0.499	0.500
	(0.000)	(0.000)	(0.000)
RDD_{t-1}	0.022	0.022	0.022
	(0.020)	(0.024)	(0.023)
$LowLev_{t-1}$	0.000	0.000	0.000
	(0.964)	(0.956)	(0.974)
$HighLev_{t-1}$	-3.293	-3.296	-3.298
	(0.000)	(0.000)	(0.000)
Ind FE	Y	Y	Y
Observations	1,066	1,066	1,066

Table X
Cost of equity and cost of debt

In this table we report the mean values of the cost of equity measured by three models (a market model, a three-factor model and a four-factor model) and the cost of debt. To estimate the cost of equity, we follow Baran and King (2012), who examine changes in the cost of equity in firms added to or removed from the S&P 500 index. All data related to factors come from Kenneth R. French's website while monthly return data originate from the CRSP. Following Frank and Shen (2016), we compute the cost of debt as total interest and related expenses divided by total debt. Following prior studies, we also define the cost of debt as the Dealscan item all-in-spread drawn, which is the amount a borrower pays over the London Interbank Offered Rate (LIBOR) or the LIBOR equivalent for each dollar drawn. As in Qi, Roth, and Wald (2010), we use the bond-yield spread for fixed-rate bonds as a proxy for the cost of debt. We define the bond-yield spread as the difference between the yield-to-maturity on a corporate bond and the yield-to-maturity on its maturity-matched Treasury yield. Total-Cost-of Borrowing (TCB) is calculated by Berg, Saunders and Steffen (2015). All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We measure statistical significance using a t-test for means. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Cost of equity

	Before	After	Difference
Market Model	0.3219	0.0968	-0.2251***
Three Factor model	0.3275	0.0983	-0.2292***
Four Factor model	0.3301	0.1026	-0.2275***

Panel B: Cost of debt

	Before	After	Difference
Cost of Total Debt	0.0778	0.0752	-0.0026
All-in-Spread Drawn	0.0103	0.0112	0.0009
Bond-Yield Spread	0.0164	0.0189	0.0025

Panel C: Cost of debt (TCB)

	Before	After	Difference
TCB	0.0071	0.0076	0.0005

Table XI
Determinants of addition to the S&P 500 index

In this table we report the results obtained from cross-sectional multivariate logit regression models for index addition decision by S&P. Added firms and their competitors are included in the analyses. The dependent variable is one if a firm is added to the index in a given quarter and zero otherwise. We consider leverage, ROA, size, market-to-book ratio, tangibility, cash holdings, sales growth, and liquidity as potential determinants of index additions. We report the odds ratios and the independent variables are scaled by their own standard deviations. All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Market leverage$_{t-1}$	0.251***			0.265***	
	(0.04)			(0.04)	
Book leverage$_{t-1}$		0.468***			0.494***
		(0.06)			(0.06)
ROA_{t-1}			1.605*	1.385	1.486
			(0.34)	(0.31)	(0.31)
$Size_{t-1}$	10.43***	6.708***	5.988***	11.48***	7.550***
	(1.57)	(0.92)	(0.92)	(2.06)	(1.24)
Market/book$_{t-1}$	1.500***	1.654***	1.463***	1.450***	1.576***
	(0.17)	(0.21)	(0.12)	(0.14)	(0.16)
Tangibility$_{t-1}$	1.031	1.039	0.995	0.994	0.987
	(0.16)	(0.16)	(0.15)	(0.15)	(0.16)
$Cash_{t-1}$	1.066	1.175	1.311	1.007	1.096
	(0.16)	(0.18)	(0.18)	(0.16)	(0.17)
Sales growth$_{t-1}$	0.900	0.888	0.833	0.873	0.845
	(0.11)	(0.10)	(0.08)	(0.10)	(0.09)
Liquidity$_{t-1}$	1.317*	1.226	1.126	1.327*	1.233
	(0.16)	(0.15)	(0.14)	(0.16)	(0.15)
Industry FE	Y	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y	Y
Observations	7,768	7,768	7,768	7,768	7,768
Pseudo R^2	0.424	0.394	0.383	0.428	0.401

Table XII
Changes in debt structure

In this table we report the results of analyses of changes in debt structure following S&P 500 index addition. The dependent variables are *PublicDebt/Debt*, which is defined as a proportion of total debt accounted for by public debt, in columns (1) and (2), and *Debt concentration (HHI)*, which is defined as a normalized Herfindahl-Hirschman index of debt type usage as in Colla, Ippolito, and Li (2013), in columns (3) and (4). All variables are defined in Appendix B and are winsorized at 1% in both tails of the distribution. We control for firm fixed effects and time fixed effects in all regressions. Standard errors reported in parentheses are clustered at the firm level. ***, ** , and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	PublicDebt/Debt		*Debt concentration (HHI)*	
	(1)	(2)	(3)	(4)
After	-0.051	-0.024	0.021	0.037
	(0.047)	(0.042)	(0.055)	(0.053)
$Size_{t-1}$		-0.160		-0.146
		(0.117)		(0.091)
$Cash_{t-1}$		0.276		-0.226
		(0.335)		(0.231)
$Profitability_{t-1}$		-0.448		0.562
		(0.605)		(0.488)
$Tangibility_{t-1}$		-0.092		-0.124
		(0.441)		(0.353)
$Market\ lev_{t-1}$		-0.527**		0.053
		(0.247)		(0.238)
$Market/book_{t-1}$		-0.007		-0.011**
		(0.005)		(0.005)
$Sales\ growth_{t-1}$		0.010		-0.125***
		(0.045)		(0.045)
$Term\ spread_{t-1}$		0.047		0.044
		(0.043)		(0.037)
Firm FE	Y	Y	Y	Y
Year*quarter FE	Y	Y	Y	Y
Observations	531	531	531	531
R^2	0.811	0.839	0.723	0.741