NBER WORKING PAPER SERIES

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Working Paper 27593
http://www.nber.org/papers/w27593

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 2020

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At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w27593.ack

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NBER Working Paper No. 27593
July 2020
JEL No. G11,G14,G23,G31,G32,G35

ABSTRACT

We investigate the impact on firms of joining the S&P 500 index from 1997 to 2017. We find that the positive announcement effect on the stock price of index inclusion has disappeared and the long-run impact of index inclusion has become negative. Inclusion worsens stock price informativeness and some aspects of governance. Compensation, investment, and financial policies change with index inclusion. For instance, payout policies of firms joining the index become more similar to the policies of their index peers. ROA falls following inclusion. There is no evidence of an impact of inclusion on competition.

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An internet appendix is available at: http://www.nber.org/data-appendix/w27593

1. Introduction

For investors wanting to hold common stocks, the best-known investment textbooks show that it is hard to do better than investing in a low cost indexed fund. However, little is known about whether firms benefit from being included in a major index. The S&P 500 index is the most visible and prestigious broad-based index in the US. In this paper, we investigate the real effects on firms of being added to the S&P 500 index, and whether these real effects have changed from 1997 to 2017 as passive holdings of stocks in the index have increased.

Joining the S&P 500 index can have both positive and negative effects on a firm. Being added to the index is like joining a prestigious club. A firm gains prestige by joining the club, but at the cost of becoming compared to other firms in the club. On the positive side, the increased demand for the stock from passive investors may increase the value of the stock and the firm gains prestige. On the negative side, the increase in holdings by passive investors implies that more investors ignore firm fundamentals when they make decisions about their holdings of the firm's stock (Barberis and Shleifer, 2003; Barberis, Shleifer, and Wurgler, 2005), so that the stock price may become less informative and governance may become worse. Further, active investors, managers, and board members become more likely to assess the firm relative to other firms in the index even though the index addition itself does not directly change the firm's fundamentals.

From 1997 to 2017, the likelihood that a listed firm belongs to the S&P 500 index roughly doubles because the number of listed firms falls by half. At the same time, the holdings of shares of firms in the index by passive investors increase, but passive investors become more sophisticated in how they attempt to replicate the performance of the index and active investors become better able to take advantage of temporary price movements associated with changes in weights of the index and index inclusion. Because of these changes, it is likely that the impact on firms of joining the index changes, but how it does so is an empirical issue.

We show that joining the index has real effects on firms and that some of these effects change over time. While joining the index has a transitory positive effect but no long-term effect on stock prices in the first half of our sample period, stock prices of firms joining the index experience no transitory

positive effect and negative risk-adjusted long-term returns in the second half of our sample period. Though there has been much concern about the impact of joining the index on price discovery, we find that this impact does not worsen as passive investing increases. We show that inclusion affects the investment, payout, and financing policies of added firms. Though payout and financing policies of included firms commove more with the payout and financing policies of their S&P 500 peers after inclusion, we find increased comovement with investment only if we measure investment by asset growth and not when we measure it by capital expenditures. In no case do these effects increase over our sample period. We also find that firms in the index repurchase more and that firms joining the index increase repurchases. A plausible explanation for this evolution is that managers of added firms see the number of S&P 500 firms in their compensation peer group increase, so that they are more compared to firms in the index after inclusion than before. Belonging to the index conveys valuable prestige. This prestige may explain why firms added to the index experience a credit rating increase. This increase is stronger earlier in our sample period. There has been much debate in the literature about a potential adverse impact on competition of the increase in passive investment because of the associated increase in common ownership. Using multiple measures of competition, we find no evidence that index inclusion has a competitive impact. In particular, an included firm's profit margins do not increase and neither do the profit margins of other firms in the industry that are already in the index.

Introduced in 1957, the S&P 500 index is the index of choice for investors who invest in passive equity vehicles. At the end of 2017, the index covers 83.3% of the market capitalization of the U.S. stock market and has a market capitalization of USD 23 trillion. S&P estimates that USD 3.4 trillion are indexed to the S&P 500 and an additional USD 6.5 trillion are benchmarked to the index at that time.[2] When a stock is added to the index, passive investors in general tend to increase their holdings of that stock. This is obviously the case for managers of funds indexed to the S&P 500 who hold the index. However, it can also be the case for investors who are benchmarked to the S&P 500 as these investors do not want their performance to differ too much from the index. We confirm that firms added to the index have higher passive ownership after being added to the index.

[2] S&P Dow Jones Indices, Annual Survey of Assets as of December 31, 2017.

Since Harris and Gurel (1986) and Shleifer (1986), much empirical evidence shows that a firm's stock price increases when it is announced that it will join the index. This stock price increase holds in the first half of our sample period (the early period), namely from 1997 to 2007, but not in the second half (the late period). There is a long-standing debate in the literature on whether this price increase is a transitory effect or a permanent effect. Possible explanations for the stock-price reaction include temporary price pressure effects or permanent price effects arising from a shift in the demand curve for the stock. We investigate whether the price effect is permanent. We find that there is no cumulative abnormal return over one year in the early period irrespective of the approach we use. In contrast, there is a significant negative cumulative abnormal return over one year including the month of addition for the late period. This cumulative abnormal return is weaker when we exclude 2008 from the late period, but it is still significant. Consequently, index inclusion appears to have a negative impact on shareholder wealth in the late period but not the early period.

A negative permanent impact of index inclusion raises the question of whether index inclusion has negative effects on firm fundamentals over time. To identify the effects of firm addition on firm fundamentals, we carry out a difference-in-differences (DiD) analysis based on S&P 500 addition.[3] For each treated firm that is added to the S&P 500 index, we select a control firm that is never in the index with similar total assets, Tobin's *q*, stock return, and in the same industry one year before the index addition. Matching on stock returns is important because the S&P 500 selection committee is unlikely to include a firm in the index whose stock has performed poorly before the inclusion. We then study the impact of index inclusion on firms' passive holdings, stock price informativeness, governance, corporate policies, accounting performance, and competition.

The adverse impact of index addition comes from the fact that a stock joining the index becomes included in a new category such that investors make decisions about the stock based on the category it is now included in. Passive investors hold the stock because it belongs to the category and change their holdings of the stock when they change their holdings of the category. Active investors now compare the firm and its policies to other firms in the category. This pushes firm policies to become more similar

[3] We use the index additions but not deletions in our empirical design because the majority of deletions are caused by acquisitions, which means we do not have the data for the deleted firms after the deletions.

to policies of index peers even though the decision to add a firm to the index has no direct impact on its fundamentals.

Passive investors do not have to acquire information about a stock to hold it. If passive investors held all stocks, there would be no information production about stocks. We show that information production about a firm's stock falls after the firm joins the index. Another way to put this is that stock prices are less informative after a stock joins the index. It is well documented that price discovery in the stock market guides managers to make more efficient decisions (see Bond, Edmans, and Goldstein, 2012, for a review of the literature). If the stock price becomes less informative, we expect firms to make worse decisions. We find evidence that being added to the S&P 500 index reduces a firm's investment efficiency.[4]

Higher passive holdings likely impact a firm's governance. Because passive funds simply track the index, they may care little about firm fundamentals and accordingly spend few resources on monitoring the corporate governance of firms in their portfolio (Bebchuk and Hirst, 2019). However, it is also possible that passive funds have incentives to improve the governance of the firms they invest in. These funds cannot walk away from a firm in the index because its weak governance leads it to destroy shareholder wealth (Appel, Gormley, and Keim, 2016). Furthermore, the low-fee design of passive funds also means fewer resources and less expertise for monitoring. Existing evidence shows that index fund providers vote more with management (Heath, Macciocchi, Michaely, and Ringgenberg, 2019) and that increases in passive ownership increase CEO power (Schmidt and Fahlenbrach, 2017). Both of these changes suggest that index inclusion reduces the incentives for investors to attempt to influence management through block holdings. Corum, Malenko, and Malenko (2020) show that, theoretically, the impact of an increase in passive investors on governance depends on whether the growth in passive investors is at the expense of active institutional managers or of independent retail investors. They argue that an increase in passive investors at the expense of active investors is likely to impact governance adversely because active investors have greater incentives to intervene in the governance of the firms in which they are investors. We find that the growth in passive holdings when a firm is added to the

[4] Billett, Diep-Nguyen, and Garfinkel (2020) find a related result for a similar sample period with a different test.

index comes at the expense of active institutional investors. The literature has provided extensive evidence on the governance benefits of block ownership. In particular, lower block ownership can exacerbate the free-rider issue in governance (Shleifer and Vishny, 1986; Edmans, 2009; Edmans and Manso, 2011). We find consistent evidence that blockholder ownership is significantly reduced after a firm is added to the S&P 500 index.

Categorical thinking can affect how institutions that produce information about firms think about a firm that is added to the S&P 500. We find this to be the case for rating agencies. We find that ratings of S&P 500 firms are higher controlling for firm characteristics. When a firm is added to the index, its credit rating increases by half a notch. However, the treatment effect is stronger for the early period than for the late period.

Categorical thinking likely impacts actions by the added firm's board and by its management. As a firm is added to the S&P 500, its board may now think that it is a different firm and that its management should be evaluated differently. We find that after a firm is added to the S&P 500, management's performance comparison group involves more firms from the S&P 500 even though inclusion does not impact firm fundamentals directly. We then explore how investment, external financing, and payout policies change when a firm is added to the index because of decisions by management. We find evidence that following inclusion investment falls, equity issuance falls, and dividends and repurchases increase. In addition, investment measured by asset growth, equity issuance, debt issuance, dividends and repurchases commove more with those of index peers after inclusion. However, some of these effects are stronger for the early period than the late period.

Our evidence shows that the permanent stock price impact of index addition is negative in the late period. We show that index addition has a real impact on firms. An obvious question is whether this real impact translates into lower accounting performance. Though most of the literature has taken the view that the fact that a firm is added to the index conveys no new information about the future performance of the firm, Denis, McConnell, Ovtchinnikov, and Yu (2003) find that analyst EPS forecasts increase after addition and that firms have higher realized EPS. We find consistent evidence. However, when we use ROA instead of EPS, we find that index addition is associated with a decrease

in ROA. Since firms joining the index increase repurchases, it is plausible that EPS could increase because of the decrease in the number of shares rather than because of an increase in net income.

Finally, we investigate the effects of index addition on market competition. As index addition mechanically increases the common ownership of firms in the index due to the greater holdings by funds tracking the index, index addition may weaken the competition among industry peers within the index, which are generally industry leaders and have a large impact on the competition dynamics. However, it is also argued that index funds generally lack incentives to intervene in the real operations of firms in their portfolio, and therefore, they should not affect competition dynamics in the market. We find no evidence of an impact of inclusion on competition using measures at the firm level and at the industry level. In particular, we do not observe an increase in profit margins for included firms or for other firms in the industry already belonging to the index.

Our paper contributes to several literatures. First, this paper contributes to the literature on the effect of adding a stock to an index. Following Harris and Gurel (1986) and Shleifer (1986), a large number of papers examine the stock price impact of S&P 500 index addition. Much of the focus of this literature is on whether demand curves for stocks slope downward. Many of these papers (e.g., Beneish and Whaley, 1996; Lynch and Mendenhall, 1997; Wurgler and Zhuravskaya, 2002) conclude that there is a permanent impact from index addition, but they look at short periods following the addition. More recently, Patel and Welch (2017) conclude that there is solid evidence of reversion for the 2000s. Authors have argued that S&P 500 index additions are problematic to assess stock demand curves. Kaul, Mehrotra, and Morck (2000) and Chang, Hong, and Liskovich (2015) find evidence of downward-sloping demand curves using, respectively, a change in weights for the TSE 300 and Russell indexes reconstitutions. Baltussen, Bekkum, and Da (2017) find that serial dependence in index returns has recently turned significantly negative due to the rising popularity of equity index products. Vijh (1994), Barberis, Shleifer, and Wurgler (2005), and Greenwood (2008) show that index addition increases comovement between stocks added and the S&P 500 index, while Chen, Singal, Whitelaw (2016) question the evidence of an increase in comovement. Qin and Singal (2015) show that indexing reduces the efficiency of stock prices, as indicated by stronger post-earnings-announcement drift and greater deviations of stock prices from the random walk. Existing studies mainly focus on the effects in the

stock market. In contrast, this paper provides evidence that index addition impacts firms' real operations.

Second, this paper contributes to the literature on passive investing (see French, 2008, and Cremers and Petajisto, 2009, for early contributions). In recent years, passive investment vehicles such as index funds and index ETFs have grown dramatically. A large literature has developed on the implications of the increase in holdings by passive investors. The literature has mixed results. For example, Boehmer and Song (2018) and Glosten, Nallareddy, and Zou (2016) show that passive investing facilitates the transmission of systematic information into prices. Boone and White (2015) find evidence that greater holdings by quasi-indexing investors lead to greater transparency and hence a better information environment for the stock. In contrast to these positive implications of passive investing, other papers find negative implications. For instance, Ben-David, Franzoni, and Moussawi (2018) show that an increase in ETF ownership in a stock causes an increase in stock return's volatility and negative autocorrelation, Israeli, Lee, and Sridhavan (2017) report that an increase in ETF ownership of a stock increases the stock's trading costs and decreases its earnings-response coefficient, and Coles, Heath, and Ringgenberg (2018) find that index investing introduces noise into stock prices but does not impact long-term price efficiency.

Much of the literature on the implications of passive investing has used Russell indexes reconstitutions as a quasi-exogenous event, but indexing to the S&P 500 dwarfs indexing to the Russell indexes. The focus of this literature is stocks demoted from the Russell 1000 to the Russell 2000. The categorical thinking that we investigate in relation to the S&P 500 is unlikely to be relevant for these demoted stocks. For instance, it seems unlikely that the board of a company that has its stock demoted would suddenly want its management to adopt policies similar to those of the smaller firms in the Russell 2000. This literature examines the impact of changes in passive investors on governance and reaches conflicting results. For instance, Appel, Gormley, and Keim (2016) find that passive mutual funds influence governance positively through their voting choices at the annual general meeting, but Schmidt and Fahlenbrach (2017) examine high-cost governance activities requiring continuous monitoring throughout the year and conclude that an increase in passive institutional membership increases the CEO's power at the expense of shareholders. Our paper shows that an increase in passive

investing has real effects on firms, in that it leads to poorer price discovery, less efficient investment, and lower block ownership. However, though much attention is devoted to potential anti-competitive implications of common ownership presumed to increase with passive ownership (see Schmalz, 2018, for a review), we find no evidence of an impact of inclusion on competition.

Third, our paper contributes to the literature on the real effects of financial markets (Bennett, Stulz, and Wang, 2019; Bond, Edmans, and Goldstein, 2012; Bond, Goldstein, and Prescott, 2009; Chen, Goldstein, and Jiang, 2007; Durnev, Morck, and Yeung, 2004; Edmans, Goldstein, and Jiang, 2012; Edmans, Jayaraman and Schneemeier, 2017; Luo, 2005). We show that S&P 500 index addition has significant effects on firms' real decisions on investments, governance, and managerial performance evaluation. Some of these effects follow form a change in the informativeness of stock prices, but most of the effects we discuss appear to be related to categorical thinking on the part of management, the firm's board, and investors in general when they assess the performance and policies of a firm that has joined the index.

The paper is organized as follows. Section 2 describes the sample construction. Section 3 reports the effects of index addition on stock returns. Section 4 presents our empirical design for our investigation of how index addition impacts firms. Section 5 shows the effects of index additions on passive ownership and governance. Section 6 examines the impact of index addition on stock price informativeness and investment efficiency. Section 7 shows the effect of index addition on firms' credit ratings. Section 8 reports the peer effects of index addition on corporate policies, including executive compensation, investment, financing, and payouts. Section 9 reports how index addition affects firm performance. Section 10 investigates the potential effect of index additions on market competition. Section 11 concludes.

2. Sample construction

Daily and monthly stock data are from CRSP. The data for the GPIN informativeness measure are from Duarte, Hu, and Young (2020).[5] Corporate accounting data are from CRSP and Compustat

[5] We are grateful to Edwin Hu for sharing the data on his website.

Merged. Institutional ownership data are from Thomson Reuters 13F. Mutual fund holdings data are from CRSP Mutual Fund Database and Thomson Reuters Mutual Fund Holdings (S12). The data on comparison groups in executive compensation contracts, available from 2006, are from IncentiveLab. The data on board characteristics are from BoardEx. S&P 500 index additions and announcement dates are from Siblis Research. Firm-level market competition measures, available from 1997, are from the Hoberg-Phillips data library. Data availability explains why our sample starts in 1997 and ends in 2017. Our sample includes 659 S&P 500 additions. Variables are defined in the Appendix. Table 1 shows summary statistics. Because 2008 is a highly unusual year, all the results of the paper are replicated in the Internet Appendix omitting 2008. We discuss in the text when omitting 2008 changes our inferences.

3. Stock price reaction to S&P 500 index additions

The existing evidence is that the stock market generally reacts positively to announcements of S&P 500 index additions. In this section, we investigate whether such a positive reaction holds throughout our sample period, whether the reaction is permanent, and whether stocks have abnormal performance after joining the index.

Announcements of additions are made after the market close.[6] We use the first trading day following the announcement (i.e., the first day an added stock is affected) as day zero when studying the effect of index additions on stock returns. We estimate four widely-used models of short-run daily cumulative abnormal returns: market model, Fama-French 3-factor model (FF3), Fama-French 4-factor (FF3 plus momentum; Carhart, 1997) model, and Fama-French 5-factor model (Fama and French, 2015).[7] For each of the four models, we calculate the cumulative abnormal returns (CARs) for event windows starting five days before day zero and ending five or twenty-one days after for each stock added to the index. We then calculate the average CAR for each event window and use *t*-tests for the statistical significance.

[6] Announcements of S&P 500 additions are made at 05:15 PM Eastern Time: https://us.spindices.com/documents/methodologies/methodology-sp-us-indices.pdf

[7] Our estimation window for the relevant models is 252 days using daily stock returns, requiring at least 200 observations within the window. To reduce the likelihood that the model estimation would be affected by the index additions (event-induced return variance), our estimation window ends 50 days before an index addition.

We report the results in Table 2. In Panel A of Table 2, we show the results for the event window [-5, +5]. CARs are positive and significant for all four models in the 1997-2017 time period as expected from the existing findings in the literature. The abnormal returns range from 3.2% to 3.3% and are all statistically significant at the 1% level for the whole period. When we estimate CARs for the early sample period (1997 to 2007) and for the late period (2008 to 2017) separately, the results are quite different for these two sub-periods. For the early period, CARs range from 4.7% to 4.9% and are highly significant. In contrast, for the late period, CARs range from 0.6% to 0.7% and are insignificant. The CARs for the late period are significantly different from the CARs for the early period. It follows that there is no stock-price reaction to the announcement of S&P 500 inclusions in the late period. As internet appendix Table IA2 shows, the results are robust if we omit 2008.

We also estimate CARs for an event window starting five days before day zero and ending twenty-one days after day zero and tabulate the results in Panel B of Table 2. This window extends our tests for abnormal returns to include one calendar month after the stock is added to the index. We find very distinct outcomes for the early sample period relative to the late sample period. While the CARs in this window are insignificant for the whole sample period, they are significantly positive for the early sample period and significantly negative for the late sample period. For the early sample period, there is evidence of reversal since the CARs for the short event window are higher than for the long event window. However, the CARs for the long event window are significantly positive and range from 2.0% to 2.4%. In contrast, for the late sample period, we find evidence of an adverse impact on the stock price of S&P 500 addition as the CARs range from -2.3% to -2.1%. The one-month CARs based on the Fama-French 4-factor model are shown in Figure 1 for the whole period and the two sub-periods.

We further extend the time horizon and investigate long-run abnormal returns 12 months following the addition, starting from the addition month (i.e., a time window [0, +12]). The literature documents the difficulty of estimating long-run abnormal returns because of issues such as the new listing bias, rebalancing bias, and skewness bias (Kothari and Warner, 1997; and Barber and Lyon, 1997). There is also controversy about the asset pricing model that should be used for expected returns. We follow the literature and measure the long-run stock abnormal returns following three widely used methodologies.

The first approach we use is the calendar-time portfolio return approach. At the end of each month, we add to the portfolio the firms added to the index. We keep a firm in the portfolio for twelve months from index addition. We then estimate a time-series regression of the portfolio monthly returns on risk factors of four asset pricing models, including the market model, the Fama-French three-factor model, the Fama-French three-factor model augmented with the momentum (UMD) factor, and the Fama-French five-factor model. We show the results in Panel C of Table 2. We find that the intercept of the regressions (monthly alpha) is negative but insignificant for the whole sample period. In other words, stocks do not earn significant abnormal returns over the twelve months period following the month they are added to the index. When we split the sample period into the early sample period and the late sample period, we find that the risk-adjusted abnormal returns are insignificant for the early sample period and significantly negative for the late sample period. For the late sample period, the monthly risk-adjusted return ranges from -0.63% to -0.73%. Removing 2008 from the late period reduces the absolute value of the monthly adjusted returns so that they range from -0.54% to -0.63% as shown in Table IA2.

Our second approach matches the portfolio of added firms with a benchmark that is constructed from a set of 125 portfolios formed on the basis of market capitalization, book-to-market, and prior-year return, following Daniel, Grinblatt, Titman and Wermers (DGTW, 1997). We show the estimates in Panel D of Table 2. The results using that approach are similar to the results from using popular asset pricing models. However, the late period alpha estimate is insignificant when we remove 2008 from the sample period.

Lastly, we implement the BHAR approach of Barber and Lyon (1997), which reflects the compounding in long-run returns. A firm's BHARs are measured as the buy-and-hold monthly returns minus the buy-and-hold monthly returns for a benchmark portfolio matched on size, book-to-market and momentum. The results shown in the last column of Panel D in Table 2 are similar to the other two approaches.[8] Note, however, that in this case the BHAR represents a one-year holding period excess return rather than a monthly alpha.

[8] The magnitude of the BHARs in the last column of Panel D in Table 2 looks larger than that of other long-run abnormal returns because BHARs are yearly abnormal returns while others are alphas in regressions using monthly returns.

With the portfolio return approach the risk-adjusted abnormal returns for the early sample period are significantly different from the risk-adjusted abnormal returns for the late sample period for all four asset pricing models and for the BHAR approach. With the DGTW calendar-time approach, the late sample period abnormal returns are not significantly different from the early sample period abnormal returns.

The evidence in this section shows that the impact on a firm's stock from being added to the S&P 500 index differs between the early sample period and the late sample period. With the early sample period, the short-run stock-price reaction to inclusion is significantly positive and the long-run impact of addition on the stock price is insignificant. In contrast, with the late sample, there is no significant positive stock-price reaction when an index addition is announced and the firm's stock price is affected negatively over time.

4. Empirical design of the difference-in-differences analysis

To investigate the impact of S&P 500 addition on firm policies, governance, and performance, we carry out difference-in-differences (DiD) analyses based on S&P 500 index addition. Specifically, we first identify all S&P 500 additions in our sample period. Added firms are our treated firms. For each treated firm, we search for a control firm that is never a member of the S&P 500 index in our sample period and use a propensity-score match on total assets, Tobin's *q*, stock return, and 2-digit SIC industry (exact match) in the year before a treated firm is added to the index, so that the matching process is not affected by index additions. Table IA1 reports the medians for the matching variables for the treated firms and control firms. Not surprisingly, our requirement of an exact industry match implies that we cannot match each variable closely. In particular, treated firms and control firms still have different Tobin's *q* and stock return after the matching process. To address this issue, in our DiD analysis we control for Tobin's *q* and stock return together with other relevant firm characteristics. We use an event window of four years before and four years after an index addition and the addition year is excluded.

We carry out a DiD analysis for a sample of treated and control firms using the following specification:

$$\mathrm{Y}_{it} = \beta_0 + \beta_1 \cdot \mathrm{SP500Add}_{it} + \beta_2 \cdot Pre\mathrm{SP500Add}_{it} + \mathrm{X}_{it} \cdot \Gamma + \mu_i + \nu_t + \epsilon_{it}, \quad (1)$$

where *i* is for firm *i* and *t* is for year *t*. Y is the dependent variable of interest, such as stock price informativeness or firm policies, *SP500Add* is a dummy variable for S&P 500 index addition, which equals one for a treated firm after its addition year and zero otherwise, and *PreSP500Add* is a dummy variable for the pre-treatment trend, which equals one for a treated firm in the year before its addition and zero otherwise, X is a vector of control variables, Γ is a vector of relevant coefficients of controls, μ is the firm fixed effect, ν is the year fixed effect, and ϵ is the error term.

The treatment effect of the DiD analysis is captured by the coefficient of *SP500Add*, β_1. In a DiD analysis, it is important to check the parallel trend condition. In our design, the coefficient of *PreSP500Add*, β_2, is for the test of the parallel trend condition. Specifically, an insignificant β_2 indicates that the treated group and the control group are not statistically different from each other before addition, which means the parallel trend condition is satisfied.

We are interested in assessing whether the impact of being added to the index differs between the early sample period and the late sample period. To assess whether the treatment effect differs between the early sample period and the late sample period, we estimate the following regression:

$$\mathrm{Y}_{it} = \beta_0 + \beta_1 \cdot \mathrm{SP500Add}_{it} + \beta_2 \cdot \mathrm{SP500Add}_{it} \times \mathrm{Late} + \beta_3 \cdot Pre\mathrm{SP500Add}_{it}$$
$$+\mathrm{X}_{it} \cdot \Gamma + \mu_i + \nu_t + \epsilon_{it} \quad (2)$$

where *Late* is an indicator variable that takes value 1 if the firm is added to the index from 2008 to 2017. Note that we do not include *Late* as a separate variable because we use year fixed effects. A significant coefficient β_2 is evidence that the treatment effect differs between the early and the late sample periods.

5. Index addition, passive holdings, and governance

The net asset value of funds indexed to the S&P 500 represents a substantial fraction of the market capitalization of the index constituents. This fraction has increased over time. However, not all indexed funds hold the basket of index constituents. Some funds attempt to approximate the performance of the index by holding an appropriately chosen subset of constituents and/or derivatives. It follows that it is not necessarily the case that the share of a stock held by passive investors increases substantially when

the stock is added to the S&P 500. Therefore, we first investigate how the ownership of added stocks changes following inclusion. Finding that passive ownership increases, we then turn to the question of whether passive ownership crowds out block ownership by non-passive investors.

5.1 Index addition and changes in ownership structure: the role of passive investing

To assess the importance of the change in the ownership structure of a stock following its inclusion in the index, we calculate the change in passive holdings of added stocks. We define a firm's passive holdings as the percent of the firm's stock held by passive mutual funds. To assess whether a fund is a passive fund, we use the active share measure proposed by Cremers and Petajisto (2009). Specifically, the active share measures the percentage of fund holdings with weights that differ from the weights in the S&P 500 index. If a fund has an active share of 60%, then 40% of the holdings of the fund have weights identical to the S&P 500 index and 60% of the holdings have different weights. We define a fund to be a S&P 500 passive mutual fund if it is a fund with a name that includes both "index" and "500" or a fund with an active share using the S&P 500 as a benchmark that is below 60%.[9]

We estimate the change in passive holdings of added stocks relative to their controls using our DiD model. In these tests, the dependent variable in Equation (1) is passive holdings defined above. Results are reported in Model 1 of Table 3. The coefficient of SP500Add is positive and statistically significant at the 1% level (*t*-value 25.72).[10] The coefficient estimate of 0.034 means that after index addition passive holdings increase by 3.4 percentage points. As is widely discussed in the literature, passive investing increases over time. Model 2 allows the coefficient of SP500Add to change in the late sample period. We find that the coefficient estimate of the interaction SP500Add x Late is 0.017 with a *t*-statistic of 8.48. With this Model, the impact of S&P 500 addition on passive holdings is higher in the late sample period than in the early sample period by 1.7 percentage points (an increase of 70.8%). Models 3 and 4 show estimates of the regressions for active mutual funds – the mutual funds that are not passive. We find that holdings by active mutual funds decrease when a stock is added to the index

[9] Our results are robust to alternative cutoffs, such as 20%, 40%, or 80%.
[10] The effect on passive holdings is larger in more recent years, as shown in Figure 2. This is consistent with the rapid growth of index funds in recent years.

and that the impact of index addition on holdings by active mutual funds is greater in the late sample period than in the early sample period.

Models 5 and 6 show the effect of index addition on total holdings by all 13F institutions. The holding data is from Thomson Reuters 13F. The coefficient of SP500Add is not statistically different from zero in the regression for the whole sample period in Model 5 and is not significantly higher in the late period in Model 6. When looking at all institutional investors, there is no significant change in holdings for newly added firms. This implies that when institutional investors tracking the S&P500 index closely (e.g., passive mutual funds) have to buy newly added stocks mechanically, other institutional investors tend to sell their holdings. This is consistent with our findings in Models 3 and 4 and the findings by Patel and Welch (2017) who show that S&P 500 addition no longer increases total investor demand. All tests in this section have statistically insignificant PreSP500Add coefficients, signifying that the parallel trends condition is satisfied.

5.2 Corporate governance

Index addition triggers greater passive holdings and these passive investors are unlikely to have as strong incentives to actively monitor the firms in their portfolio as the investors they replace, namely active institutional investors (Corum, Malenko, Malenko, 2020). As a result, it is likely that the power of management increases as a result of index addition (Schmidt and Fahlenbrach, 2017). If this is the case, we would expect a drop in holdings by blockholders that are not passive funds. These blockholders would see their ability to influence management drop after the firm's inclusion, which would reduce the expected return on their holdings. The resulting decrease in blockholders reduces the monitoring of management, so that management becomes more powerful and entrenched. We investigate the effects of index addition on blockholder ownership, in which blockholders are large shareholders holding at least 5% of a firm's shares outstanding.

In our analysis, we consider blockholder ownership from 13F institutions excluding quasi-index fund holdings, which follows Bushee and Noe (2000). We exclude quasi-index funds to address the potential concern that asset management companies may become new blockholders because of the size of their

indexed funds but are unlikely to monitor firms actively. We use the blockholder ownership as the dependent variable in Equation (1) and the results are reported in Table 4.

Model 1 shows that the coefficient of SP500Add is negative and statistically significant at the 5% level. The effects are also economically significant. After an index addition, aggregate blockholder ownership falls by 2.5 percentage points, which is 14.7% of its average of 17%. Model 2 shows that the SP500Add x Late interaction is not statistically significant.

6. Stock price informativeness and investment-*q* sensitivity

One expected consequence of having more passive investors is that less information is impounded in stock prices as fewer investors trade actively on new information. In this section, we show that an added firm's stock price becomes less informative. If a firm's stock price becomes less informative, we expect that the firm's investment efficiency falls. We find support for this hypothesis in the early period, but not so much in the late period.

6.1 Stock price informativeness

As discussed in the introduction, there is evidence in the literature that when a stock is added to the S&P 500 index, its return comoves more with other stocks in the index. Larger co-movement reduces the proportion of firm-specific information in stock prices, and in turn decreases price informativeness. Therefore, we expect that index addition have a negative effect on stock price informativeness.

We use two measures of stock price informativeness. The first measure is *Rsq*, which is the R-squared from a market model regression of a firm's daily stock returns on market returns in a year. The proxy for market returns is the value-weighted return from CRSP (*vwretd*). Roll (1988) introduced R-squared as a measure of firm-specific variation unrelated to public information. In subsequent work, Durnev, Morck, Yeung, and Zarowin (2003) show that the stock price of firms with lower R-squared is more informative in that current returns have more information about future earnings. A larger *Rsq* means a firm's stock comoves more with the market and its price is less informative about firm-specific events (i.e., lower price informativeness). The second measure is *GPIN*, following the Generalized PIN

model proposed by Duarte, Hu, and Young (2020). GPIN has a micro foundation based on structural market microstructure models. A larger GPIN means the stock price is more informative.

Table 5 shows our estimates. For each dependent variable, we estimate Equation (1) and Equation (2). Model 1 shows index addition increases *Rsq*. The variable PreSP500Add is insignificant and the coefficient estimate is zero. After index addition the stock price comoves more with the market and its informativeness is reduced significantly. This result is consistent with the findings on changes in R-squared by Barberis, Shleifer and Wurgler (2005). Model 2 allows for changes in the coefficient on SP500Add in the late sample period. We find that the coefficient on SP500Add x Late is statistically insignificant. It follows from this that index addition increases *Rsq* and does so similarly throughout the sample period. With GPIN, the story is more complicated. The results in Model 3 and Model 4 indicate that GPIN decreases with index addition, but it decreases significantly less in the late period. These results are consistent with a weaker treatment effect of index addition on price informativeness.

We further investigate the direct link between price informativeness and passive holdings of stocks. Specifically, we regress the price informativeness measure on the stock holdings by passive mutual funds and relevant firm characteristics. Results are reported in Panel B of Table 5. Neither Model 1 nor Model 2 show evidence of a direct link between passive ownership and stock price informativeness measures by *Rsq*. In contrast, Models 3 and 4 show strong evidence of such a link for GPIN. The evidence for GPIN is consistent with the hypothesis that passive holdings decrease GPIN, which means passive holdings have a negative effect on stock price informativeness.

6.2 Investment efficiency

The negative effect of index addition on price informativeness can reduce the efficiency of corporate investment. The existing literature documents that managers can learn from their firm's stock price to improve investment efficiency. In particular, a firm's investment is more sensitive to Tobin's *q* (i.e., higher investment-*q* sensitivity) when its stock price is more informative (e.g., Chen, Goldstein, and Jiang, 2007). In this section, we follow the literature and measure investment efficiency by investment-*q* sensitivity. We follow the regression model of Chen, Goldstein, and Jiang (2007). As

index addition has a negative effect on price informativeness, we expect index addition to reduce investment-q sensitivity. Our specification is as follows.

$$\text{Capex}_{\text{it}} = \beta_0 + \beta_1 \cdot \text{SP500Add}_{i,t} \times q_{i,t-1} + \beta_2 \cdot q_{i,t-1} + \beta_3 \cdot \text{SP500Add}_{i,t} + \beta_4 \cdot \text{PreSP500Add}_{i,t} + \beta_5 \cdot \text{PreSP500Add}_{i,t} \times q_{i,t-1} + X_{it} \cdot \Gamma + \mu_i + \vartheta_t + \varepsilon_{it} \quad (3)$$

where i is the firm index, t is the year index, *Capex* is capital expenditure scaled by lagged assets, $SP500Add$ is a dummy variable for the treatment effect of S&P 500 index addition, which equals one for a treated firm after the addition year, and zero otherwise, $PreSP500Add$ is a dummy variable for the pre-treatment trend, which equals one for a treated firm in the year prior to the index addition, and zero otherwise, X is the vector of control variables, Γ is the coefficient vector for the control variables, μ_i is the firm fixed effect, ϑ_t is the year fixed effect, and ε_{it} is the error term. The focus is on the coefficient of the interaction between SP500Add and Tobin's q, β_1. We expect β_1 to be negative, which means index addition reduces the investment-q sensitivity.

Model 1 of Table 6 shows estimates of equation (3). The result shows that the treatment effect is significantly negative, which means that index addition reduces the sensitivity of investment to Tobin's q. One might be concerned that the stock price is distorted by the shift in demand by passive investors, so that the sensitivity of investment to Tobin's q should fall. However, this explanation is implausible because we are estimating the treatment effect on the four years following the index addition. The pre-trend coefficient is not significant, so that we cannot reject the parallel trend assumption.[11]

To estimate whether the treatment effect differs in the late sample period from the early sample period, we use the following equation:

$$\text{Investment}_{\text{it}} = \beta_0 + \beta_1 \cdot \text{SP500Add}_{i,t} \times q_{i,t-1} + \beta_2 \cdot \text{SP500Add}_{i,t} \times q_{i,t-1} \times \text{Late}_{\text{it}} + \beta_3 \cdot \text{SP500Add}_{i,t} + \beta_4 \cdot q_{i,t-1} + \beta_5 \cdot \text{PreSP500Add}_{i,t} \times q_{i,t-1} + X_{it} \cdot \Gamma + \mu_i + \vartheta_t + \varepsilon_{it} \quad (4)$$

[11] In contemporaneous work, Billett, Diep-Nguyen, and Garfinkel (2020) estimate a regression to assess the impact of S&P 500 inclusion on investment in a study where the main focus is on the investment efficiency of peers using a different approach.

Model 2 of Table 6 shows estimates of equation (4). The coefficient on SP500Add x Tobin's *q* is negative and statistically significant at the 1% level. The coefficient on SP500Add x Tobin's *q* x Late is not statistically significant. However, when we exclude 2008, we find that the interaction for the late period is significantly positive with a coefficient of 0.004 when the coefficient on SP500Add x Tobin's *q* is -0.006. This evidence suggests that the impact of index addition on investment efficiency is much weaker in the later period.

7. Credit ratings and S&P 500 addition

Credit rating agencies produce opinions that investors use to assess the credit risk of securities and other obligations issued by firms. In their function, they use both quantitative and qualitative information. In this section, we investigate whether being included in the S&P 500 affects a firm's credit rating. For that purpose, we use our DiD approach.

We first investigate whether ratings of S&P 500 firms differ from those of non-S&P 500 firms. For this purpose, we create a sample including all S&P 500 firms and the largest 500 non-S&P 500 firms (by market capitalization) each year. We collect S&P long-term issuer credit ratings from Compustat. To use ratings information in a regression setting, we define a variable *Rating*, an integer between 1 and 22 in which AAA is 22 and each step down in rating is one integer less. We define a dummy variable *SP500*, which equals one if a firm is a member of the S&P 500 index in a year and zero otherwise. Then we regress numerical ratings on SP500, controlling for firm characteristics, industry fixed effects, and year fixed effects. We control for industry fixed effects to capture the within-industry cross-sectional heterogeneity of ratings between S&P 500 firms and non-S&P 500 firms.[12] Results in Panel A of Table 7 show that S&P 500 members have a higher credit rating. For example, Model 1 shows that the coefficient of the SP500 dummy is positive and statistically significant at the 1% level. With this coefficient, on average a S&P 500 firm's rating is four tenth of a notch than that of a non-S&P 500 firm after controlling for firm characteristics.

[12] Our results in Panel A are robust when controlling for firm fixed effects. But controlling for firm fixed effects captures the within-firm switching effect rather than cross-sectional heterogeneity of ratings between S&P 500 firms and non-S&P 500 firms.

We then turn to the DiD analysis. Panel B of Table 7 shows the estimates. The results in Model 1 shows that for the sample period as a whole index inclusion increases a firm's credit rating by almost half a notch. In Model 2, we allow for the treatment effect to change from the early period to the late period. We find that the interaction for the late period is not significant.

8. Peer effects on corporate policies

A firm that joins the S&P 500 joins a new prestigious club. Categorical thinking would suggest that as the firm joins the new club, its board and managers pay more attention to what peers within the new club do than before the firm joins the new club. In this section, we demonstrate this effect and show that corporate policies change when a firm is added to the index. We show first that incentives of managers change as their comparison group for compensation includes more S&P 500 peer firms after their firm is added to the index. We then show that the firm's investment, external financing, and payout policies change. Importantly, we show that the added firm's policies become more affected by the actions of its S&P 500 peers.

8.1 Executive compensation

In this section, we investigate whether index inclusion changes how a firm's board evaluates the CEO's performance. Managerial performance evaluation is crucial to managerial incentives and can affect important corporate decisions. Boards usually specify a list of peer firms in executive compensation contracts and use these peers as the benchmark of executive performance in the relative performance evaluation (Aggarwal and Samwick, 1999; Gong, Li, and Shin, 2011). This relative performance determines the performance-based portion of the CEO's compensation. If a board includes more S&P 500 firms in a CEO's peer group following addition of the firm to the index, we would expect that this would lead the CEO to takes actions more similar to those of the firm's peers in the index.

We collect the data on peer firms from IncentiveLab and define a variable *%SP500Peer* as the portion of S&P 500 peer firms in the firm's peer group for the relative performance evaluation. This data becomes available in 2006, so we have no results for the early period. We first show univariate results that compare the average of %SP500Peer in newly added firms before and after the addition. These

results are reported in Panel A of Table 8. The results show that before index addition the average portion of S&P 500 peers is 41.3% and the average increases by 10.3 percentage points after index addition, or 24.9%, to 51.6%. The difference in the averages is statistically significant and the *p*-value of the mean equality *t*-test is only 0.001.

We further carry out a DiD analysis and use %SP500Peer as the dependent variable. Results are reported in Panel B of Table 8. The coefficient of SP500Add in Model 1 is positive and statistically significant at the 5% level. The coefficient of 0.051 means that a newly added firm increases the portion of S&P 500 peers in the relative performance evaluation peer group by 5.1 percentage points, which is 12.3% of the average proportion before the index addition. Note that the coefficient on PreSP500Add is small and insignificant, which indicates that there is no difference in the fraction of S&P 500 peers in the performance evaluation peer group of the treated firms and of the control firms before index addition. The evidence is consistent with the categorical idea that corporate boards think that after index addition the newly added firm becomes different and that management should be evaluated differently despite the fact that index addition has no direct impact on firm fundamentals. One might argue that the board does not necessarily know about the index inclusion when it selects the peer group in the event year. We also estimate the regression lagging the control variables. Model 2 shows that the results are similar.

8.2 S&P 500 peer effects on investment

After index inclusion, we expect the firm's board, its management, and its active investors to compare the firm more with its S&P 500 peers. As a result, we expect corporate policies to change and one way in which they are likely to change is in exhibiting greater comovement with industry peers in the index. One driver of this greater comovement could be the compensation peer effect documented in the previous section. In this section, we focus on the impact of S&P 500 inclusion on corporate investment. Though categorical thinking could lead to greater comovement of investment, there are other reasons for greater comovement of investment after inclusion. Specifically, with weaker governance, management exerts less effort and, therefore, relies less on private information. When managers rely more on public information, their decisions become more similar. Using a different

metric comovement, Knyazeva, Knyazeva, Morck, and Yeung (2008) find that worse governance is associated with higher comovement of investment.

We first examine whether the investment rate of S&P 500 firms differs from that of other firms. We measure investment by the growth of total assets, which is the annual change in total assets scaled by lagged total assets.[13] This measure takes into account acquisitions and has now become a standard measure of investment in the asset pricing literature (see, for instance, Fama and French, 2015). The test sample includes all S&P 500 firms and the largest 500 non-S&P 500 firms (by market capitalization) each year. We include industry fixed effects to capture the within-industry cross-sectional heterogeneity in investment between S&P 500 firms and non-S&P 500 firms. Year fixed effects are also included. The results are reported in Panel A of Table 9. Model 1 shows that the coefficient of the S&P 500 membership dummy SP500 is negative and statistically significant at the 1% level. When allowing the membership effect to change across sub-periods, Model 2 shows that the coefficient of SP500 remains negative and highly significant, but the coefficient of SP500 x Late is positive and significant, so that the membership effect weakens in the late period.

We then investigate the treatment effect on investment of joining the index. The results are reported in Panel B of Table 9. Model 1 shows that the coefficient of the treatment dummy SP500Add is negative and statistically significant at the 1% level. The result shows that newly added firms significantly decrease their investment rate following addition. However, when we allow the impact to differ in the late period, Model 2 shows that the effect is much smaller in the late period as the coefficient on SP500Add x Late is positive and significant.

To study the treatment effect on the association between the added firm's investment and its industry peers in the index, we define a variable *InvestSP500Peer* that is the average investment of S&P 500 peers in a firm's industry (4-digit SIC, excluding the firm itself). The specification of our tests is as follows:

[13] Results using capital expenditure as a measure of investment are reported in the Internet Appendix Table IA14. The results show that S&P500 firms have fewer capital expenditures than non-S&P500 firms; index additions reduce capital expenditures; but the peer effect of index additions on capital expenditure is not statistically significant at the 10% level.

$$\text{Investment}_{\text{it}} = \beta_0 + \beta_1 \cdot \text{InvestSP500Peer}_{it} \times \text{SP500Add}_{it} + \beta_2 \cdot \text{InvestSP500Peer}_{it} + \beta_3 \cdot \text{SP500Add}_{it} + \beta_4 \cdot \text{InvestSP500Peer}_{it} \times \text{PreSP500Add}_{it} + X_{it} \cdot \Gamma + \mu_i + \vartheta_t + \varepsilon_{it}, \quad (5)$$

where i is the firm index, t is the year index, InvestSP500Peer is as defined above, $SP500Add$ is a dummy variable for the treatment effect of S&P 500 index addition, which equals one for a treated firm after the addition year, and zero otherwise, $PreSP500Add$ is a dummy variable for the pre-treatment trend, which equals one for a treated firm in the year prior to the index addition, and zero otherwise, X is the vector of control variables, Γ is the coefficient vector for the control variables, μ_i is the firm fixed effect, ϑ_t is the year fixed effect, and ε_{it} is the error term. The focus is on the coefficient of the interaction between SP500Add and InvestSP500Peer, β_1.

Panel C of Table 9 tabulate results on investment comovement. The results show a strong increase in investment comovement after a firm is added to the index. This increase is stable between the early and late period.

8.3. External financing

In this section, we investigate how index addition affects net debt issuance and net equity issuance. Net debt issuance is defined as debt issuance less debt retired scaled by total assets. Net equity issuance is equity issued less equity buybacks scaled by total assets. We expect external financing of added firms to comove more with that of their S&P 500 industry peers.

We first examine whether external financing of S&P 500 firms differs from that of other firms. The test sample includes all S&P 500 firms and the largest 500 non-S&P 500 firms (by market capitalization) each year. We include industry fixed effects to capture the within-industry cross-sectional heterogeneity in external financing between S&P 500 firms and non-S&P 500 firms. Year fixed effects are also included. Panel A of Table 10 reports the results. Model 1 shows that the coefficient of the S&P 500 membership dummy SP500 is negative but not statistically significant at the 10% level. When allowing the coefficient to differ between the early and late periods, Model 2 shows that neither coefficient is statistically significant. Models 3 and 4 show how equity issuance differs for

S&P 500 firms and non-S&P 500 firms. Model 3 reports that the coefficient of SP500 is negative and statistically significant at the 1% level. Model 4 shows that this effect is stable across sample periods. These results show that S&P 500 firms have significantly less net equity financing compared with non-S&P 500 firms.

We then investigate the treatment effect on financing policy of joining the index. Panel B of Table 10 reports the results. Neither Model 1 nor Model 2 provide evidence supportive of an effect of index inclusion on net debt issuance. In Model 3, the coefficient on SP500Add is negative and statistically significant. Finally, in Model 4, the coefficient on SP500Add x Late is insignificant, which means the treatment effect is stable across sample periods.

To study the treatment effect on the financing comovement between a newly added firm and its industry peers in the index, we define *NDI_SP500Peer* and *NEI_SP500Peer*, which are the average net debt issuance and net equity issuance of S&P 500 peers in a firm's industry (4-digit SIC, excluding the firm itself), respectively. The specification of our tests is as follows:

$$\mathrm{F_{it}} = \beta_0 + \beta_1 \cdot \mathrm{FSP500Peer}_{it} \times \mathrm{SP500Add}_{it} + \beta_2 \cdot \mathrm{FSP500Peer}_{it} + \beta_3 \cdot \mathrm{SP500Add}_{it} + \beta_4 \cdot \mathrm{FSP500Peer_{it}} \times \mathrm{PreSP500Add}_{it} + X_{it} \cdot \Gamma + \mu_i + \vartheta_t + \varepsilon_{it}, \quad (6)$$

where *i* is the firm index, *t* is the year index, F is net debt issuance or net equity issuance, FSP500Peer is NDI_SP500Peer or NEI_SP500Peer, respectively, $SP500Add$ is a dummy variable for the treatment effect of S&P 500 index addition, which equals one for a treated firms after an addition year, and zero otherwise, $PreSP500Add$ is a dummy variable for the pre-treatment trend, which equals one for a treated firms in the year prior to the index addition, and zero otherwise, X is the vector of control variables, Γ is the coefficient vector for the control variables, μ_i is the firm fixed effect, ϑ_t is the year fixed effect, and ε_{it} is the error term. The focus is on the coefficient of the interaction between SP500Add and FSP500Peer, β_1. We expect β_1 to be positive, which means index addition increases the comovement between the external financing of newly added firms and that of their S&P 500 industry peers.

Results on external financing comovement are reported in Panel C of Table 10. The estimated coefficients for the impact of S&P 500 inclusion are surprisingly large. Model 1 shows that the coefficient of NDI_SP500Peer x SP500Add is 0.618 and statistically significant at the 1% level. Such a coefficient means that if S&P 500 peers of an added firm raise 1% of assets as net debt, the included firm's net debt increases by 0.618%. Model 2 shows that this effect is stable across sample periods. Models 1 and 2 confirm that after index addition net debt financing of the newly added firm comoves more with that of its industry peers in the S&P 500 index. Models 3 and 4 show that index addition also increases the association between net equity financing of the newly added firms and their industry peers in the S&P 500 and this effect is stable across sample periods. The magnitude of the effects for net equity issuance is similar to the magnitude of the effects for net debt issuance.

8.4. Payout policy peer effects

We would expect payouts of added firms to comove more with those of their S&P 500 industry peers. We measure payouts by the ratio of dollar amount of payouts to total assets and use three measures of payouts: dividends, repurchases, and total payouts as the sum of dividends and repurchases.

We first examine whether payouts of S&P 500 firms differ from payouts of other firms. Since payout policies differ across industries, we use industry and year fixed effects as well as the control variables we use in other regressions. The test sample includes all S&P 500 firms and the largest 500 non-S&P 500 firms (by market capitalization) in each year. The results are reported in Panel A of Table 11. Models 1 and 2 show that there is no difference in dividend payouts between S&P 500 firms and other firms. However, Models 3 and 4 show a strong difference in repurchases. Within an industry, S&P 500 firms repurchase more than other firms after controlling for total assets, Tobin's *q*, cash flow, cash, leverage and stock return, by 2.1 percentage points of assets. This difference is stable across sample periods. Models 5 and 6 show that the results for total payouts are similar to those for repurchases.

We then investigate the treatment effect on payout policy of joining the index. Panel B of Table 11 reports the results. Models 1 and 2 show that dividends increase following addition, but the increase is small compared with the increase in repurchases shown in Models 3 and 4. Model 3 shows that index addition increases repurchases by 1.6%, which is 53.3% of the sample mean for repurchases of 3%.

Model 4 demonstrates that the treatment effect is stable across sample periods. Note that net equity issuance in Table 10 falls with repurchases. Consequently, the increase in repurchases likely explains the decrease in net equity issuance documented in Table 10. Models 5 and 6 show similar results for total payouts.

To study the treatment effect on the comovement between the added firm's payout policies and its industry peers in the index, we define three variables *DivSP500Peer*, *RepSP500Peer*, and *PayoutSP500Peer*, which are the average dividend, repurchase, and total payout of S&P 500 peers in a firm's industry (4-digit SIC, excluding the firm itself), respectively. The specification of our tests is as follows:

$$\mathrm{Y_{it}} = \beta_0 + \beta_1 \cdot \mathrm{YSP500Peer}_{it} \times \mathrm{SP500Add}_{it} + \beta_2 \cdot \mathrm{YSP500Peer}_{it} + \beta_3 \cdot \mathrm{SP500Add}_{it} + \beta_4 \cdot \mathrm{YSP500Peer_{it}} \times \mathrm{PreSP500Add}_{it} + X_{it} \cdot \Gamma + \mu_i + \vartheta_t + \varepsilon_{it}, \quad (7)$$

where *i* is the firm index, *t* is the year index, Y is Dividend, Repurchase, or Payout, and YSP500Peer is DivSP500Peer, RepSP500Peer, or PayoutSP500Peer, respectively, $SP500Add$ is a dummy variable for the treatment effect of S&P 500 index addition which equals one for treated firms after an addition year, and zero otherwise, $PreSP500Add$ is a dummy variable for the pre-treatment trend, which equals one for a treated firms in the year prior to the index addition, and zero otherwise, X is the vector of control variables, Γ is the coefficient vector for the control variables, μ_i is the firm fixed effect, ϑ_t is the year fixed effect, and ε_{it} is the error term. The focus is on the coefficient of the interaction between SP500Add and YSP500Peer, β_1. We expect β_1 to be positive, which means index addition increases the association between the relevant payout policy of newly added firms and that of their S&P 500 industry peers.

Results on payout comovement are reported in Panel C of Table 11. Model 1 shows that the coefficient of DivSP500Peer x SP500Add is positive and statistically significant at the 1% level. Model 2 shows that this effect is stable across sample periods. Models 1 and 2 confirm that after index addition dividend payouts of newly added firms comove more with those of their industry peers in the S&P 500 index. Models 3 and 4 show that index addition also increases repurchase comovement between newly added firms and their industry peers in the S&P 500. Not surprisingly, the effect on comovement is

stronger for repurchases than for dividends. Furthermore, the magnitude of the coefficient of RepSP500Peer x SP500Add is twice that of DivSP500Peer x SP500Add. Models 5 and 6 show that the treatment effect on the comovement of total payouts are consistent with that of its two components as shown in Models 1 to 4.

9. Firm earnings and profitability

Given our evidence that joining the index changes firm governance and policies, it is possible that these changes cause a change in firm earnings and return on assets (ROA). We investigate this possibility in this section.

Though index addition is generally viewed as having no direct implications for firm performance, Denis, McConnell, Ovtchinnikov, and Yu (2003) show that firms joining the index experience an increase in analyst earnings forecasts and higher realized earnings. Better earnings performance seems difficult to reconcile with our finding of negative abnormal returns over the year following index inclusion. The findings of Denis et al. (2003) are for the period from 1987 through 1999. Their sample period overlaps for two years with our sample period. We therefore first examine whether the results of Denis et al. (2003) hold for our sample period. Our approach uses Equations (1) and (2) of our DiD analysis.

Model 1 of Table 12 shows the addition effect on EPS forecasts by financial analysts. The dependent variable *EPS forecast* is the average analyst estimate for the one-year EPS from IBES. The coefficient is positive and significant at the 10% level. In Model 2, we allow for the treatment effect to differ between the early and late sample periods. We find that neither the coefficient on SP500Add nor the coefficient on SP500Add x Late are significant, but both coefficients are positive. When we turn to realized EPS, the treatment effect is insignificant in Model 3. In Model 4, the coefficient on SP500Add is insignificantly negative but the coefficient on SP500 x Late is positive and statistically significant at the 5% level. These results suggest that our results are not inconsistent with those of Denis et al. (2003).

EPS is defined as a firm's earnings divided by shares outstanding. Our findings on share repurchases show that firms repurchase more after index addition, which means that shares outstanding, the denominator of EPS, is reduced after index addition. Therefore, it could be that the treatment effect on

the numerator is negative but is offset by the reduction in the number of shares when we look at EPS. Return on assets (ROA) does not suffer from the impact of repurchases on the denominator of EPS. We would therefore expect ROA to fall following a firm's inclusion in the S&P 500 index. We define ROA as the ratio of net income over assets. The DiD analysis is also reported in Table 12. The results show that the coefficient on SP500Add is negative and statistically significant at the 5% or 1% level. For example, Model 6 shows that ROA falls by 1.6 percentage points when a firm joins the index and that the effect is stable over the whole sample period. A fall of 1.6 percentage point is 18% of its standard deviation (0.09). The results demonstrate that index addition has negative real effects on firm performance, and in particular, index addition significantly reduces ROA of added firms.

10. Collusion and competition

When a firm is added to the S&P 500 index, relevant index funds rebalance their portfolios to include the firm in their holdings. The fraction of stocks held by index funds increases substantially over our sample period. The literature has emphasized that increases in index fund ownership leads to increases in common ownership of stocks in an index. Various authors have expressed concerns that increases in common ownership can lead to a decrease in competition (see Schmalz, 2018, for a review). The argument is that two firms with common ownership have less incentive to compete against each other. In this section, we investigate whether index addition affects the competition among S&P 500 peer firms.

We first study the effect on the product market competition of newly added firms at the firm level. If the increase in the common ownership by passive investors leads to a collusion among firms in the S&P 500 index, the firm-level competition is expected to decrease. We use three firm-level measures of product competition. The first is *Fluidity*, which is the fluidity of product market reflecting product market threats or instability (Hoberg, Phillips, and Prabhala, 2014). The second is *Similarity*, which is the product similarity between a firm and its rivals (Hoberg and Phillips, 2016). They are both text-based competition measures from the Hoberg-Phillips data library. The third is *Gross margin*, which is the difference between revenues and COGS scaled by revenues.

The results of the DiD analysis are reported in Panel A of Table 13. Models 1 and 2 show that the treatment effect on Fluidity is not significant. Models 3 and 4 show similarly that there is no evidence that S&P inclusion increases Similarity, which means that inclusion does not lead firms to differentiate their products more. Lastly, in Models 5 and 6, we show that there is no evidence that index inclusion causes an increase in a firm's gross margin.

We further provide evidence at the industry level. If index addition leads to a decrease in competition among peer firms in the S&P 500 index, we would expect a larger reduction in competition when more firms in an industry are added to the S&P 500 index. To measure the competition among industry peers in S&P 500 firms, we first divide S&P 500 firms by their industries (3-digit SIC) into groups, which are called SP500 industry groups. We then define *Lerner index SP500* as the median gross margin within an SP500 industry group in a year. A greater value of this variable indicates less competition among peer firms in an S&P 500 industry group.

We define *Ch(SP500Firms)* as the change in the number of firms in an S&P 500 industry group in a year. We then regress the change in *Lerner index SP500* on *Ch(SP500Firms)* including industry fixed effects and year fixed effects and the sample for this test is at the industry-year level. The result is reported in Model 1 of Panel B. The result shows that when more firms in an industry are added to the S&P 500 index we do not observe a significant change in competition among the S&P 500 firms in that industry. Model 2 allows for the treatment effect to differ between the early and late sample periods, in which the coefficient of Ch(SP500 Firms) x Late is insignificant.

We also investigate potential heterogenous effects when the number of firms in an S&P 500 industry group increases or decreases. Accordingly, we define a variable *Increase (Decrease) in SP500 firms* as a dummy variable equal to one if one or more firms are added to (deleted from) an S&P 500 industry group in a year. The relevant result is reported in Model 3 of Panel B. The result shows that neither an increase nor a decrease in the number of firms in an S&P industry group leads to a significant change in competition in the industry group. Model 4 allows for the treatment effect to differ between the early and late sample periods, in which the coefficients of the two interaction terms are both insignificant. In sum, we do not find the evidence that index addition reduces product market competition.

11. Conclusion

In this paper, we first show that the impact on stock returns from S&P 500 index inclusion has changed substantially over time. In the first half of our sample period, announcement of addition to the S&P 500 has a positive abnormal return that does not disappear over time. In the second half of our sample period, there is no longer a significant positive abnormal return and the long-run impact of index addition on a stock is negative.

When a firm joins the index, it acquires investors who are indifferent to the price of the firm's stock. As a result, less information is incorporated in the stock price through the trading of investors, so that the price of the stock becomes less informative. We show that the informativeness of the stock price decreases with index inclusion. The decrease in the informativeness of the stock price causes the firm to invest less efficiently. The increase in the fraction of passive investors decreases the quality of the governance of the firm both because passive investors have little incentives to invest in governance activities and because the increase in passive holdings decreases the potential gains to investors from actively trying to influence a firm's activities. We find evidence that there may be a reputation effect from joining the index with credit rating agencies in that inclusion causes an increase in a firm's rating.

Though it is widely recognized that joining the index changes the composition of the shareholder body, the literature has not explored the implication that joining the index appears to lead to a change in the firm's peers as viewed by its board and its management. This peer effect of joining the index has important implications for firm policies that have not been identified before. This peer effect is surprising because by merely classifying a firm as belonging to the index does not change any of the fundamental characteristics of a firm. Yet, as the firm joins the index, its board changes the CEO's peer group for its compensation policy, so that the fraction of peers from the S&P500 increases by 24.9%. We show that a firm's investment, funding, and payout policies become more correlated with the policies of its index peers. We also find that repurchases increase sharply as a result of firms joining the index. Lastly, we find no effect of inclusion on competition even though it causes an increase in passive ownership. Though passive ownership decreases throughout our sample period, the effects we document do not become stronger over time and in some cases become weaker. Further research should

attempt to explain why and how markets and investors appear to have adjusted to the increase in passive investing so that the real effects of passive investing have become somewhat weaker.

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Appendix: Variable Definitions

Active	the number of a firm's shares held by all mutual funds less those shares held by passive funds scaled by the firm's total shares outstanding
All 13F	the number of a firm's shares held held by institutions filing 13F's at the SEC.gov website scaled by the firm's total shares outstanding
Amihud	stock illiquidity measure by Amihud (2002)
Analysts	the number of financial analysts covering a firm
Block ownership	aggregate percentage ownership of a firm's outstanding shares held by all blockholders (owners of more than 5%) excluding quasi-index institutions
Board independence	the number of board members who are classified as independent directors divided by the number of all board members
Capex	capital expenditures scaled by lagged total assets
CapexSP500Peer	the average capex of S&P 500 firms in a firm's industry (4-digit SIC)
Cash	cash and cash equivalents scaled by total assets
Cashflow	income before extraordinary items plus depreciation and amortization all scaled by total assets
Ch(SP500 Firms)	the change in the number of firms in an S&P 500 industry in a year
Decrease in SP500 Firms	a dummy variable equal to one if one or more firms are removed from an S&P 500 industry in a year
Dividend	the dollar amount of dividends paid to common stock scaled by total assets
DivSP500Peer	the average dividend of S&P 500 firms in a firm's industry (4-digit SIC)
ESP forecast	the average analyst annual earnings per share (EPS) estimate from IBES
EPS realized	realized annual EPS
Fluidity	the firm-level competition measure as calculated in Hoberg, Phillips, and Prabhala (2014)
GPIN	(GPIN) is Generalized-PIN as calculated in Duarte, Hu, and Young (2020)

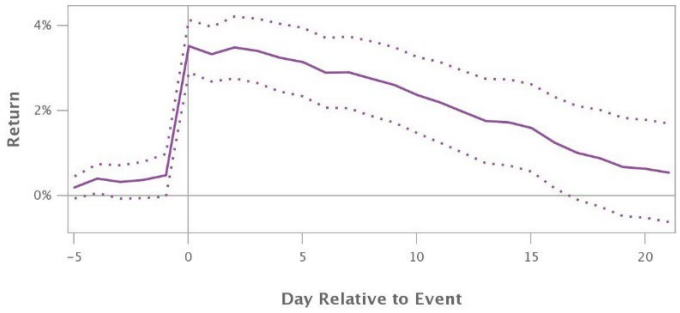
Gross margin	Gross margin is revenues less COGS scaled by revenues
Increase in SP500 Firms	a dummy variable equal to one if one or more firms are added to an S&P 500 industry in a year
Investment	the annual change in total assets scaled by lagged total assets
InvestSP500Peer	the average investment of S&P 500 firms in a firm's industry (4-digit SIC)
Late	a dummy variable equal to one if the year is greater than 2007 and zero otherwise
Lerner Index SP500	the median gross margin within an industry-year
Leverage	the sum of short term and long-term debt scaled by total assets
Log(Compensation)	the natural logarithm of the CEO's annual compensation (TDC1)
Log(Employees)	the natural logarithm of the number of the firm's employees (in thousands)
Log(Revenue)	the natural logarithm of a firm's total revenue
Net debt	debt issued less debt retired scaled by total assets
Net equity	equity issued less equity repurchased scaled by total assets
NDI_SP500Peer	the average net debt issuance of S&P 500 firms in a firm's industry (4-digit SIC)
NEI_SP500Peer	the average net equity issuance of S&P 500 firms in a firm's industry (4-digit SIC)
Passive	the number of a firm's shares held in S&P 500 passive mutual funds scaled by the firm's shares outstanding, where passive funds are those with an active share of less than 0.60 where the active share follows that in Cremers and Petajisto (2009) or a fund whose name contains both "500" and "index"
PayoutSP500Peer	the average payout (dividend plus repurchase) of S&P 500 firms in a firm's industry (4-digit SIC)
PreSP500Add	dummy variable equal to one for treated firms one year prior to an addition year and zero otherwise (always equal to zero for control firms)
Rating	an integer between 1 and 22, in which AAA is 22 and each step down is one integer less (following Butler, Fauver, and Mortal, 2009
Repurchase	the dollar amount of repurchases scaled by total assets

RepSP500Peer	the average repurchase of S&P 500 firms in a firm's industry (4-digit SIC)
ROA	Net income scaled by total assets
Rsq	the R-squared from a model regressing daily stock returns on market returns within a firm-year
%S&P500Peer	percent of a firm's compensation peer group comprised of firms in the S&P 500
Similarity	the firm-level competition measure as calculated in Hoberg and Phillips (2016)
SP500	dummy variable equal to one if a firm is a member of the S&P 500 and zero otherwise
SP500Add	dummy variable equal to one for treated firms after the addition year and zero otherwise (always equal to zero for control firms)
Tobin's *q*	the sum of total assets plus market value of equity minus book value of equity divided by total assets
Volatility	the standard deviation of stock returns in a year, calculated using daily stock returns from CRSP

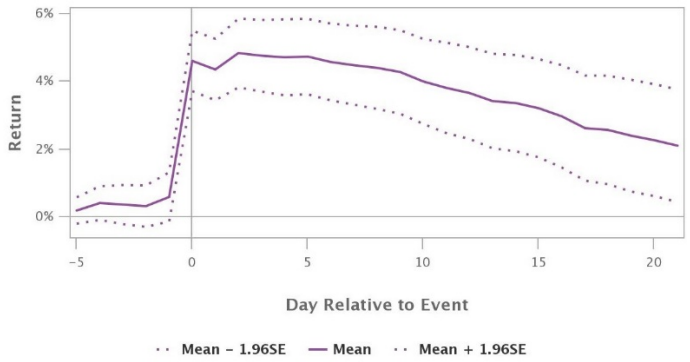
Figure 1: Daily abnormal returns around S&P 500 index additions

The figures present daily abnormal returns around S&P 500 index additions. The event window is [-5, +21]. Abnormal returns are the difference between the actual daily return and the predicted return on the same day. The predicted return is calculated based on the four-factor model (Fama-French 3-factor plus momentum), in which betas are estimated using a 252-day window ending 50 days before an index addition. The 95% confidence intervals are shown in dotted lines. Day 0 is the day following an announcement date as the addition is announced after the market close. Panels A, B, and C is for CARs around S&P 500 index additions during 1997-2017, 1997-2007 and 2008-2017, respectively.

Panel A: 1997-2017



Panel B: 1997-2007



Panel C: 2008-2017

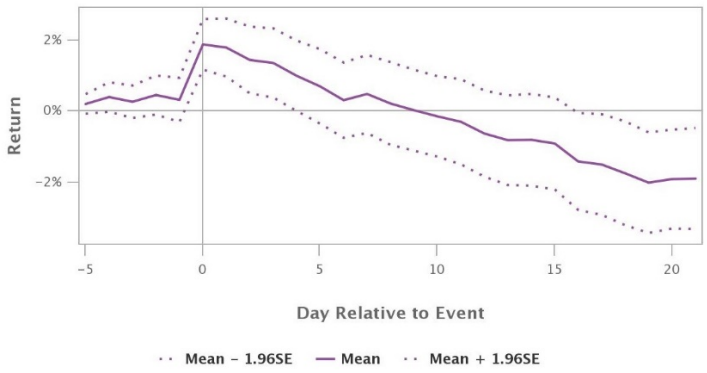


Figure 2: Passive holdings in S&P 500 firms over time

This figure presents the annual average passive holdings in S&P 500 firms that are added to the index within previous four years. The passive holding is the proportion of a firm's outstanding shares held by S&P 500 passive mutual funds. A mutual fund is defined as an S&P 500 passive mutual fund if its fund name contains both "index" and "500" or its active share is less than 0.60 (following that in Cremers and Petajisto, 2009).

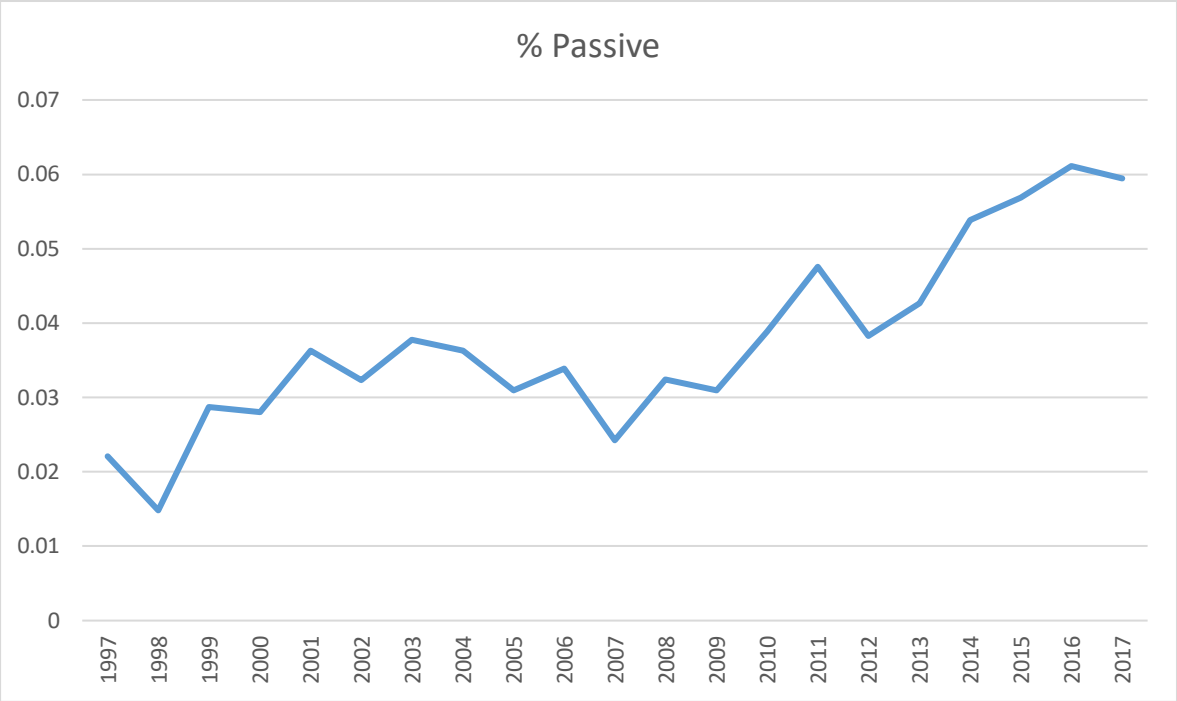


Table 1: Summary statistics

This table presents summary statistics. The sample includes treated firms added to the S&P 500 index and control firms that are propensity-score matched on total assets, Tobin's *q*, stock return, and industry (2-digit SIC) in the year before index addition (more details in Section 4). The sample period is 1997 to 2017. All variables are winsorized at the 1st and 99th percentiles. Variable definitions are in Appendix.

Variable	Mean	SD	p25	p50	p75	N
Log(Assets)	8.46	1.28	7.65	8.41	9.25	6,707
Tobin's *q*	2.38	2.01	1.20	1.65	2.65	6,707
Cash	0.15	0.17	0.03	0.08	0.21	6,704
Leverage	0.26	0.21	0.09	0.24	0.39	6,707
Block ownership	0.17	0.14	0.07	0.14	0.24	2,851
Rsq	0.26	0.17	0.12	0.23	0.37	6,113
GPIN	0.07	0.06	0.04	0.06	0.08	2,762
Capex	0.06	0.08	0.01	0.04	0.08	6,690
Cashflow	0.11	0.11	0.05	0.10	0.16	6,265
%SP500Peers	0.44	0.22	0.29	0.44	0.60	2,102
Investment	0.22	0.50	0.01	0.09	0.24	6,707
Net debt issuance	0.02	0.08	-0.01	0	0.04	6,064
Net equity issuance	-0.01	0.07	-0.02	0	0.01	5,758
Dividend	0.01	0.02	0	0.00	0.02	6,707
Repurchase	0.03	0.05	0	0.00	0.03	5,936
ROA	0.05	0.09	0.01	0.04	0.09	6,707

Table 2: Abnormal returns of S&P 500 index additions

This table presents abnormal stock returns for S&P 500 index additions. The abnormal returns are calculated for the full sample (1997 to 2017), the early sub-period (1997 to 2007), and the late sub-period (2008 to 2017). The *p*-values of the equality tests for abnormal returns between the early and the late sub-periods are reported. Panel A (B) shows the short-run CARs for the event window [-5, +5] ([-5, +21]) around the announcement date. The short-run CARs are calculated using four models: market model, Fama-French three-factor model, Carhart (1997) four-factor model (FF3 plus momentum), and Fama-French five-factor model (Fama and French, 2015). Panels C and D present long-run CARs starting from the addition month to 12 months later. Panel C presents CARs (monthly alphas) using the calendar-time portfolio approach. Panel D presents abnormal returns based on benchmark portfolio matching following Daniel, Grinblatt, Titman and Wermers (1997). In particular, the column "Calendar-time monthly alpha" shows the average difference between the stock return and its matched benchmark portfolio return, in which the average is across all firms added to S&P 500 index from the addition month to 12 months later (the window is [0,12]). The column "Event time BHAR" shows the event-time buy-and-hold abnormal returns (BHAR), which are measured as the buy-and-hold raw return minus the buy-and-hold return for a benchmark portfolio matched on size, book-to-market, and momentum over the same [0,12] window as in Panel C following Barber and Lyon (1997) and Daniel, Grinblatt, Titman and Wermers (1997). ***, **, and * are for statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Short-run CARs [-5, +5]: event-time method

Period	Market	FF3	FF3 + UMD	FF5
1997-2017	0.033***	0.033***	0.032***	0.033***
1997-2007	0.049***	0.048***	0.047***	0.049***
2008-2017	0.006	0.007	0.007	0.006
p-value (early - late)	<0.01	<0.01	<0.01	<0.01

Panel B. Short-run CAR [-5, +21]: Event-time method

Period	Market	FF3	FF3 + UMD	FF5
1997-2017	0.006	0.005	0.006	0.004
1997-2007	0.024***	0.020**	0.023***	0.021**
2008-2017	-0.023***	-0.021***	-0.021***	-0.022***
p-value (early - late)	<0.01	<0.01	<0.01	<0.01

Panel C. One year long-run CAR: Calendar-time portfolio approach (monthly alpha)

Period	Market	FF3	FF3 + UMD	FF5
1997-2017	-0.0025	-0.0023	-0.0021	-0.0022
1997-2007	0.0013	0.0015	0.0023	0.0026
2008-2017	-0.0063**	-0.0073**	-0.0073**	-0.0066**
p-value (early - late)	0.05	0.02	0.02	0.02

Panel D. One year long-run CAR: DGTW benchmark portfolio match

Period	Calendar-time alpha monthly	Event-time BHAR
1997-2017	-0.0021	0.004
1997-2007	0.0003	0.035
2008-2017	-0.0045**	-0.053**
p-value (early - late)	0.12	0.04

Table 3: Passive mutual fund holdings and S&P 500 index additions

This table shows the effects of S&P 500 index addition on passive fund holdings, active fund holdings, and total 13F-institutional holdings. A mutual fund is defined as an S&P 500 passive mutual fund if its active share is less than 0.60 (following Cremers and Petajisto, 2009) or its fund name contains both "index" and "500". *Passive* is the proportion of a firm's outstanding shares held by S&P 500 passive mutual funds. *Active* is the proportion of a firm's outstanding shares held by active mutual funds that are not passive mutual funds (as defined above). *All 13F* is the proportion of a firm's outstanding shares held by all 13F institutions. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after the addition year and zero otherwise. *PreSP500Add* is a dummy variable that is equal to one for treated firms one year prior to an addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. The event window is four years before and four years after a year of addition. The addition year is excluded. The sample period is from 1997 to 2017. All specifications include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Passive	Passive	Active	Active	All 13F	All 13F
SP500Add	0.034***	0.024***	-0.115***	-0.031	-0.007	-0.015
	[25.72]	[13.66]	[-2.72]	[-1.12]	[-0.28]	[-0.62]
SP500Add x Late		0.017***		-0.142*		0.015
		[8.48]		[-1.71]		[0.46]
PreSP500Add	0.001	0.001	0.021	0.025	-0.005	-0.006
	[1.43]	[0.83]	[0.44]	[0.50]	[-0.35]	[-0.39]
Log(Assets)	0.002**	0.002**	0.033	0.033	0.028	0.028
	[2.43]	[2.52]	[1.32]	[1.34]	[1.55]	[1.55]
Tobin's *q*	0.001***	0.001***	0.010	0.010	0.002	0.002
	[2.86]	[2.82]	[1.37]	[1.42]	[0.35]	[0.32]
Cash	0.001	0.002	-0.025	-0.029	0.037	0.037
	[0.50]	[0.69]	[-0.56]	[-0.65]	[0.60]	[0.59]
Leverage	0.001	0.002	0.090**	0.085**	0.091*	0.090*
	[0.30]	[0.47]	[2.23]	[2.09]	[1.96]	[1.95]
Return	0.000	0.000	-0.004	-0.004	0.025**	0.025**
	[0.38]	[0.23]	[-0.20]	[-0.18]	[2.43]	[2.43]
Observations	4,501	4,501	4,501	4,501	3,027	3,027
R-squared	0.816	0.825	0.594	0.595	0.803	0.803
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

Table 4: Corporate governance and S&P 500 index additions

This table shows the effect of S&P 500 index addition on block ownership. Block ownership is the percent of shares held by blockholders (at least 5%). Quasi index institutions are excluded, in which quasi-index institutions follow the classification by Bushee and Noe (2000). *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to an addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. The event window is four years before and four years after a year of addition. The addition year is excluded. The sample period is from 1997 to 2017. All specifications include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
VARIABLES	Block ownership	Block ownership
SP500Add	-0.025**	-0.028**
	[-1.98]	[-1.98]
SP500Add x Late		0.005
		[0.36]
PreSP500Add	-0.012	-0.012
	[-1.54]	[-1.56]
Log(Assets)	-0.033***	-0.033***
	[-2.95]	[-2.96]
Tobin's *q*	-0.003	-0.003
	[-1.06]	[-1.08]
Cash	-0.019	-0.020
	[-0.57]	[-0.58]
Leverage	0.088***	0.087***
	[3.23]	[3.22]
Return	-0.006	-0.006
	[-1.31]	[-1.31]
Analysts	-0.001	-0.001
	[-0.93]	[-0.92]
Amihud	0.000	0.000
	[0.98]	[0.99]
Observations	2,346	2,346
R-squared	0.673	0.673
Firm FE	Y	Y
Year FE	Y	Y

Table 5: Stock price informativeness, S&P 500 additions, and passive holdings

This table presents the effect of S&P 500 index addition and passive mutual fund holdings on stock price informativeness (SPI). *Rsq* is the R-squared from the market model where the value-weighted market return is used（*vwretd* in CRSP). *GPIN* follows the Generalized PIN model by Duarte, Hu, and Young (2020). *SP500Add* is a dummy variable that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable that is equal to one for treated firms one year prior to an addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. Panel A (B) shows the addition (passive holding) effect on SPI. In Panel B, *Passive* is the proportion of a firm's outstanding shares held in S&P 500 passive mutual funds. A mutual fund is defined as an S&P 500 passive mutual fund if its active share is less than 0.60 (following that in Cremers and Petajisto, 2009) or its fund name contains both "index" and "500". The event window is four years before and four years after a year of addition. The addition year is excluded. The sample period is from 1997 to 2017. All specifications include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: SPI and S&P 500 additions

VARIABLES	(1) Rsq	(2) Rsq	(3) GPIN	(4) GPIN
SP500Add	0.022***	0.030***	-0.021***	-0.030***
	[2.81]	[3.42]	[-3.95]	[-3.96]
SP500Add x Late		-0.015		0.017**
		[-1.31]		[2.36]
PreSP500Add	0.000	0.001	0.009	0.008
	[0.07]	[0.12]	[1.06]	[1.01]
Log(Assets)	0.032***	0.031***	-0.002	-0.001
	[6.12]	[6.07]	[-0.33]	[-0.26]
Tobin's *q*	0.011***	0.011***	0.008*	0.008**
	[6.89]	[6.88]	[1.94]	[1.97]
Cash	0.011	0.010	-0.017	-0.017
	[0.42]	[0.41]	[-0.65]	[-0.65]
Leverage	-0.054***	-0.054***	0.038**	0.039***
	[-2.72]	[-2.76]	[2.50]	[2.63]
Return	0.002	0.003	0.004	0.004
	[0.76]	[0.78]	[1.08]	[1.10]
Observations	5,332	5,332	2,379	2,379
R-squared	0.751	0.752	0.264	0.266
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Panel B: SPI and passive holdings

VARIABLES	(1) Rsq	(2) Rsq	(3) GPIN	(4) GPIN
Passive	0.036	-0.113	-0.306***	-0.356**
	[0.31]	[-0.69]	[-3.64]	[-2.35]
Passive x Late		0.236		0.091
		[1.14]		[0.60]
Log(Assets)	0.033***	0.033***	-0.004	-0.004
	[5.34]	[5.40]	[-0.63]	[-0.64]
Tobin's *q*	0.013***	0.013***	0.007**	0.007**
	[7.52]	[7.56]	[2.29]	[2.29]
Cash	0.047*	0.047*	-0.013	-0.012
	[1.67]	[1.68]	[-0.48]	[-0.47]
Leverage	-0.055**	-0.055**	0.034**	0.034**
	[-2.56]	[-2.57]	[2.11]	[2.09]
Return	-0.002	-0.002	0.008*	0.008*
	[-0.59]	[-0.63]	[1.88]	[1.87]
Observations	4,769	4,769	2,209	2,209
R-squared	0.760	0.760	0.237	0.237
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Table 6: Investment-*q* sensitivity and S&P 500 additions

This table shows the effect of S&P 500 index addition on firms' investment efficiency. *Capex* is defined as capital expenditures scaled by lagged total assets. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to an addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. Tobin's *q* is one-year lagged following the literature. The event window is four years before and four years after an addition year. The addition year is excluded. The sample period is from 1997 to 2017. All specifications include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
VARIABLES	Capex	Capex
SP500Add x Tobin's *q*	-0.005***	-0.006***
	[-4.23]	[-4.01]
SP500Add x Tobin's *q* x Late		0.003
		[1.55]
Tobin's *q*	0.008***	0.008***
	[7.57]	[7.19]
Tobin's *q* x Late		-0.002
		[-0.88]
SP500Add	0.007	0.013**
	[1.52]	[2.17]
SP500Add x Late		-0.014**
		[-1.97]
PreSP500Add x Tobin's *q*	-0.001	-0.001
	[-0.93]	[-0.88]
PreSP500Add	-0.000	-0.000
	[-0.03]	[-0.03]
Cashflow	0.106***	0.106***
	[5.49]	[5.49]
Observations	5,384	5,384
R-squared	0.763	0.764
Firm FE	Y	Y
Year FE	Y	Y

Table 7: Credit ratings and S&P 500 index additions

This table shows the effect of S&P 500 index addition on corporate credit ratings. *Rating* is an integer between 1 and 22, in which AAA is 22 and each step down is one integer less (following Butler, Fauver, and Mortal, 2009). Panel A shows differences in ratings of S&P 500 firms and non-S&P 500 firms. *SP500* is a dummy variable equal to one if a firm is a member of the S&P 500 index and zero otherwise. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. The test sample for Panel A includes all S&P 500 firms and the largest 500 non-S&P 500 firms (by market capitalization) per year from 1997-2017. Panel B shows the effect of S&P 500 additions on ratings. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to the addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. The event window in Panel B is four years before and four years after an addition year. The addition year is excluded. All specifications in Panel A (B) include industry (firm) and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Ratings of S&P 500 and non-S&P 500 firms

	(1)	(2)
VARIABLES	Rating	Rating
SP500	0.415***	0.292***
	[3.56]	[2.79]
Log(Assets)	1.089***	1.040***
	[19.32]	[18.94]
Tobin's *q*	0.264***	0.393***
	[2.87]	[4.99]
Cash		-2.287***
		[-4.14]
Leverage		-4.522***
		[-11.14]
Return		-0.937***
		[-13.33]
Observations	15,530	15,341
R-squared	0.350	0.415
Industry FE	Y	Y
Year FE	Y	Y

Panel B. S&P 500 addition effects on credit ratings

VARIABLES	(1) Rating	(2) Rating
SP500Add	0.408***	0.522***
	[3.17]	[3.35]
SP500Add x Late		-0.219
		[-1.20]
PreSP500Add	0.104	0.110
	[1.43]	[1.52]
Log(Assets)	0.844***	0.839***
	[7.62]	[7.59]
Tobin's *q*	0.118**	0.116**
	[2.43]	[2.36]
Cash	-0.419	-0.429
	[-0.86]	[-0.88]
Leverage	-1.522***	-1.544***
	[-3.64]	[-3.73]
Return	-0.383***	-0.381***
	[-5.64]	[-5.60]
Observations	3,617	3,617
R-squared	0.900	0.900
Firm FE	Y	Y
Year FE	Y	Y

Table 8: S&P 500 peer firms as performance benchmark in executive compensation

This table shows the effect of S&P 500 index addition on CEO performance evaluation in executive compensation. *%SP500Peer* is the portion of S&P 500 peers in a CEO's peer group for the relative performance evaluation in her compensation contract. The data is available from 2006. Panel A shows the univariate evidence and compares *%SP500Peers* before and after a firm is added to the S&P 500 index. The *p*-value is for the *t*-test of mean equality. Panel B shows results of multivariate regressions. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to an addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. Model 1 uses contemporaneous control variables. Model 2 uses lagged controls and drops the event year. Peer group data is from IncentiveLab. The event window is four years before and four years after an addition year. The addition year is excluded. All specifications include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Univariate evidence

	%SP500Peer	*p*-value (mean equality)
Before addition	0.413	0.001
After addition	0.516	

Panel B. DiD regressions

	(1)	(2)
VARIABLES	%SP500Peers	%SP500Peers
Controls	Contemp	Lagged
SP500Add	0.051**	0.037*
	[2.12]	[1.83]
PreSP500Add	0.013	0.018
	[0.86]	[1.23]
Log(Assets)	0.072***	0.093***
	[3.56]	[3.78]
Tobin's *q*	0.007	0.011*
	[0.95]	[1.77]
Cash	-0.074	0.076
	[-1.10]	[1.17]
Leverage	-0.041	-0.095
	[-0.76]	[-1.55]
Return	-0.013	-0.010
	[-1.61]	[-1.25]
Analysts	0.004**	0.004**
	[2.57]	[2.22]
Board independence	-0.065	-0.298**
	[-0.64]	[-2.46]
Observations	1,441	1,269
R-squared	0.847	0.849
Firm FE	Y	Y
Year FE	Y	Y

Table 9: Corporate investment and S&P 500 additions

This table shows the effect of S&P 500 index addition on corporate investment. *Investment* is the annual change in total assets scaled by lagged total assets. Panel A shows differences in investment of S&P 500 firms and non-S&P 500 firms. *SP500* is a dummy variable equal to one if a firm is a member of the S&P 500 index and zero otherwise. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. The test sample in Panel A includes all S&P 500 firms and the largest 500 non-S&P 500 firms (by market capitalization). Panel B shows the effect of S&P 500 additions on investment. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to an addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. Panel C shows the S&P 500 peer effect on investment of newly added firms. *InvestSP500Peer* is the average investment of S&P 500 peers in a firm's industry. The event window in Panels B and C is four years before and four years after an addition year. The addition year is excluded. The sample period is from 1997 to 2017. Specifications in Panel A include industry and year fixed effects. Specifications in Panels B and C include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Investment of S&P 500 and non-S&P 500 firms

	(1)	(2)
VARIABLES	Investment	Investment
SP500	-0.056***	-0.079***
	[-6.53]	[-9.22]
SP500 x Late		0.049***
		[4.58]
Log(Assets)	0.029	0.024
	[1.08]	[1.07]
Log(Assets) squared	-0.002	-0.001
	[-1.23]	[-1.15]
Tobin's *q*	0.017***	0.017***
	[4.23]	[3.59]
Cashflow	-0.441**	-0.444***
	[-2.11]	[-6.50]
Cash	0.116**	0.113***
	[2.22]	[3.24]
Leverage	0.047	0.045*
	[1.12]	[1.90]
Return	0.154***	0.153***
	[6.16]	[12.62]
Observations	18,966	18,966
R-squared	0.133	0.134
Industry FE	Y	Y
Year FE	Y	Y

Panel B. S&P 500 addition effects on investment

VARIABLES	(1) Investment	(2) Investment
SP500Add	-0.149***	-0.201***
	[-5.20]	[-4.83]
SP500Add x Late		0.098**
		[2.22]
PreSP500Add	-0.038	-0.041
	[-1.44]	[-1.53]
Log(Assets)	-0.002	0.007
	[-0.01]	[0.06]
Log(Assets) squared	0.014**	0.014**
	[2.05]	[2.00]
Tobin's *q*	-0.003	-0.003
	[-0.28]	[-0.30]
Cash	0.274**	0.278**
	[2.17]	[2.21]
Leverage	0.361***	0.365***
	[4.37]	[4.43]
Cashflow	1.571***	1.566***
	[9.65]	[9.61]
Return	0.110***	0.109***
	[5.63]	[5.63]
Observations	5,357	5,357
R-squared	0.396	0.397
Firm FE	Y	Y
Year FE	Y	Y

Panel C. S&P 500 peer effects on investment

VARIABLES	(1) Investment	(2) Investment
InvestSP500Peer x SP500Add	0.485***	0.450***
	[3.72]	[2.85]
InvestSP500Peer x SP500Add x Late		0.165
		[0.59]
InvestSP500Peer x Late		-0.062
		[-0.43]
InvestSP500Peer	0.223***	0.235***
	[3.57]	[3.79]
SP500Add	-0.215***	-0.278***
	[-6.41]	[-5.93]
SP500Add x Late		0.119**
		[2.48]
InvestSP500Peer x PreSP500Add	0.122	0.119
	[0.77]	[0.73]
PreSP500Add	-0.045	-0.046
	[-1.30]	[-1.33]
Log(Assets)	0.014	0.024
	[0.12]	[0.20]
Log(Assets) squared	0.011	0.011
	[1.60]	[1.54]
Tobin's *q*	-0.001	-0.001
	[-0.10]	[-0.14]
Cash	0.341***	0.343***
	[2.80]	[2.85]
Leverage	0.334***	0.342***
	[3.82]	[3.91]
Cashflow	1.338***	1.333***
	[8.28]	[8.27]
Return	0.101***	0.100***
	[5.02]	[5.03]
Observations	4,680	4,680
R-squared	0.445	0.447
Firm FE	Y	Y
Year FE	Y	Y

Table 10: External financing and S&P 500 index additions

This table shows the effect of S&P 500 index addition on firms' external financing. *Net Debt* is defined as debt issuance less debt retired scaled by total assets. *Net Equity* is equity issued less equity repurchased scaled by assets. Panel A shows differences in external financing of S&P 500 firms and non-S&P 500 firms. *SP500* is a dummy variable equal to one if a firm is a member of the S&P 500 index and zero otherwise. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. The test sample in Panel A includes all S&P 500 firms and the largest 500 non-S&P 500 firms (by market capitalization). Panel B shows the effect of S&P 500 additions on net debt issuance and net equity issuance. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to an addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. Panel C shows the S&P 500 peer effect on security issuance of newly added firms. *NDI_SP500Peer* (*NEI_SP500Peer*) is the average net debt (equity) issuance of S&P 500 firms in a firm's industry (4-digit SIC). The event window in Panels B and C is four years before and four years after an addition year. The addition year is excluded. The sample period is from 1997 to 2017. Specifications in Panel A include industry and year fixed effects. Specifications in Panels B and C include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. External financing of S&P 500 and non-S&P 500 firms

	(1)	(2)	(3)	(4)
VARIABLES	Net Debt	Net Debt	Net Equity	Net Equity
SP500	-0.002	-0.003	-0.021***	-0.021***
	[-1.05]	[-1.59]	[-9.08]	[-9.77]
SP500		0.002		0.000
		[1.00]		[0.13]
Log(Assets)	-0.002**	-0.002***	0.002**	0.002***
	[-2.38]	[-3.14]	[2.75]	[2.94]
Tobin's *q*	0.001	0.001**	-0.002	-0.002***
	[1.57]	[2.13]	[-1.59]	[-2.73]
Cash	0.043***	0.043***	0.007	0.007
	[4.68]	[6.95]	[0.76]	[0.78]
Leverage	0.135***	0.135***	-0.006	-0.006
	[11.07]	[23.29]	[-0.81]	[-0.92]
Return	0.001	0.001	0.016***	0.016***
	[0.47]	[0.72]	[5.27]	[10.28]
Firm age	-0.000***	-0.000***	0.000	0.000
	[-4.14]	[-4.67]	[0.01]	[0.01]
Observations	14,950	14,950	14,470	14,470
R-squared	0.134	0.135	0.186	0.186
Industry FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Panel B. S&P 500 addition effects on external financing

VARIABLES	(1) Net Debt	(2) Net Debt	(3) Net Equity	(4) Net Equity
SP500Add	-0.003	0.002	-0.017***	-0.021***
	[-0.60]	[0.31]	[-3.82]	[-3.50]
SP500Add x Late		-0.010		0.008
		[-1.14]		[1.16]
PreSP500Add	-0.001	-0.001	-0.003	-0.003
	[-0.20]	[-0.16]	[-0.87]	[-0.92]
Log(Assets)	0.022***	0.022***	0.010***	0.010***
	[5.12]	[5.07]	[2.73]	[2.76]
Tobin's *q*	0.002	0.002	0.000	0.000
	[1.04]	[1.05]	[0.16]	[0.17]
Cash	0.084***	0.084***	0.075***	0.075***
	[3.97]	[3.95]	[3.99]	[3.98]
Leverage	0.280***	0.280***	-0.005	-0.005
	[11.55]	[11.52]	[-0.35]	[-0.33]
Return	-0.003	-0.003	0.013***	0.013***
	[-0.81]	[-0.80]	[5.49]	[5.48]
Firm age	-0.000	-0.000	0.002***	0.002***
	[-0.07]	[-0.05]	[2.88]	[2.73]
Observations	4,511	4,511	4,275	4,275
R-squared	0.330	0.331	0.506	0.506
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Panel C. S&P 500 peer effects on external financing

VARIABLES	(1) Net Debt	(2) Net Debt	(3) Net Equity	(4) Net Equity
NDI_SP500Peer x SP500Add	0.618***	0.636***		
	[9.01]	[7.11]		
NDI_SP500Peer x SP500Add x Late		-0.017		
		[-0.13]		
NDI_SP500Peer x Late		-0.059		
		[-0.61]		
NDI_SP500Peer	0.146***	0.167***		
	[2.96]	[2.65]		
NDI_SP500Peer x PreSP500Add	0.016	0.017		
	[0.13]	[0.14]		
NEI_SP500Peer x SP500Add			0.646***	0.749***
			[7.83]	[6.48]
NEI_SP500Peer x SP500Add x Late				-0.177
				[-1.17]
NEI_SP500Peer x Late				0.036
				[0.45]
NEI_SP500Peer			0.218***	0.204***
			[3.98]	[3.16]
NEI_SP500Peer x PreSP500Add			0.036	0.028
			[0.35]	[0.27]
SP500Add	-0.007	-0.007	-0.001	-0.002
	[-1.17]	[-0.85]	[-0.11]	[-0.30]
SP500Add x Late		-0.001		0.002
		[-0.12]		[0.27]
PreSP500Add	0.005	0.005	-0.003	-0.003
	[0.91]	[0.95]	[-0.66]	[-0.71]
Log(Assets)	0.016***	0.017***	0.009**	0.009**
	[3.62]	[3.64]	[2.30]	[2.29]
Tobin's *q*	0.001	0.001	0.001	0.001
	[0.81]	[0.80]	[0.42]	[0.39]
Cash	0.084***	0.084***	0.080***	0.079***
	[3.51]	[3.51]	[4.16]	[4.11]
Leverage	0.255***	0.255***	0.003	0.004
	[10.44]	[10.44]	[0.21]	[0.27]
Return	-0.001	-0.001	0.011***	0.011***
	[-0.36]	[-0.33]	[4.46]	[4.41]
Firm age	0.002	0.002	0.002	0.002
	[0.39]	[0.41]	[0.66]	[0.64]
Observations	3,955	3,955	3,734	3,734
R-squared	0.407	0.407	0.577	0.577
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Table 11: Payouts and S&P 500 index additions

This table shows the effect of S&P 500 index addition on corporate payouts. *Dividend* is the dollar amount of dividends paid to common stock scaled by total assets. *Repurchase* is the dollar amount of repurchases scaled by total assets. *Payout* is the sum of *Dividend* and *Repurchase*. Panel A shows differences in payouts of S&P 500 firms and non-S&P 500 firms. *SP500* is a dummy variable equal to one if a firm is a member of the S&P 500 index and zero otherwise. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. The test sample in Panel A includes all S&P 500 firms and the largest 500 non-S&P 500 firms (by market capitalization). Panel B shows the effect of S&P 500 additions on payouts. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to an addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. Panel C shows the S&P 500 peer effect on payouts of newly added firms. *DivSP500Peer*, *RepSP500Peer*, and *PayoutSP500Peer* are the average dividend, repurchase, and total payouts of S&P 500 peers in a firm's industry (4-digit SIC), respectively. The event window in Panels B and C is four years before and four years after an addition year. The addition year is excluded. The sample period is from 1997 to 2017. Specifications in Panel A include industry and year fixed effects. Specifications in Panels B and C include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Payouts of S&P 500 and non-S&P 500 firms

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Dividend	Dividend	Repurchase	Repurchase	Payout	Payout
SP500	-0.001	-0.001	0.021***	0.021***	0.020***	0.020***
	[-0.92]	[-0.96]	[11.34]	[13.65]	[10.51]	[11.73]
SP500 x Late		-0.000		-0.000		-0.001
		[-0.09]		[-0.12]		[-0.26]
Log(Assets)	0.000	0.000	-0.003***	-0.003***	-0.003***	-0.003***
	[0.76]	[0.78]	[-5.12]	[-5.48]	[-4.18]	[-4.47]
Tobin's *q*	0.001**	0.001***	0.001*	0.001***	0.003**	0.003***
	[2.49]	[4.15]	[1.85]	[2.89]	[2.21]	[3.48]
Cashflow	0.123***	0.123***	0.219***	0.219***	0.359***	0.359***
	[13.64]	[18.82]	[13.22]	[18.80]	[16.04]	[25.29]
Cash	-0.007*	-0.007**	0.030***	0.030***	0.024***	0.024***
	[-1.93]	[-2.08]	[4.36]	[4.48]	[3.02]	[3.08]
Leverage	0.006*	0.006*	0.018***	0.018***	0.026***	0.026***
	[1.80]	[1.94]	[3.20]	[3.52]	[3.78]	[4.38]
Return	-0.006***	-0.006***	-0.007***	-0.007***	-0.014***	-0.014***
	[-6.91]	[-11.94]	[-4.50]	[-8.16]	[-5.87]	[-11.51]
Observations	18,972	18,972	17,701	17,701	17,701	17,701
R-squared	0.325	0.325	0.314	0.314	0.386	0.386
Industry FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

Panel B. S&P 500 addition effects on payouts

VARIABLES	(1) Dividend	(2) Dividend	(3) Repurchase	(4) Repurchase	(5) Payout	(6) Payout
SP500Add	0.003***	0.003**	0.016***	0.017***	0.020***	0.022***
	[2.67]	[2.43]	[4.86]	[3.50]	[5.27]	[4.05]
SP500Add x Late		-0.001		-0.001		-0.004
		[-0.48]		[-0.21]		[-0.56]
PreSP500Add	0.001	0.001	0.002	0.002	0.004	0.004
	[1.09]	[1.11]	[0.94]	[0.95]	[1.26]	[1.28]
Log(Assets)	-0.002**	-0.002**	-0.011***	-0.011***	-0.014***	-0.014***
	[-2.21]	[-2.22]	[-4.82]	[-4.80]	[-5.20]	[-5.18]
Tobin's *q*	0.001**	0.001**	0.000	0.000	0.001	0.001
	[2.58]	[2.58]	[0.30]	[0.30]	[1.03]	[1.03]
Cashflow	0.014**	0.014**	0.123***	0.123***	0.156***	0.156***
	[2.20]	[2.20]	[8.06]	[8.06]	[7.75]	[7.75]
Cash	0.001	0.001	-0.021	-0.021	-0.020	-0.020
	[0.36]	[0.35]	[-1.58]	[-1.59]	[-1.38]	[-1.39]
Leverage	0.003	0.003	0.013	0.013	0.029**	0.029**
	[0.59]	[0.59]	[1.14]	[1.13]	[2.08]	[2.07]
Return	-0.002***	-0.002***	-0.008***	-0.008***	-0.011***	-0.011***
	[-3.71]	[-3.73]	[-5.63]	[-5.64]	[-6.51]	[-6.52]
Observations	5,359	5,359	4,780	4,780	4,780	4,780
R-squared	0.738	0.738	0.574	0.574	0.594	0.594
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

Panel C. S&P 500 peer effects on payouts

VARIABLES	(1) Dividend	(2) Dividend	(3) Repurchase	(4) Repurchase	(5) Payout	(6) Payout
DivSP500Peer x SP500Add	0.263***	0.280*				
	[3.17]	[1.71]				
DivSP500Peer x SP500Add x Late		0.032				
		[0.16]				
DivSP500Peer x Late		-0.051				
		[-0.55]				
DivSP500Peer	0.222***	0.239***				
	[4.27]	[3.65]				
DivSP500Peer x PreSP500Add	-0.013	-0.011				
	[-0.23]	[-0.19]				
RepSP500Peer x SP500Add			0.551***	0.580***		
			[7.44]	[5.33]		
RepSP500Peer x SP500Add x Late				-0.059		
				[-0.41]		
RepSP500Peer x Late				0.009		
				[0.15]		
RepSP500Peer			0.143***	0.141***		
			[3.75]	[3.63]		
RepSP500Peer x PreSP500Add			0.054	0.054		
			[1.00]	[0.98]		
PayoutSP500Peer x SP500Add					0.612***	0.649***
					[8.13]	[5.90]
PayoutSP500Peer x SP500Add x Late						-0.050
						[-0.36]
PayoutSP500Peer x Late						-0.025
						[-0.38]
PayoutSP500Peer					0.221***	0.228***
					[4.84]	[4.70]
PayoutSP500Peer x PreSP500Add					0.072	0.069
					[1.17]	[1.13]
SP500Add	-0.002	-0.000	-0.004	-0.006	-0.013***	-0.013**
	[-1.27]	[-0.09]	[-1.04]	[-1.16]	[-2.90]	[-2.26]
SP500Add x Late		-0.004		0.004		-0.000
		[-1.57]		[0.66]		[-0.03]
PreSP500Add	0.000	0.001	0.002	0.002	0.001	0.001
	[0.40]	[0.42]	[0.69]	[0.69]	[0.22]	[0.28]
Log(Assets)	-0.001	-0.001	-0.011***	-0.011***	-0.013***	-0.013***
	[-1.41]	[-1.44]	[-4.79]	[-4.77]	[-4.60]	[-4.62]
Tobin's *q*	0.001**	0.001**	0.000	0.000	0.001	0.001
	[1.99]	[2.02]	[0.32]	[0.33]	[1.04]	[1.05]
Cashflow	0.016**	0.016**	0.086***	0.086***	0.119***	0.119***
	[2.18]	[2.20]	[5.89]	[5.89]	[5.75]	[5.79]
Cash	0.003	0.003	-0.017	-0.016	-0.015	-0.015
	[0.68]	[0.68]	[-1.33]	[-1.30]	[-1.05]	[-1.01]
Leverage	0.003	0.003	0.004	0.004	0.019	0.019
	[0.62]	[0.59]	[0.33]	[0.32]	[1.22]	[1.22]
Return	-0.002***	-0.002***	-0.006***	-0.006***	-0.009***	-0.009***
	[-3.24]	[-3.22]	[-3.89]	[-3.90]	[-4.78]	[-4.76]
Observations	4,682	4,682	4,137	4,137	4,137	4,137
R-squared	0.765	0.766	0.641	0.641	0.665	0.665
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

Table 12: EPS forecasts, realized EPS, and ROA

This table shows the effect of S&P 500 index addition on analyst forecasted EPS, realized EPS, and ROA. *EPS forecast* is the average analyst estimate on annual earnings per share (EPS) from IBES. *EPS Realized* is the realized annual EPS. *ROA* is net income scaled by total assets. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to the addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. The event window is four years before and four years after an addition year. The addition year is excluded. The sample period is from 1997 to 2017. All specifications include firm and year fixed effects. Robust standard errors are clustered at the firm level. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	EPS forecast	EPS forecast	EPS realized	EPS realized	ROA	ROA
SP500Add	0.225*	0.106	0.189	-0.069	-0.011**	-0.016***
	[1.84]	[0.93]	[1.22]	[-0.46]	[-2.13]	[-2.63]
SP500Add x Late		0.211		0.476**		0.010
		[1.17]		[2.06]		[1.26]
PreSP500Add	0.089	0.083	0.150	0.139	0.003	0.002
	[1.45]	[1.37]	[1.63]	[1.51]	[0.77]	[0.71]
Log(Assets)	0.683***	0.682***	0.371***	0.378***	0.009*	0.009*
	[5.95]	[5.97]	[3.13]	[3.20]	[1.67]	[1.70]
Tobin's *q*	0.137***	0.137***	0.060*	0.059*	0.013***	0.013***
	[4.20]	[4.22]	[1.93]	[1.91]	[7.08]	[7.05]
Cash	0.175	0.181	1.136**	1.143**	0.069***	0.069***
	[0.51]	[0.53]	[2.05]	[2.08]	[3.11]	[3.11]
Leverage	-1.108***	-1.106***	-2.746***	-2.734***	-0.127***	-0.127***
	[-2.99]	[-2.96]	[-5.77]	[-5.74]	[-6.08]	[-6.06]
Return	-0.092*	-0.092*	0.464***	0.463***	0.012***	0.012***
	[-1.79]	[-1.79]	[6.20]	[6.18]	[3.82]	[3.81]
Volatility	-17.556***	-17.599***	-35.019***	-35.065***	-1.573***	-1.574***
	[-4.77]	[-4.76]	[-7.06]	[-7.07]	[-6.65]	[-6.66]
Observations	3,837	3,837	4,999	4,999	5,002	5,002
R-squared	0.802	0.802	0.593	0.594	0.611	0.611
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

Table 13: Competition and index additions

This table shows the effect of S&P 500 index addition on firms' product market competition. Panel A shows evidence at the firm level. *Fluidity* and *Similarity* are firm-level competition measures from the Hoberg and Phillips data library, where a larger value reflects more competition. *Gross margin* is revenues less COGS scaled by revenues. *SP500Add* is the S&P 500 addition dummy that is equal to one for treated firms after an addition year and zero otherwise. *PreSP500Add* is a dummy variable equal to one for treated firms one year prior to the addition year and zero otherwise. Both *SP500Add* and *PreSP500Add* equal zero for control firms. *Late* is a dummy variable equal to one for years in or after 2008 and zero otherwise. Panel B shows evidence at the industry level. We first divide all S&P 500 firms in a year into different groups by 3-digit SIC industries (i.e. S&P 500 industry group) and define variables at the industry group level. In particular, *Ch(Lerner index SP500)* is the annual change in the median gross margin within an industry group in a year. *Ch(SP500 Firms)* is the change in the number of firms in an S&P 500 industry group in a year. *Increase* (*Decrease*) *in SP500 firms* is a dummy variable equal to one if one or more firms are added to (deleted from) an S&P 500 industry group in a year. The event window is four years before and four years after a year of addition. The addition year is excluded. The sample period is from 1997 to 2017. Panel A (Panel B) specifications include firm (industry) and year fixed effects. Robust standard errors are clustered at the firm level in Panel A and at the industry level in Panel B. Variable definitions are in Appendix. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Firm level

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Fluidity	Fluidity	Similarity	Similarity	Gross margin	Gross margin
SP500Add	-0.085	-0.012	-0.390	-0.543	-0.007	-0.013
	[-0.46]	[-0.06]	[-1.01]	[-1.01]	[-0.88]	[-1.22]
SP500Add x Late		-0.128		0.286		0.011
		[-0.59]		[0.50]		[0.88]
PreSP500Add	0.012	0.017	-0.277	-0.288	0.006	0.006
	[0.10]	[0.16]	[-0.93]	[-0.96]	[1.19]	[1.14]
Log(Assets)	0.302**	0.302**	0.278	0.280	0.014*	0.014*
	[2.43]	[2.43]	[1.02]	[1.02]	[1.81]	[1.85]
Tobin's *q*	0.015	0.015	0.084	0.083	0.007**	0.007**
	[0.39]	[0.41]	[0.87]	[0.86]	[2.41]	[2.39]
Cash	0.589	0.589	0.786	0.787	-0.030	-0.029
	[1.28]	[1.28]	[0.93]	[0.93]	[-0.75]	[-0.74]
Leverage	0.213	0.208	-0.748	-0.738	-0.063*	-0.063*
	[0.41]	[0.41]	[-0.76]	[-0.75]	[-1.69]	[-1.67]
Return	-0.056	-0.055	-0.215*	-0.215*	0.000	0.000
	[-0.91]	[-0.91]	[-1.76]	[-1.76]	[0.03]	[0.01]
Observations	4,313	4,313	4,548	4,548	5,718	5,718
R-squared	0.830	0.830	0.910	0.910	0.871	0.871
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

Panel B: Industry level

VARIABLES	(1) Ch(Lerner Index SP500)	(2) Ch(Lerner Index SP500)	(3) Ch(Lerner Index SP500)	(4) Ch(Lerner Index SP500)
Ch(SP500 Firms)	0.004	0.007		
	[0.42]	[0.55]		
Ch(SP500 Firms) x Late		-0.006		
		[-0.49]		
Increase in SP500 Firms			0.013	0.029
			[0.72]	[0.70]
Increase in SP500 Firms x Late				-0.033
				[-0.57]
Decrease in SP500 Firms			-0.002	0.004
			[-0.15]	[0.19]
Decrease in SP500 Firms x Late				-0.012
				[-0.34]
Observations	5,689	5,689	5,689	5,689
R-squared	0.007	0.007	0.007	0.007
Industry FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y