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ABSTRACT

While major stock market indices are followed by large monetary investments, we document that membership decisions for the S&P 500 index have a nontrivial amount of discretion. We show that firms' purchases of S&P ratings appear to improve their chance of entering the index (but purchases of Moody's ratings do not). Furthermore, firms tend to purchase more S&P ratings when there are openings in the index membership. Such a pattern is also confirmed by an event study that explores a rule change on index membership in 2002. Finally, discretionary additions exhibit subsequent deterioration in financial performance relative to rule-based additions.

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An online appendix is available at http://www.nber.org/data-appendix/w29351

1. Introduction

Entry into a major stock index often boosts a firm's stock price. This happens both because a large amount of passively managed money – mutual funds pegged to the indices and exchange-traded funds (ETFs) – follows them, and because the use of the indices as a performance benchmark induces even active money managers to place large weight on index member stocks in their portfolios. For example, using data from 1976 to 1983, a pioneering study by Shleifer (1986) shows that membership in the Standard and Poor's (S&P) 500 index implies an increase in the equity price by 2.79%. Chang, Hong and Liskovich (2014) show that this effect also holds for Russell index member firms. As index funds have gained popularity over the last two decades,[1] this effect may have gained strength. Kashyap, Kovrijnykh, Li, and Pavlova (2021) find that benchmarking a firm's performance to the S&P500 index, which is common in executive compensation packages, generates additional, inelastic demand for index member stocks.

As the price premium associated with index membership implies a lower cost of capital for a firm, non-index member firms would have a strong incentive to join a major index. Of all the indices, the S&P 500 is the most prominent one and attracts the greatest amount of tracking funds. Tesla provides a recent illustration of the benefit of entering the S&P 500: its stock price increased by 60% from November 16, 2020, when its inclusion in the index was first announced, to December 21, 2020, when its inclusion was consummated. In addition, membership in the S&P 500 index could bring prestige to the corporate executives and recognition and marketing value to the firms. Given these benefits, corporate executives, in principle, would be willing to pay something to get their companies into the index membership.

If the decisions on index membership were entirely rules-based, there would be no way for firms to buy their way into the index. We will show that the membership decisions entail discretion by the S&P. It is already known that the index membership does not consist of the 500 largest firms in market capitalization. The S&P has announced a set of rules beyond market capitalization, such as minimum financial viability and liquidity requirements and representativeness of various industries. To the best of our knowledge,

[1] E.g. Investment Company Fact Book (2020) and Sun (2021)

no academic studies have looked into whether the S&P exercises discretion beyond its own published rules. We intend to fill this void. The *Financial Times* (2015, 2020) has described some examples of this discretion[2] and has also expressed concerns over the risks in the power of stock market indices if such discretion is used in index membership decisions.[3]

Standard and Poor publishes its index methodology describing both the minimum eligibility and the selection criteria for adding stocks to the S&P500 index. By following the published criteria as closely as possible,[4] we are able to explain about 62% of the membership status (which firms belong to the index and which do not at a given point in time) and only about 3% of the addition decisions (which firms are added to the index in a given quarter) from 1980 to 2018. That is, about 38% of the index membership and 97% of the index additions to the S&P 500 index involve discretionary considerations that are not predicted by the published rules. The prediction power increases to 72% for membership and 7% for additions if we focus on firms from 2015 to 2018. Nonetheless, there is still a significant room for discretion in S&P 500 index decisions. For comparison, using the published rules for the Russell 1000, we are able to explain about 93% of the index membership and 75% of index additions from 1996 to 2016. In other words, compared to Russell 1000 membership decisions, additions to S&P500 exhibit a substantially bigger gap between published rules and actual decisions.

Since S&P is also in the business of selling rating and other services to firms, we will examine whether firms try to curry favour with S&P by strategically increasing their rating purchases during times when there are openings in the index membership. We will also examine whether S&P's decisions on index membership are influenced by firms' rating purchase behaviour. There may be other ways for firms to curry favor, such as buying consulting services from S&P, but rating purchases are directly observable. As far as we know, no paper in the literature has used the rating purchase data to examine their connections with index membership decisions.

We document a pair of data patterns that are informative when taken together. First, we examine whether S&P's decisions on adding firms to the index give weight to firms'

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[2] "Indices favour discretion in applying rules," August 15, 2015, *Financial Times*.
[3] "The risks in the power of stock market indices," November 27, 2020, *Financial Times*.
[4] https://www.spglobal.com/spdji/en/documents/methodologies/methodology-sp-us-indices.pdf

rating purchases, beyond the published index methodology. We control for firms' purchase of Moody ratings in this exercise. Second, we examine whether firms strategically purchase more S&P ratings (relative to Moody ratings) when there is an exogenous increase in the likelihood of entering the index (such as that caused by a merger of two S&P500 member firms). We find that the answer to both questions is yes.

S&P discloses that the index membership decisions are made by an index committee of the S&P.[5] The index committee members are S&P employees, and it is not clear whether and how S&P executives and employees in other parts of the company interact with the index committee. In principle, reputational concerns can deter S&P from engaging in activities that present a conflict of interest. However, rating agencies in general, and S&P in particular, are not free from conflicts of interest in other areas. For example, Efing and Hau (2014) show that the leading rating agencies, including S&P, systematically give more-favorable ratings on structured debt securities to firms that maintain a large bilateral business relationship. Baghai and Becker (2018), using data from India, show that rating agencies also give upwardly biased ratings to firms that buy more non-rating services from them. In other words, reputational concerns may not be strong enough to deter the rating agencies from engaging in conflict-of-interest activities. As of now, the existing literature still has not investigated the objectivity of the index composition and the possible conflict of interest in the membership decisions on the most tracked stock index.

A natural comparison for S&P rating purchases is those from Moody's. S&P and Moody's combined US market share was approximately 82% (S&P 49.5%, and Moody's 32.3%) in 2018.[6] Since Moody's does not have a stock index, firms do not have to consider the impact of their rating purchases from Moody's on the chance of getting into a Moody's index. Throughout our analyses, we control for firms' rating purchases from Moody's.

Our sample consists of all newly added S&P 500 firms and non-S&P 500 firms listed in the United States from 1980 to 2018, excluding those that do not satisfy the minimum eligibility dictated by the S&P (e.g., not traded on an eligible US exchange, not common shares, or not organized as a corporation).

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[5] https://www.indexologyblog.com/2014/08/07/inside-the-sp-500-an-active-committee/

[6] Annual Report on Nationally Recognized Statistical Rating Organizations, January 2020, available at https://www.sec.gov/files/2019-annual-report-on-nrsros.pdf

If a firm wishes to curry favour with the S&P, rating purchases are only one of the ways to do it. However, as other fee-based services are not disclosed, we will focus on rating purchases, which are observable. Firms may purchase more ratings and commit to subscribe to ratings for a longer duration, and they may also buy consulting services from S&P. We show a statistically significant positive association between firms' S&P rating purchases shortly before a change in the index membership and their probabilities of being added to the index, controlling for firms' rating purchase from Moody's.

A firm that is too small in terms of market capitalization knows that it has no chance of being included in the index and may not bother with currying favour. This suggests that, if some of firms' rating purchases are intended to improve their chance of getting into the index, then such an effect should be more pronounced for non-index member firms that are relatively large. We find support in the data for this pattern.

We sharpen our identification with two additional exercises. First, we examine rating purchase behaviour during times when there is an opening in the index membership for reasons exogenous to these firms. In particular, mergers and acquisitions (M&As) between existing S&P 500 constituent firms create such an opening and are likely to be outside the control of the firms outside of the index. (We do not exclude mergers that are later withdrawn since they still signal at the time of their announcement a higher probability for firms outside the index to join the index.) We show that in the quarter with such a merger announcement, relatively large firms outside the index tend to increase their purchases of S&P ratings (but not of Moody's ratings).

Second, the reward for joining the index club—the stock price premium associated with the index membership—may vary over time, and this could alter the "willingness to pay" of the firms outside the index to acquire membership. Using cumulative abnormal returns (CAR) around S&P 500 addition events averaged over the preceding two years, we show that firms' S&P rating purchases following announcements of M&As between S&P 500 firms are more pronounced in years with a higher stock price reaction to an addition event. This provides further confirmation that S&P rating purchases are motivated partly by a desire to be added to S&P 500 index. Again, to rule out the possibility that firms buy more ratings merely because they wish to issue more bonds for expansion, rather than to

curry favour with S&P, we control for both their bond issues and purchases of Moody's ratings in all regressions.

Another informative exercise is to use the S&P 500 index rule change in 2002. The rule change excluded foreign firms from the S&P 500 index, resulting in seven foreign firms being ousted from the index. We use this 2002 event as an adverse shock to foreign firms' incentive to compete for S&P 500 membership. We use a difference-in-difference (DID) setting and find that there is a reduction in S&P rating purchases by foreign firms in the quarters after the event. In addition, the effect is more pronounced for large foreign firms and foreign firms from the same countries as the removed members. When we repeat the exercise in firms' purchases of Moody's rating, we see no comparable behaviour. This reinforces the argument that firms purchase S&P ratings partly to curry favour in order to obtain membership in the index.

Finally, we investigate the consequence of such discretionary additions on firms' long-run performance. In doing so, we first classify S&P 500 additions into two groups, *discretionary in* and *rule-based in*, using the following approach. To begin with, we use a logit model to predict a firm's probability of being added to the S&P 500 over a three-year rolling window on a set of predictor variables. For any S&P 500 addition, we then check whether there exist(s) other candidate firm(s) that (1) satisfied all the S&P 500 addition criteria; (2) were in the same sector as the added firm or in other, underrepresented sectors in the S&P 500; and (3) had a higher implied S&P 500 membership probability (such as with higher market capitalization) in the addition quarter. Therefore, *discretionary in* refers to those additions for which we could find counterfactual firm(s), whereas *rule-based in* are those additions for which we could not find any counterfactual firm(s). Since for each *discretionary in*, there might exist more than one counterfactual firm, we select the firm that has the largest implied S&P 500 membership probability and denote this set of firms as the matched *discretionary out*.

We compare the accounting and stock market performance around S&P 500 additions between discretionary in and discretionary out, and between discretionary in and rule-based in. For comparison between discretionary in and discretionary out, our results suggest that *discretionary-in* firms experienced, on average, 14.6% and 37.0% reductions in profitability and return on asset (ROA), respectively, in the subsequent four years

compared to the matched *discretionary-out stocks*. However, discretionary additions experienced a significant increase in investment, about 12.7% in the subsequent two years. This suggests that possible resource misallocation was induced by the discretion in the index addition decisions.

To compare *discretionary in* and *rule-based in*, we construct a group of control firms using an entropy balancing approach proposed by Hainmueller (2012) for each addition. We then use this sample to examine heterogeneous inclusion effects. Our results suggest that firms added to the S&P 500 are more likely to experience declines in both post-inclusion profitability and post-inclusion ROA. Note that Bennett, Stulz and Wang (2020) document a decline in financial performance after stocks are added to the index. We point out an important difference between the two different sets of firms: the decline in financial performance is driven by discretionary additions. Our estimates imply that discretionary additions experience, on average, further 10.1% and 59.5% reductions in profitability and ROA in the subsequent four years compared to normal additions. In other words, firms added to the index through the S&P's use of discretion are more likely than firms that join the index based on the rules to be weak performers. In addition, we show that relative to *rule-based ins* and *discretionary outs*, *discretionary-ins* perform worse on long-run stock returns. For example, over a 36-month window, *discretionary ins,* on average, suffer a 620 (340) basis points (bps) reduction in annualized returns relative to the *rule-based ins* (or *discretionary outs*).

Our paper contributes to several strands of the literature. First, it enriches the literature on index additions by investigating the existence and consequences of discretion in the addition decisions. A large literature examines the consequences of index additions, with a strong focus on financial market reactions, especially on the stock price impact, to investigate whether demand curves for stocks slope downward. Using the S&P 500, papers such as Harris and Gurel (1986), Shleifer (1986), Beneish and Whaley (1996), Lynch and Mendenhall (1997), Wurgler and Zhuravskaya (2002) and Chen, Noronha, and Singal (2004) suggest that there is a permanent impact from index addition, while some papers, such as Patel and Welch (2017), suggest that on a longer horizon, there has been reversion since the 2000s. Using other indexes, several papers find evidence of downward-sloping demand curves. Kaul, Mehrotra and Morck (2000) examine changes in TSE 300 index

weights; Chang, Hong and Liskovich (2014) investigate changes in the Russell index reconstitution; and Hau, Massa and Peress (2009) and Hau (2011) examine the redefinition of the Morgan Stanley Capital International global equity index. Vijh (1994), Barberisand and Shleifer (2003), Barberis, Shleifer and Wurgler (2005), Greenwood (2007) and, more recently, Chen, Singal and Whitelaw (2016) study the interaction between index addition and comovement. On the real effects, Denis, McConnell, Ovtchinnikov and Yu (2003) show that firms newly added to the S&P 500 experience significant increases in EPS forecasts and significant improvements in realized earnings. Bennett, Stulz and Wang (2020) provide evidence that index addition impacts firms' real operations, such as compensation, investment, financial policies and many others. Our paper complements this literature by looking at potential determinants of index addition that may reflect discretions and conflicts of interest.

Second, our paper contributes to the literature on conflicts of interest in the financial market by documenting a previously unstudied type of conflict of interest associated with index membership decisions. Much of the focus in the existing literature on rating agencies is on the possibility of rating inflation by the agencies. He, Qian and Strahan (2012) show that large issuers receive higher ratings. Efing and Hau (2015) present evidence that issuers that provide more securitization business to rating agencies receive higher ratings. Baghai and Becker (2018) show that issuers that pay rating agencies for non-rating services receive higher ratings. Instead of looking at the intensive margin on the content of ratings, our paper adds to this literature by looking at an extensive margin—i.e., whether issuers have an advantage in rating agencies' other business.

The rest of the paper is organized as follows. In Section 2, we provide institutional background information on stock price indexing, especially the relative importance of the S&P500 index, and the general workings of the credit rating industry. In Section 3, after presenting the S&P's rules governing membership in the index, we study the extent of discretion in S&P 500 membership and addition decisions. In Section 4, we examine a pair of questions inspired by the data: 1) In S&P's decisions on which stocks to be added to the index, do rating purchases by firms have an impact beyond the announced addition criteria? 2) Does a vacancy on the index have an impact on firms' decisions to purchase S&P ratings? In Section 5, we study the consequences of discretionary additions for post-addition firms'

stock performance by comparing them to both rule-based additions and discretionary exclusions. Finally, in Section 6, we conclude the paper.

2. Institutional Background

2.1.Landscape of the fund market

The assets under management (AUM) of US mutual funds grew from only USD 21 billion, or 4% of US GDP, in 1959 to exceeding USD 26 trillion, or 120% of US GDP, in 2019. About 45% of the value is in equity funds, and 30% of the equity funds are index funds.[7]

Exchange Traded Funds (ETFs) are typically linked to major market indices and have grown tremendously since their invention in 1989. By the end of 2019, the US ETF market has USD 4.4 trillion in total assets, accounting for 70% of the global ETF market. The index ETFs account for the majority of the growth, from USD 2.4 billion in 1996 to USD 4.2 trillion in 2019, while non-ETF index funds have grown from USD 1.3 billion in 2004 to USD 181 billion in 2019.

Table 1 reports the number of funds, the AUMs of the funds, and other descriptive statistics of the global fund market in 1980, 1990, 2000, 2010, and 2019, respectively. Our sample contains all the open-end, ETF and closed-end funds globally, as reported by Morningstar. We see the tremendous growth over the last 40 years. By the end of 2019, the total number of funds was 93,056, and the money involved in these funds exceeded USD 43 trillion.

We pay special attention to funds benchmarking (i.e., actively referencing or passively tracking) the S&P 500 index, as they are the most important type of index funds by asset value. We report the number and value of three groups of funds: (1) index ETFs: ETFs passively track an index; (2) Index funds: open-end or closed-end funds passively track an index; and (3) other funds benchmarking against the index: open-end, closed-end and ETF funds actively reference or passively track an index. For comparison, we also report funds tracking the Russell 1000. The number of funds benchmarking the S&P 500 doubled between 2000 to 2019, while their collective AUMs more than tripled, reaching USD 5.5 trillion. The Russell 1000 funds are on a much smaller scale, although they exhibit

[7] *Investment Company Fact Book*, 2020.

a similar trend in growth. In the Online Appendix Table 1, we list the top ten S&P 500 funds by asset value in 1980, 1990, 2000, 2010, and 2019, respectively. The Vanguard 500 Index Investor was the very first such fund, but many major fund companies now offer such a fund.

Zooming in on the US fund market, Figure 1a presents the time series of the aggregate AUM for all open-end funds and ETFs, index funds, and index ETFs that passively tracking a certain index in the US market from 1970 to 2019. Index funds and index ETFs jointly account for about half of all the open-end funds and ETFs in terms of AUM by the end of the sample. In Figure 1b, the S&P 500 funds can be seen to account for 20% of all open-end funds and ETFs by 2019.

2.2. S&P 500 Index Selection Rules

Standard and Poor announces a set of conditions for firms to be considered for inclusion in the S&P 500 index. It is convenient to separate these conditions into two groups: (a) minimum eligibility conditions; and (b) selection criteria to choose among firms that satisfy (a) to be added to the index. The minimum eligibility stipulates that only the common shares of corporations listed on major US exchanges, such as the NYSE or NASDAQ,[8] would be considered.

Out of the stocks that satisfy the minimum eligibility conditions, we describe below S&P 500 membership rules based on the index methodology published by S&P.[9] The selection criteria in 2020 are described below. Some of these rules apply to S&P Composite 1500 indices altogether—i.e. S&P 500, S&P 400 (MidCap), and S&P 600 (SmallCap).

In subsequent statistical analysis, our regression sample will be restricted to those firms that satisfy the minimum eligibility conditions. We will code each selection criterion for addition to the index as a regressor and assess the extent to which the criteria variables can account for actual addition decisions made by the S&P.

Market Capitalization: Since February 20, 2019, the requirement for market capitalization for the S&P 500 has been an unadjusted company market capitalization of

[8] NYSE includes AMEX, and CBOE was also considered eligible by S&P after June 2016.
[9] https://www.spglobal.com/spdji/en/documents/methodologies/methodology-sp-us-indices.pdf, and https://www.spglobal.com/spdji/en/governance/methodologies/#methodology-information.

USD 8.2 billion or more. The requirement for market capitalization ranges are reviewed from time to time to ensure consistency with market conditions. The historical market capitalization threshold since July 18, 2007 is reported in Online Appendix Table 2. For example, the threshold was USD 5 billion in 2007 and USD 6.1 billion in 2017. No thresholds before 2007 are reported by S&P.[10]

Liquidity: The ratio of the annual dollar value traded (defined as the average closing price over the period, multiplied by historical volume) to float-adjusted market capitalization should be at least 1.00 (**Liquidity Criterion 1**), and the stock should trade a minimum of 250,000 shares (**Liquidity Criterion 2**) in each of the six months leading up to the evaluation date.

Public float: Investable Weight Factor (IWF) is calculated as the available float shares over total shares outstanding. Available float shares include shares held by depository banks; pension funds (including government pensions and retirement funds); mutual funds; ETFs; investment funds; and asset managers (including hedge funds with no board of directors representation); investment funds of insurance companies; and independent foundations not associated with the company.[11] The rule for IWF was first implemented in 2004. The required IWF was 50% for the S&P500 (and other composite 1500 indices) from 2004 to April 30, 2019, and was reduced to 10% after that.

Financial Viability: The sum of the most recent four consecutive quarters' Generally Accepted Accounting Principles (GAAP) earnings (net income excluding

[10] Before July 31, 2017, a spin-off from an existing index member firm needed to meet the same market capitalization threshold as other added firms. After that date, a spin-off company could be waived with the minimum market capitalization requirement by the index committee if it was domiciled in the United States and significantly bigger than other constituent companies resulting from the original index member firm. Since April 30, 2019 (which is outside our sample), a company meeting the unadjusted company market capitalization criteria has also been required to have a security level float-adjusted market capitalization that is at least 50% of the respective index's unadjusted company-level minimum market capitalization threshold, while no such requirement existed prior to that date.

[11] Shares held by long-term strategic shareholders are generally excluded in the public float. These shareholders include officers and directors and related individuals whose holdings are publicly disclosed; private equity, venture capital and special equity firms; asset managers and insurance companies with board of directors representation; other publicly traded companies; holders of restricted shares; company-sponsor employee share plans/trusts, defined contribution plans/savings, and investment plans; foundations or family trusts associated with the company; government entities at all levels except for government retirement/pension funds; sovereign wealth funds; and any individual person listed as a 5% or greater stakeholder in a company as reported in regulatory filings (a 5% threshold is used as detailed information on holders and their relationship to the company and is generally not available for holders below that threshold).

discontinued operations) should be positive (**Financial Viability 1**), as should the most recent quarter's (**Financial Viability 2**).[12]

Minimum time since Initial Public Offerings (IPOs): The stocks should have been traded for at least 12 months since IPOs. Prior to March 10, 2017, IPOs were required to be seasoned for at least six months before being considered for addition to an index.

There are exceptions that are explicitly explained in the S&P index's methodology. First, after July 31, 2017, the index committee could waive the criteria for financial viability, liquidity, and public float for a firm to be added to S&P500 if that firm was already in the S&P400 (a mid-cap index) or the S&P600 (a small-cap index) and if the committee decided that such an action would enhance the representativeness of the index. Second, the index committee could add a non-index member firm that had acquired an S&P500 firm to the index even if that firm did not otherwise meet the two financial viability criteria. In our subsequent empirical work, we will consider these explicit exceptions as part of the rules. In other words, an addition to the index will be classified as a rule-based addition if it satisfies one of the two "exceptions" mentioned here (plus other criteria).

Note that the criteria described above are for adding a firm currently outside the S&P500 index to the index. For firms already in the index, the index committee may decide to keep it even if some of the financial viability or liquidity criteria are violated so as to minimize the turnover of the index membership. No exact rules on when to drop an index member are published, although S&P often releases a statement when a firm is dropped.

We will assess the use of discretion versus rules in S&P's decisions on additions to the S&P500 index by comparing the actual additions against observable firm characteristics. Below, we present a set of variables that we have constructed to capture index addition eligibility conditions, as published by S&P.

(1) **Domicile**: S&P requires firms eligible for index consideration to be domiciled in the US. Using information obtained from Compustat, we create two dummies to reflect this. *US Headquarters* equals one if a firm's headquarters is in the US, and *US incorporation* equals one if foreign incorporation code is US.

[12] For equity real estate investment trusts (REITs), financial viability is based on GAAP earnings and/or Funds From Operations (FFO), if reported. FFO is a measure commonly used in equity REIT analysis.

(2) **Market Capitalization**: Based on the historical market capitalization guidelines from S&P, we create a dummy variable *MktCap_OK* that equals one if a firm meets the S&P 500 market capitalization threshold and zero otherwise. Since no minimum market capitalization threshold before July 2007 is published, we assume that S&P does not exercise discretion in this dimension before that date. (In other words, we give the maximum benefit of the doubt to S&P.)

For each firm that is a US firm (including being domiciled in the US) and traded on an eligible US stock exchange, we construct a size rank in each quarter based on its relative market capitalization in that quarter. We then create a sets of dummies for size rank groups: *size rank[1,100], size rank[101, 300], size rank[301, 500], size rank[501, 700]* and *size rank[701, 1000]*. Size rank over 1000 is in the omitted group. If the rank of a firm's market capitalization (and being US-based and trading on an eligible exchange) were the only criteria that matter, then the firms in the size rank groups [1, 100], [101, 300], and [301, 500] would have been in the index, and all other firms would not have been in the index.

(3) **Liquidity 1**: *Turnover ⩾1* is an indicator variable that equals one if the firm's annual dollar value traded is equal to or greater than its market capitalization, and zero otherwise.[13]

(4) **Liquidity 2:** A dummy variable (*monthly volume≥250,000 shares*) is created that is equal to one if a firm's average monthly trading volume in each of the six months leading up to the quarter is equal or greater than 250,000 shares and zero otherwise.

(5) **Financial viability 1**: *earnings_last1Q>0* is a dummy variable equal to one if the earnings in the most recent quarter are positive, and zero otherwise.

(6) **Financial viability 2**: *Earnings_last4Q>0* is another dummy that equals one if the sum of the earnings in the most recent four quarters is positive.

(7) **IPO:** *IPO_OK* equals one if the share has been traded for at least six months since IPO for addition decisions before March 2017, or for at least 12 months since IPO for addition decisions after March 2017.

[13] Due to the limited information on float as defined by S&P, we claim that our measure is a noisy proxy for the liquidity measure used by S&P. S&P uses the float-adjusted market capitalization in the denominator.

(8) **Public float:** *IWF_OK* equals one for any stock before 2004 or for stocks whose IWF exceeded 50% during 2004-2019. (As our sample ends in 2018, we do not utilize a change in the rule that reduces the IWF threshold to 10% in 2019.).[14]

(9) **Deletion Gap**: From July 31, 2017, S&P required any company that is removed from an S&P 1500 index must wait a minimum of one year from its index removal date before being reconsidered as a replacement candidate. Therefore, for periods after July 31, 2017, we create a dummy variable *deletion gap_OK* to reflect this requirement. For periods before July 31, 2017, the deletion gap criterion is assumed to be satisfied.

(10) **Sector representation**: Sector balance, as measured by a comparison of each Global Industry Classification Standard (GICS) sector's weight in an index with its weight in the S&P Total Market Index, in the relevant market capitalization range, is also considered in the selection of companies for the indices. Therefore, we construct two variables to reflect this consideration. One is *SP500 sector representation*, which is the sector weight in the existing S&P 500 index. The other is *difference in sector representation*, which is calculated as the difference in sector weight between the S&P Total Market Index and the S&P 500 Index. In our membership and addition regressions, we also include the continuous measures of *log(MktCap), turnover*, *log(average monthly volume), earnings_last1Q*, and *earnings_last4Q*.

One aspect of the S&P addition selection rules is when to make exceptions to other rules. First, the financial viability criteria can be waived for a firm that has acquired an S&P 500 index member firm. To reflect this possibility, we create a dummy variable *S&P500_acquiror* that equals one if a non-S&P 500 firm has aquired an S&P 500 firm within the past six months of the evaluation quarter. Second, after July 31, 2017, the index committee could put a firm that is already in the S&P 400 (the mid-cap index) or S&P 600 (the small-cap index) into the S&P 500, even if it does not meet the financial viability, the liquidity or the minimum public float percentage criteria. To give S&P the maximum benefit of the doubt, we assume that S&P does not exercise discretion in these cases. Let *SP400or600* be a dummy that is equal to one for stocks that were a member of either the S&P 400 or the S&P 600 in the previous quarter after August 1, 2017, and zero otherwise. In regressions, we will include interaction terms between the dummy *SP400or600* and

[14] We acquire the holding by strategic holders from Capital IQ, and the date is available from 2004.

financial viability terms (*earnings_last1Q>0,* or *earnings_last4Q>0*), *liquidity (turnover* ≥ 1, or *monthly volume≥250,000 shares)* or minimum float percentage (*IWF_OK*), respectively.

While our list of variables represents our best interpretation of S&P's selection criteria for adding a firm to the S&P500 index, it could still contain noise. For example, there is no published minimum market capitalization before 2007 (although the decisions will still depend on the rank of a firm's market capitalization). We will assume that any addition to the index by S&P before 2007 satisfies the criterion if there is one. This means that we err on the side of giving S&P the maximum benefit of the doubt. However, it is possible that S&P had a minimum market cap threshold before 2007 that is not publicly known, and this could cause our predicted list of additions to deviate from S&P's actions. Nonetheless, our key identification assumption is that such noises are not correlated with a firm's S&P rating purchases.

2.3.Credit Rating

Standard and Poor's, besides making and leasing market indices, also sells credit rating and other services. Henry Varnum Poor started publishing its first ratings in 1916, a few years after John Moody started publishing bond ratings in 1909. John Knowles Fitch had founded Fitch Ratings in 1914. The global credit rating industry is highly concentrated. According to the 2019 Annual Report on Nationally Recognized Statistical Rating Organizations, S&P leads the pack with a market share of 49.5%, while Moody's ranks second, with a share of 32.3%. Fitch is some distance behind, with a market share of 13.5%.

Credit ratings are meant to be independent and professional opinions about credit risk by credit rating agencies (CRAs). There are two major types of ratings. First, an issuer-level rating evaluates the issuer's ability and willingness to repay its obligations in accordance with the terms of those obligations. (An issuer is typically a company that needs to issue a bond in the capital market.) Second, an issue-level rating evaluates the credit quality associated with an individual debt issue, such as a corporate or municipal bond. CRAs use, among other things, information from the issuer and other sources to evaluate the credit quality of the issue and the likelihood of default.

In forming their ratings, rating agencies typically use analysts or mathematical models, or a combination of the two. The analyst-driven rating process typically involves in-person due diligence to form an opinion and provide a rating upon a request from an issuer. The major rating agencies, such as Moody's, S&P and Fitch, use mainly the issuer-pay model, meaning that they charge issuers a fee for providing a ratings opinion. To an issuer, the payment for a rating can be divided into two parts: (1) fees at the time of rating initiation; and (2) subsequent annual renewal fee for an existing rating. The exact fee amounts are confidential.[15] According to interviews with Moody's and S&P, the fees at a rating initiation are generally much higher than the subsequent renewal fees.

S&P may offer fee-based consulting services other than ratings. For example, it might provide consulting services to firms on how to improve the chance of getting into a major index or to improve the credit scoring of a given issue. However, we are not able to obtain information on either the nature of the services or the fee structure. In comparison, we can obtain information on whether and when a firm obtains a rating from S&P (and Moody's). By examining only rating purchases, we potentially underestimate the extent of the payment to S&P that a company wishing to join the index may make.

3. Rules vs. Discretion in S&P 500 Membership and Addition Decisions

We examine how much the membership and additions to the S&P 500 index can be explained by the published selection rules. Before discussing the S&P's published selection rules,[16] we look closely at the 92 additions during 2015-2018. In Panel A of Table 2, we see that 19, 26, 24, and 23 firms were added to the S&P 500 index in these four years, respectively. Panel B reports the fraction of S&P 500 additions that violates each of the selection criteria (e.g., market capitalization, liquidity, financial viability, public float, and so on). In the absence of discretion in the addition decisions, one should find zero violation for each criterion. Instead, we find that, on average, about 33% of actual additions in a year violated at least one of the published selection criteria. Among the criteria, financial

[15] We made inquiries to S&P about the ballpark levels of rating fees and were told that the fees structures for different types of rating (e.g. entity vs. security) could vary. The initiation cost accounts for a major proportion of the total cost of a rating purchase.

[16] https://www.spglobal.com/spdji/en/documents/methodologies/methodology-sp-us-indices.pdf

viability and public float were most likely to be violated. In comparison, the requirement on time since IPO was always observed.

Equally informative, we find in Panel C that a larger number of firms (between 118 and144 firms a year) that were not added to the index appear to have satisfied all the selection criteria. In other words, deviations from the selection criteria did not occur because no firms could satisfy all the criteria. In Panel D of Table 2, we present the average values of these variables.

In Table 3, we model S&P 500 membership status using probit and linear models, respectively. Our sample contains all public firms in both the Compustat and CRSP databases from 1980 to 2018 that satisfied the minimum eligibility requirements (common shares of US-domiciled corporations traded on eligible US stock exchanges).

On a quarterly basis, we run prediction regressions with a set of variables reflecting the selection criteria. In Column 1 of Table 3, the probit regression is run with only size rank dummies and quarter fixed effects, and we see that all of the size rank dummies are positive and significant. Larger firms are more likely to be included in S&P 500 index, with the point estimates following a monotonic decreasing pattern from the largest size group to the smallest size group. The pseudo R2 is 0.61.

We report linear models estimated by ordinary least squares (OLS) in Columns 2-5. An advantage of a linear model is that we can include both firm and time fixed effects. The linear model in Column 2 produces similar results as the probit in Column 1. We add a continuous measure of firm size (*log(MktCap)*) and a dummy variable for whether a firm meets the minimum size requirement (*MktCap_OK*) in Column 3. Both newly added variables have a correct sign and are statistically significant. However, the improvement in R2 is negligible. Column 4 further expands the list of regressors to include S&P's other selection criteria: *turnover* ≥ 1*; monthly volume* $\geq 250{,}000$ *shares; earnings_last1Q>0; earnings_last4Q>0; IPO_OK; IWF_OK; deletion gap_OK; headquarters in US; incorporated in US; SP400or600; SP500_acquiror*; *turnover; log(average monthly volume); earnings_last1Q*; *earnings_last4Q; SP500 sector representation; difference in sector representation* and five interaction terms between *SP400or600* and *turnover* ≥ 1*; monthly volume* $\geq$ *250,000 shares; earnings_last1Q>0; earnings_last4Q>0; and, IWF_OK*. The coefficients for these regressors are sensible, but the R2 increases only

modestly, from 0.59 to 0.62. In other words, whether a firm is a member of the S&P 500 index cannot be entirely explained by the published selection criteria. Deviations from the criteria represent a non-trivial fraction of the variations in the data.

In Column 5, where we restrict the sample to 2015-2018, we see an additional moderate increase in the explanatory power of the regression due to more precise knowledge of the selection rules. However, the R2 is still only 0.72, again indicating the presence of discretion by the S&P.

We use the same specification to examine the addition decisions. While the sample for membership status regressions consists of all common shares of US-domiciled corporations traded on a major US stock exchange, including existing S&P 500 members, the sample for the addition regressions is a subset that excludes existing S& P500 members in a given quarter. As reported in Table 4, the signs and the significance patterns of the coefficients in the addition regression are similar to those in the index membership regressions in Table 3. However, the explanatory powers of the linear models to predict S&P 500 additions (3-7%) are substantially lower than those of the corresponding linear membership regressions (59-72%).

The maximum R2 of 7% is achieved in Column 6, in which we restrict the sample to 2015-2018, recognize that addition events may not occur at the end of a quarter, and re-calculate the size and rank variables immediately prior to each addition announcement date. Still, the sign and significance patterns for the coefficients are similar to those in previous columns, and the final R2 is still very low. We conclude that S&P often uses discretions outside the published criteria when deciding which firms to add to the S&P 500 index.

For comparison, we examine how well the membership status and addition decisions of the Russell 1000 conform to Russell's published selection criteria. We report these results in Table 5. Russell's announced selection criterion is based mainly on market capitalization. Indeed, for index membership status (whether a given firm is in the Russell 1000 or not), in Column 1, we find that a simple dummy for size rank between 1 and 1000 produces an R2 of 93%. For additions to the index, reported in Column 5, a simple dummy

for size rank of 1-1000 produces an R2 of 75%.[17] Both are much higher than their counterparts for the S&P 500 index. In short, S&P appears to deviate from its published criteria in its decisions on adding firms to its index much more than Russell does.

4. Rating Purchases and S&P 500 Membership

We now examine the relationship between firms' rating purchases and S&P's decision on adding firms to the index.

4.1.Sample

Our sample in baseline regressions is panel data containing 12,266 firm-quarter observations from 1980 to 2018. From the universe of all the public firms in Compustat-Center for Research in Security Prices (CRSP) merged database, we construct a sample of observations that satisfy the minimum eligibility conditions—namely, common shares of corporations traded on eligible US exchanges. For example, we exclude stocks that are (1) listed outside the NYSE, AMEX, and NASDAQ; (2) not common shares; and (3) from entities not organized as a corporation.[18] For every included firm in a quarter, we also require availability of its stock information in that and the previous quarters and financial information from the previous fiscal year in either CRSP or Compustat.

Using information from Siblis Research (follow Bennett, Stulz and Wang, 2020), we identify a total of 923 additions to the S&P 500 index during 1980-2018. The source of Siblis Research is S&P press releases with addition and removal dates for constituent firms. We cross-validate Siblis's addition list with the time series of the S&P 500 constituent list

[17] Using refined size rank information during 2000-2006, as computed by Ben-David et al. (2019), we can obtain an R2 of 99% for both the membership status and addition regressions. We thank Itzhak Ben-David, Francesco Franzoni, and Rabih Moussawi for providing their code and data used in Ben-David et al. (2019).
[18] We exclude firms with organizational structures and share types as master limited partners, closed-end funds, ETFs, ETNs, royalty trust, preferred stock, convertible preferred stock, unit trust, equity warrants, convertible bonds, rights, and ADRs. We lack the necessary information to explicitly exclude business development companies, limited liability companies, special purpose acquisition companies and investment trusts. It is possible that CRSP or Compustat has excluded some of these observations. As a robustness check, we manually collect information of business development companies and find that our baseline results remain quantitatively similar after excluding these firms.

in CRSP and remove secondary share class additions and those from spin-offs of existing S&P 500 member firms. This yields a final list of 773 addition cases.[19]

At the end of each quarter during 1980-2018, we identify all new additions to the S&P 500 index. We do not study how removals of firms from the index are determined as the criteria for deletion are vague. This means that we do not identify discretion in the removal decisions.

We obtain rating purchase information from the S&P Credit Rating and the Moody's Rating Delivery Services (Historical) databases. We consider both issuer-level ratings (i.e., rating for a company for a period of time) and issue-level ratings (rating for a particular bond of a given company at a given point in time). In the rating databases, we can identify whether a rating was initiated (i.e., for the first time for that issue or issuer) or renewed. We focus on rating initiation as a rating purchase as they involve a higher level of payment to the rating agencies.

We define *purchase_sp* as a dummy variable if a firm purchases at least one rating from S&P any time during the four quarters leading up to a quarter with addition events. Separately, *purchase_any* is a dummy variable if a firm purchases at least one rating from either S&P or Moody's during the same time window. In other words, *purchase_sp* = 1 only when *purchase_any* = 1, but the reverse may not be true. We will include both variables in baseline regressions to see if purchases of S&P ratings, as opposed to rating purchases in general, help to improve a firm's chance of getting into the S&P 500 index.

We also construct financial viability, liquidity, and other firm-quarter level variables using information from Compustat, CRSP, and CapitalIQ. The details about the variable construction are reported in Appendix II.

4.2. Contemporaneous and prior S&P rating purchases and index additions

Does S&P give favorable consideration to firms purchasing its rating services when it makes decisions on which firms to add to the S&P 500 index? If the answer is yes, we

[19] The CRSP's time series of S&P 500 constituent lists produces 942 addition cases from 1980 to 2018. The main reason is that CRSP also records addition events resulting from a merger, spinoff, or name change of companies that are already included in the index. We exclude them from our sample, effectively assuming that the S&P does not exercise discretion in these cases; we also find 12 cases of additions of firms that do not appear to be organized as corporations. We exclude them from the sample, effectively not penalizing S&P for possible discretion in these cases.

may see that firms' prior and contemporaneous rating purchases from S&P positively predict their probability of being added to the S&P 500 index, regardless of the published addition criteria. We estimate the following equation:

$$SP\_add_{i,t} = \beta_1 Purchase\_sp_{i,t-4,t} + \beta_2 Purchase\_any_{i,t-4,t} + C_{i,t-1} + F_i + X_t + \varepsilon_{i,t}. \quad (1)$$

The dependent variable $SP\_add_{i,t}$ is a dummy variable that equals 100 if firm i is added to S&P 500 index in quarter t, and zero otherwise. $Purchase\_sp_{i,t-4,t}$ is a dummy variable that takes a value of one if firm i has purchased any rating from S&P in this or any of the previous four quarters, and zero otherwise.

It is possible that a company wishing to expand its scale simultaneously issues bonds and becomes more likely to be added to the index. To control for a firm's general tendency to purchase bond ratings (as opposed to purchasing S&P ratings), we include another control variable, $Purchase\_any_{i,t-4,t}$, which is a dummy variable for a firm's purchase of a rating from either S&P or Moody's in any of the four previous quarters.[20] $C_{i,t-1}$ is a set of variables describing S&P's selection criteria for adding a firm to S&P 500, as in Column 4 of Table 3. F_i and X_t represent firm and quarter fixed effects, respectively.

In Column 1 of Table 8, we run a probit regression. After controlling for firms' general rating purchases (*purchase_any*), we find that the coefficient of *purchase_sp* is still positive and significant, suggesting that firms' ex ante rating purchase from S&P enhances its chance of being added to S&P 500 index. In Column 2, we use a linear model and find results similar to those in the probit model. In Column 3, we further include firm fixed effects and still find a positive and significant coefficient for *purchase_sp*. The point estimate suggests that the probability of being added to the index is raised by 0.133 with a purchase of S&P ratings. This is economically large when compared to the unconditional probability of 0.146 of being added to the index. Overall, Columns 1 to 3 consistently suggest that purchasing S&P ratings enhances a firm's chance of being added to the index.

[20] We have data only on S&P and Moody's ratings and potentially miss rating purchases from other agencies. However, S&P and Moody's collectively account for about 85% of the market. Not having data on Fitch and other rating services potentially generates a bias against our finding that S&P rating purchases are special.

Firms with a small market capitalization may be too far from the S&P 500 threshold. If rating purchases are motivated partly by a desire to curry favour with S&P, then non-index member firms that are sufficiently big in terms of market capitalization may have a stronger incentive than smaller firms to strategically purchase S&P ratings. In Column 4, we examine whether there are any heterogeneous effects across firms in different size groups. We interact size group dummies with *purchase_any* and *purchase_sp*, respectively. We find interesting heterogeneity: the interaction term between *purchase_sp* and *size rank[301, 500]* is positive and significant, suggesting that the effect is largely dominated by firms whose market capitalization is in the borderline area of the S&P 500.

4.3.Anticipatory Rating Purchases? The case of S&P 500 merger events

If a firm's rating purchases are motivated in part by a desire to get into the index, a testable implication is that rating purchases may be more active when there is an opening in the index. In this subsection, we use a merger between two existing S&P 500 members as an exogenous shock to non-S&P 500 firms' incentive to compete for S&P 500 vacancies. Our sample in this exercise consists of all non-S&P 500 firms. If firms do, indeed, use rating purchases to bribe S&P for S&P 500 membership, we should expect that the M&As between exiting S&P 500 members would cause some firms to alter their purchases of S&P ratings relative to Moody's ratings. Again, larger firms close enough to the threshold of the S&P 500 may have a stronger incentive to purchase S&P ratings to boost their entry probability. Therefore, we follow equation (2) to run the following regressions.

$$Purchase\_sp_{i,t} = \beta_1 SPmerger_t + \beta_2 SPmerger_t \times Size\ rank_{i,t}\ (or\ memprob\ rank_{i,t}) + \beta_3 Size\ rank_{i,t}\ (or\ memprob\ rank_{i,t}) + \gamma_1 Purchase\_moody_{i,t} + \gamma_2 Bond_{i,t} + C_{i,t-1} + F_i + \varepsilon_{i,t}. \quad (2)$$

The dependent variable $Purchase\_sp_{i,t}$ is a dummy variable that equals one if a firm purchases any S&P rating in quarter *t*, and zero otherwise. The independent variable $SPmerger_t$ is a dummy variable that equals one if there is any announcement of M&As between existing S&P 500 members in quarter *t*, and zero otherwise. We use two measures to capture the closeness of firms to the S&P 500 threshold. The first measure is the rank of market capitalization of a firm among the universe of all eligible stocks (*size rank*), as in

Table 3. The second measure is the rank of predicted probability of becoming an S&P 500 member (*memprob rank*). To construct *memprob,* we use a logit model to predict a firm's probability of entering the S&P 500 over a three-year rolling window on a set of predictor variables, as in Table 3, Column 4. In different specifications, we include these variables and their interaction terms with $SPmerger_t$. We also control for whether firm i also purchases ratings from Moody's in quarter t with variable $Purchase\_moody_{i,t}$. $Bond_{i,t}$ is a dummy variable that equals one if there is any bond issuance for firm i in quarter t. $C_{i,t-1}$is a set of firm-level controls at quarter t-1 including *log(MktCap), M/B, leverage, profitability* and $\sigma(ret)$. F_i represents the firm fixed effects, and standard errors are clustered at the firm level.

In Column 1 of Table 9, we first interact an indicator variable reflecting a firm's size rank from 1 to 1000. We find a positive and significant coefficient for *SPmerger*: in the quarters with mergers of S&P 500 existing members, non-index firms are more likely to purchase S&P ratings. This supports the interpretation that firms not currently in S&P500 have a stronger incentive to buy S&P ratings when there is a vacancy on the index. Moreover, the interaction term between *SPmerger* and *size rank[1, 1000]* is also positive and significant, suggesting that larger non-index firms respond more strongly to an announcement of mergers between two S&P 500 firms.

In Column 2, we further break up the group of *size rank[1, 1000]* into five groups: size rank*[*1,100*]*; *size rank[101, 300]*; *size rank[301,500]*; *size rank[501,700]*; and *size rank[701, 1000].* We repeat the exercise in Column 1 and replace *size rank[1,1000]* with the five subgroups. We also replace the interaction term *SPmerger* × *size rank[1,1000]* with five interactions of the subgroups with *SPmerger*. We find that effects are dominated by firms ranked from 300 to 700 in market capitalization. Given that the S&P 500 generally contains the 500 very large firms in the US market, firms close to this threshold may have the strongest incentive to compete for membership. These firms appear to believe that purchasing S&P ratings (versus purchasing Moody's ratings) is helpful to their chance of being added into the index.

In Column 4, we use the quartile of *memprob*—namely, *memprob 25% -50%, memprob 50% - 75%,* and *memprob above 75%*—to reflect firms' closeness to the S&P 500 threshold. We show that the interaction term *SPmerger* and *memprob* quartiles are

positive and significant for quartiles above 50%, suggesting that firms with a higher probability of becoming S&P 500 members have stronger incentives to purchase S&P ratings when there are any between S&P 500 mergers. Consistent with this argument, we show that the magnitude of the effect is the largest for firms in the highest *memprob* quartile. After including the interaction terms of *SPmerger* and *memprob* dummies, the coefficient for *SPmerger* gets close to zero and becomes negative and marginally significant, implying that the effect is driven largely by the firms with a higher probability of getting membership. These firms evidently believe that purchasing S&P ratings is important to their chance of being chosen for the index.

Another testable implication of the hypothesis is that firms would make more rating purchases from S&P when the benefit (i.e., valuation increase) from being added to the S&P 500 is higher. To see if there is any empirical support for this implication, we estimate a time series of the cumulative abnormal returns (CAR) associated with additions to the S&P 500 index. We then use the information to separate those quarters involving a merger of two S&P member firms into one subset in which the CARs for additions are in the top quartile of the values—denoted by *SPmerger_HighCAR*—and another subset for the remaining periods—denoted by *SPmerger_LowCAR*. The CAR for additions in a given quarter is calculated as the average of all addition events, with a window of [-14, 5] trading days for a given addition event, over the two years preceding the quarter.

In Column 1 of Table 10, we interact *size rank[1,1000]* with the dummies, *SPmerger_HighCAR* and *SPmerger_LowCAR,* respectively. This regression includes firm fixed effects as well as the same set of control variables as in Table 9. This reveals that, indeed, the firms that are ranked between 301 and 700 exhibit an especially strong incentive to buy more S&P ratings during times when the CARs for additions are high (or in the top quartile of all CAR values). The firms ranked between 701 and 1000 exhibit a similar tendency but on a weaker scale. Firms ranked below 1000 do not seem to buy more ratings when there are openings in the index, probably because they know they have no chance of getting into the index anyway. Firms ranked ahead of 300 in terms of market cap do not buy more ratings, probably because they are so large that they do not need to.

These data patterns support the view that firms whose market capitalizations are ranked between 301 and 1000 not only wish to get into the index, especially when the

perceived benefits are high, but also believe that buying ratings from S&P (as opposed to Moody's) can increase their chance of being added to the index. This would not have been true if they had believed that the addition decisions were made solely and objectively based on the published addition criteria. (Recall from Table 2 that about 1/3 of the actual additions involve firms violating some of the published selection criteria, while many firms that are left out of the index satisfy all the published criteria.)

4.4. The 2002 Shock: A Rule Change by S&P

On July 11, 2002, S&P announced a rule change for index member eligibility: all index member firms had to be headquartered in the United States. At the same time, S&P announced that, effective July 19, 2002, seven foreign-headquartered firms would be removed from the index and replaced by US firms.[21] As the move was unexpected, the stock prices of the seven ousted companies fell, while the funds that tracked the US index rushed to dump their shares even before they left the index formally on July 19.

This event provides another opportunity to validate our hypothesis. If rating purchases by firms are motivated partly by a desire to curry favour with S&P and, thus, enhance their chance to get into the index, the rule change should have reduced rating purchases by foreign firms traded on US exchanges, especially rating purchases from the S&P by relatively large foreign firms.

Using a DID identification strategy, we examine any change in the propensity to purchase ratings from S&P before and after the announcement between US and foreign firms traded on US stock exchanges. We focus on rating purchases by non-S&P 500 firms from Q3 2001 to Q3 2003,[22] with the following specification:

$$Purchase\_sp_{i,t} = \beta_1 Post_t \times Foreign_i + \gamma_1 Bond_{i,t} + C_{i,t-1} + F_i + X_t + \varepsilon_{i,t}. \quad (4)$$

[21] The seven stocks removed from the index were Royal Dutch Petroleum Co. and Unilever N.V. from Europe, and Nortel Networks Corp., Alcan Inc., Barrick Gold Corp., Placer Dome Inc. and Inco Ltd from Canada. The replacements were Goldman Sachs Group Inc., United Parcel Service Inc., Principal Financial Group Inc. and Prudential Financial Inc., eBay Inc. and SunGuard Data Systems Inc.

[22] This refers to +/- 4 quarters around the announcement quarter. Our results are similar if we focus on alternative window of +/- 6 or 8 quarters.

The dependent variable $Purchase\_sp_{i,t}$ is a dummy variable that equals one if a firm purchases an S&P rating in quarter t, and zero otherwise. Let $Post_t$ be a dummy for the quarters after the announcement of the rule change, and $Foreign_i$ is a dummy for foreign firms, using S&P's definition of domicile. The key independent variable is $Post_t \times Foreign_i$, a firm-quarter-level dummy variable that equals one if firm i is a foreign firm in quarters after Q3 2002, and zero otherwise. We also control for $Bond_{i,t}$, which is a dummy variable that equals one if there is any bond issuance by firm i in quarter t. $C_{i,t-1}$ is a set of firm-level controls at quarter t-1, as suggested by the literature on demand for credit ratings, including *log(MktCap), M/B, leverage, profitability* and *σ(ret)*. Note that the direct effects, $Post_t$ and $Foreign_i$, are absorbed by time fixed effects, X_t, and firm fixed effects, F_i , respectively. All standard errors are clustered at the firm and quarter levels.

Columns 1 to 5 of Table 11 report the regression results using the presence of S&P rating purchases by firms as the dependent variable. According to Column 1, foreign firms reduced their purchases of S&P ratings by 72.2% (=-0.057/0.079) in response to the rule change. This effect is both economically and statistically significant.

In Column 2, we include the set of control variables. The estimate implies a reduction in the purchases of S&P ratings by 38.0% (=-0.030/0.079) following the rule change. We can learn more from exploring some heterogeneity across firms. In Column 3, where we split foreign firms into large and small ones in terms of market capitalization, we see that the effect is concentrated mainly in large foreign firms. These are the firms for which entering the S&P 500 was a realistic possibility before the rule change.

We note that the seven foreign firms that used to be in the S&P 500 index are only Canadian and European firms. The rule change might have been a bigger shock to the Canadian and European firms, as becoming an S&P 500 member was regarded as more likely for them before the rule change than it was for foreign firms from elsewhere. In Column 4, where we split foreign firms into those from Canada or Europe versus those from elsewhere, we indeed see that the reduction in the purchases of S&P ratings was mainly among Canadian and European firms. Finally, in Column 5, where we split the post dummy into the first two quarters following the rule change and the subsequent two quarters following the rule change, we find that the reduction in S&P rating purchases by foreign firms is persistent in both sub-periods.

To reinforce the interpretation that the reduced purchases of S&P ratings by foreign firms was a reaction to no longer being able to "buy" an improved chance of getting into the S&P 500 index—as opposed to a reduced need to issue bonds for any other reason—it may be informative to compare the results with purchases of ratings from Moody's. We provide such comparisons in Columns 6 to 10, with specifications identical to those in Columns 1-5, except for the use of Moody's rating purchases as the dependent variable. Strikingly, we find no change in rating purchases from Moody's by foreign firms following S&P's rule change in 2002.[23]

The contrast between foreign firms' purchase of S&P ratings versus Moody's ratings speaks volume. The patterns clearly suggest that foreign firms bought S&P ratings partly because they believed that such purchases could "buy" an improved chance to get into the S&P500 index. As soon as this prospect disappeared due to the rule change, they bought fewer ratings from S&P. Recall from the previous section that S&P's decisions on which firms to add to the index do appear to take into account rating purchases by firms. Thus, as the findings in Table 11 show, foreign firms' belief about the value of continuing to purchase ratings from S&P appears rational.

5. Discretionary Additions and Subsequent Performance

Bennett, Stulz and Wang (2020) document that the firms that have been added to the S&P 500 index appear to exhibit a deterioration in their accounting performance relative to a control group subsequent to the additions. We revisit this question but distinguish between two groups of added firms: those for which S&P waived some selection criteria, even though more-qualified firms existed (to be labelled as "*discretionary in*"); and those satisfying all selection criteria (to be labelled as "*rules-based in*"). We will show that, subsequent to being added into the index, the "*discretionary-in*" group exhibits a deterioration in both accounting and stock price performance relative to the "*rules-based-in*" group.

We first use a logit model to predict a firm's rules-based probability of being in the S&P 500 index every quarter if one were to follow only the S&P rules without discretion.

[23] The only marginally significant coefficient suggests that small foreign firms seemed to buy fewer Moody's ratings after 2002Q3, but large foreign firms exhibited no change in their behavior.

This probability is estimated using a three-year rolling window on the variables constructed based on the S&P rules, as in Column 4 of Table 3. A firm that has been added to the index by the S&P is classified as a "*discretionary in*" if there existed other candidate firm(s) at the time of the addition that (1) satisfied all the addition criteria; (2) were in either the same sector as the added firm or an underrepresented sector in the index; and (3) had higher implied S&P 500 membership probability at the time according to the rules-based probability of entry equation. Otherwise, the addition is classified as "*rules-based in.*"

Note that for a given "*discretionary in*," there can be multiple candidate firms that satisfy all selection criteria and are estimated to have a higher rules-based probability of entering the index. For every "*discretionary in*," we define a "*discretionary out*" as the firm with the highest rules-based predicted probability of entering the index among all candidate firms that satisfy all the selection criteria.

We start by comparing *discretionary-in* firms with *discretionary-out* firms in terms of financial performance subsequent to the additions with the following equation:

$$Performance_{i,t} = \beta_1 Post_t \times Discretionary\ In_i + C_{i,t-1} + F_i + X_t + \varepsilon_{i,t}\,. \qquad (5)$$

The dependent variable $Performance_{i,t}$ is profitability (EBITA/asset), returns on asset (ROA), or investment (relative to assets) for firm *i* in quarter *t*. On the regressor side, $Post_t$ is a dummy variable for all time periods since the addition event. We include control variables that are standard in the existing literature on financial performance, including *log(asset),* return in the previous year *(ret_lag1yr)*, the ratio of market to book value (*M/B)*, and total debt/asset (*leverage)*, together with both firm and year fixed effects specific to each pair of discretionary-in and *discretionary-out* firms.[24]

Panels A, B, and C of Table 12 report the results when using *profitability*, *ROA*, and *investment* as the dependent variables, respectively. We explore different estimation windows ranging from -4 to +4 years. From Column 1 of Panel A, the *discretionary ins* show significantly worse profitability, 13.9% (=-0.021/0.151) lower than that of the *discretionary outs*, one year after the additions. The estimate barely changes when we add other control variables (Column 2). The difference in profitability is persistent even when

[24] Following our procedure of constructing *discretionary-in* and *discretionary-out* firms, for each *discretionary-in* firm, we find a matched *discretionary-out* firm. However, it could be the case that one *discretionary-out* firm matched with potentially many *discretionary-in* firms. Therefore, in equation (5), we implement firm and year fixed effects within each matched pair.

we look at two years after the additions (Columns 3 and 4) or four years after the additions (Columns 5 and 6).

From Columns 1 and 2 of Panel B, *discretionary ins* are seen to exhibit worse ROA, 54.1% (=-0.020/0.054), one year after the addition events (Column 2). This pattern also persists at least four years after the additions (Columns 3-6). From Columns 1 and 2 of Panel C, the *discretionary ins* are likely to raise their investments more than the *discretionary outs* by at least 16.3% (=0.013/0.080) one year after the addition events (Column 2). Such a pattern also persists at least four years after the addition events (Columns 3-6). Since being added into the index often reduces the cost of capital, the extra investment exhibited by the discretionary-in firms over their discretionary-out counterparts is not surprising. But since discretionary-in firms generally show poorer financial performance, as shown in Panels A and B of this table, their relative advantage in cost of capital and investment suggests possible misallocation of resources in the economy induced by S&P's discretion in its index membership decisions.

We now compare the relative performance of *discretionary-in* firms and *rules-based-in* firms, using a setting similar to that of Bennett, Stulz and Wang (2020). Specifically, we estimate the following equation:

$$Performance_{i,t} = \beta_1 Post_t \times Treat_i + C_{i,t-1} + F_i + X_t + \varepsilon_{i,t}\,, \qquad (6)$$

where $Performance_{i,t}$ is either profitability or ROA. While $Post_t$ is a dummy variable for (firm-specific) time periods after the addition years, $Treat_i$ is a dummy variable that equals one if firm i is added into S&P 500 in year t. We construct the set of control firms using entropy balancing proposed by Hainmueller (2012) and then use this sample to examine the heterogeneous inclusion effect by estimating the following equation:

$$Performance_{i,t} = \beta_1 Post_t \times Treat_i + \beta_2 Post_t \times Treat_i \times Discretionary\ In_i + C_{i,t-1} + F_i + X_t + \varepsilon_{i,t}\,, \qquad (7)$$

"$Discretionary\ In_i$" is a dummy variable for additions that are discretionary. In this case, β_2 captures the performance heterogeneity of discretionary-in firms relative to otherwise similar index members that enter the index based on the published rules.

Panels A and B of Table 13 report the results with profitability and ROA as the dependent variables, respectively. Columns 1, 3, 5 and 7 of Panels A and B confirm Bennett, Stulz and Wang's (2020) finding that index additions are generally associated with a

deterioration in financial performance in subsequent years. However, Columns 2, 4, 6 and 8 indicate that the deterioration in the relative performance is driven entirely by the additions that are discretionary. Additions that are based on published rules exhibit no relative decline in either profitability or ROA, compared to the control group. This suggests a new interpretation of the data patterns documented in Bennett, Stulz and Wang (2020).

We now compare relative stock price performance across different firm groups following addition events. To do so, we track the cumulative returns for each firm in the three groups over 60 months after the addition events and plot the average of each group in Figure 2. We see that the discretionary-in firms (the solid red line) perform worse than either rules-based entrants in the index (the broken blue line) or the discretionary-out firms (the broken green line) in virtually all horizons. We report the results of the *t* tests on their differences for the horizons of 36, 48, and 60 months in Table 14. We see that, at these horizons, the *discretionary-in* firms indeed have significantly worse relative stock price performance than the other groups.

The economic magnitudes of these differences are sizeable. For example, at the 36-month window, *discretionary ins* have, on average, lower annualized returns, by 620 bps, relative to the *rule-based* entrants to the index. Even though the gap between *discretionary ins* and *discretionary outs* is narrower, the *discretionary ins* still have a lower annualized return, by 340 bps.

In summary, the stocks that entered the S&P 500 index via discretion tended to exhibit worse profitability and worse returns on equity in subsequent periods than either the stocks that should have entered the index but were excluded or the stocks that entered the index based on the published rules. The stocks that entered the index via discretion also tended to exhibit worse relative stock returns than either of the other two groups. Yet the firms whose stocks entered the index via discretion tended to do more investment than either of the other groups. These patterns suggest that discretion in addition decisions lead to resource misallocation.

6. Conclusion

The S&P 500 index is the single most tracked stock index by institutional investors via both mutual funds and ETFs. It is also commonly used as a benchmark in CEO

performance evaluations and compensation packages. We document that the S&P 500 is not entirely an objectively constructed index. Instead, the S&P has likely exercised a non-trivial amount of discretion in deciding which firms to add to the index.

Three data patterns suggest that the discretion is often exercised in a way that encourages firms to buy fee-based services from the S&P. First, a firm's rating purchases from S&P tend to increase its likelihood of entering the index outside of the published selection rules (but purchases of ratings from Moody's do not help). Second, firms tend to purchase more ratings from S&P when there is an opening in the index membership. This is especially true for firms ranked between 300 and 700 and at times when the payoff from being in the index are the highest. Third, a case study of a sudden rule change in 2002 that made foreign firms no longer eligible for S&P 500 index membership also confirms that firms' purchase of S&P ratings is motivated, in part, by a belief that rating purchases affect S&P's decisions on adding firms to the index.

Firms that enter the S&P500 index via discretion often exhibit a relative decline in profitability or ROA when compared to either firms that enter by the rules or firms that should enter the index but are excluded by discretion. This suggests possible misallocation of resources.

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Online Appendix 1: Firms filtered out of the sample (not for publication)

As the S&P states that it would consider only common stocks of corporations trading on eligible US stock exchanges for possible inclusion in the index, we restrict our sample to these firms. Below are the details of these restrictions.

Domicile: Only common stocks of US companies listed on either the NYSE or NASDAQ[25] are eligible for the S&P 500 index. For index purposes, a US company has the following characteristics: (1) Files 10-K annual reports; (2) The US portion of fixed assets and revenues constitutes a plurality of the total, though not necessarily more than 50%. When these factors are in conflict, fixed assets determine plurality. Revenue determines plurality when there is incomplete asset information. Geographic information for revenue and fixed asset allocations are determined by the company, as reported in its annual filings. (3) The primary listing must be on an eligible US exchange, as described under Exchange Listing below. If criterion (2) is not met or is ambiguous, S&P may still deem it a US company for index purposes if its primary listing, headquarters and incorporation are all in the US and/or a "domicile of convenience." In situations in which the only factor suggesting that a company is not a US company is its tax registration in a "domicile of convenience" or another location chosen for tax-related reasons, S&P Dow Jones Indices normally determines that the company is still a US company. The final determination of domicile eligibility is made by the Index Committee, which can consider other factors including, but not limited to: operational headquarters location; ownership information; location of officers, directors and employees; investor perception; and other factors deemed to be relevant.

Exchange Listing: A primary listing on one of the following US exchanges is required: NYSE, NYSE Arca, NYSE American, NASDAQ Global Select Market, NASDAQ Select Market, NASDAQ Capital Market, Cboe BZX, Cboe BYX, Cboe EDGA, and Cboe EDGX. Ineligible exchanges include OTC Bulletin Board and Pink Sheet. Prior to June 17, 2016, Cboe listed stocks were also excluded.

Organizational Structure: the issuing company must be a corporation (including equity and mortgage REITs). Ineligible organizational structures include business development companies, limited partnerships, master limited partnerships, limited liability

[25] Also CBOE after June 2016.

companies, closed-end funds, ETFs, ETNs, royalty trusts, and special purpose acquisition companies.

Share type: the issuing company must be common shares. Ineligible share types include preferred stock, convertible preferred stock, unit trust, equity warrants, convertible bonds, investment trusts, rights, and ADRs. Tracking stocks are not eligible for the S&P Composite 1500 indices. Prior to July 31, 2017, companies with multiple share class structures were eligible for inclusion in the S&P Composite 1500 and its component indices. Now, companies with multiple share class structures are not eligible for inclusion in the S&P Composite 1500 and its component indices. All existing S&P Composite 1500 constituent companies with multiple share class structures are grandfathered in and will remain in the S&P Composite 1500.[26]

[26] Due to turnover and liquidity concerns, S&P 100 & 500 constituent Berkshire Hathaway Inc. (NYSE:BRK.B) is an exception to the Multiple Share Classes rules, as detailed in S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology. S&P Dow Jones Indices will continue to consolidate the share count for this company under the B share class line.

Online Appendix 2 Variable Definitions

Variable	Definition
Panel A:S&P 500 Membership and Addition Prediction	
Size rank [1, 100]	Rank from 1 to 100 among all the candidate universe based on market capitalization at quarter *t*-1
Size rank [101, 300]	Rank from 101 to 300 among all the candidate universe based on market capitalization at quarter *t*-1
Size rank [301, 500]	Rank from 301 to 500 among all the candidate universe based on market capitalization at quarter *t*-1
Size rank [501, 700]	Rank from 501 to 700 among all the candidate universe based on market capitalization at quarter *t*-1
Size rank [701, 1000]	Rank from 701 to 1000 among all the candidate universe based on market capitalization at quarter *t*-1
Log(MktCap)	Logarithm of market capitalization at quarter *t*-1
MktCap_OK	A dummy variable equals one if a firm's market capitalization meets the S&P 500 published market capitalization threshold, and zero otherwise. We can trace the historical market capitalization threshold for S&P 500 back to 7/18/2007. For firms prior to 7/18/2007, we denote this variable as 1.
Turnover	Ratio of annual dollar value traded (defined as average closing price over the period multiplied by historical volume) to market capitalization
Turnover≥1	A dummy variable that equals one if the ratio of annual dollar value traded (defined as average closing price over the period multiplied by historical volume) to market capitalization is equal to or greater than one, and otherwise is zero
Log(average monthly volume)	Logarithm value of the average monthly volume of shares traded in the window of [-6, -1] months leading up to the evaluation date.
Monthly volume≥250,000 shares	A dummy variable that equals one if the stock trades a minimum of 250,000 shares in all the months of the six months leading up to the evaluation date.
Earnings_last1Q	Most recent quarter's earnings
Earnings_last4Q	Sum of the most recent four consecutive quarters' earnings (net income excluding discontinued operations)
Earnings_last1Q>0	A dummy that equals one if the most recent quarter's earnings are positive
Earnings_last4Q>0	A dummy that equals one if the sum of the most recent four consecutive quarters' earnings (net income excluding discontinued operations) is positive
IPO_OK	A dummy variable that equals one if a company has its IPO more than the required threshold length from the evaluation date, and zero otherwise.
IWF_OK	A dummy that equals one if a firm's Investable Weight Factor (*IWF*) is greater than or equal to 0.5. *IWF* is calculated as available float shares over total shares outstanding. Available float shares are calculated from holding information from CapitalIQ. For quarters before 2004, it is defined as one.
Deletion gap_OK	A dummy variable that equals one if the length since last deletion from S&P 500 is greater than the required threshold for periods after July 31, 2017. For periods before July 31, 2017, the deletion gap_OK is set to one.
SP400or600	A dummy variable equals one if a firm is an existing S&P 400 (mid cap) or S&P 600 (small cap), and zero otherwise.
SP500_acquiror	A dummy variable equals one if a firm acquired any S&P 500 member firms in the window of [-2, 0] quarters leading up to the evaluation date, and zero otherwise.
SP500 sector representation	Sum of the market capitalization in GICS sector *i* over the total market capitalization for all firms in S&P 500 index.
Difference in sector representation	(Sector weight in S&P Total Market Index – sector weight in S&P 500 Index).
US Headquarters	A dummy that equals one if a firm's headquarters are in the US, and zero otherwise
US Incorporation	A dummy that equals one if foreign incorporation code is US, and zero otherwise.
Panel B:Baseline regression	
SP_Add	A dummy equals 100 if a firm is added to S&P 500 in quarter *t*, and otherwise is zero

Purchase_SP	A dummy variable equals one if firm *i* purchases any rating from S&P over quarter [*t*-4, *t*] based on the rating date reported by S&P, and is zero otherwise.
Purchase_Any	A dummy variable equals one if a firm purchases any rating either from S&P or Moody's over quarter [*t*-4, *t*], and otherwise is zero.
Panel C: Between S&P 500 M&As	
Purchase_SP	A dummy variable equals one if firm *i* purchases any rating from S&P in quarter *t* based on the rating date reported by S&P, and is zero otherwise
SPmerger	A dummy that equals one if there is any announcement of M&As between existing S&P 500 members with 100% share sought in quarter *t*
SPmerger_HighCAR	A dummy variable that equals one if the between S&P 500 M&As (SPmerger=1) is in a quarter in which the average S&P 500 addition CAR over the past two years from the current evaluation date is in the top 25% of the entire sample period. Otherwise, the value takes zero. S&P addition CAR is calculated via WRDS Eventus under a market model with an estimation window [-120, -30] days and event window [-14, 5] days around addition date.
SPmerger_LowCAR	A dummy variable that equals one if the between S&P 500 M&As (SPmerger=1) is in a quarter in which the average S&P 500 addition CAR over the past two years from the current evaluation date is below the top 25% of the entire sample period. Otherwise, the value takes zero. S&P addition CAR is calculated via WRDS Eventus under a market model with an estimation window [-120, -30] days and event window [-14, 5] days around addition date.
Memprob	A predicted value of a firm's membership probability in quarter *t*. Estimation follows a logit regression with variables including *log(MktCap), MktCap_OK, turnover ≥ 1, monthly volume ≥ 250,000 shares, earnings_last1Q>0, earnings_last4Q>0, IPO_OK, IWF_OK, deletion gap_OK, LOC=US, FIC=US, SP400or600, SP500_acquiror, size rank[1,100], size rank[101,300], size rank[301,500], size rank[501,700], size rank[701,1000], turnover, log(average monthly volume), earnings_last1Q, earnings_last4Q, SP500 sector representation, difference in sector representation and 5 interaction terms between SP400or600 and turnover ≥ 1, monthly volume ≥ 250,000 shares, earnings_last1Q>0, earnings_last4Q>0, and, IWF_OK for periods after July 31, 2017, respectively,* over a rolling window of [*t*-13, *t*-1] quarters. Then, we define three dummies to reflect a firm in the different memprob quartiles.
Purchase_Moody	A dummy variable equals one if firm *i* purchases any rating from Moody's in quarter *t* based on the rating date reported by Moody's, and is zero otherwise.
Log(MktCap)	Logarithm of market capitalization in quarter *t*-1
M/B	Market to book value of asset in quarter *t*-1
Leverage	Sum of long-term debt and short-term debt scaled by total assets in quarter *t*-1
Profitability	EBITDA/Assets at quarter *t*-1
σ(ret)	Standard deviation of daily stock return within quarter *t*-1
Bond	A dummy variable that equals one if there is any bond issuance in quarter *t*
Panel D: 2002 shock regressions	
Post	A dummy variable equals one if quarter *t* is after Q3 2002, and zero otherwise.
Foreign	A dummy variable equals one if the firm is classified as a non-US firm, and zero otherwise.
Panel E: Consequences of discretionary additions	
Post	A dummy variable equals one if quarter *t* is after S&P 500 addition quarter, and zero otherwise.
Treat	A dummy variable equals one if the firm is classified as an S&P 500 entrant, and zero otherwise.
Discretionary in	A dummy variable equals one if the firm is classified as a discretionary in, and zero otherwise.
Log(asset)	Logarithm of total assets in year *t*-1
M/B	Market to book value of assets in year *t*-1
Leverage	Sum of long-term debt and short-term debt scaled by total assets in year *t*-1
Ret_lag1yr	Stock return in year *t*-1
Profitability	EBITDA/Assets at year *t*
ROA	Net Income/Assets at year *t*
Investment	Capex/Assets at year *t*

Table 1: Descriptive Statistics for Global Fund Market.

This table provides the descriptive statistics for the global fund market, including open-end, closed-end and ETFs, in 1980, 1990, 2000, 2010, and 2019, respectively, based on data from Morningstar. The table shows the number of funds and the value of AUM (in parentheses). Panel A provides statistics for funds benchmarked against S&P 500, while Panel B reports the same set of statistics for funds benchmarked against the Russell 1000. Based on the information provided by Morningstar, we identify index ETFs (ETFs passively tracking an index) and index funds (mutual funds passively tracking an index). Other funds benchmarked against an index including those referencing an index but are not otherwise classified as a passively managed index fund.

Fund	**1980**	**1990**	**2000**	**2010**	**2019**
Total # of funds	493	3372	15336	73297	93056
(Total value in bn $)	(62)	(938)	(5896)	(21734)	(43672)
Panel A: S&P 500					
# of S&P 500 ETFs	0	0	6	56	140
(Value in bn $)	(0)	(0)	(28)	(146)	(777)
# of S&P 500 funds	1	13	111	118	157
(Value in bn $)	(0)	(4)	(234)	(326)	(1269)
# of Other funds benchmarking against S&P 500	130	352	1241	1919	1816
(Value in bn $)	(22)	(116)	(1331)	(1929)	(3490)
Total # of funds benchmarking against S&P 500	131	365	1358	2093	2113
(Total value in bn $)	(22)	(120)	(1593)	(2401)	(5536)
Panel B: Russell 1000					
# of Russell 1000 ETFs	0	0	3	13	31
(Value in bn $)	(0)	(0)	(0)	(33)	(123)
# of Russell 1000 funds	0	0	0	6	20
(Value in bn $)	(0)	(0)	(0)	(2)	(44)
# of Other funds benchmarking against Russell 1000	56	130	473	681	553
(Value in bn $)	(12)	(55)	(768)	(681)	(1330)
Total # of funds benchmarking against Russell 1000	56	130	476	700	604
(Total value in bn $)	(12)	(55)	(768)	(716)	(1497)

Table 2: Rule Violations in S&P 500 Additions

This table summarizes deviations of S&P 500 additions from the published rules from 2015 to 2018. The number of S&P 500 additions, the fraction of additions that meets each rule, and the number of non-addition firms that satisfies all criteria are reported in Panels A, B, and C, respectively. The average values of the underlying variables corresponding to each addition rule are reported in Panel D.

	2015	2016	2017	2018	2015 - 2018
Panel A: # of Additions					
	19	26	24	23	92
Panel B: Percentage of stocks meet specific criterion					
Meet all criteria	68.42	65.38	58.33	78.26	67.39
US headquarter	89.47	96.15	91.67	100.00	94.57
US incorporation	89.47	96.15	87.50	100.00	93.48
MktCap $\geq$ S&P 500 threshold	100.00	92.31	100.00	100.00	97.83
Turnover ≥ 1	94.74	100.00	100.00	95.65	97.83
Monthly volume $\geq$ 250,000 shares	100.00	100.00	100.00	100.00	100.00
Earnings_last1Q > 0	89.47	84.62	91.67	86.96	88.04
Earnings_last4Q > 0	89.47	100.00	87.50	95.65	93.48
IWF $\geq$ required threshold	73.68	76.92	70.83	91.30	78.26
Time since IPO $>$ required threshold	100.00	100.00	100.00	100.00	100.00
Time since last deletion from S&P 500 $>$ required threshold	100.00	100.00	100.00	100.00	100.00
Panel C: # of unique non-addition firms that satisfied all criteria					
Observations	133	116	112	142	222
Panel D: Average value of the underlying characteristics					
MktCap	14249.09	9630.51	11821.21	13135.14	12031.99
	(4246.15)	(2971.89)	(3755.60)	(3249.00)	(3886.25)
Turnover	2.84	2.74	2.26	2.35	2.54
	(1.91)	(1.33)	(1.58)	(1.43)	(1.55)
Log(average monthly volume)	17.34	17.11	17.09	16.79	17.07
	(0.94)	(0.72)	(0.89)	(0.81)	(0.84)
Earnings_last1Q	134.66	83.17	109.41	93.02	103.11
	(163.36)	(89.34)	(130.76)	(111.98)	(123.22)
Earnings_last4Q	537.73	368.79	342.23	410.72	407.23
	(454.29)	(228.44)	(414.76)	(325.63)	(359.68)
IWF	0.74	0.77	0.71	0.91	0.78
	(0.45)	(0.43)	(0.46)	(0.29)	(0.41)

Table 3: Predicting S&P 500 Membership

This table reports regression results on predicting which firms are in the S&P 500 index. The sample contains all public firms from 1980 to 2018 that meet the minimum eligibility conditions. Columns 1 and 2 report a probit and linear regression, respectively, with size rank dummies and quarter fixed effects. column 3 adds to the linear model a continuous measure of firm size ("log(MktCap)") and a dummy variable indicating whether a firm meets the size requirement ("MktCap_OK"). Column 4 includes additional control variables, including Turnover≥1, monthly volume≥250,000 shares, earnings_last1Q>0, earnings_last4Q>0, IPO_OK, IWF_OK, deletion gap_OK, US headquarter, US incorporated, SP400or600, SP500_acquirer, turnover, log(average monthly volume), earnings_last1Q, earnings_last4Q, SP500 sector representation, difference in sector representation and five interaction terms between SP400or600 and Turnover≥1, monthly volume≥250,000 shares, earnings_last1q>0, earnings_last4q>0, and, IWF_OK for period after July 31, 2017, respectively. Column 5 follows the same specification as column 4 but restricts the sample to 2015-2018. Robust standard errors clustered at the firm level are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	S&P500_member=1, Otherwise=0				
	Probit	OLS			
		1980 - 2018			2015 - 2018
Variables	(1)	(2)	(3)	(4)	(5)
Size rank[1,100]	3.943***	0.909***	0.845***	0.772***	0.797***
	(0.102)	(0.015)	(0.015)	(0.015)	(0.033)
Size rank[101,300]	3.470***	0.807***	0.751***	0.693***	0.701***
	(0.056)	(0.012)	(0.013)	(0.012)	(0.028)
Size rank[301,500]	2.691***	0.538***	0.487***	0.457***	0.599***
	(0.046)	(0.013)	(0.014)	(0.013)	(0.027)
Size rank[501,700]	1.923***	0.250***	0.209***	0.207***	0.197***
	(0.044)	(0.011)	(0.011)	(0.011)	(0.021)
Size rank[701,1000]	1.287***	0.093***	0.076***	0.080***	0.055***
	(0.038)	(0.006)	(0.006)	(0.006)	(0.009)
Log(MktCap)			0.007***	0.012***	-0.000
			(0.000)	(0.001)	(0.002)
MktCap_OK			0.092***	0.066***	0.070***
			(0.013)	(0.012)	(0.017)
Control				✓	✓
Quarter FE	✓	✓	✓	✓	✓
Observation	672,947	672,947	668,420	560,480	61,616
R^2	0.61	0.59	0.59	0.62	0.72

Table 4: Predicting Additions to S&P 500

This table reports results on predicting which firms are added to S&P 500. The sample contains all newly added S&P 500 firms and non-S&P 500 firms that meet the minimum eligibility conditions. The lists of regressors in Columns 1-5 are the same as in the corresponding columns of Table 3. In column 6, we adopt a different timing for evaluating a firm's market capitalization. In particular, for each unique addition announcement, we re-rank candidate firms based on the latest market capitalization up to three calendar days leading up to the announcement. Rather than using data at the end of a quarter, we re-run the prediction model using the actual addition dates from 2015 to 2018. Robust standard errors clustered at the firm level are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	S&P500_addition=1, Otherwise=0					
	Probit	OLS				
		1980 - 2018			2015 - 2018	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Size rank[1,100]	2.199***	0.020***	0.016***	0.026***	0.035**	0.534***
	(0.133)	(0.005)	(0.005)	(0.005)	(0.017)	(0.164)
Size rank[101,300]	2.548***	0.040***	0.038***	0.042***	0.028***	0.131***
	(0.097)	(0.003)	(0.003)	(0.003)	(0.008)	(0.026)
Size rank[301,500]	2.344***	0.026***	0.024***	0.026***	0.071***	0.023***
	(0.091)	(0.001)	(0.001)	(0.001)	(0.009)	(0.004)
Size rank[501,700]	1.583***	0.004***	0.002***	0.003***	0.006***	-0.003***
	(0.094)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Size rank[701,1000]	1.088***	0.001***	0.001***	0.001***	0.000	-0.003***
	(0.100)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Log(MktCap)			0.000***	-0.000***	-0.001***	0.000
			(0.000)	(0.000)	(0.000)	(0.000)
MktCap_OK			0.008***	0.010***	0.004***	-0.001*
			(0.002)	(0.002)	(0.001)	(0.001)
Control				✓	✓	✓
Event FE						✓
Quarter FE	✓	✓	✓	✓	✓	
Observation	584,713	602,279	597,797	490,361	53,859	239,662
R^2	0.38	0.03	0.03	0.03	0.05	0.07

Table 5: Predicting Russell 1000 Membership and Additions

This table reports prediction results for Russell 1000 membership (columns 1-4) and addition decisions (columns 5-8), respectively. The sample includes all Russell 3000 firms from 1996 to 2016. In columns 1-2 and 5-6, the market capitalization at end of May each year is used to construct the dummy variables for size ranks. We follow Russell's announcement and incorporate a banding rule after 2007 (to cap the number of membership changes at any given point in time). In columns 3-4, and 7-8, modified market capitalization computed by Ben-David et al. (2019) for 2000-2006 is used to define the size rank dummies. Year fixed effects are controlled for in all specifications. Robust standard errors clustered at the firm level are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	Membership				Addition			
Model	OLS		Probit		OLS		Probit	
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size rank[1, 1000]	0.964***		4.221***		0.860***		3.662***	
	(0.002)		(0.036)		(0.007)		(0.046)	
Size rank[1,100]		0.998***		8.900***		0.994***		9.282***
		(0.001)		(0.088)		(0.002)		(0.106)
Size rank[101,300]		0.998***		8.900***		0.997***		9.313***
		(0.001)		(0.087)		(0.001)		(0.102)
Size rank[301,500]		0.997***		6.167***		0.988***		5.848***
		(0.001)		(0.214)		(0.005)		(0.284)
Size rank[501,700]		0.994***		5.510***		0.960***		5.206***
		(0.001)		(0.114)		(0.009)		(0.147)
Size rank[701,1000]		0.819***		3.780***		0.555***		3.434***
		(0.007)		(0.084)		(0.012)		(0.083)
Size rank[1001,1500]		0.087***		1.508***		0.015***		0.994***
		(0.005)		(0.084)		(0.001)		(0.081)
Size rank[1501,2000]		0.007***		0.500***		0.004***		0.493***
		(0.001)		(0.083)		(0.001)		(0.091)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Observation	62,700	62,700	62,700	62,700	41,203	41,203	41,203	41,203
R^2	0.93	0.86	0.87	0.82	0.75	0.66	0.72	0.72

Table 6: "Misclassification Errors" by Firm Size

This table reports and compares the "misclassification errors"- deviations from the published criteria - for S&P 500 (over 1980-2018) and Russell 1000 (over 1996-2016), respectively. Panel A reports results on membership status, while Panel B reports results on addition decisions. Column 1 in Panels A and B refers to the predicted rank groups for S&P 500 membership or additions, based on column 4 in Tables 3 and 4, respectively. Column 4 in Panels A and B reports the predicted rank groups for Russell 1000 membership and additions, based on columns 2 and 6 in Table 5, respectively. As an example, the numbers in the first row means that, for firms ranked 1-250 according S&P's published criteria, 93.9% of the firms are actually made into S&P 500, and 6.1% are not. In comparison, for firms ranked 1-500 using Russell's published criteria, 100% are made into Russell 1000, and 0% are left out.

Panel A: Membership

S&P 500			Russell 1000		
Group	In the Index (%)	Outside the Index (%)	Group	In the Index (%)	Outside the Index (%)
[1, 250]	93.9	6.1	[1, 500]	100.0	0.0
[251, 500]	65.1	34.9	[501, 1000]	95.5	4.5
[501, 750]	17.5	82.5	[1001, 1500]	4.2	95.8
[751, 1000]	3.2	96.8	[1501, 2000]	1.0	99.0
> 1000	0.2	99.8	> 2000	0.2	99.8

Panel B: Addition

S&P 500			Russell 1000		
Group	In the Index (%)	Outside the Index (%)	Group	In the Index (%)	Outside the Index (%)
[1, 250]	4.2	95.8	[1, 500]	99.6	0.4
[251, 500]	1.7	98.3	[501, 1000]	83.2	16.8
[501, 750]	0.9	99.1	[1001, 1500]	2.4	97.6
[751, 1000]	0.2	99.8	[1501, 2000]	0.4	99.6
> 1000	0.0	100.0	> 2000	0.1	99.9

Table 7: Sample Summary Statistics

This table provides summary statistics for the variables used in the regressions that analyze the relation between rating purchases and S&P 500 addition probability. The sample contains newly added S&P 500 firms and non-S&P 500 firms that meet the sample construction criteria. Detailed variable definitions are in Appendix II.

Variables	Obs	Mean	SD	Median
SP_Add	532744	0.145	3.806	0.000
Purchase_SP	532744	0.072	0.258	0.000
Purchase_Any	532744	0.092	0.290	0.000
US headquarter	532744	0.935	0.247	1.000
US incorporation	532744	0.933	0.249	1.000
Log(MktCap)	528342	5.184	1.754	5.153
MktCap $\geq$ S&P 500 threshold	528342	0.722	0.448	1.000
Turnover	529515	1.336	1.986	0.755
Turnover ≥ 1	529515	0.408	0.492	0.000
Log(average monthly volume)	532744	13.454	2.738	13.691
Monthly volume $\geq$ 250,000 shares	532744	0.571	0.495	1.000
Earnings_last1Q	517138	7.044	37.147	1.393
Earnings_last1Q > 0	532744	0.709	0.454	1.000
Earnings_last4Q	482766	27.050	124.532	5.685
Earnings_last4Q > 0	482766	0.728	0.445	1.000
IWF	107347	0.846	0.179	0.917
IWF $\geq$ required threshold	532744	0.795	0.404	1.000
Time since IPO $>$ required threshold	532744	0.955	0.208	1.000
Time since last deletion from S&P 500 $>$ required threshold	532744	1.000	0.013	1.000
S&P 500 sectoral representation	532744	0.113	0.046	0.113
Difference in sectoral representation	532744	-0.002	0.015	0.000
S&P400/600	532744	0.169	0.375	0.000
Aquiror of S&P500 firm	532744	0.000	0.011	0.000

Table 8: Rating Purchases and S&P 500 Additions

This table reports results on how firms' ex-ante rating purchases affect their probability of being added to S&P 500. The sample contains all firms that meet the minimum eligibility conditions, excluding firms already in the index at the time of an addition decision. The dependent variable "SP_Add"is a binary variable that equals 100 if a firm is added to S&P 500 in quarter t, and otherwise equals zero. The key independent variable "Purchase_SP"is a dummy variable that equals one if firm i has purchased at least one rating from S&P over quarter [t-4, t], and zero otherwise. "Purchase_Any"is a dummy variable that equals one if the firm has purchased a rating from either S&P or Moody's over quarter [t-4, t], and otherwise is zero. "Other controls"are variables constructed according to the published S&P 500 addition criteria, as in column 4 of Table 3. Detailed variable definitions are in Appendix II. Firm and quarter fixed effects are included where indicated. Robust standard errors clustered at firm and quarter levels are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	Probit	OLS		
	SP_Add=100, Otherwise=0			
Variables	(1)	(2)	(3)	(4)
Purchase_Any	0.031	-0.089	-0.018	-0.040**
	(0.075)	(0.064)	(0.069)	(0.020)
Purchase_SP	0.126*	0.158**	0.133*	0.018
	(0.075)	(0.074)	(0.077)	(0.022)
Purchase_SP × Size rank[1,100]				-1.678
				(1.952)
Purchase_SP × Size rank[101,300]				0.370
				(1.501)
Purchase_SP × Size rank[301,500]				1.351**
				(0.648)
Purchase_SP × Size rank[501,700]				-0.196
				(0.275)
Purchase_SP × Size rank[701,1000]				0.072
				(0.054)
Size rank[1,100]	1.039***	1.650***	5.350***	5.959***
	(0.256)	(0.505)	(0.877)	(1.022)
Size rank[101,300]	1.245***	3.884***	6.216***	5.269***
	(0.227)	(0.406)	(0.561)	(0.546)
Size rank[301,500]	1.081***	2.520***	3.026***	2.946***
	(0.196)	(0.211)	(0.247)	(0.253)
Size rank[501,700]	0.466***	0.203***	0.190**	0.195*
	(0.177)	(0.070)	(0.094)	(0.103)
Size rank[701,1000]	0.447***	0.043*	0.036	0.045
	(0.157)	(0.024)	(0.031)	(0.033)
Purchase_Any interacts with size ranks				✓
Other Controls	✓	✓	✓	✓
Firm FE			✓	✓
Quarter FE	✓	✓	✓	✓
Observation	465,572	479,203	478,983	478,983
R^2	0.43	0.03	0.05	0.05

Table 9: Vacancies in S&P 500 and Firm Rating Purchases

This table reports results on firms' S&P rating purchases when there is an announcement of an M&A event between existing S&P 500 members. The sample contains all firms that meet the minimum eligibility conditions that are not already in the index and not involved in an M&A event with an S&P 500 member firm. The dependent variable, "Purchase_SP", equals one if a firm purchases a rating from S&P in quarter t and zero otherwise. The independent variable "SPmerger"is a dummy that equals one if there is an M&A news involving two S&P 500 members in quarter t. Firms' rank bracket dummies in market capitalization are interacted with "SPmerger"variable. Memprob quartiles are dummies indicating which quartile the predicted membership probability is for a given firm in quarter t, estimated from a three-year rolling window. "Purchase_Moody"is a dummy indicating whether the firm has also purchased a Moody's rating. Other controls include log market capitalization, ratio of market to book value, profitability, and standard deviation of the return series. Robust standard errors clustered by firm are shown in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	Purchase_SP=1, Otherwise=0		
Variables	(1)	(2)	(3)
SPmerger	-0.000	-0.000	-0.001*
	(0.000)	(0.000)	(0.000)
SPmerger × Size rank[1,1000]	0.004**		
	(0.002)		
SPmerger × Size rank[1,100]		0.023	
		(0.021)	
SPmerger × Size rank[101,300]		-0.003	
		(0.009)	
SPmerger × Size rank[301,500]		0.009*	
		(0.005)	
SPmerger × Size rank[501,700]		0.008**	
		(0.004)	
SPmerger × Size rank[701,1000]		0.000	
		(0.002)	
SPmerger × Memprob 25% - 50%			-0.001
			(0.001)
SPmerger × Memprob 50% - 75%			0.002*
			(0.001)
SPmerger × Memprob above 75%			0.005***
			(0.001)
Purchase_Moody	0.298***	0.298***	0.293***
	(0.009)	(0.009)	(0.009)
Control	✓	✓	✓
Firm FE	✓	✓	✓
Observation	421,623	421,623	391,646
R^2	0.30	0.30	0.30

Table 10: Variations in Index Membership Benefits and Rating Purchases

This table investigates how rating purchase behavior changes when the stock price premium associated with the index membership changes. For each quarter, we compute the average CAR associated with S&P 500 additions in the previous two years. We define "HighCAR" as a dummy for those quarters whose CARs for additions are in the top 25% of all quarters. Correspondingly, "SPmerger_HighCAR" is a dummy variable that equals one if a M&A takes place in a quarter with a high CAR for recent additions to the index, and "SPmerger_LowCAR" is a dummy that equals one if a M&A takes place in a quarter with a low CAR for recent additions. We also include interaction terms of "SPmerger_HighCAR" and "SPmerger_LowCAR", respectively, with size rank dummies and memprob dummies. Additional controls are the same as in Table 9. Firm fixed effects are included in the regressions. Robust standard errors clustered by firm are shown in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	Purchase_SP=1, Otherwise=0		
Variables	(1)	(2)	(3)
SPmerger_HighCAR	-0.001**	-0.001**	-0.001*
	(0.001)	(0.001)	(0.001)
SPmerger_LowCAR	0.000	0.000	-0.001
	(0.000)	(0.000)	(0.000)
SPmerger_HighCAR × Size rank[1,1000]	0.015***		
	(0.003)		
SPmerger_LowCAR × Size rank[1,1000]	-0.000		
	(0.002)		
SPmerger_HighCAR × Size rank[1,100]		0.034	
		(0.033)	
SPmerger_LowCAR × Size rank[1,100]		0.020	
		(0.021)	
SPmerger_HighCAR × Size rank[101,300]		0.011	
		(0.013)	
SPmerger_LowCAR × Size rank[101,300]		-0.008	
		(0.009)	
SPmerger_HighCAR × Size rank[301,500]		0.024***	
		(0.008)	
SPmerger_LowCAR × Size rank[301,500]		0.003	
		(0.005)	
SPmerger_HighCAR × Size rank[501,700]		0.020***	
		(0.006)	
SPmerger_LowCAR × Size rank[501,700]		0.004	
		(0.004)	
SPmerger_HighCAR × Size rank[701,1000]		0.008**	
		(0.004)	
SPmerger_LowCAR × Size rank[701,1000]		-0.003	
		(0.002)	
SPmerger_HighCAR × Memprob 25% - 50%			-0.002
			(0.001)
SPmerger_LowCAR × Memprob 25% - 50%			-0.000
			(0.001)
SPmerger_HighCAR × Memprob 50% - 75%			0.002
			(0.001)
SPmerger_LowCAR × Memprob 50% - 75%			0.002*
			(0.001)
SPmerger_HighCAR × Memprob above 75%			0.010***
			(0.002)
SPmerger_LowCAR × Memprob above 75%			0.003*
			(0.001)
Purchase_Moody	0.298***	0.298***	0.293***
	(0.009)	(0.009)	(0.009)
Control	✓	✓	✓
Firm FE	✓	✓	✓
Observation	421,623	421,623	391,646
R^2	0.30	0.30	0.30

Table 11: The 2002 Rule Change and Rating Purchases

This table investigates the effects of S&P's rule change announcement in 2002 on non-S&P500 firms' rating purchases, using a difference-in-differences framework. The sample contains all the non-S&P 500 firms from 2001Q3 to 2003Q3. In columns 1-5 and 6-10, dummies for S&P or Moody's rating purchases are dependent variables, respectively. "Post"is a dummy variable indicating the time periods after 2002Q3 (inclusive). "Foreign"is a dummy variable for non-US firms. "Large foreign firms"is a dummy variable for those foreign firms whose size is in the top 25% among all foreign firms listed in the US in 2002Q3. Other controls include log(MktCap), M/B, leverage, profitability, σ(ret), and bond issuance. Firm and quarter fixed effects are included. Columns 3-5 and 8-10 further decompose the treatment effects with firm size, firm origins and time horizon, respectively. Robust standard errors clustered by firm and quarter are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	Purchase_SP=1, Otherwise=0					Purchase_moody=1, Otherwise=0				
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Post × Foreign	-0.058**	-0.031***				-0.011	0.005			
	(0.020)	(0.007)				(0.015)	(0.018)			
Post × Large Foreign			-0.072***					0.063		
			(0.015)					(0.037)		
Post × Small Foreign			-0.011					-0.022*		
			(0.013)					(0.011)		
Post × European/Canadian				-0.052***					0.015	
				(0.013)					(0.020)	
Post × Non-European/Canadian Foreign				0.102					-0.055	
				(0.065)					(0.036)	
Post Quarter 1 and 2 × Foreign					-0.027*					0.003
					(0.013)					(0.016)
Post Quarter 3 and 4 × Foreign					-0.035**					0.008
					(0.014)					(0.025)
Control		✓	✓	✓	✓		✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observation	11,554	9,377	9,170	9,377	9,377	11,554	9,377	9,170	9,377	9,377
R^2	0.26	0.37	0.37	0.37	0.37	0.17	0.43	0.43	0.43	0.43

Table 12: Comparing Firm Performance: "Discretionary in"vs. "Discretionary out"

This table compares performance of "discretionary in"firms subsequent to their entry into S&P 500 relative to their matched "discretionary out"counterparts. Various windows such as from 4 years before entry into the index to one year, two years, and four years after are used. Profitability, ROA, and investment are the dependent variables in Panel A, B, and C, respectively. "Post"is a dummy variable for time periods after entry into the index. "Discretionary In"is a dummy variable for additions that are discretionary. Other controls include log(asset), Ret_lag1yr, M/B, and leverage. Match-specific firm fixed effects and match-specific year fixed effects. Robust standard errors clustered by match-specific firm and match-specific year are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% level, respectively.

	Profitability					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	[-4,+1]		[-4,+2]		[-4,+4]	
Post × Discretionary In	-0.021**	-0.021**	-0.020***	-0.021***	-0.019***	-0.020***
	(0.009)	(0.009)	(0.007)	(0.007)	(0.006)	(0.006)
Log(asset)		-0.014*		-0.014**		-0.009*
		(0.007)		(0.007)		(0.005)
Ret_lag1yr		0.132		0.101		0.149
		(0.120)		(0.118)		(0.117)
M/B		0.007		0.008		0.007
		(0.006)		(0.006)		(0.005)
Leverage		-0.005		-0.023		-0.039*
		(0.029)		(0.024)		(0.021)
Match-Specific Firm FE	✓	✓	✓	✓	✓	✓
Match-Specific Year FE	✓	✓	✓	✓	✓	✓
Observation	4,426	3,850	5,124	4,534	6,338	5,690
R^2	0.88	0.90	0.88	0.91	0.87	0.89
	ROA					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	[-4,+1]		[-4,+2]		[-4,+4]	
Post × Discretionary In	-0.018	-0.020*	-0.013	-0.017*	-0.015*	-0.016**
	(0.012)	(0.011)	(0.010)	(0.009)	(0.008)	(0.007)
Log(asset)		-0.085***		-0.081***		-0.059***
		(0.032)		(0.027)		(0.020)
Ret_lag1yr		0.065		0.034		0.143
		(0.152)		(0.151)		(0.140)
M/B		0.010		0.012*		0.009*
		(0.006)		(0.006)		(0.006)
Leverage		-0.037		-0.069**		-0.072***
		(0.035)		(0.033)		(0.025)
Match-Specific Firm FE	✓	✓	✓	✓	✓	✓
Match-Specific Year FE	✓	✓	✓	✓	✓	✓
Observation	4,776	4,162	5,540	4,908	6,856	6,162
R^2	0.80	0.83	0.78	0.82	0.78	0.81
	Investment					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	[-4,+1]		[-4,+2]		[-4,+4]	
Post × Discretionary In	0.015*	0.013	0.017**	0.013*	0.017**	0.013*
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.007)
Log(asset)		-0.045***		-0.049***		-0.040***
		(0.014)		(0.015)		(0.012)
Ret_lag1yr		0.255**		0.316**		0.339**
		(0.122)		(0.154)		(0.154)
M/B		0.005***		0.004***		0.005***
		(0.001)		(0.001)		(0.001)
Leverage		-0.108**		-0.110**		-0.084**
		(0.053)		(0.053)		(0.041)
Match-Specific Firm FE	✓	✓	✓	✓	✓	✓
Match-Specific Year FE	✓	✓	✓	✓	✓	✓
Observation	3,938	3,750	4,618	4,402	5,818	5,552
R^2	0.79	0.84	0.77	0.81	0.75	0.79

Table 13: Comparing Firm Performance: "Discretionary In" vs. "Rules-based In"

This table compares the relative performance between "discretionary-in" and "rules-based-in" firms subsequent to their entry into S&P 500 using a double-difference framework. The sample includes all S&P 500 additions from 1980 to 2018, as well as a set of non-S&P 500 firms matched individually to each addition firm using an entropy-balanced approach. Match-specific firm fixed effects and match-specific year fixed effects are included. Robust standard errors clustered by match-specific firm and match-specific year are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	Profitability							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	[-4,+1]		[-4,+2]		[-4,+3]		[-4,+4]	
Post × Treat	-0.004**	0.002	-0.006***	0.001	-0.007***	0.001	-0.007***	-0.000
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Post × Treat × Discretionary In		-0.009***		-0.011***		-0.011***		-0.010***
		(0.003)		(0.003)		(0.003)		(0.003)
Log(asset)	-0.005**	-0.005**	-0.005**	-0.005**	-0.005**	-0.004**	-0.004**	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Ret_lag1yr	0.169***	0.169***	0.181***	0.181***	0.193***	0.193***	0.188***	0.188***
	(0.013)	(0.013)	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)
M/B	0.010***	0.010***	0.011***	0.011***	0.011***	0.011***	0.012***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.009	0.009	0.002	0.002	0.003	0.004	0.000	0.000
	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Match-Specific Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Match-Specific Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Observation	1,017,571	1,017,571	1,177,015	1,177,015	1,319,392	1,319,392	1,448,212	1,448,212
R^2	0.88	0.88	0.87	0.87	0.86	0.86	0.85	0.85
	ROA							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	[-4,+1]		[-4,+2]		[-4,+3]		[-4,+4]	
Post × Treat	-0.001	0.002	-0.004	0.003	-0.002	0.005	-0.001	0.006**
	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)
Post × Treat × Discretionary In		-0.004		-0.010**		-0.010**		-0.012***
		(0.005)		(0.005)		(0.004)		(0.004)
Log(asset)	-0.035***	-0.035***	-0.036***	-0.036***	-0.033***	-0.033***	-0.030***	-0.030***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Ret_lag1yr	0.230***	0.230***	0.231***	0.231***	0.259***	0.259***	0.262***	0.262***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.019)	(0.019)	(0.017)	(0.017)
M/B	0.014***	0.014***	0.015***	0.015***	0.015***	0.015***	0.015***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.007	0.007	0.014	0.015*	0.015*	0.016**	0.011	0.011
	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.007)	(0.007)
Match-Specific Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Match-Specific Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Observation	1,017,560	1,017,560	1,177,003	1,177,003	1,319,380	1,319,380	1,448,200	1,448,200
R^2	0.78	0.78	0.75	0.75	0.74	0.74	0.72	0.72

Table 14: Comparing Stock Performance

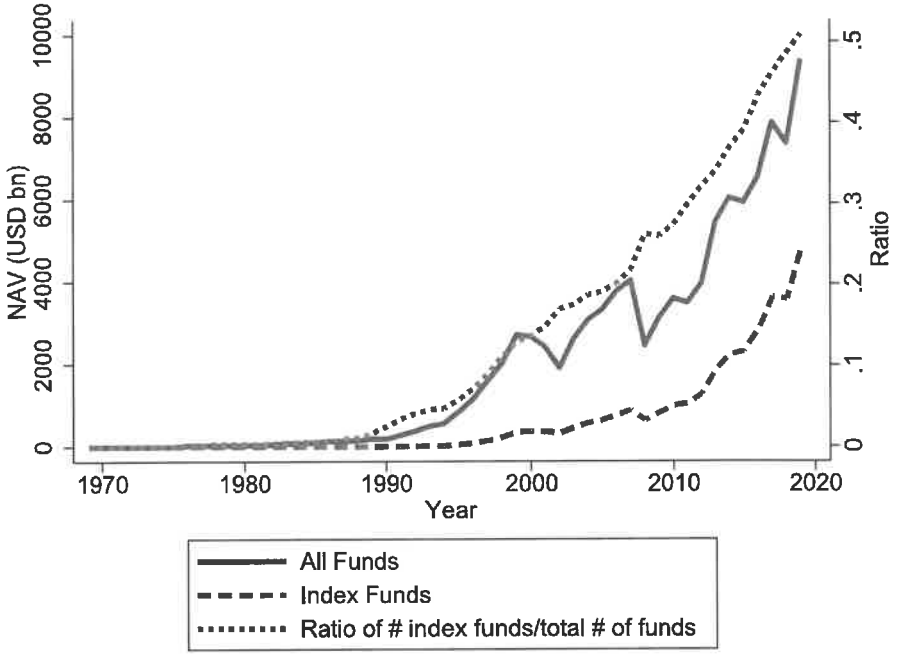
This table compares the relative stock performance among "discretionary in", "rules-based in", and matched "discretionary out". We report cumulative annualized returns over 36-, 48-, and 60-month windows for the three groups dynamically defined following each addition event. Robust standard deviations are in the parentheses. t-statistics on the differences between groups are reported in the last two columns. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

Month	Discretionary In	Rule-Based In	Discretionary Out	Difference	
	(1)	(2)	(3)	(4) = (1) - (2)	(5) = (1) - (3)
36	0.030***	0.092***	0.065***	-0.062***	-0.034**
	(0.010)	(0.012)	(0.011)	(0.016)	(0.015)
48	0.043***	0.102***	0.061***	-0.059***	-0.017
	(0.009)	(0.011)	(0.009)	(0.014)	(0.012)
60	0.048***	0.100***	0.059***	-0.051***	-0.010
	(0.008)	(0.010)	(0.008)	(0.012)	(0.011)

Figure 1: Growth of Index Funds

Figure 1a presents the AUM for index funds (including both open-end mutual funds and ETFs) in the US market from 1970 to 2019, with the AUM for all funds reported for comparison. Figure 1b plots the AUM of all index funds tracking S&P 500 and the share of S&P500 index funds in the total number of all index funds.

(a) Volume of index funds



(b) Volume of index funds tracking SP500

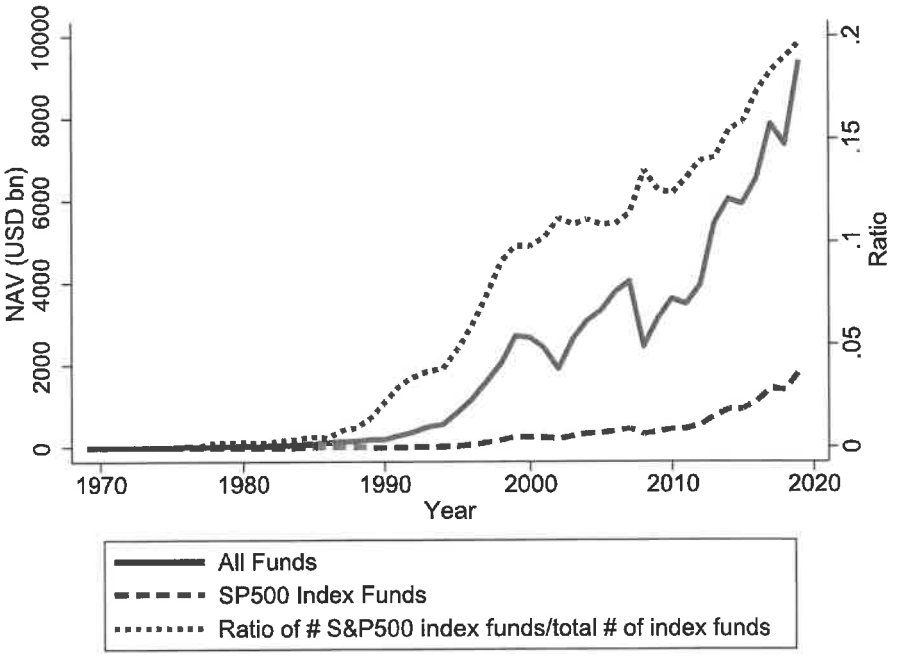


Figure 2: Comparing Stock Performance

This figure plots the average cumulative abnormal returns following S&P 500 additions for "rules-based in", "discretionary in", and the matched "discretionary out" firms, respectively.