Is Stock Index Membership for Sale?

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January 2022

Abstract

While major stock market indices are followed by large monetary investments, we document that membership decisions for S&P 500 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 rules-based additions.

JEL Codes: G10, G24

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*Li and Liu: Australian National University; and Wei: Columbia Business School, FISF, NBER, and CEPR. We would like to thank Markus Brunnermeier, Bruce Grundy, Zhiguo He, Harrison Hong, Kairong Xiao, and seminar participants at the Australian National University, Monash University, and Columbia University for their useful comments on the paper. All errors are our own.

Disclosure Statements

Kun Li

This research received no funding from any organization or person other than my university research budget.

Xin Liu

This research received no funding from any organization or person other than my university research budget.

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I am an independent director of a large mutual fund company. This research received no funding from any organization or person other than my university research budget.

1. Introduction

A large amount of money follows major stock market indices, with S&P 500 taking up the biggest share of the tracking funds. This paper investigates whether decisions on membership of the S&P 500 index involve discretions, and whether the discretions are exercised in a way that encourages firms to purchase more Standard and Poor's (S&P) rating services. It also investigates whether discretionary entrants exhibit worse subsequent financial and stock performances relative to rules-based entrants.

Entry into a major stock index often boosts a firm's stock price. Tesla provides a recent example for corporate executives and the public: its stock price increased by 60% from November 15, 2020, the day before its inclusion in S&P 500 was announced, to December 21, 2020, the day of the actual inclusion. Of course, the price change of any given stock can potentially be explained by some idiosyncratic factors. With a more rigorous analysis of the data from 1976 to 1983, a pioneering study by Shleifer (1986) shows that membership in S&P 500 raised 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&P 500 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. 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 obtain index membership for their companies.

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. The S&P has announced a set of rules beyond market

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

capitalization, such as minimum financial viability and liquidity requirements and representativeness of various industries. To the best of our knowledge, no academic studies in the economics and finance literature have systematically investigated whether and how the S&P exercises discretion beyond its own published rules in the S&P 500 entrant decisions and examined whether there exists a conflict of interest in the discretionary decisions.[2]

Standard and Poor's publishes its index methodology describing both the minimum eligibility and the selection criteria for adding stocks to the S&P 500 index.[3] By following the published criteria as closely as possible, we are able to explain about 63% 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 37% 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. As S&P discloses precise rules since 2015, we show that the prediction power increases to 71% for membership and 7% for additions if we focus on firms from 2015 to 2018. Nonetheless, there are still significant deviations in S&P 500 addition decisions from S&P's published rules. Indeed, about 1/3 of the additions during 2015-2018 appear to violate at least one of the published rules. At the same time, many stocks that satisfy all conditions and also appear to have a higher value of market capitalization are left out of the index. 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&P 500 exhibit a substantially bigger gap between published rules and actual decisions.

[2] The *Financial Times* has described some examples of this discretion in an article titled "Indices favour discretion in applying rules," published on August 15, 2015. It points out possible risks associated with such discretions in a subsequent article, "The risks in the power of stock market indices," November 27, 2020. Since typically more than 500 stocks satisfy the eligibility conditions for inclusion in S&P500, legal scholar Robertson (2021) calls the actual index membership "simply one particular large cap portfolio" and suggests that the common interpretation of S&P500 as a passive index is incorrect. Given the discretions in the index membership decisions, Sharfman and Deluard (2021) advocate more disclosure by both S&P and the funds that track the index.

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

Since S&P is also in the business of selling rating and other services to firms, we 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 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 find that S&P appears to give statistically significant weight to firms' rating purchases in making decisions on which firms are added to the index, beyond the published index methodology. We control for firms' purchase of Moody ratings in this exercise. We also find that firms strategically purchase more S&P ratings (relative to Moody ratings) when there is an opening in the S&P 500 index. This pair of data patterns suggests that the index membership is not entirely objectively determined and the firms understand this.

The index membership decisions are made by an index committee of S&P.[4] 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

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

32.3%) in 2018.[5] Moody's does not have a stock index, and firms buy Moody's ratings only when they have an intrinsic business need to do so. Throughout our analyses, we control for firms' rating purchases from Moody's.

To see whether firm purchases of S&P ratings are partly motivated by a desire to enter S&P 500, we conduct three 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 that are not in 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 (more than they do of Moody's ratings). This suggests that, in these firms' view, purchasing S&P ratings can affect S&P's decisions on which firms to be added to the index.

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" for the index membership. Using cumulative abnormal returns (CAR) around S&P 500 addition events averaged over the preceding two years, we show that firms buy more S&P ratings after an opening in the index especially in years with a higher stock price reaction to an addition event. This provides further confirmation that S&P rating purchases by firms are motivated partly by a desire to be added to the S&P 500 index.

Third, an event study on a sudden rule change in 2002 provides additional confirmation. The rule change made foreign firms no longer eligible for S&P 500, resulting in seven foreign firms being ousted from the index. We use this change as an adverse shock to foreign firms' incentive to compete for S&P 500 membership. With a difference-in-difference (DID) setting, we indeed find a significant reduction in S&P rating purchases by foreign firms after the event (relative to US firms). 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.

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

Finally, we investigate the consequence of such discretionary additions on firms' medium-run performance. Conceptually, all firms that have been added to S&P 500 can be classified into *rules-based entrants* and *discretionary entrants*, depending on whether their additions can be explained by the published rules. We find that the *discretionary entrants* tend to have a lower (annualized) profitability by 7.8% and a lower (annualized) ROA by 35.1% than the *rules-based entrants* in the four years subsequent to the additions.

We also construct a set of firms that are *discretionary-outs* – those are the firms not added to the index by S&P even though they satisfy all eligibility criteria and a rules-based regression assigns them a higher probability of joining the index than the *discretionary entrants*. We find that the *discretionary entrants* tend to have a lower profitability by 12.2% and a lower ROA by 32.7% than *discretionary-outs* in the four years subsequent to the former's additions to the index. These patterns suggest that the discretions on index membership may produce inefficiency in resource allocation.

There is also a difference in the long-run stock price performance among the three groups of the firms: we show that the *discretionary entrants* exhibit worse relative stock returns than either the *rules-based entrants* (by 640 basis points) or the *discretionary-outs* (by 300 basis points) over a 36-month window subsequent to their additions to the index.

Bennett, Stulz and Wang (2020) document a decline in financial performance after stocks are added to S&P 500. They do not distinguish between discretionary and rules-based additions. Our findings offer a new perspective on their results. In particular, the decline in financial performance by entrants to S&P 500 appears to be mostly driven by discretionary entrants.

We consider an alternative interpretation: rating purchases help a firm to gain index membership not because S&P would lower the standard for the firm but because S&P gains useful non-public information about the quality of the firm from the due diligence process needed for the ratings. This alternative interpretation can be discounted for three reasons. First, S&P's published methodology on additions to the index only describes publicly available information. The additional non-public information should be just as likely to reduce the chance of a firm being added to the index. In any case, using non-public information from the rating process would contradict the S&P's claim that its decisions on index additions involve no inputs from any other parts of the company. Second, a non-

trivial fraction of the discretionary entrants involves a waiver of some published rules, while at the same time many of the excluded firms satisfy all eligibility criteria. One does not need non-public information to see that some of the addition criteria are violated for these discretionary entrants. Third, if the non-public information gained from the rating process helps S&P to choose better firms than purely public information would, it is contradicted by our finding that discretionary entrants are worse firms (in terms of subsequent accounting performance) and worse stocks (in terms of subsequent stock returns) than either rules-based entrants 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, including both stock price and real impacts. Shleifer (1986), Harris and Gurel (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 price increase following additions to S&P 500, while Patel and Welch (2017), document some reversion in prices over a longer horizon. Evidence on the stock price reaction to membership in other indexes has been provided by Kaul, Mehrotra and Morck (2000) for TSE 300 index; Chang, Hong and Liskovich (2014) for the Russell index; and Hau, Massa and Peress (2009) and Hau (2011) for the Morgan Stanley Capital International global equity index. Vijh (1994), Barberisand and Shleifer (2003), Barberis, Shleifer and Wurgler (2005), Greenwood (2007) and Chen, Singal and Whitelaw (2016) study the interaction between index addition and comovement. Denis, McConnell, Ovtchinnikov and Yu (2003) show that firms newly added to S&P 500 experience significant increases in EPS forecasts and significant improvements in realized earnings. None of these papers investigates the differences between discretionary versus rules-based additions to an index.

Second, the paper provides a new interpretation about the performance of firms that have been added to the index. As mentioned earlier, Bennett, Stulz and Wang (2020) show that the firms that have been added to the index often perform worse in subsequent periods in terms of profitability and returns on assets. We show that this result is mostly driven by discretionary entrants. By delaying adding Telsla to S&P 500 and by excluding multi-class shares from the index by S&P, Sharfman and Deluard (2021) show that the returns on the

index have been made lower. We show that a reduction in financial performance is systematic and more general than these two cases.

Third, 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 existing literature related to rating agencies is on the possibility of rating inflation. 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 buy non-rating services receive higher ratings. Our paper is the first that systematically documents likely conflicts of interest in the membership decisions for a major stock index and their consequences.

The paper is organized as follows. In Section 2, we provide background information on stock price indexing, including the relative importance of S&P 500, and the general working of the credit rating industry. In Section 3, we describe S&P's published rules governing its decisions on adding firms to the index, and study the extent of discretion in the actual decisions. In Section 4, we investigate whether S&P assigns weights to firms' rating purchases in deciding which firms to be added to the index, and whether firms' rating purchases are partly motivated by a desire to influence S&P's decisions on index membership. In Section 5, we study the financial performance of the discretionary entrants subsequent to their additions to the index. Finally, we conclude the paper in Section 6.

2. Institutional Background

2.1.Landscape of the fund market

US equity funds have grown tremendously over the last four decades. Table 1 reports the number of all equity-based open-end funds and exchange-traded funds (ETFs) and their assets under management (AUMs) in 1980, 1990, 2000, 2010, and 2019, respectively, according to Morningstar. In 1980, there were 237 funds with a combined AUM of 37.7 billion dollars. By 2019, the total number of funds reached 2,608, with a combined AUM of 9.4 trillion dollars.

The dollar value of the funds that passively track S&P 500 has grown even faster. In Panel A of Table 1, the number of index funds (including ETFs and open-end mutual

funds) that passively track S&P 500 has increased from just one (Vanguard 500 index fund) in 1980 to 91 by 2019, with AUM growing from 0.1 billion dollars in 1980 to more than 1.8 trillion dollars by 2019. The number of actively managed funds that nonetheless explicitly benchmark against S&P 500 has increased from 96 in 1980 to 481 in 2019, with AUM growing from 18.7 billion dollars in 1980 to 481 billion during the same period. The combined AUM for both types of funds has grown from 18.8 billion dollars in 1980 to more than 3.7 trillion dollars in 2019.

For comparison, we also report funds tracking and benchmarking against the Russell 1000. They have also grown at a tremendous rate during the same period, but the total AUM of all funds tracking Russell 1000 (165.5 billion dollars) is less than 10% of that tracking S&P 500 in 2019. If we include the funds benchmarking but not passively tracking the two indices, the AUM for Russell 1000 (1.3 trillion dollars) is about 1/3 of that for S&P 500.

Figure 1 presents the time series of the aggregate AUM for all S&P 500 index funds (including open-end funds and ETFs) in the US market from 1970 to 2019. As a result of a faster relative growth, the share of S&P 500 funds reached 20% of all open-end funds and ETFs or about 9% of US GDP by 2019.

2.2. S&P 500 Index Selection Rules

Standard and Poor's 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 for choosing among firms that satisfy the minimum eligibility conditions for the index. The minimum eligibility stipulates that only the common shares of corporations listed on major US exchanges, such as the NYSE or NASDAQ,[6] would be considered.

Out of the stocks that satisfy the minimum eligibility conditions, we describe below S&P 500 addition criteria as stated in the index methodology published by S&P.[7] Some of

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

these rules apply to S&P Composite 1500 indices in general—i.e. also to S&P 400 (MidCap) and S&P 600 (SmallCap).

In subsequent statistical analyses, 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 addition criteria variables can account for actual addition decisions made by the S&P.

Market Capitalization: Since February 20, 2019, the minimum requirement for market capitalization for the S&P 500 has been an unadjusted company market capitalization of USD 8.2 billion. The requirement for market capitalization is reviewed from time to time to keep up with market development. The historical market capitalization thresholds since July 18, 2007 are reported in 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.[8]

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 ratio of 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.[9] The rule for IWF was first

[8] 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.

[9] 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

implemented in 2004. The required IWF was 50% for S&P 500 (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 discontinued operations) should be positive (**Financial Viability 1),** as should the most recent quarter's (**Financial Viability 2)**.[10]

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&P 500 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&P 500 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&P 500 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&P 500 index by comparing the actual additions against observable firm

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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).

[10] 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.

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.[11]

(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 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 set 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 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* $\geqslant 1$ 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.[12]

(4) **Liquidity 2:** A dummy variable (*monthly volume*$\geq$*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 (net income excluding discontinued operations) in the most recent quarter are positive, and zero otherwise.

[11] The correlation between the two variables is 0.83 for all our sample firms from 1980 to 2018.
[12] 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.

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

(7) **IPO:** S&P requires eligible firms to have been listed at least for 12 months (or 6 months in earlier years). As we require the firms in our sample to have at least four quarters of earnings data reported in Compustat, we automatically exclude those that do not satisfy the "time from IPO" requirement. For this reason, we will not include "time from IPO" as a regressor in our prediction regressions for either membership or additions to the index. In other words, if S&P had exercised discretion in this dimension, we will not count it as a part of its discretion.

(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.)**.**[13]

(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 the index with its weight in the S&P Total Market Index, in the relevant market capitalization range, is also considered in the selection of addition stocks. 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.

The index methodology discusses when to make exceptions to 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 acquired an S&P 500 firm within the past six

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

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 financial viability terms (*earnings_last1Q>0,* or *earnings_last4Q>0*), *liquidity (turnover* $\geqslant$*1,* or *monthly volume*$\geq$*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&P 500 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 overall creditworthiness and financial strength. Issuer-level ratings can be used as an information tool by capital markets participants or the issuer's counterparties, such as banks, clients, suppliers, joint-venture partners, brokers, and government agencies. 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.[14] 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. We start by a close look at the 773 additions to S&P 500 from 1980 to 2018. As S&P provides the most details of the index rules

[14] 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.

including all changes since 2015, we also take a special look at the 92 additions to S&P 500 from 2015 to 2018. In Panel B of Table 2, we reports the fraction of S&P 500 additions that violates a given selection criteria (e.g., market capitalization, liquidity, financial viability, public float, and so on).[15] For example, as reported in the last column, in the period of 2015-2018, 67.4% of the 92 additions satisfied all addition criteria stated in the S&P methodology (or 32.6% violated at least one criterion). 94.6% satisfied the US headquarter requirement, and the same proportion satisfied the UC incorporation requirement (and they do not have to be the same set of stocks in general). 97.8% of the addition stocks that year met the minimum market capitalization requirement. 97.8% of the firms satisfied the first liquidity requirement (in terms of turnover) and 100% satisfied the second liquidity requirement (in terms of monthly trading volume). 90.2% and 93.5% satisfied the two financial viability requirements on earnings (in terms of both the latest quarter and the sum of the previous four quarters) respectively. 78.3% of the stocks satisfied the minimum requirement on investable weight factor (investable float share in percent of total shares). All addition stocks in the sample satisfied the required minimum time from the most recent deletion from the index. In the absence of discretion in the addition decisions, one should find zero violation for each criterion. Instead, we find that, on average (the last column of Table 2), about 33% of actual additions in a year violated at least one of the published addition criteria. Among the criteria, public float threshold, financial viability, and US incorporation requirement were most likely to be violated.

Equally informative, we find in Panel C of Table 2 that a large number of firms (4522 in 1980-2018 and 224 in 2015-2018) that were not added to the index appear to have satisfied all the selection criteria at a time when some stocks were added to the index. In other words, deviations from the selection criteria did not occur because no firms could satisfy all the criteria. Instead, for every addition to the index that involves a waiver of some addition criteria, there are usually multiple firms that satisfy all criteria but are not added to the index.

[15] We use end-of-previous quarter statistics to compute selection criteria. We will report a robustness check where a firm's market capitalization is computed using the stock price three days before an addition announcement. The results are essentially the same.

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 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 R^2 is 0.60.

We report linear models estimated by ordinary least squares (OLS) in Columns 2-6 of Table 3. 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. Note that we (intentionally) report the raw R^2 (i.e., not adjusting for the degree of freedom) at the bottom of the table. 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 R^2 is negligible.

Column 4 further expands the list of regressors to include size group dummies and dummies that reflect S&P's other selection criteria: *MktCap_OK, turnover⩾1; monthly volume ⩾ 250,000 shares; earnings_last1Q>0; earnings_last4Q>0; IWF_OK; headquarters in US; incorporated in US.* In the published methodology, S&P states that special consideration to firms that are existing S&P 400 (the mid-cap index) or S&P 600 (the small cap index) firms or firms that acquires any existing S&P 500 firms. To reflect these, we also include two dummies *SP400or600 and SP500_acquiror* in the regression. The coefficients for these regressors are sensible, but the unadjusted R^2 increases only modestly, from 0.59 to 0.61. Column 5 further includes the underlying continuous value of the selection criteria dummies, namely *log(MktCap)*, *turnover, log(average monthly volume), earnings_last1Q*, *earnings_last4Q;* and two continuous variable reflected sector representation, *SP500 sector representation* and *difference in sector representation.* Moreover, as S&P states in its methodology that those stocks already in S&P 400 or S&P

600 can be added to S&P 500 even if some of the financial viability or liquidity conditions are not satisfied, we add five interaction terms between *SP400or600* and *turnover⩾1; monthly volume ⩾ 250,000 shares; earnings_last1Q>0; earnings_last4Q>0; and, IWF_OK*. We also include a dummy variable *deletion gap_OK* to reflect the requirement that from July 31, 2017, S&P required any company removed from S&P 500 to wait a minimum of one year from its index removal date before being reconsidered as a replacement candidate. Without adjusting for the degree of freedom, the R^2 by construction is a non-decreasing function of the number of regressors. Yet, the R^2 increases only modestly, from 0.61 to 0.63. 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 6 of Table 3, where we restrict the sample to 2015-2018 – the period with explicit information on minimum market capitalization, we see an additional moderate increase in the explanatory power of the regression due to more precise knowledge of the selection rules. However, the R^2 is still only 0.71, again indicating the presence of discretion by the S&P.

We use the same specification to examine the addition decisions. The regression sample for any quarter consists of eligible US stocks that are outside the index, and is a subset of the regression sample in Table 3 (which also include the stocks already in the index). 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 (59-71%).

The maximum R^2 of 7% is achieved in Column 7, 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 R^2 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), we find that a simple dummy for size rank between 1 and 1000 produces an R^2 of 93% (as reported in Column 1 of Table 5). For additions to the index, reported in Column 5, a simple dummy for size rank of 1-1000 produces an R^2 of 75%.[16] Both are much higher than their counterparts for the S&P 500 index. In Columns 2 and 6, we look at more disaggregated size bin dummies. In Columns 3-4 and 7-8, we report Probit results. Table 6 further compares deviations from the published criteria for S&P 500 (over 1980-2018) and Russell 1000 (over 1996-2016). In all cases, 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 panel data sample contains 11,957 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.[17] For every included firm in a quarter, we also require availability of its stock

[16] Using refined size rank information during 2000-2006, as computed by Ben-David et al. (2019), we obtain 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).

[17] We exclude master limited partners, closed-end funds, ETFs, ETNs, royalty trust, preferred stock, convertible preferred stock, unit trust, equity warrants, convertible bonds, rights, or ADRs. We lack the necessary information to explicitly exclude business development companies, limited liability companies, special purpose acquisition companies or 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 similar after excluding these firms.

information in that and the previous quarters and earnings and other financial information from the previous four quarters in either CRSP or Compustat.

Using information from Siblis Research (following 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 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.[18]

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 Capital IQ S&P Credit Rating database (accessed through WRDS) and the Moody's Rating Delivery Services (Historical) database. 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 identify when a rating was initiated (i.e., for a particular issuer or issue).[19] Note that a firm over time may have multiple ratings purchased from S&P, and any new purchase is a rating initiation. We focus on rating initiation (as opposed to change or renewal of existing ratings) as a rating purchase in our analyses as they generally involve a higher level of payment to the rating agencies. We exclude the unsolicited ratings that are not requested by issuer companies.[20]

We define *purchase_sp* as a dummy variable that equals one for a particular firm-quarter if the firm purchases at least one rating from S&P any time during the four quarters

[18] 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. By excluding them from our sample, we effectively assume that S&P does not exercise discretion in these cases; we also find 12 cases of addition 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.

[19] Both data sources have an indicator variable for whether a rating is newly issued. For example, in Capital IQ S&P Credit Rating, this is recorded in "Rating Action Word."

[20] Unsolicited ratings are ones that are determined without the consent and/or payment of the issuer being rated. In both S&P and Moody's rating databases, we can identify whether a rating is unsolicited or not. As a matter of fact, the vast majority of the ratings issued by S&P and Moody's are solicited ratings.

leading up to that quarter. 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. By construction, *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 construct financial viability, liquidity, and other firm-quarter level variables using information from Compustat, CRSP, and Capital IQ.

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 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 new rating from S&P in this or any of the previous four quarters, and zero otherwise. $C_{i,t-1}$ is a set of variables describing S&P's published selection criteria for adding a firm to S&P 500 as in Column 5 of Table 4. F_i and X_t represent firm and quarter fixed effects, respectively.

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 $Purchase\_any_{i,t-4,t}$, which is a dummy variable for a firm's purchase of any new rating from either S&P or Moody's over the same period as $Purchase\_sp_{i,t-4,t}$.[21]

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

[21] 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.

positive and significant, suggesting that firms' ex ante rating purchase from S&P enhances its chance of being added to S&P 500 index. Since being added to the index has a low unconditional probability, we follow King and Zeng (2001), implemented a logistic regression that adjusts for rare events, and report the results in Column 2 of Table 8. While the results are qualitatively the same in Column 2 (after adjusting for the rarity of addition events) as in Column 1 (without adjusting for the rarity of the events), the economic effect of purchasing S&P ratings is doubled.

In Column 3 of Table 8, we use a linear model and find results similar to the Probit model. The point estimate suggests that the probability of being added to the index is raised by 0.16% with a purchase of S&P ratings. This is economically large when compared to the unconditional probability of 0.16% of being added to the index[22]. In other words, purchasing ratings from S&P roughly doubles a random non-index member stock's chance of entering the index. In Column 4, we further include firm fixed effects and still find a positive and significant coefficient for *purchase_sp*. Overall, Columns 1 to 4 consistently suggest that purchasing S&P ratings enhances a firm's chance of being added to the index.

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 5, 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 especially strong for firms whose market capitalization is in the borderline area of the S&P 500.

We have considered an alternative interpretation of our finding: the positive correlation between a firm's purchase of S&P ratings and its chance of being added to the index is innocent, as S&P simply uses the additional non-public information it learns from the rating process to make a better judgement about which firms to be added to the index.

[22] In the sample spanning 156 quarters, a total of 773 stocks have been added to the index, out of 479,203 firm-quarter level observations (where the firm count refers to those firms not already in the index at the time of an addition event). This yields an unconditional addition probability of 0.16% (=773/479203).

This alternative interpretation is unlikely to be valid for four reasons. First, the additional information that S&P learns about a firm should be either negative or positive, and hence as likely to reduce as to increase the firm's chance of being added to the index. Second, the S&P's published methodology only lists variables that can be constructed from publicly available information and mentions no aspect of the stock that requires the use of non-public information that can be learned from S&P's interaction with the firm. In any case, the use of non-public information from the rating process would contradict S&P's public stance that no communication with its rating services plays any role in its index addition decisions. Third, as documented earlier, a non-trivial fraction of the stocks added to the index involves a waiver of some published addition criteria, even though many firms that satisfy all addition criteria are not added to the index. The violation of addition criteria by some newly added stocks can be observed without the use of non-public information. Fourth, if non-public information from the rating process is used, it presumably would help S&P to select better stocks to be added to the index than using public information alone. But we will report later that "discretionary entrants" to the index tend to be worse firms (in terms of subsequent accounting performance) and worse stocks (in terms of stock price performance) than either the many stocks excluded from the index or "rules-based entrants".

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.[23] Out of the 156 quarters during 1980-2018, there are announcements of M&As between S&P 500 firms in 90 quarters. In this exercise, our sample consists of all non-S&P 500 firms. Note that some rating purchases could be just a result of a desire to expand its scale. In this case, the firms may buy more ratings from any combination of rating agencies. We are interested in examining if firms choose to buy extra ratings from S&P. If firms do

[23] M&As that are announced and later withdrawn are left in the sample as they create the same incentive for firms wishing to enter the index.

use rating purchases to influence S&P's decisions on which firms to be added to the index, we should expect some firms to alter their purchases of S&P ratings relative to Moody's ratings when there are openings on the index membership. In particular, 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.

As rating purchases from S&P and Moody's are joint decisions, we use a seemingly unrelated regression (SUR) framework. Specifically, we run the following pair of regressions.

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

$$Purchase\_moody_{i,t} = \beta_1 SPmerger_t + \beta_2 SPmerger_t \times Size\ group_{i,t} + \beta_3 Size\ group_{i,t} + \gamma_2 Bond_{i,t} + C_{i,t-1} + F_i + \varepsilon_{i,t}. \quad (3)$$

The dependent variable $Purchase\_sp_{i,t}$ ($Purchase\_moody_{i,t}$) is a dummy variable that equals one if a firm purchases any S&P (Moody's) rating in quarter *t*, and zero otherwise. The independent variable $SPmerger_t$is a dummy variable that captures the merger events between existing S&P 500 member firms. In our baseline regression, $SPmerger_t$ equals one if there is any announcement of M&As between existing S&P 500 members any time during this or the previous two quarters i.e., over quarter [*t*-2, *t*], and zero otherwise.[24]

We control for rating purchases related to a need to issue bonds by a dummy variable, $Bond_{i,t}$, 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 *σ(ret)*. Because the *SPmerger* dummy varies by quarter, we include firm fixed effects F_i and and cluster all standard errors at the firm level in the regressions.

The rank of market capitalization of a firm carries information on the proximity of the firm to the S&P 500 threshold. We consider a number of ways to denote firm's size rank. A dummy variable *size rank[1,1000]* is an indicator variable for firms whose market capitalization is in the top 1000 (out of the universe of all listed firms, including those already in the index). If rating purchase is motivated partly by a desire to get into the index, such action is expected to be especially strong for firms in the top 1000 group since those

[24] Our results remain qualitatively similar if we use alternative windows, such as quarters [*t*-1, *t*].

outside the top 1000 do not have much hope to enter the index regardless how much they try. We interact the size group dummy for top-1000 firms and the dummy for time periods with M&A events between index member firms. The source of identifications are from comparison of the sensitivities of firms (in different size groups) purchasing new ratings from S&P in the event of between-S&P 500 M&As relative to that of their purchasing new ratings from Moody's. If these firms do respond more strongly to opening in the index membership, the coefficient on the interaction term is expected to be positive and statistically significant.

The results from the first SUR estimation are reported in Columns 1 and 2 of Table 9, where the dependent variables are purchases of S&P ratings and Moody's ratings, respectively. As the coefficients on the interaction terms between *SPmerger* and *size rank[1, 1000]* are positive and significant in both equations, firms appear to respond to news about possible opening in the index membership by trying to raise funds to expand their size which would lead to more rating purchases from all rating agencies. Importantly, the coefficient on the interaction term is twice as large in the S&P rating purchase equation (0.009) than in the one for Moody's rating purchase (0.004), and a *Chi-squared* test easily rejects the null of no difference between the two coefficients. In other words, firms respond to new opening in the index membership by purchasing substantially more ratings from S&P than from Moody's. This means that the additional purchases of S&P ratings likely go beyond a desire to increase the firm size.

In Columns 3 and 4 (which constitute the second SUR estimation), we further break up the top 1000 firms in terms of market capitalization 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 Columns 1 and 2 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*. A key finding is that additional rating purchases from S&P come primarily from firms ranked from 300 to 700 in market capitalization. The difference between S&P and Moody's coefficients are statistically significant for size group [301,500] and marginally significant for size group [501,700].

This pattern is consistent with our interpretation that rating purchases are partly strategic. Firms whose size is ranked in the top 300 likely believe that they can enter the

index on their merit alone. Those ranked below 700 likely believe they have little chance anyway. In comparison, firms ranked between 301 and 700 are in a grey zone. If strategic rating purchase is needed to elevate their chance of entering the index, it makes sense for firms in this middle group to try the hardest. The regression results suggest that firms in the middle group appear to respond to an opening on the index membership more than either much larger firms or much smaller firms.

The median time gap between the announcement and completion dates of M&As involving two index member firms is 162 days. This means firms have more than one quarter to react to the M&A news. As there could be some lag between the time of an M&A event and the time of an actual rating purchase, we now employ a sample filtering rule to increase the contrast between the times when there is an opening in the index membership and the times when there is for sure no opening in the index membership. Specifically, we restrict the sample to two types of time periods: those with M&A events in each of three consecutive quarters and those with no M&A events in three consecutive quarters. This naturally results in fewer time periods and a smaller sample. We examine whether the rating purchase behavior is systematically different between these two types of time periods.

We report the SUR results for the restricted sample in Columns 5 to 8. We also reconstruct *Bond* dummy to be one if any of the [*t*-2, *t*] quarters have bond issuance. With a sharper contrast between the two types of time periods, we would expect the strategic rating purchase to be more visible. The results suggest that this is indeed the case. The coefficients on the interaction terms in Columns 5-8 are generally much larger than their counterparts in Columns 1-4. In addition, whenever the coefficients are statistically significant, the point estimates in the S&P rating purchase equations (Columns 5 and 7) are always larger than the corresponding ones in the Moody's rating purchase equation (Columns 6 and 8). Most importantly, those firms ranked between 301 and 700 react more strongly to news about opening in the index membership than either larger or smaller stocks. The coefficients on the interaction terms for firms whose sizes are between 301 and 700 are statistically significantly bigger for S&P rating purchases than for Moody's rating purchases. The point estimate on the interaction with size rank [701,1000] is also bigger for S&P rating purchase than for Moody's rating purchases, but the difference between the

two is not statistically significant. These patterns are again consistent with the interpretation that rating purchases are partly strategic. There are extra rating purchases from S&P (over purchase from Moody's) by firms whose size ranks are between 301 and 700 when there is a new opening in the index membership.

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 all time periods involving a merger between 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 over all addition events in the two preceding years, with a window of [-14, 5] trading days for a given addition event.[25] If the CAR for additions is in the top 25% of the entire sample period, it is defined as HighCAR period, and otherwise as LowCAR periods.

Table 10 presents the results (with the restricted sample that sharpens the contrast between the two types of periods)[26]. In Columns 1 and 2 of Table 10, we interact *size rank[1,1000]* with *SPmerger_HighCAR* and *SPmerger_LowCAR* dummies, respectively. This regression includes firm fixed effects as well as the same set of control variables as in Table 9. The results confirm that firms react more strongly to opening in the index membership during times when the payoff for joining the index (price premium associated with index membership) is higher. In Columns 3 and 4 where we use finer size groups, we see that the rating purchase reactions are especially strong from firms whose size is ranked between 301 and 700 during times with a high payoff to join the index. They purchase more S&P ratings than Moody's ratings in such times. This again suggests that the extra S&P rating purchases go beyond a desire to issue more bonds or become bigger.

[25] The CAR for S&P additions is calculated via WRDS Eventus under a market model with an estimation window of [-120, -30] days and an event window of [-14, 5] days around an addition date.
[26] The results for the full sample are qualitatively similar.

To summarize, these data patterns support the view that firms 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 membership 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.[27] 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.

We use a triple differencing identification strategy. In other words, we compare the differences in the rating purchases from S&P versus Moody's by foreign versus US firms before and after the 2002 rule change. We focus on rating purchases by non-S&P 500 firms (both foreign and domestic) from Q3 2001 to Q3 2003,[28] with the following SUR specification:

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

[27] 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.

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

$$Purchase\_moody_{i,t} = \beta_1 Post_t \times Foreign_i + \gamma_1 Bond_{i,t} + C_{i,t-1} + F_i + X_t + \varepsilon_{i,t}. \quad (5)$$

In equation (4), 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. In equation (5), the dependent variable $Purchase\_moody_{i,t}$ is a dummy variable that equals one if a firm purchases an S&P rating in quarter *t*, and zero otherwise. The right-hand-side variables are the same between the two equations. Let $Post_t$ be a dummy for the quarters after the announcement of the rule change, and $Foreign_i$ is a dummy for (US-listed) 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. [29]

Column 1 of Table 11 reports the regression results with incidence of S&P rating purchases by firms as the dependent variable. The coefficient on the interaction term between "foreign firms" and "post-2002" time periods is negative and statistically significant, suggesting that US-listed foreign firms indeed reduced rating purchases from S&P by 78% (=-0.059/0.076). 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 is informative to compare the results with purchases of ratings from Moody's. The purchase of Moody's ratings is the second equation in the same SUR estimation, reported in Column 2 of Table 11. We see no statistically significant change in the purchasing behavior by foreign firms with regard to Moody's ratings. The F-statistic for the null of no difference in the two coefficients in the two equations is 5.7, rejecting the null at the 5% level.

[29] To implement the SUR with double clustering, we use a stacked regression approach. We report sample summary statistics in panel B, Appendix Table 10.

In the second SUR estimation reported in Columns 3 and 4, we include a set of control variables as in Tables 9 and 10. The estimates implies a reduction in the purchases of S&P ratings by 46.1% (=-0.035/0.076) by foreign firms relative to US firms following the rule change, whereas there is no significant change in Moody rating purchases. Furthermore, the difference between the two coefficients is statistically significant at 5% level.

We can learn more from exploring some heterogeneity across firms. In the third SUR estimation reported in Columns 5 and 6, 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. The *F*-tests suggest that the effect is stronger for large foreign firms comparing to small foreign firms in terms of S&P rating purchase relative to Moody rating purchase. This makes sense since large foreign firms have a more realistic chance of entering S&P 500 than the smaller foreign firms 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. Canadian and European firms before the rule change might infer that they have a better chance of entering the index than firms from other foreign countries (say Brazilian or Chinese firms). Consequently, the rule change might have been a bigger shock to the Canadian and European firms. In the fourth SUR estimation reported in Columns 7 and 8, 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 the fifth SUR estimation reported in Columns 9 and 10, where we split the post-2002 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.

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&P 500 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 in the benefit of purchasing 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: rules-based entrants and discretionary entrants. For every firm that is added to the index, we check if there exist other firms that satisfy all addition criteria as published S&P and are stronger than the firm actually added to the index (such as having a bigger market capitalization). An added firm is considered a rules-based entrant if there are no more qualified firms that are not added to the index. On the other hand, an added firm would be considered a discretionary entrant if there exist more qualified firms that have been excluded from the index. The set of more qualified firms excluded from the index are labeled as "discretionary outs." We will report that the relative performance deterioration reported in Rennett, Stulz, and Wang (2020) is mostly driven by discretionary entrants.

As reported in Table 2, about 1/3 of the firms added to the index during 2015-2018 do not satisfy at least one of the addition criteria as published by S&P. In principle, if at the time of a firm being added to the index, there exists no other firm that satisfy all addition criteria and has a larger market capitalization, one could make the case that S&P has to waive some criteria in order to add any firm. However, we find this is generally not the case. That is, when addition criteria are waived for an added firm, there usually exists a firm – often more than one firm – that satisfy all addition criteria including sector representation, liquidity, and financial viability and still have a bigger market capitalization than the added firm.

We define the set of "discretionary-outs" conservatively and require them to satisfy all addition criteria, belong to either underrepresented sectors or the same sector of the addition(s), and are predicted to have a higher chance to enter the index using a specification similar to Column 4 of Table 4 (but dynamically estimated using the most recent three years of data) than the corresponding discretionary entrants. "Discretionary-

out" firms typically have a bigger market capitalization than the corresponding discretionary entrants.[30] [31]

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:

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

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.[32]

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, 8.8% (=-0.013/0.148) lower than that of the

[30] Note that an addition may be classified as rules-based even if some addition criteria are waived as long as there exists no more qualified stocks outside the index. On the other hand, an addition may be classified as discretionary even without rule violations if there are more qualified stocks that are not added to the index.

[31] In the benchmark regressions, we use market capitalization at the end of previous quarter to approximate size in selection criteria. In some cases, a firm may have a merger and acquisition event during the period from the end of the previous quarter to the time when a firm is added to the index. As a robustness check, we find that our results are robust to control for merger and acquisitions and its interaction with size in those predictive regressions. Separately, we compare market capitalization between discretionary in and discretionary out. at quarter *t*-1, t and *t*+4, respectively. We find that discretionary-out firms are significant larger in general. Lastly, instead of using member probability we use size to determine discretionary entrants and discretionary out firms. We find our results are robust as well.

[32] 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 (6), we implement firm and year fixed effects within each matched pair. We report sample summary statistics in Appendix Table 10, panel C.

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 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, 46.2% (=-0.024/0.052), one year after the addition events (Column 2). This pattern also persists at least four years after the additions (Columns 3-6). From Panel C, the *discretionary ins* are likely to raise their investments more than the *discretionary outs* by at least 19.8% (=0.016/0.081) 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:

$$Performance_{i,t} = \beta_1 Post_t \times Treat_i + C_{i,t-1} + F_i + X_t + \varepsilon_{i,t}\,, \tag{7}$$

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:

$$Performance_{i,t} = \beta_1 Post_t \times Treat_i + \beta_2 Post_t \times Treat_i \times Discretionary\ In_i + C_{i,t-1} + F_i + X_t + \varepsilon_{i,t}\,, \tag{8}$$

"$Discretionary\ In_i$" 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.[33]

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. Focusing on the horizon of [-4, +4] years around the addition events (Column 8 of Panel A and B), we find that rules-based additions exhibit no relative decline in either profitability or ROA, compared to the control group. However, discretionary entrants are associated with a further 7.8% (=0.010/0.128) decrease in profitability and a decline in ROA by 35.1% (=0.013/0.037) compared to the rules-based entrants. 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 entrants (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 entrants* 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 entrants* have, on average, lower annualized returns, by 640 bps, relative to the *rule-based* entrants to the index. Even though the gap between *discretionary entrants* and *discretionary outs* is narrower, the *discretionary entrants* still have a lower annualized return, by 300 bps.

[33] We report sample summary statistics in Appendix Table 10, Panel D and compare entropy balanced and non-balanced sample in Appendix Table 11.

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 S&P 500 is not entirely an objectively constructed index. Instead, 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&P 500 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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Table 1: Descriptive Statistics for US Fund Market.

This table provides the descriptive statistics for the US equity funds, including open-end funds 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 at the end of each year (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 funds (mutual funds or ETFs) that passively tracking an index. Other funds benchmarked against an index include those referencing an index but are not otherwise classified as a passively managed index fund.

Fund	**1980**	**1990**	**2000**	**2010**	**2019**
Total # of funds	237	727	2425	2543	2608
(Total value in bn USD)	(37.7)	(176.7)	(2661.9)	(3601.1)	(9401.1)
Panel A: S&P 500					
Total # of S&500 index funds	1	13	97	82	91
(Total value in bn USD)	(0.1)	(3.9)	(260.3)	(445.2)	(1851.4)
# of Other funds benchmarking against S&P 500	96	210	714	590	481
(Total value in bn USD)	(18.7)	(84.0)	(1001.3)	(1075.6)	(1834.6)
Total # of funds benchmarking against S&P 500	97	223	811	672	572
(Total value in bn USD)	(18.8)	(87.9)	(1261.5)	(1520.8)	(3686.0)
Panel B: Russell 1000					
Total # of Russell 1000 index funds	0	0	3	10	40
(Total value in bn USD)	(0.0)	(0.0)	(0.5)	(31.9)	(165.5)
# of Other funds benchmarking against Russell 1000	51	118	429	521	402
(Total value in bn USD)	(10.7)	(51.7)	(737.9)	(608.6)	(1175.9)
Total # of funds benchmarking against Russell 1000	51	118	432	531	442
(Total value in bn USD)	(10.7)	(51.7)	(738.3)	(640.5)	(1341.3)

Table 2: Rules versus Discretion in S&P 500 Additions

For firms added to S&P 500 during 2015-2018, this table reports the number of S&P 500 additions (Panel A), the fraction of additions that meets a given criterion (Panel B), and the number of firms that satisfy all criteria but not added to the index (Panel C), respectively.

	1980s	1990s	2000s	2010s	1980 - 2018	2015 - 2018
Panel A: # of Additions						
	201	175	237	160	773	92
Panel B: Percentage of stocks meeting a given criterion						
Meet all criteria	22.39	41.71	53.59	60.63	44.24	67.39
US headquarter	97.51	95.43	97.89	86.88	94.95	94.57
US incorporation	97.01	94.86	97.05	84.38	93.92	93.48
MktCap $\geq$ S&P 500 threshold	100.00	100.00	98.31	97.50	98.96	97.83
Turnover ≥ 1	24.88	49.71	85.65	98.13	64.29	97.83
Monthly volume $\geq$ 250,000 shares	82.09	97.71	97.89	99.38	94.05	100.00
Earnings_last1Q > 0	98.51	94.86	91.56	93.13	94.44	90.22
Earnings_last4Q > 0	97.01	90.86	90.72	95.00	93.27	93.48
IWF $\geq$ required threshold	100.00	100.00	75.95	70.00	86.42	78.26
Time since last deletion from S&P 500 $>$ required threshold	100.00	100.00	100.00	100.00	100.00	100.00
Panel C: # of (unique) firms that satisfied all addition criteria but not added to the index						
	997	3004	2340	300	4522	224

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 consists all public firms during 1980-2018 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 an indicator variable for whether a firm meets the size requirement ("MktCap_OK"). Column 4 include a set of dummy variables that reflects S&P's rule, including Turnover≥1, monthly volume≥250,000 shares, earnings_last1Q>0, earnings_last4Q>0, IWF_OK, deletion gap_OK, US headquarter, US incorporated, SP400or600, SP500_acquirer. Column 5 further controls for continuous value of the rule-related variables, such as turnover, log(average monthly volume), earnings_last1Q, earnings_last4Q, SP500 sector representation, difference in sector representation as well as 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 6 follows the same specification as column 5 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)	(6)
Size rank[1,100]	3.928***	0.909***	0.844***	0.850***	0.771***	0.785***
	(0.102)	(0.015)	(0.015)	(0.014)	(0.015)	(0.034)
Size rank[101,300]	3.455***	0.807***	0.750***	0.753***	0.693***	0.686***
	(0.057)	(0.012)	(0.013)	(0.011)	(0.012)	(0.029)
Size rank[301,500]	2.674***	0.537***	0.486***	0.499***	0.454***	0.580***
	(0.047)	(0.013)	(0.014)	(0.013)	(0.013)	(0.027)
Size rank[501,700]	1.902***	0.248***	0.208***	0.237***	0.204***	0.181***
	(0.045)	(0.011)	(0.012)	(0.011)	(0.011)	(0.021)
Size rank[701,1000]	1.268***	0.092***	0.075***	0.104***	0.079***	0.054***
	(0.039)	(0.006)	(0.006)	(0.006)	(0.006)	(0.009)
Log(MktCap)			0.007***		0.012***	-0.001
			(0.000)		(0.001)	(0.002)
MktCap_OK			0.090***	0.073***	0.064***	0.082***
			(0.013)	(0.012)	(0.012)	(0.018)
Turnover≥ 1				0.025***	0.009***	0.041***
				(0.003)	(0.003)	(0.007)
Monthly volume≥ 250,000 shares				0.038***	-0.007*	-0.044***
				(0.003)	(0.004)	(0.006)
Earnings_last1Q > 0				0.001	0.008***	0.019***
				(0.001)	(0.002)	(0.004)
Earnings_last4Q > 0				0.010***	0.004**	0.022***
				(0.002)	(0.002)	(0.005)
IWF_OK				0.030***	0.031***	0.029***
				(0.004)	(0.004)	(0.006)
US headquarter				0.057***	0.059***	0.046***
				(0.018)	(0.019)	(0.016)
US incorporation				0.075***	0.091***	0.063***
				(0.018)	(0.020)	(0.015)
SP400/600				-0.133***	-0.151***	-0.100***
				(0.005)	(0.006)	(0.007)
SP500_Acquiror				-0.075	-0.077	-0.076
				(0.055)	(0.055)	(0.149)
Other controls					✓	✓
Quarter FE	✓	✓	✓	✓	✓	✓
Observation	603,097	603,097	598,650	598,650	549,007	60,142
R^2	0.6	0.59	0.59	0.61	0.63	0.71

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. (It excludes firms already in the index in the first year of the sample period.) The lists of regressors in Columns 1-6 are the same as in the corresponding columns of Table 3. In column 7, firm market capitalization are evaluated three days before each addition announcement made by S&P (compared to evaluating market capitalization at the end of previous quarter in other columns). 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)	(7)
Size rank[1,100]	2.165***	0.020***	0.016***	0.019***	0.026***	0.034**	0.535***
	(0.134)	(0.005)	(0.005)	(0.005)	(0.005)	(0.017)	(0.164)
Size rank[101,300]	2.506***	0.040***	0.037***	0.039***	0.041***	0.027***	0.128***
	(0.097)	(0.003)	(0.003)	(0.003)	(0.003)	(0.008)	(0.025)
Size rank[301,500]	2.306***	0.026***	0.024***	0.025***	0.026***	0.070***	0.023***
	(0.091)	(0.001)	(0.001)	(0.001)	(0.001)	(0.009)	(0.004)
Size rank[501,700]	1.534***	0.004***	0.002***	0.002***	0.002***	0.005***	-0.003***
	(0.095)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Size rank[701,1000]	1.005***	0.001***	0.001***	0.000**	0.001***	0.000	-0.003***
	(0.102)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(MktCap)			0.000***		-0.000***	-0.001***	0.000
			(0.000)		(0.000)	(0.000)	(0.000)
MktCap_OK			0.008***	0.008***	0.010***	0.004***	-0.001
			(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Turnover$\geq$ 1				0.001***	0.001***	0.001**	-0.000
				(0.000)	(0.000)	(0.000)	(0.000)
Monthly volume$\geq$ 250,000 shares				-0.001***	-0.001***	-0.000	-0.002***
				(0.000)	(0.000)	(0.000)	(0.001)
Earnings_last1Q > 0				0.000	0.000**	0.000	0.000
				(0.000)	(0.000)	(0.001)	(0.001)
Earnings_last4Q > 0				0.000	0.001***	0.001**	0.001
				(0.000)	(0.000)	(0.001)	(0.001)
IWF_OK				0.001***	0.001***	0.000	-0.001**
				(0.000)	(0.000)	(0.000)	(0.000)
US headquarter				0.002***	0.002***	0.003***	-0.001
				(0.001)	(0.001)	(0.001)	(0.001)
US incorporation				0.002***	0.003***	0.001	0.002*
				(0.001)	(0.001)	(0.001)	(0.001)
SP400/600				0.002***	0.002***	0.004***	0.004***
				(0.000)	(0.000)	(0.001)	(0.001)
SP500_Acquiror				0.094**	0.068*	-0.019***	-0.003*
				(0.041)	(0.038)	(0.006)	(0.002)
Other controls					✓	✓	✓
Event FE							✓
Quarter FE	✓	✓	✓	✓	✓	✓	
Observation	516,860	532,744	528,342	528,342	479,203	52,444	230,039
R^2	0.37	0.03	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. Columns 1-2 and 5-6 use linear model and columns 3-4 and 7-8 use probit model. The market capitalization at end of May is used to construct the dummy variables for size ranks. We also follow Russell's methodology and incorporate a banding rule after 2007 (to cap the number of membership changes at any given point in time). 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: Deviations from Rules by Firm Size: S&P 500 versus Russell 1000

This table compares deviations from the published criteria for S&P 500 (over 1980-2018) and Russell 1000 (over 1996-2016). Panel A reports results on membership status, while Panel B reports results on addition decisions. Columns 1 and 4 in each panel refer to the predicted rank groups of market capitalization (as in Column 4 of Tables 3 and 4 for S&P decisions, and columns 2 and 6 of Table 5 for Russell 1000 decisions, respectively.) As an example, according to the first row, for firms whose market capitalization are ranked between 1 and 250 according S&P's published criteria, 93.9% are made into S&P 500, and 6.1% are not. In comparison, for firms whose market capitalization are ranked between 1 and 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
$[251, 500]$	64.9	35.1	$[501, 1000]$	95.5	4.5
$[501, 750]$	17.1	82.9	$[1001, 1500]$	4.2	95.8
$[751, 1000]$	3.1	96.9	$[1501, 2000]$	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 (%)
$[1, 250]$	4.0	96.0	$[1, 500]$	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 relationship between rating purchases and S&P 500 addition probability. The sample contains newly added S&P 500 firms during the sample period and firms that are not added but meet the sample construction criteria. Detailed variable definitions are in Appendix II.

Variables	#Obs	Mean	Std Deviation	Median
SP_Add	479203	0.156	3.945	0.000
Purchase_SP	479203	0.077	0.266	0.000
Purchase_Any	479203	0.099	0.298	0.000
US headquarter	479203	0.937	0.244	1.000
US incorporation	479203	0.935	0.246	1.000
Log(MktCap)	479203	5.259	1.731	5.249
MktCap $\geq$ S&P 500 threshold	479203	0.711	0.454	1.000
Turnover	479203	1.347	1.528	0.804
Turnover ≥ 1	479203	0.429	0.495	0.000
Log(average monthly volume)	479203	13.678	2.410	13.819
Monthly volume $\geq$ 250,000 shares	479203	0.612	0.487	1.000
Earnings_last1Q	479203	6.901	23.911	1.525
Earnings_last1Q > 0	479203	0.738	0.440	1.000
Earnings_last4Q	479203	25.248	84.631	5.810
Earnings_last4Q > 0	479203	0.732	0.443	1.000
IWF	102321	0.854	0.172	0.922
IWF $\geq$ required threshold	479203	0.789	0.408	1.000
Time since IPO $>$ required threshold	479203	0.985	0.122	1.000
Time since last deletion from S&P 500 $>$ required threshold	479203	1.000	0.012	1.000
S&P 500 sectoral representation	479203	0.114	0.044	0.115
Difference in sectoral representation	479203	-0.003	0.014	-0.001
S&P400/600	479203	0.187	0.390	0.000
Aquiror of S&P500 firm	479203	0.000	0.011	0.000

Table 8: Do Rating Purchases Enhance the Probability of Being Added to S&P 500?

This table investigates 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 those already in the index at the time of an addition decision. Column 1 is a Probit regression, while column 2 use rare event logit (Relogit) followed King and Zeng (2001). Columns 3-5 use linear models. 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 zero otherwise. The key independent variable "Purchase_SP"is a dummy variable that equals one if firm i has purchased one rating from S&P in the current or any of the previous three quarters (i.e., 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 any time during the same period. "Other controls"are variables constructed according to S&P's published addition criteria. 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.

	SP_Add=100, Otherwise=0				
	Probit	Relogit	OLS		
Variables	(1)	(2)	(3)	(4)	(5)
Purchase_Any	0.029	0.089	-0.091	-0.019	-0.039*
	(0.075)	(0.183)	(0.063)	(0.068)	(0.020)
Purchase_SP	0.128*	0.315*	0.160**	0.134*	0.016
	(0.075)	(0.183)	(0.074)	(0.077)	(0.022)
Purchase_SP × Size rank[1,100]					-1.679
					(1.952)
Purchase_SP × Size rank[101,300]					0.441
					(1.476)
Purchase_SP × Size rank[301,500]					1.408**
					(0.631)
Purchase_SP × Size rank[501,700]					-0.214
					(0.274)
Purchase_SP × Size rank[701,1000]					0.056
					(0.048)
Size rank[1,100]	1.043***	3.617***	1.636***	5.274***	5.880***
	(0.260)	(0.806)	(0.504)	(0.872)	(1.018)
Size rank[101,300]	1.254***	4.015***	3.835***	6.113***	5.184***
	(0.231)	(0.746)	(0.401)	(0.551)	(0.538)
Size rank[301,500]	1.088***	3.660***	2.489***	2.974***	2.878***
	(0.199)	(0.678)	(0.206)	(0.241)	(0.247)
Size rank[501,700]	0.455**	2.025***	0.181***	0.168*	0.180*
	(0.181)	(0.646)	(0.068)	(0.091)	(0.099)
Size rank[701,1000]	0.408**	1.750***	0.030	0.019	0.028
	(0.159)	(0.601)	(0.022)	(0.029)	(0.031)
Purchase_Any interacts with size ranks					✓
Other controls	✓	✓	✓	✓	✓
Firm FE				✓	✓
Quarter FE	✓	✓	✓	✓	✓
Observation	465,572	465,572	479,203	478,983	478,983
R^2	0.43	0.44	0.03	0.05	0.05

Table 9: Do Firms Buy More S&P Ratings When There Are Vacancies in S&P 500?

This table investigates whether firms buy more ratings from S&P 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. We use SUR framework to estimate jointly firms' rating purchase behavior from S&P and Moody's. The dependent variable, "Purchase_SP"("Purchase_Moody"), equals one if a firm purchases a rating from S&P (Moody's) in the quarter of an M&A announcement and zero otherwise. In Columns 1-4, the sample period consists of all quarters during 1980-2018 and define the independent variable "SPmerger"is a dummy that equals one if there is an announced M&A event between S&P 500 members in this quarter or any of the previous two quarters, and zero otherwise. In Columns 5-8, the sample consists of either quarters for which there has been an M&A event between S&P member firms in this quarter as well as each of the previous quarters, or quarters for which there is no relevant M&A event in the current quarter and each of the previous two quarters. The goal of the restricted sample is to sharpen the contrast between the time periods with and without the M&A events. Accordingly, "SPmerger"equals one if there is an M&A announcement between S&P 500 M&As in each of the three quarters from t-2 to t, and zero otherwise. Firms' rank bracket dummies in market capitalization are interacted with "SPmerger"variable. Other controls include log market capitalization, ratio of market to book value, leverage ((long-term debt+short-term debt)/total assets), profitability (EBITDA/Asset), and standard deviation of the daily return in a quarter. Robust standard errors clustered by firm are shown in parentheses. Chi2-test of difference between coefficients of S&P and Moody's regressions are reported. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	Full Sample				Restricted Sample			
	SP	Moody	SP	Moody	SP	Moody	SP	Moody
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPmerger × Size rank[1,1000]	0.009***	0.004***			0.028***	0.017***		
	(0.002)	(0.001)			(0.004)	(0.003)		
SPmerger × Size rank[1,100]			0.026	0.011			0.073	-0.000
			(0.024)	(0.019)			(0.053)	(0.039)
SPmerger × Size rank[101,300]			0.010	0.006			0.035*	0.028*
			(0.008)	(0.007)			(0.019)	(0.015)
SPmerger × Size rank[301,500]			0.016***	0.003			0.043***	0.024***
			(0.005)	(0.003)			(0.011)	(0.008)
SPmerger × Size rank[501,700]			0.015***	0.006**			0.040***	0.021***
			(0.005)	(0.003)			(0.008)	(0.005)
SPmerger × Size rank[701,1000]			0.003	0.003*			0.016***	0.012***
			(0.003)	(0.002)			(0.005)	(0.003)
SPmerger	0.001	0.002***	0.001	0.002***	0.002*	0.003***	0.002**	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Bond	0.466***	0.647***	0.466***	0.647***	0.090*	0.180***	0.087	0.179***
	(0.011)	(0.013)	(0.011)	(0.013)	(0.054)	(0.067)	(0.054)	(0.067)
SPmerger × Size rank[1,1000]^{SP} = SPmerger × Size rank[1,1000]^{Moody}	4.400***				7.981***			
SPmerger × Size rank[1,100]^{SP} = SPmerger × Size rank[1,100]^{Moody}			0.287				2.101	
SPmerger × Size rank[101,300]^{SP} = SPmerger × Size rank[101,300]^{Moody}			0.158				0.129	
SPmerger × Size rank[301,500]^{SP} = SPmerger × Size rank[301,500]^{Moody}			4.499***				3.127***	
SPmerger × Size rank[501,700]^{SP} = SPmerger × Size rank[501,700]^{Moody}			2.467				6.315***	
SPmerger × Size rank[701,1000]^{SP} = SPmerger × Size rank[701,1000]^{Moody}			0.000				0.833	
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	421907	421907	421907	421907	141113	141113	141113	141113
R^2	0.11	0.29	0.11	0.29	0.01	0.01	0.01	0.01

Table 10: Do Firms Buy More Ratings When the Payoff for Entering the Index Is Higher?

This table reports SUR results that investigate how rating purchase behavior changes when the stock price premium associated with S&P 500 membership changes. For each quarter, we compute the average CAR associated with S&P 500 additions in the previous two years. We separate all time periods into the "HighCAR" quarters (those whose CARs for additions are in the top 25% of the values) and the "LowCAR" quarters. Correspondingly, "SPmerger_HighCAR" are time periods when simultaneously there is an M&A event between two index member firms and a high price premium associated with joining the index. Similarly, "SPmerger_LowCAR" refers to those quarters with an M&A event between two index member firms but a low price premium associated with joining the index. A triple interaction among "SPmerger_HighCAR" and size rank [1,000] examines rating purchase behavior by firms whose market capitalization is ranked in the top 1000 during the periods with an M&A event and a high price premium for joining the index. Firm fixed effects are included in the regressions. Robust standard errors clustered by firm are shown in parentheses. Chi2-test of difference between coefficients of S&P and Moody's regressions are reported. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	SP	Moody	SP	Moody
Variables	(1)	(2)	(3)	(4)
SPmerger_HighCAR × Size rank[1,1000]	0.034***	0.013***		
	(0.005)	(0.003)		
SPmerger_LowCAR × Size rank[1,1000]	0.017***	0.025***		
	(0.005)	(0.004)		
SPmerger_HighCAR × Size rank[1,100]			0.067	-0.005
			(0.043)	(0.040)
SPmerger_LowCAR × Size rank[1,100]			0.087	0.004
			(0.109)	(0.063)
SPmerger_HighCAR × Size rank[101,300]			0.039*	0.020
			(0.021)	(0.018)
SPmerger_LowCAR × Size rank[101,300]			0.029	0.044*
			(0.025)	(0.026)
SPmerger_HighCAR × Size rank[301,500]			0.049***	0.012
			(0.013)	(0.008)
SPmerger_LowCAR × Size rank[301,500]			0.033**	0.049***
			(0.014)	(0.012)
SPmerger_HighCAR × Size rank[501,700]			0.050***	0.019***
			(0.009)	(0.006)
SPmerger_LowCAR × Size rank[501,700]			0.021**	0.023***
			(0.010)	(0.008)
SPmerger_HighCAR × Size rank[701,1000]			0.021***	0.009**
			(0.005)	(0.004)
SPmerger_LowCAR × Size rank[701,1000]			0.007	0.017***
			(0.007)	(0.006)
Bond	0.089	0.180***	0.086	0.180***
	(0.054)	(0.067)	(0.054)	(0.067)
$\text{SPmerger\_HighCAR} \times \text{Size rank[1,1000]}^{\text{SP}} = \text{SPmerger\_HighCAR} \times \text{Size rank[1,1000]}^{\text{Moody}}$	21.709***			
$\text{SPmerger\_LowCAR} \times \text{Size rank[1,1000]}^{\text{SP}} = \text{SPmerger\_LowCAR} \times \text{Size rank[1,1000]}^{\text{Moody}}$	2.409			
$\text{SPmerger\_HighCAR} \times \text{Size rank[1,100]}^{\text{SP}} = \text{SPmerger\_HighCAR} \times \text{Size rank[1,100]}^{\text{Moody}}$			2.384	
$\text{SPmerger\_LowCAR} \times \text{Size rank[1,100]}^{\text{SP}} = \text{SPmerger\_LowCAR} \times \text{Size rank[1,100]}^{\text{Moody}}$			0.741	
$\text{SPmerger\_HighCAR} \times \text{Size rank[101,300]}^{\text{SP}} = \text{SPmerger\_HighCAR} \times \text{Size rank[101,300]}^{\text{Moody}}$			0.897	
$\text{SPmerger\_LowCAR} \times \text{Size rank[101,300]}^{\text{SP}} = \text{SPmerger\_LowCAR} \times \text{Size rank[101,300]}^{\text{Moody}}$			0.246	
$\text{SPmerger\_HighCAR} \times \text{Size rank[301,500]}^{\text{SP}} = \text{SPmerger\_HighCAR} \times \text{Size rank[301,500]}^{\text{Moody}}$			8.904***	
$\text{SPmerger\_LowCAR} \times \text{Size rank[301,500]}^{\text{SP}} = \text{SPmerger\_LowCAR} \times \text{Size rank[301,500]}^{\text{Moody}}$			1.054	
$\text{SPmerger\_HighCAR} \times \text{Size rank[501,700]}^{\text{SP}} = \text{SPmerger\_HighCAR} \times \text{Size rank[501,700]}^{\text{Moody}}$			12.419***	
$\text{SPmerger\_LowCAR} \times \text{Size rank[501,700]}^{\text{SP}} = \text{SPmerger\_LowCAR} \times \text{Size rank[501,700]}^{\text{Moody}}$			0.020	
$\text{SPmerger\_HighCAR} \times \text{Size rank[701,1000]}^{\text{SP}} = \text{SPmerger\_HighCAR} \times \text{Size rank[701,1000]}^{\text{Moody}}$			4.853***	
$\text{SPmerger\_LowCAR} \times \text{Size rank[701,1000]}^{\text{SP}} = \text{SPmerger\_LowCAR} \times \text{Size rank[701,1000]}^{\text{Moody}}$			2.360	
Controls	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Observations	141113	141113	141113	141113
R^2	0.01	0.01	0.01	0.01

Table 11: Rating Purchases by Non-US Firms after the 2002 Rule Change

This table investigates how non-US firms change their rating purchases, relative to US firms, following the rule change in 2002Q3 on S&P 500 membership eligibility. It reports five sets of SUR estimation results with each consisting of two equations for S&P and Moody's rating purchases, respectively. The sample contains all firms listed on major US stock exchanges that are not S&P 500 member firms during 2001Q3-2003Q3. The odd and numbered columns report purchases of S&P ratings and Moody's ratings, respectively. "Post"is an indicator variable for 2002Q3 and later. "Foreign"is a dummy variable for non-US firms listed on US stock exchanges. "Large foreign firms"is a dummy variable for those foreign firms in the top 25% of market capitalization among all US-listed foreign firms in 2002Q3. Other controls include log(MktCap), M/B, leverage, profitability, σ(ret), and bond issuance. Firm-rating agency and quarter-rating agency fixed effects are included. Columns 5-10 differentiate the treatment effects by firm size, country origins, and time horizon, respectively. Robust standard errors clustered by firm-rating agency, quarter-rating agency, and firm-quarter are reported in parentheses. F-test of difference between coefficients for S&P's and Moody's rating purchases are reported.***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels, respectively.

	SP	Moody	SP	Moody	SP	Moody	SP	Moody	SP	Moody
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Post × Foreign	-0.059***	-0.011	-0.035***	0.005						
	(0.018)	(0.014)	(0.006)	(0.017)						
Post × Large Foreign					-0.072***	0.063				
					(0.018)	(0.037)				
Post × Small Foreign					-0.017	-0.022**				
					(0.010)	(0.010)				
Post × European/Canadian							-0.057***	0.015		
							(0.012)	(0.020)		
Post × Non-European/Canadian Foreign							0.102	-0.054		
							(0.063)	(0.035)		
Post Quarter 1 and 2 × Foreign									-0.031**	0.003
									(0.012)	(0.016)
Post Quarter 3 and 4 × Foreign									-0.039***	0.008
									(0.013)	(0.024)
Bond			0.598***	0.682***	0.598***	0.682***	0.598***	0.682***	0.598***	0.682***
			(0.031)	(0.027)	(0.031)	(0.028)	(0.031)	(0.027)	(0.031)	(0.027)
F test:										
Post Foreign^{SP} = Post Foreign^{Moody}	5.702**		6.621**							
Large/EU-CAN/Q1-Q2^{SP} = Small/NonEU-CAN/Q3-Q4^{SP}					5.557**		4.781**		0.161	
Large/EU-CAN/Q1-Q2^{Moody} = Small/NonEU-CAN/Q3-Q4^{Moody}					7.121**		2.901		0.050	
Large/EU-CAN/Q1-Q2^{SP} = Large/EU-CAN/Q1-Q2^{Moody}					17.725***		13.591***		4.618**	
Small/NonEU-CAN/Q3-Q4^{SP} = Small/NonEU-CAN/Q3-Q4^{Moody}					0.101		4.241*		3.524*	
Controls			✓		✓		✓		✓	
Firm-rating Agency FE	✓		✓		✓		✓		✓	
Quarter-rating Agency FE	✓		✓		✓		✓		✓	
R^2	0.12		0.30		0.30		0.30		0.30	
Observation	23230		18826		18396		18826		18826	

Table 12: Comparing Firm Performance: "Discretionary Entrants"versus "Discretionary Outs"

This table compares performance of "discretionary entrants "subsequent to their entry into S&P 500 relative to their matched "discretionary excluded counterparts". A series of time windows 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 (lagged 1 year return), 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	-0.014***	-0.013**	-0.017***	-0.017***	-0.018***	-0.018***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)
Log(asset)		-0.008		-0.009		-0.007
		(0.006)		(0.006)		(0.005)
Ret_lag1yr		0.210***		0.211***		0.228***
		(0.057)		(0.052)		(0.047)
M/B		0.001		0.002		0.002
		(0.002)		(0.002)		(0.002)
Leverage		0.004		-0.013		-0.028
		(0.029)		(0.025)		(0.021)
Match-Specific Firm FE	✓	✓	✓	✓	✓	✓
Match-Specific Year FE	✓	✓	✓	✓	✓	✓
Observation	4,414	3,834	5,112	4,516	6,324	5,680
R^2	0.87	0.88	0.86	0.87	0.85	0.86
	ROA					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	[-4,+1]		[-4,+2]		[-4,+4]	
Post × Discretionary In	-0.020**	-0.024**	-0.014	-0.021**	-0.014**	-0.017***
	(0.009)	(0.010)	(0.009)	(0.008)	(0.006)	(0.006)
Log(asset)		-0.071**		-0.069***		-0.053***
		(0.029)		(0.025)		(0.020)
Ret_lag1yr		0.155		0.094		0.161*
		(0.108)		(0.115)		(0.097)
M/B		0.005		0.008*		0.006*
		(0.003)		(0.004)		(0.003)
Leverage		0.004		-0.037		-0.052**
		(0.036)		(0.033)		(0.025)
Match-Specific Firm FE	✓	✓	✓	✓	✓	✓
Match-Specific Year FE	✓	✓	✓	✓	✓	✓
Observation	4,788	4,158	5,558	4,908	6,860	6,158
R^2	0.73	0.75	0.71	0.73	0.69	0.72
	Investment					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	[-4,+1]		[-4,+2]		[-4,+4]	
Post × Discretionary In	0.015*	0.016*	0.016**	0.015**	0.016**	0.014**
	(0.008)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)
Log(asset)		-0.045***		-0.046***		-0.038***
		(0.012)		(0.014)		(0.011)
Ret_lag1yr		0.249**		0.309**		0.325**
		(0.120)		(0.151)		(0.154)
M/B		0.004***		0.004***		0.004***
		(0.001)		(0.001)		(0.001)
Leverage		-0.110**		-0.111**		-0.092**
		(0.049)		(0.048)		(0.039)
Match-Specific Firm FE	✓	✓	✓	✓	✓	✓
Match-Specific Year FE	✓	✓	✓	✓	✓	✓
Observation	3,954	3,746	4,636	4,402	5,830	5,552
R^2	0.80	0.84	0.78	0.81	0.76	0.79

Table 13: Comparing Firm Performance: Discretionary versus Rules-based Entrants

This table compares the relative profitability, returns on assets, and investment between discretionary and rules-based entrants subsequent to their additions to 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 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	0.003	-0.006***	0.002	-0.007***	0.002	-0.007***	-0.000
	(0.003)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)
Post × Treat × Discretionary In		-0.011**		-0.013***		-0.012***		-0.010***
		(0.005)		(0.005)		(0.004)		(0.004)
Log(asset)	-0.005**	-0.005*	-0.005**	-0.005**	-0.005**	-0.005**	-0.004**	-0.004**
	(0.003)	(0.003)	(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***
	(0.016)	(0.016)	(0.015)	(0.015)	(0.014)	(0.014)	(0.013)	(0.013)
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	0.010	0.002	0.002	0.003	0.004	0.000	0.000
	(0.009)	(0.009)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
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	0.005	-0.004	0.006	-0.002	0.007	-0.001	0.007
	(0.005)	(0.005)	(0.004)	(0.006)	(0.004)	(0.005)	(0.003)	(0.004)
Post × Treat × Discretionary In		-0.009		-0.014*		-0.013**		-0.013**
		(0.008)		(0.007)		(0.006)		(0.006)
Log(asset)	-0.035***	-0.035***	-0.036***	-0.036***	-0.033***	-0.033***	-0.030***	-0.030***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Ret_lag1yr	0.230***	0.230***	0.231***	0.231***	0.259***	0.259***	0.262***	0.262***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)	(0.027)	(0.025)	(0.025)
M/B	0.014***	0.014***	0.015***	0.015***	0.015***	0.015***	0.015***	0.015***
	(0.002)	(0.002)	(0.002)	(0.002)	(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
	(0.012)	(0.012)	(0.012)	(0.012)	(0.010)	(0.010)	(0.010)	(0.010)
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 Price Performance: Discretionary versus Other Firms

This table compares the relative stock price performance between discretionary entrants with both rules-based entrants and matched discretionary-outs. 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 Entrants	Rules-Based Entrants	Discretionary Outs	Difference	
	(1)	(2)	(3)	(4) = (1) - (2)	(5) = (1) - (3)
36	0.032***	0.097***	0.062***	-0.064***	-0.030**
	(0.010)	(0.013)	(0.011)	(0.017)	(0.015)
48	0.047***	0.103***	0.061***	-0.056***	-0.015
	(0.009)	(0.011)	(0.009)	(0.014)	(0.012)
60	0.049***	0.099***	0.059***	-0.050***	-0.010
	(0.008)	(0.010)	(0.007)	(0.013)	(0.011)

Figure 1: Growth of S&P 500 Index Funds 1970-2019

Presented below are a time series of the combined asset under management (AUM) of all funds tracking S&P 500 (including both open-end mutual funds and ETFs), its share in % of US GDP and its share in the total AUM of all funds.

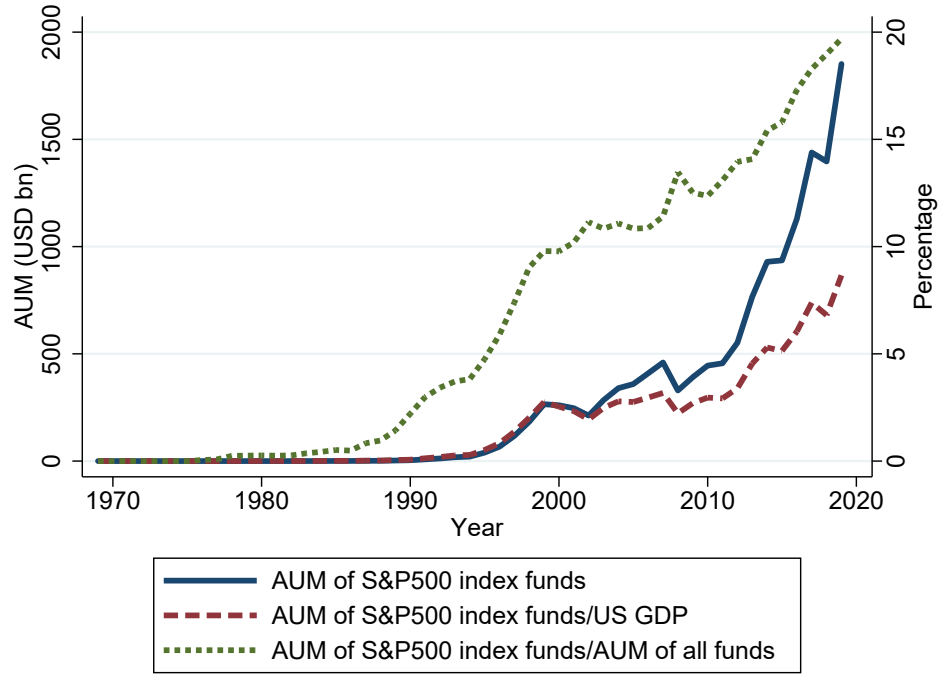

Figure 2: Comparing Stock Performance: Discretionary Entrants and Other Stocks

This figure plots the average cumulative abnormal returns for three sets of stocks following their additions to S&P 500: rules-based entrants, discretionary entrants, and matched discretionary outs, respectively.