

What Happened to the Index Effect? A Look at Three Decades of S&P 500[®] Adds and Drops

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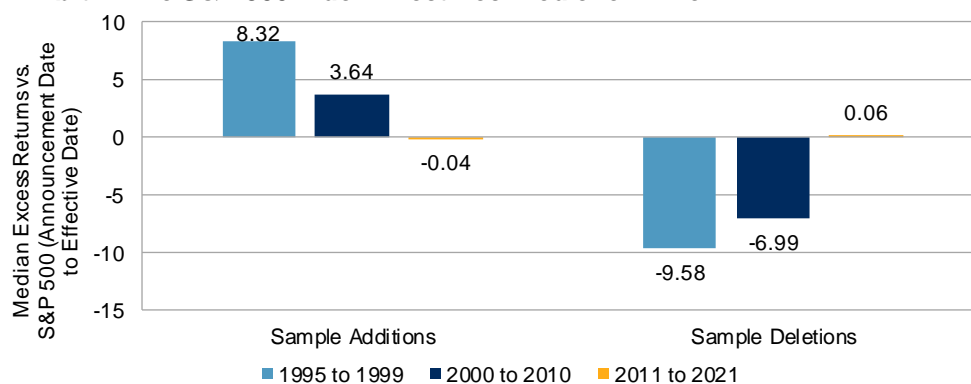
EXECUTIVE SUMMARY

The index effect refers to the excess returns putatively associated with a security being added to, or removed from, a headline index. Although it has been studied for decades, the index effect has received more attention in recent years amid the growth of passive investing and the accompanying speculation that stock returns may be affected by buying and selling pressures from index-tracking investors reacting to changes in index membership.

This paper analyzes [S&P 500](#) additions and deletions from the start of 1995 to June 2021. We focus on the S&P 500 given it is the world's most widely followed index—USD 13.5 trillion was indexed or benchmarked to the large-cap U.S. equity gauge at the end of 2020¹—and so if the growth of passive investing contributed to an index effect, one might expect it to appear in S&P 500 additions and deletions.

Overall, our analysis corroborates the general consensus reflected in existing literature: **the S&P 500 index effect seems to be in a structural decline** (see Exhibit 1). Our analysis also suggests that an improvement in stock liquidity may help to explain the attenuation in the index effect over time.

Exhibit 1: The S&P 500 Index Effect Declined over Time



Source: S&P Dow Jones Indices LLC, FactSet. Chart based on median excess returns of sample additions and sample deletions between January 1995 and June 2021. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

¹ [“Survey of Indexed Assets.”](#) S&P Dow Jones Indices, Dec. 31, 2020.

INTRODUCTION

Index-based, passive investing has grown tremendously over the past five decades.

Passive investing has grown tremendously over the past five decades: cumulative flows into index-linked investment products surpassed those going into active funds since 2008,² and the exchange-traded fund (ETF) industry has grown from USD 807 billion at the end of 2007 to nearly USD 8 trillion in 2020.³ Such growth has been accompanied by a list of unwarranted criticisms to the extent that “dangers of passive investing” turns up many multiples more Google News results than “dangers of passive smoking.”⁴

If the growth of index-based passive assets is likely to have caused an index effect anywhere...

Much has been written about the index effect. For example, it has been well documented over the past three decades that stocks added to a popular index tended to outperform the index between the “Announcement Date” and “Effective Date,” and this was typically followed by a small post-Effective Date correction.

...one might reasonably suppose the index effect would exist for S&P 500 additions and deletions.

This paper serves as a follow up to a prior paper published by S&P Dow Jones Indices (S&P DJI) that examined the declining index effect across five of the biggest global equity markets.⁵ For this update, we focus on the S&P 500 given it is the world’s most widely followed and most liquid index, with a large ecosystem.⁶ Hence, if the growth of index-based passive assets is likely to have caused an index effect anywhere, one might reasonably suppose the index effect would exist for S&P 500 additions and deletions.

The S&P 500 index effect seems to be in a structural decline.

Our paper adds to the existing literature by offering a continuous look at S&P 500 changes from the early days of index funds to end of June 2021. Our analysis corroborates the general consensus reflected in existing literature: the S&P 500 index effect seems to be in a structural decline, with the median excess returns of our sample of additions falling from 8.32% (1995-1999) to -0.04% (2011-2021). The magnitude of median excess returns associated with our sample of deletions also fell, changing from -9.58% (1995-1999) to 0.06% (2011-2021).

The declining index effect is likely a result of many structural changes taking place in the financial industry and capital markets. From the rise of

² https://www.morningstar.com/content/dam/marketing/shared/pdfs/Research/Fund_Flows_August2019_Final.pdf?

³ <https://www.statista.com/statistics/224579/worldwide-etf-assets-under-management-since-1997/>

⁴ For an overview of some of the common criticisms of passive investing, see Ganti, Anu and Craig Lazzara, “[The Slings and Arrows of Passive Fortune](#),” S&P Dow Jones Indices, April 2018.

⁵ Dash, Srikant and Aye M. Soe, “[The Shrinking Index Effect: A Global Perspective](#),” November 2008.

⁶ See Bennett, Chris, Tim Edwards, Sherifa Issifu, and Craig Lazzara, “[A Window on Index Liquidity: Volumes Linked to SPDJI Indices](#),” S&P Dow Jones Indices, August 2019.

the ETF market makers, to markets becoming more efficient,⁷ the passive investing ecosystem is evolving, with index rebalancing at the heart of it.

LITERATURE OVERVIEW

Papers covering periods up to the early 2000s generally found a positive index effect, but studies that covered the mid to late 2000s noted a decline in the size of the index effect.

Much of the literature and theory surrounding index effects have focused on S&P 500 deletions and additions, with the earliest studies dating back to 1986.⁸ Bender, Nagori, and Tank⁹ compiled an exhaustive list of index effect studies on the major U.S. and international equity benchmarks. Among the S&P 500 studies, papers covering periods up to the early 2000s generally found a positive index effect, but studies that covered the mid to late 2000s noted a decline in the size of the index effect.

The more recent findings run counter to the notion that the rise of index investing and capital flows into index-linked products affect price discovery. In our 2008 paper, we noted that the index effect perhaps may have become a victim of its own success, with a large number of market participants entering the passive ecosystem. Renshaw⁷ attributed the ETF market makers for lessening the index effect. Bender et al.⁹ found that markets have become more efficient, leading to a weakening index effect.

Previously, we noted that the index effect perhaps may have become a victim of its own success...

Most studies take one of five perspectives when analyzing the index effect:

1. **Price pressure hypothesis** theorizes that prices will reverse after the index change when heavy index fund trading subsides around the change date.
2. **Imperfect substitutes hypothesis** states that the price effect is permanent because index fund buying changes the available float of shares.
3. **Liquidity hypothesis** suggests that prices are affected if the liquidity of stocks being deleted is affected.
4. **Information content hypothesis** contends that index addition and deletions are based on firm-specific factors that will affect prices of the firm's stock. Also, additions and deletions from the index affect the level of scrutiny and analyst coverage of the stocks.
5. **Selection criteria hypothesis** suggests that evidence of abnormal returns is not robust since the stock selection process followed by index providers itself uses historical prices.

...with a large number of market participants entering the passive ecosystem.

⁷ See Renshaw, Anthony, "[The Weakening Index Effect](#)," *The Journal of Index Investing*, Summer 2020, vol. 11, issue 1, pp. 17-31. and Bender et al. "[The Past, Present and Future of the Index Effect](#)," *Journal of Index Investing*, Winter 2019.

⁸ For example, see Harris, L.E. and Eitan Gurel, "[Price and Volume Effects Associated with Changes in the S&P 500 List: New Evidence for the Existence of Price Pressures](#)," *The Journal of Finance*, 1986, vol. 41, issue 4, pp. 815-829; and A. Shleifer, "[Do Demand Curves for Stocks Slope Downwards?](#)" *The Journal of Finance*, 1986, vol. 41, issue 3, pp.579-590.

⁹ "[The Past, Present and Future of the Index Effect](#)," *Journal of Index Investing*, Winter 2019.

S&P 500 CONSTITUENT CHANGES: INDEX MECHANICS

The S&P 500 is widely regarded as the best single gauge of large-cap U.S. equity performance.

The S&P 500 is designed to measure the performance of the large-cap U.S. equity segment and is widely regarded as the best single gauge of large-cap U.S. equity performance: the 500 companies in the index accounted for approximately 80% of the entire U.S. equity market capitalization and over USD 13.5 trillion was indexed or benchmarked to the S&P 500 at the end of 2020.¹⁰

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The large-cap U.S. equity benchmark is maintained by S&P DJI's U.S. Index Committee, whose members are full-time S&P DJI employees. The Index Committee meets monthly to review, among other things:

- Pending corporate actions that may affect index constituents;
- Statistics comparing the composition of the indices to the market;
- Companies that are being considered as candidates for addition to an index; and
- Significant market events.¹¹

The S&P 500 is not necessarily the largest 500 U.S.-domiciled companies.

Crucially, the S&P 500 is not necessarily the largest 500 U.S.-domiciled companies: companies must first meet various criteria before they are eligible to be considered for addition to the index.¹²

For example, firms must have a history of positive earnings and must meet certain liquidity and size thresholds. Exhibit 2 summarizes the S&P 500 addition criteria outlined in the S&P U.S. Indices Methodology.

Firms must meet various criteria before they are eligible to be considered for index addition.

Satisfying the addition criteria does not guarantee S&P 500 inclusion: the Index Committee also considers sector balance—as measured by comparing Global Industry Classification Standard® (GICS®) sector weights in the [S&P Total Market Index \(TMI\)](#), within the appropriate market capitalization range—when considering constituent changes. Also, **the addition criteria are not used for determining ongoing S&P 500 membership** because the Index Committee seeks to avoid index turnover when possible. This means that existing S&P 500 stocks that may no longer satisfy one or more of the addition criteria are not automatically deleted from the index.

¹⁰ “[Survey of Indexed Assets](#),” S&P Dow Jones Indices, Dec. 31, 2020.

¹¹ For more information, see [S&P U.S. Indices Methodology](#).

¹² The addition criteria set forth in Exhibit 2 are also used for maintenance of the S&P MidCap 400 and the S&P S smallCap 600. Together with the S&P 500, the three indices compose the S&P Composite 1500®.

Exhibit 2: The S&P 500 Uses a Number of Index Addition Criteria

CRITERIA	DESCRIPTION
Reconstitution of Stocks	Throughout the year, as corporate actions arise
Earnings	The sum of the most recent four consecutive quarters' as-reported earnings should be positive, as should the most recent quarter's*
Liquidity	The ratio of annual U.S. dollar value traded to float-adjusted market capitalization should be 1.00 or greater, and the stock should trade a minimum of 250,000 shares in each of the six months leading up to the evaluation date
Market Capitalization	Unadjusted company market capitalizations of USD 13.1 billion or more; these ranges are reviewed from time to time to assure consistency with market conditions
Public Float	At least 10% of shares publicly floated**
IPO Seasoning	12 months required
Domicile of Constituents	U.S. companies, based on multiple criteria such as fixed assets, revenues, listing, etc.
Sector Classification	Global Industry Classification Standard (GICS)

Any company that is removed from the S&P 500 may not be considered as a replacement candidate for the index until at least one year after its index removal date.

*Prior to 2014, the S&P DJI earnings criterion required four consecutive quarters of positive earnings, instead of the sum of the last four quarters being positive.
 **A company meeting the unadjusted company market capitalization criteria is also 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.
 Source: S&P Dow Jones Indices LLC. Data as of June 2021. Table is provided for illustrative purposes.

The S&P 500 does not have a set reconstitution schedule; changes to the index are made on an ongoing, as-needed basis. Additions and deletions are announced at 5:15 p.m. ET and typically become effective no less than three business days after the implementation Effective Date.¹³ These announcements are available to the public via www.spglobal.com/spdji before, or at the same time, they are available to clients or the affected companies. Any company that is removed from the S&P 500 may not be considered as a replacement candidate for the index until at least one year after its index removal date.

A majority of S&P 500 additions (378) graduated from the S&P 400, although many additions (332) came from outside the S&P 1500.

ADDITIONS AND DELETIONS: DATA AND SAMPLE

The S&P 500 had 715 additions and 711 deletions between January 1995 and June 2021, averaging around 27 constituent adds and drops per year.¹⁴ This annual average trended down over time: about 35 changes per year were typical between 1995 and 1999, but this fell to about 28 per year between 2000 and 2010, before falling to about 21 per year since 2011. A majority of S&P 500 additions (378) graduated from the S&P MidCap 400®, although many additions (332) came from outside the S&P Composite 1500®. Most deletions (529) went to outside the S&P 1500®, while 142 were moved to the S&P 400®. Exhibit 3 summarizes this information.

¹³ Less than three business days' notice may be given at the discretion of the Index Committee.

¹⁴ The reason for the difference in the total number of adds and drops is that additional share classes for five companies were added in 2014 and 2015. One of these additional share classes was removed toward the end of 2015.

Most deletions (529) went to outside the S&P 1500, while 142 were moved to the S&P 400.

Exhibit 3: S&P 500 Additions and Deletions over Time

PERIOD	ADDITIONS	ADDITIONS FROM		
		S&P 400	S&P 600®	OUTSIDE S&P 1500
Entire period	715	378	5	332
1995 to 1999	177	96	0	81
2000 to 2010	312	158	4	150
2011 to 2021	226	124	1	101

PERIOD	DELETIONS	DELETIONS TO		
		S&P 400	S&P 600	OUTSIDE S&P 1500
Entire period	711	142	40	529
1995 to 1999	178	10	18	150
2000 to 2010	311	32	17	262
2011 to 2021	222	100	5	117

Source: S&P Dow Jones Indices LLC. Table shows S&P 500 additions and deletions, as announced by S&P Dow Jones Indices, between Jan. 1, 1995, and June 30, 2021. Table is provided for illustrative purposes.

Exhibit 4 offers an overview of our sample that we use for our analysis. In order to construct our sample of additions and deletions, we remove from the data in Exhibit 3 any company that lacked a full series of FactSet returns and volume information for the period starting 21 trading days prior to the announcement date and ending 21 trading days after the Effective Date.¹⁵ We also exclude restructurings, recapitalizations, bankruptcies, acquisitions, mergers, spinoffs, and delistings in order to isolate the impact of changes to index membership. We also exclude any changes for which the Announcement Date and Effective Date were the same. The additions and deletions used within our study are hereafter referred to as the “sample additions” and “sample deletions.”

In our sample additions and deletions, we excluded restructurings, recapitalizations, bankruptcies, acquisitions, mergers, spinoffs, and delistings.

Exhibit 4: Our Sample Contains over 80% of Additions, but Far Fewer Deletions

PERIOD	SAMPLE ADDITIONS	SAMPLE ADDITIONS FROM		
		S&P 400	S&P 600	OUTSIDE S&P 1500
Entire period	576	355	5	216
1995 to 1999	130	89	0	41
2000 to 2010	260	151	4	105
2011 to 2021	186	115	1	70

PERIOD	SAMPLE DELETIONS	SAMPLE DELETIONS TO		
		S&P 400	S&P 600	OUTSIDE S&P 1500
Entire period	223	123	31	69
1995 to 1999	31	5	15	11
2000 to 2010	90	22	12	56
2011 to 2021	102	96	4	2

Source: S&P Dow Jones Indices LLC. Table shows sample S&P 500 additions and deletions, as announced by S&P Dow Jones Indices, between Jan. 1, 1995, and June 30, 2021. Inclusion within our study is determined by the criteria outlined in the previous paragraph. Table is provided for illustrative purposes.

¹⁵ The Effective Date refers to the date of the last market close prior to the constituent change being reflected as included in the S&P 500. This is the date on which a theoretical index tracker will likely purchase added (sell dropped) index constituents at or near the market close to avoid tracking error.

Our sample additions represent over 80% (576 out of the 715) of all additions to the S&P 500 between January 1995 and June 2021. The majority (355 out of 576) of sample additions graduated from the S&P 400 and, as observed with all additions, there was a downward trend in the number of sample additions over time—an annual average of 26, 24, and 18 in the periods 1995 to 1999, 2000 to 2010, and 2011 to 2021, respectively.

There was a downward trend in the number of sample additions over time.

However, our sample deletions contain only 31% of all deletions (223 out of 711). This proportion is particularly small for deletions to outside the S&P 1500; only 69 out of 529 (13%) were included in our sample, reflecting the fact that most deletions were caused by M&A activity or significant restructurings. This speaks to the potential benefit of the Index Committee making constituent changes on an ongoing, as-needed basis; they are able to react to corporate actions in order to ensure the S&P 500 continues to reflect the performance of large-cap U.S. equities.

Most deletions were caused by M&A activity or significant restructurings.

TERMINOLOGY AND RETURNS ANALYSIS SETUP

As is common in studies of the index effect, we analyze companies' excess returns by taking the difference between a stock's total return and that of the S&P 500, thus controlling for market movements. We present results based on median excess returns, mitigating the impact of extreme returns, and controlling for differences in sample size across the different time periods.

We use the following terminology throughout our study.

We analyze companies' excess returns by taking the difference between a stock's total return and that of the S&P 500, thus controlling for market movements.

- **Announcement Date (AD):** This is the date on which the names of companies to be added or removed from the index are announced by S&P DJI.
- **AD+X:** X trading days after the Announcement Date.
- **Effective Date (ED):** The date of the last market close prior to the constituent change being reflected in the S&P 500. This is typically the date on which a theoretical index tracker purchases (sells) the index addition (deletion) at or near the market close to avoid tracking error.¹⁶
- **ED+X:** X trading days after the Effective Date.

Exhibit 5 summarizes the horizons we use when assessing the excess returns of sample additions and sample deletions between January 1995 and June 2021.

¹⁶ For example, suppose an index announcement states a constituent change will go into effect *prior to the open* on a particular date, Y. The ED in our study is the trading day prior to Y.

Exhibit 5: Time Horizons Studied

FROM	TO	SHORTHAND
21 Days before Announcement Date	Announcement Date	AD-21 to AD
5 Days before Announcement Date	Announcement Date	AD-5 to AD
Announcement Date	Effective Date	AD to ED ¹⁷
Effective Date	5 Days after Effective Date	ED to ED+5
Effective Date	21 Days after Effective Date	ED to ED+21

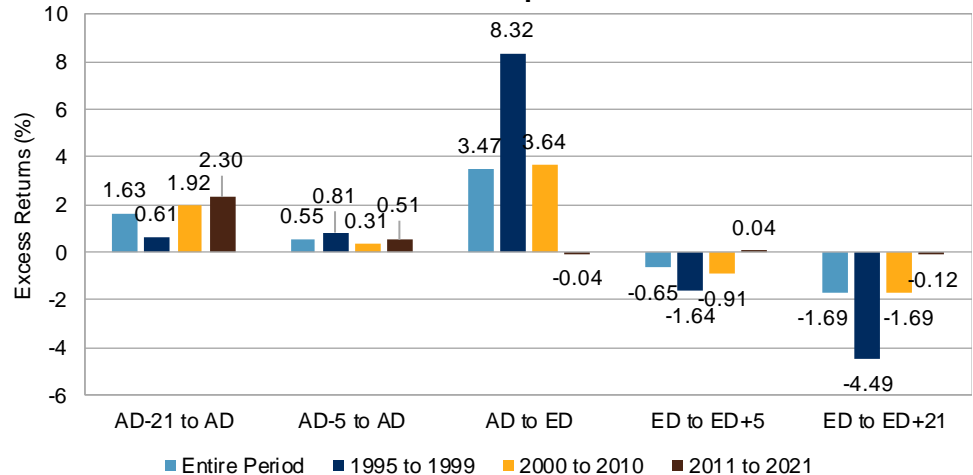
Source: S&P Dow Jones Indices LLC. Days refers to trading days. Table is provided for illustrative purposes.

SAMPLE ADDITIONS

Over the past 25 years, median excess returns associated with sample additions have declined (see Exhibit 6). Excess returns between the AD and ED fell from 8.32% (1995 to 1999) to 3.64% (2000 to 2010) to -0.04% (2011 to 2021). This is consistent with recent findings from research into the S&P 500 index effect that found no abnormal returns between the AD and ED.¹⁸

The index effect declined in our sample of additions over the past 25 years.

Exhibit 6: Median Excess Returns of Sample Additions



Source: S&P Dow Jones Indices LLC, FactSet. Charts show median excess total returns in USD of sample additions between January 1995 and June 2021. Past performance is no guarantee of future results. Charts are provided for illustrative purposes.

To investigate whether the index effect varies depending on the source of the addition, we separate sample additions into two groups. Group 1 contains companies added from the S&P MidCap 400 and the S&P SmallCap 600®, while Group 2 contains companies added from outside of the mid- and small-cap indices. Exhibit 7 summarizes the excess returns for both groups.

As observed across the entire sample, **both groups saw a decline in median excess returns between the AD and ED.** This decline was particularly pronounced for companies added from the S&P 400 and S&P

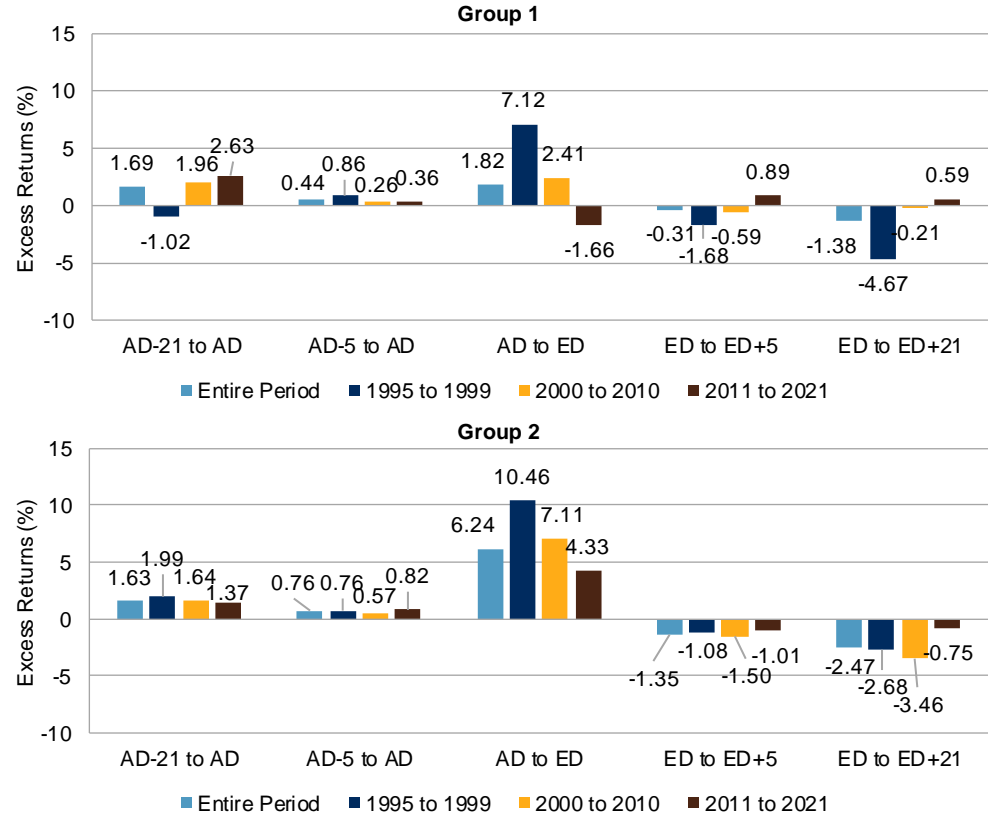
¹⁷ The median number of trading days between the AD and the ED was four.

¹⁸ Renshaw, Anthony, "The Weakening Index Effect," *The Journal of Index Investing*, Summer 2020, vol. 11, issue 1, pp. 17-31.

Both groups saw a decline in median excess returns between the Announcement Date and the Effective Date.

600 (Group 1): excess returns between the AD and ED fell from 7.12% (1995 to 1999) to 2.41% (2000 to 2010), before dropping to -1.66% (2011 to 2021). The corresponding excess returns for Group 2 were 10.46%, 7.11%, and 4.33%, respectively. Excess returns after the ED rose over time—and turned positive—for Group 1. No such observation was made for Group 2, with median excess returns after the ED remaining negative in each period.

Exhibit 7: Median Excess Returns for Sample Additions in Groups 1 and 2



Differences in the magnitude and sign of median excess returns between Groups 1 and 2 may reflect the growing ecosystem around the S&P 400 and S&P 600.

Source: S&P Dow Jones Indices LLC, FactSet. Chart shows median excess total returns in USD of sample additions from the S&P 400 and S&P 600 for Group 1 and outside the S&P 1500 for Group 2 between January 1995 and June 2021. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Differences in the magnitude (AD to ED) and sign (post-ED between 2011 and June 2021) of median excess returns between Groups 1 and 2 may reflect the growing ecosystem around the S&P 400 and S&P 600. We shall revisit this topic in a later section, but for now say only that that growing assets tracking the mid- and small-cap indices, and improved stock liquidity, may have contributed to a reduction in the liquidity premium over time. The attenuation in excess returns—particularly for Group 1—may therefore reflect less repricing once companies were added to the S&P 500.¹⁹

¹⁹ All else equal, a higher liquidity premium would lead to a greater index effect: greater price changes would be needed so that stocks' expected returns were decreased by the higher expected liquidity associated with being a member of the S&P 500 (and no longer being considered a mid- or small-cap company).

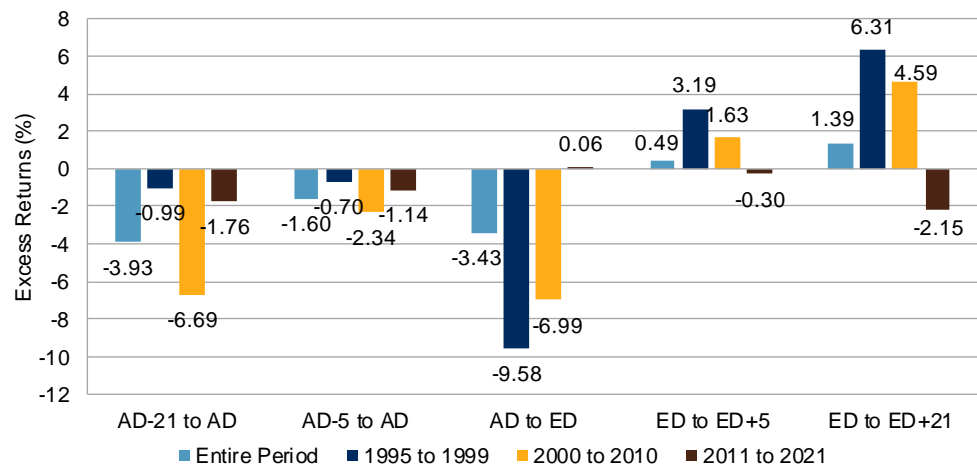
SAMPLE DELETIONS

When it comes to our analysis of sample deletions, it is important to recall that our sample contains only 31% of all deletions between January 1995 and June 2021. Notwithstanding this caveat, Exhibit 8 summarizes median excess returns for sample deletions since 1995. We observe the following.

The index effect declined in our sample of deletions

- The index effect declined in our sample of deletions; the magnitude of median excess returns between the AD and ED decreased over time.
- Median excess returns between the AD and ED were positive over the past decade (0.06%). This compares with -9.58% and -6.99% for the periods 1995 to 1999 and 2000 to 2010, respectively.
- Excess returns after the ED decreased over the past 25 years and turned negative over the past decade.

Exhibit 8: Median Excess Returns of Sample Deletions



Median excess returns between the Announcement Date and the Effective Date were positive over the past decade.

Source: S&P Dow Jones Indices LLC, FactSet. Chart shows median excess total returns in USD of sample deletions between January 1995 and June 2021. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

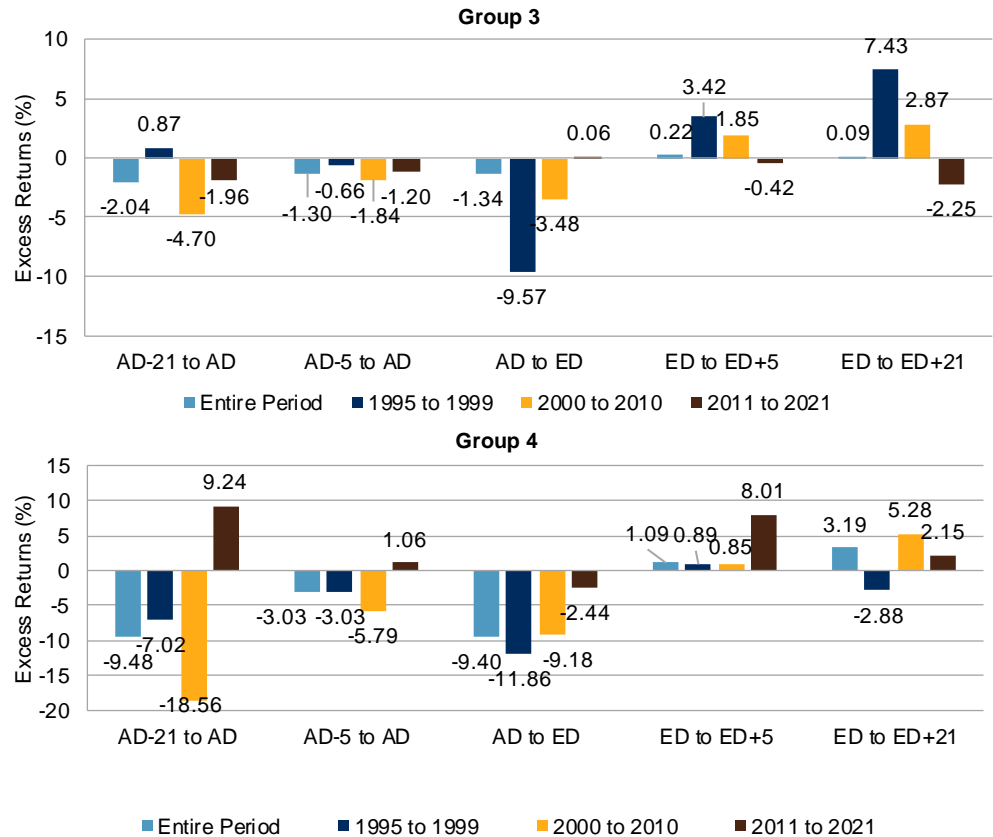
Next, we separate sample deletions into two groups in order to assess the impact of the destinations of deletions on the index effect. Group 3 contains companies that were dropped to the S&P 400 or S&P 600, while Group 4 contains companies that were dropped to outside the S&P 1500. Exhibit 9 provides a summary of the median excess returns for both groups.

As observed for the sample of deletions, **there was a clear reduction in the magnitude of the index effect for both groups over the past 25 years.** Indeed, Group 3’s median excess returns between the AD and ED changed from -9.57% (1995 to 1999) to -3.48% (2000 to 2010) to 0.06% (2011 to 2021). The corresponding figures for Group 4 were -11.86%, -9.18%, and -2.44%, respectively.

There was a clear reduction in the magnitude of the index effect for both groups.

Group 3's median excess returns after the ED declined over the past 25 years and turned negative in the past decade. Corresponding figures for Group 4 were positive between 2011 and June 2021. Group 4 also posted positive median excess returns leading up to the AD in the past decade, whereas the corresponding figures for Group 3 were negative.

Exhibit 9: Median Excess Returns for Sample Deletions in Groups 3 and 4



Median excess returns after the Effective Date for sample deletions to the S&P 400 and S&P 600 declined over the past 25 years and turned negative in the most recent decade.

Corresponding figures for sample deletions to outside the S&P 1500 were positive in the period from 2011 to 2021.

Source: S&P Dow Jones Indices, FactSet. Charts show median excess total returns in USD of sample deletions to the S&P 400 and S&P 600 (Group 3) and outside the S&P 1500 (Group 4) between January 1995 and June 2021. Past performance is no guarantee of future results. Charts are provided for illustrative purposes.

Once again, the decline in the index effect for sample deletions may reflect another consequence of a growing ecosystem around the S&P 400 and S&P 600. Indeed, increased liquidity in the smaller stocks may have required less repricing from a lower liquidity premium. Companies in Group 3 may have experienced an expansion in liquidity given the growth in assets tracking the S&P 400 and S&P 600 in recent years.

Differences in excess returns post-ED may reflect the fact that Group 4 changes were typically caused by changes to companies' index eligibility. These companies' returns were therefore relatively unchanged after the ED, notwithstanding the impact between the AD and ED.

ROLE OF SECTOR MEMBERSHIP

Incorporating revenues and earnings in GICS classifications means that companies in the same sector are likely to have shared sensitivities to certain trends.

We have thus far looked at the impact of S&P 500 membership on companies' excess returns. Our analysis now turns to the potential impacts of sector membership on the index effect.

GICS is a widely recognized way to group companies. Based on revenues, market perception, and earnings, companies are grouped into one of 158 possible sub-industries. Each sub-industry is then mapped to—in decreasing order of granularity—one of 69 industries, one of 24 industry groups, and one of 11 sectors.²⁰

Incorporating revenues and earnings in GICS classifications means that companies in the same sector are likely to have shared sensitivities to certain trends and news flow. Since these sensitivities may be specific to a sector, **there may be times when sectoral membership plays a greater role in determining company returns compared to membership of a broader index.**²¹

There may be times when sectoral membership plays a greater role in determining company returns compared to membership of a broader index.

Exhibit 10 offers a breakdown of each company's GICS sector classification, as of the respective ED, for sample additions and deletions. Most of the sample additions came from the Information Technology and the Financials sectors. The Consumer Discretionary sector also accounted for many sample additions and deletions.

²⁰ See the [GICS methodology](#).

²¹ For a discussion on the role of sector effects in the S&P 500, see Lazzara, Craig and Tim Edwards, "[Sector Effects in the S&P 500](#)," S&P Dow Jones Indices, March 2019.

Exhibit 10: GICS Sector Breakdown of Sample Additions and Deletions

SECTOR	SAMPLE ADDITIONS				SAMPLE DELETIONS			
	ENTIRE PERIOD	1995 TO 1999	2000 TO 2010	2011 TO 2021*	ENTIRE PERIOD	1995 TO 1999	2000 TO 2010	2011 TO 2021*
Energy	38	3	26	9	26	1	5	20
Materials	17	4	7	6	19	3	10	6
Industrials	64	10	28	26	34	8	17	9
Consumer Discretionary	91	16	37	38	63	15	21	27
Consumer Staples	22	3	14	5	8	1	4	3
Health Care	64	8	25	31	9	2	2	5
Financials	114	39	54	21	20	0	10	10
Information Technology	122	34	49	39	32	1	15	16
Communication Services	13	5	4	4	5	0	2	3
Utilities	28	8	16	4	4	0	4	0
Real Estate	3	0	0	3	3	0	0	3

Most of the sample additions came from the Information Technology and the Financials sectors.

Source: S&P Dow Jones Indices LLC, FactSet. Chart shows the GICS sector breakdown of sample additions and deletions between January 1995 and June 2021. Real Estate became a standalone sector in September 2016. Prior to September 2018, Communication Services was called Telecommunication Services. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Using S&P 500 sector returns, there was a reduction in the index effect for both sample additions and deletions.

To control for sector membership in our index effect analysis, we repeat the median excess returns analysis using the relevant S&P 500 sector as the benchmark instead of the large-cap U.S. equity benchmark. The choice of sector is based on companies' sector classifications as of their respective ED. We leave the results to the appendix, and we observe the following.

- A reduction in the index effect for both sample additions and deletions, with the magnitude of median excess returns between the AD and ED falling over the past 25 years.
- This attenuation was particularly pronounced for additions from, and deletions to, the S&P 1500 (Groups 1 and 3).
- Median excess returns for sample deletions to outside the S&P 1500 (Group 4) were positive after the ED in the period 2011 to 2021, compared to the negative returns for sample deletions to the S&P 400 and S&P 600 (Group 3).
- Median excess returns after the ED for sample additions from the S&P 1500 (Group 1) rose over the past 25 years and turned positive in the period 2011 to 2021. The same was not observed for sample additions from outside the S&P 1500 (Group 2).

We saw similar results for the S&P 500, implying that changes in the index effect were not driven by sector membership.

The similarity in observations when using the S&P 500 or its sectors for comparison suggests that changes in the index effect were not driven by sector membership. We now turn our attention to potential drivers of the attenuation in the index effect, and we begin with an overview

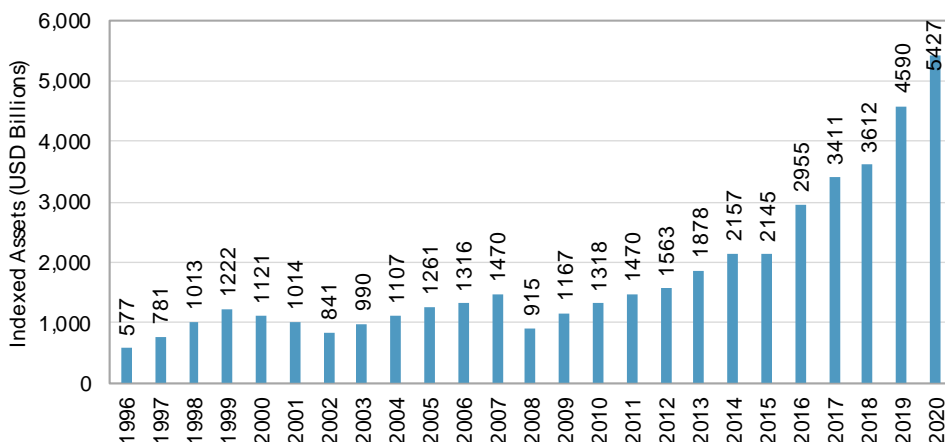
of the growth in S&P 500, S&P 400, and S&P 600 indexed assets and the higher liquidity of stocks over the past 25 years.

INDEXED ASSETS & LIQUIDITY

As one of the most widely followed and widely tracked indices in the world, over USD 5.4 trillion was indexed to the S&P 500 as of the end of 2020 according to data from S&P DJI’s Annual Survey of Indexed Assets.²² This compares with USD 577 billion at the end of 1996.

USD 5.4 trillion was indexed to the S&P 500 as of the end of 2020, up from USD 577 billion at the end of 1996.

Exhibit 11: S&P 500 Indexed Assets



Source: S&P Dow Jones Indices LLC. Data as of Dec. 31, 2020. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Assets tracking the S&P 400 and S&P 600 also grew since 1996, and at a quicker rate than their large-cap counterpart.

Additionally, assets tracking the S&P 400 and S&P 600 also grew since 1996, and at a quicker rate than their large-cap counterpart. Indeed, USD 207 billion and USD 99 billion was indexed to the S&P 400 and S&P 600, respectively, at the end of 2020. These represented 12-fold and 90-fold increases since the end of 1996, respectively, versus a 9-fold increase in assets tracking the S&P 500.²³

Accompanying the growth in assets tracking the S&P 500, S&P 400, and S&P 600, and perhaps indicative of greater depth in the U.S. equity market, S&P 500 additions and deletions became more liquid over the past 25 years. One way to measure this is to compute the median dollar value traded (MDVT) for each sample addition and deletion.²⁴ Exhibit 12 provides median figures for sample additions between 1995 and 2021, including: a) MDVT figures from AD-21 to AD; b) S&P 500 index weights as of the open on the first trading day after the ED; and c) the ratio of MDVT from ED+1 to ED+21 versus MDVT from AD-21 to AD.

S&P 500 additions and deletions became more liquid over the past 25 years.

²² “[Survey of Indexed Assets](#),” S&P Dow Jones Indices, Dec. 31, 2020.

²³ As of Dec. 31, 2020, S&P 500 indexed assets represented 17% of the free-float market capitalization of S&P 500 companies, compared with 10% and 11% for the S&P 400 and S&P 600, respectively.

²⁴ MDVT is computed by first calculating the dollar value traded by multiplying closing prices in USD and daily volumes. The MDVT figures then equal the median value for each stock over the relevant period.

Exhibit 12: Liquidity of Sample Additions

YEAR	MDVT (AD-21 TO AD)			S&P 500 OPEN WEIGHT (%)			MDVT (ED+1 TO ED+21) vs. MDVT (AD-21 TO AD)		
	SAMPLE ADDITIONS	GROUP 1	GROUP 2	SAMPLE ADDITIONS	GROUP 1	GROUP 2	SAMPLE ADDITIONS	GROUP 1	GROUP 2
1995	10.75	11.61	8.42	0.10	0.11	0.10	1.60	1.78	1.51
1996	17.16	27.89	10.27	0.10	0.11	0.07	1.48	1.23	1.64
1997	12.57	13.21	8.60	0.09	0.09	0.09	1.75	1.76	1.67
1998	26.58	20.28	37.42	0.10	0.10	0.11	1.54	1.58	1.49
1999	27.85	24.58	43.94	0.06	0.06	0.05	1.44	1.37	2.36
2000	60.09	59.44	102.56	0.07	0.07	0.06	1.29	1.23	1.51
2001	36.37	36.37	35.14	0.06	0.05	0.07	1.44	1.38	1.68
2002	49.01	32.32	82.48	0.07	0.06	0.13	1.36	1.35	1.44
2003	9.44	78.13	8.57	0.05	0.05	0.05	1.42	0.83	1.90
2004	46.42	51.01	31.02	0.07	0.07	0.08	1.43	1.40	1.53
2005	57.35	60.68	37.18	0.08	0.07	0.09	1.43	1.24	1.52
2006	81.11	72.48	89.65	0.07	0.06	0.07	1.27	1.20	1.38
2007	69.83	64.37	88.92	0.06	0.06	0.06	1.47	1.29	1.64
2008	71.02	65.20	78.82	0.06	0.06	0.07	1.24	1.21	1.26
2009	55.59	53.59	100.94	0.06	0.05	0.07	1.25	1.26	1.25
2010	87.44	73.88	102.79	0.08	0.05	0.12	1.34	1.23	1.56
2011	117.69	85.80	138.07	0.09	0.08	0.14	1.29	1.15	1.43
2012	108.35	107.94	108.75	0.09	0.06	0.10	1.32	1.08	1.42
2013	109.32	94.06	199.67	0.09	0.07	0.11	1.44	1.44	1.48
2014	95.28	83.42	106.33	0.06	0.06	0.07	1.50	1.43	1.69
2015	122.30	72.59	199.19	0.07	0.06	0.12	1.22	1.17	1.24
2016	87.63	65.22	155.64	0.06	0.05	0.07	1.16	1.14	1.23
2017	68.72	60.83	113.12	0.05	0.05	0.07	1.41	1.16	1.49
2018	125.84	95.65	146.18	0.06	0.05	0.07	1.34	1.37	1.14
2019	78.29	65.38	228.91	0.05	0.05	0.09	1.26	1.26	1.27
2020	116.16	108.04	256.76	0.05	0.05	0.11	1.23	1.00	2.39
2021	190.32	160.92	524.71	0.05	0.05	0.17	1.30	1.31	1.06

Source: S&P Dow Jones Indices LLC, FactSet. MDVT figures are in USD millions. Data as of June 31, 2021. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Exhibit 12 shows that addition to the S&P 500 typically led to higher liquidity after the ED compared with before the AD: the median ratio of MDVTs was always greater than one. **The increased liquidity may suggest that, upon addition to one of the most widely followed and widely tracked indices, S&P 500 companies typically benefit from greater investor attention and analyst coverage.**

Interestingly, increases in MDVT (AD-21 to AD) and higher liquidity post-ED were stronger for additions from outside the S&P 1500. One potential explanation for this is that additions from outside the S&P 1500 (Group 2) were typically larger than those that migrated within the S&P 1500 (Group 1): median S&P 500 open weights were typically greater for the former than the latter. Hence, these companies may have had a greater trading volume before the AD and these companies may garner more investor attention and analyst coverage post-addition.

Exhibit 13 repeats the liquidity analysis for sample deletions. Median S&P 500 closing index weights on the ED are shown instead of open weights. The low representation of sample deletions limits the potential relevance of conclusions but, notwithstanding the fact that 69% of deletions are not included in our sample, we once again see increased liquidity over time. Additionally, it is important to note that the **liquidity of sample deletions typically rose after the ED compared with before the AD. This may point to S&P 500 membership having benefits in terms of analyst coverage and investor attention even after a stock is removed from the index.**

Exhibit 13: Liquidity of Sample Deletions

YEAR	MDVT (AD-21 TO AD)			S&P 500 CLOSE WEIGHT (%)			MDVT (ED+1 TO ED+21) vs. MDVT (AD-21 TO AD)		
	SAMPLE DELETIONS	GROUP 3	GROUP 4	SAMPLE DELETIONS	GROUP 3	GROUP 4	SAMPLE DELETIONS	GROUP 3	GROUP 4
1995	0.47	0.43	1.04	0.00	0.01	0.00	1.64	1.90	1.12
1996	1.17	1.18	0.92	0.01	0.01	0.01	1.43	1.93	1.27
1997	3.19	4.64	1.42	0.01	0.01	0.01	1.33	1.00	2.86
1998	2.63	3.58	2.63	0.01	0.01	0.01	1.65	2.08	1.17
1999	4.79	4.79	4.02	0.01	0.01	0.01	1.73	1.73	1.32
2000	2.10	1.94	2.39	0.00	0.00	0.00	1.52	1.47	1.56
2001	5.47	3.88	46.05	0.00	0.01	0.00	0.81	1.35	0.43
2002	39.27	N/A	39.27	0.05	N/A	0.05	0.84	N/A	0.84
2003	7.44	N/A	7.44	0.00	N/A	0.00	4.49	N/A	4.49
2004	7.66	7.66	N/A	0.01	0.01	0.01	1.39	1.39	N/A
2005	20.56	N/A	20.56	0.00	N/A	0.00	0.72	N/A	0.72
2006	19.29	22.76	10.62	0.01	0.02	0.01	1.04	1.51	0.94
2007	43.78	61.79	29.10	0.02	0.04	0.02	0.89	0.77	1.33
2008	31.94	26.01	37.26	0.01	0.01	0.01	0.54	0.73	0.54
2009	45.62	34.41	55.02	0.01	0.01	0.01	1.21	1.06	1.24
2010	22.09	22.09	N/A	0.01	0.01	0.01	1.53	1.53	N/A
2011	24.27	24.27	N/A	0.01	0.01	0.01	0.87	0.87	N/A
2012	32.56	33.20	32.56	0.01	0.01	0.01	1.35	1.33	1.40
2013	38.81	38.81	N/A	0.02	0.02	0.02	1.12	1.12	N/A
2014	53.13	53.13	N/A	0.02	0.02	0.02	1.30	1.30	N/A
2015	78.61	78.61	N/A	0.02	0.02	0.02	1.03	1.03	N/A
2016	53.82	53.82	N/A	0.01	0.01	0.01	1.00	1.00	N/A
2017	76.05	76.05	N/A	0.02	0.02	0.02	1.12	1.12	N/A
2018	83.42	83.42	N/A	0.02	0.02	0.02	1.09	1.09	N/A
2019	61.01	61.01	N/A	0.02	0.02	0.02	0.98	0.98	N/A
2020	93.41	97.94	55.04	0.01	0.01	0.01	0.81	0.82	0.57
2021	58.54	58.54	N/A	0.02	0.02	0.02	0.70	0.70	N/A

Source: S&P Dow Jones Indices LLC, FactSet. MDVT figures are in USD millions. Data as of June 31, 2020. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

We now turn our attention to assessing whether these trends may help to explain the attenuation in the index effect. Owing to the small sample size of deletions, we will focus on sample additions hereafter.

LIQUIDITY PREMIUM AND THE INDEX EFFECT

Once a company is added to the S&P 500, investors tracking the index typically buy portions of the company to avoid tracking error.

To gauge the potential impact of liquidity on the index effect, we consider certain factors that may impact the cost of liquidity in the market.

The first factor we consider is the available pool of indexed assets associated with an S&P 500 addition that comes from either the S&P 400 or S&P 600. This is because **greater assets tracking mid caps and small caps can offset some of the buying pressure on S&P 500 additions by matching some of the demand from investors tracking the S&P 500**. Indeed, once a company is added to the S&P 500, investors tracking the index typically buy portions of the company to avoid tracking error. At the same time and for the same reason, investors tracking the S&P 400 and S&P 600 would be looking to sell their holdings in that same company.

At the same time and for the same reason, investors tracking the S&P 400 and S&P 600 would be looking to sell their holdings in that same company.

As a result, we compute the “incremental indexed assets” associated with a sample S&P 500 addition in order to gauge buying pressure. Specifically, for a particular ED, we take the total indexed assets tracking the S&P 500 at the end of the previous year and multiply this by the stock weight in the S&P 500 prior to the open on the first trading date after the ED.²⁵ This is the aggregate amount that investors tracking the S&P 500 would have to own of the stock to avoid tracking error against the index.

Next, we take the total indexed assets tracking the index of origin (IoO; either the S&P 400 or S&P 600) at the end of the prior year, and multiply this by the closing weight of the company in the index of origin as of the ED. This is the aggregate amount that investors tracking the index of origin would likely sell in the company to avoid tracking error. If a company was added from outside the S&P 1500, we assume it had no indexed assets prior to its addition to the S&P 500.

If a company was added from outside the S&P 1500, we assume it had no indexed assets prior to its addition to the S&P 500.

By taking the difference between these two figures, the **incremental indexed assets show S&P 500 indexed assets that would need to buy an addition over and above indexed assets that would be selling at the same time.**²⁶

$$\begin{aligned} \text{Incremental Indexed Assets} &= \\ &= (\text{S\&P 500 open weight}_{\text{ED}+1} * \text{S\&P 500 indexed assets}) - (\text{IoO close weight}_{\text{ED}} \\ &\quad * \text{IoO indexed assets}) \end{aligned}$$

²⁵ Indexed assets are based on year-end 2020 figures from S&P DJI’s [“Survey of Indexed Assets.”](#)

²⁶ For the purposes of this calculation, we assume that all indexed assets trade instantaneously at the close of the ED.

We defined the range as the difference in maximum price minus the minimum price, divided by the average price.

The next steps we take are: a) to multiply incremental indexed assets by the range of the addition's stock price from AD-21 to AD; and b) to divide by the addition's MDVT (AD-21 to AD). We defined the range as the difference in maximum price minus the minimum price, divided by the average price. This leaves us with an implicit cost measure defined as follows.

$$\text{Implicit Cost} = \frac{\text{Incremental Indexed Assets}}{\text{MDVT (AD - 21 to AD)}} * \text{Range}$$

The implicit cost measure reflects the fact that market makers sit in between buyers and sellers.

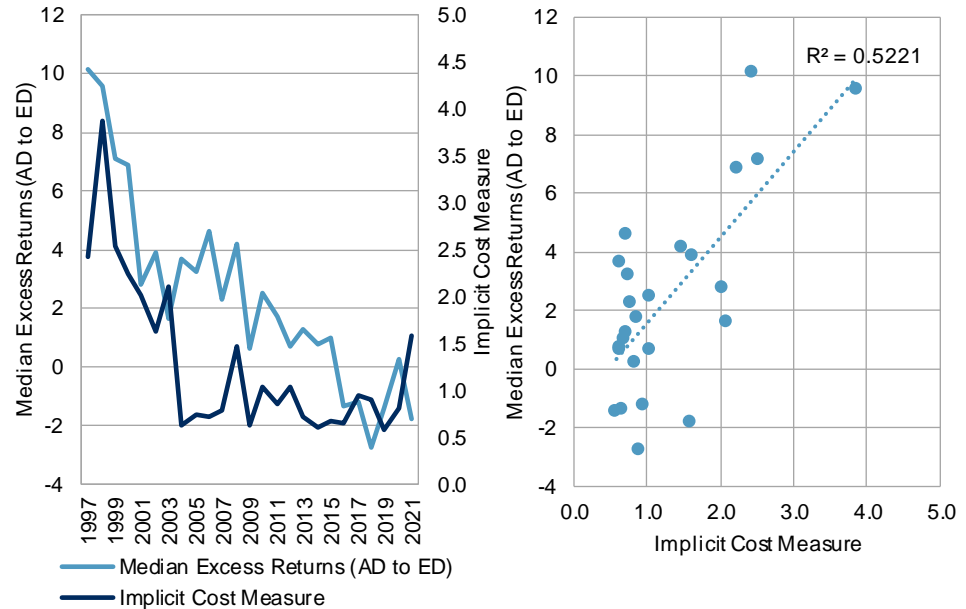
The implicit cost measure reflects the fact that market makers sit in between buyers and sellers. While we assume trading happens instantaneously, in practice market makers may have to hold inventory from one side of a trade before the other side has completed. All else equal, the risk of holding inventory increases when incremental indexed assets represent a larger portion of the stock's typical MDVT. A greater movement in the addition's stock price introduces greater risk for the market maker that they are holding the stock when it falls. In each case, the market maker may pass this risk onto investors as an additional cost for providing liquidity.

In each case, the market maker may pass this risk onto investors as an additional cost for providing liquidity.

Exhibit 14 shows the median excess returns of sample additions between the AD and the ED in each year between 1997 and June 2021.²⁷ The exhibit also shows the corresponding median values of the implicit cost measure. The left-hand chart shows a downward trend in both series, with the right-hand chart showing the changes in the implicit cost measure helped to explain more than 50% of the variation in median excess returns between 1997 and 2021. In other words, **an improvement in liquidity appeared to help explain the attenuation in the index effect, historically.**

²⁷ Median excess returns are relative to the S&P 500, and we begin in 1997 because S&P DJI's data on indexed assets data begins in 1996.

Exhibit 14: Implicit Cost Measure and the Index Effect – Sample Additions



Both the median excess returns (AD to ED) and the implicit cost measure had downward trends over time...

...the changes in the implicit cost measure helped to explain more than 50% of the variation in median excess returns.

Source: S&P Dow Jones Indices LLC, FactSet. Data as of June 31, 2021. Past performance is no guarantee of future results. Charts are provided for illustrative purposes.

Exhibit 15 repeats the analysis for sample additions from the S&P 400 and S&P 600 (Group 1) and for sample additions from outside the S&P 1500 (Group 2). In both cases, **changes in the median implicit cost measure were positively correlated with changes in the index effect.**

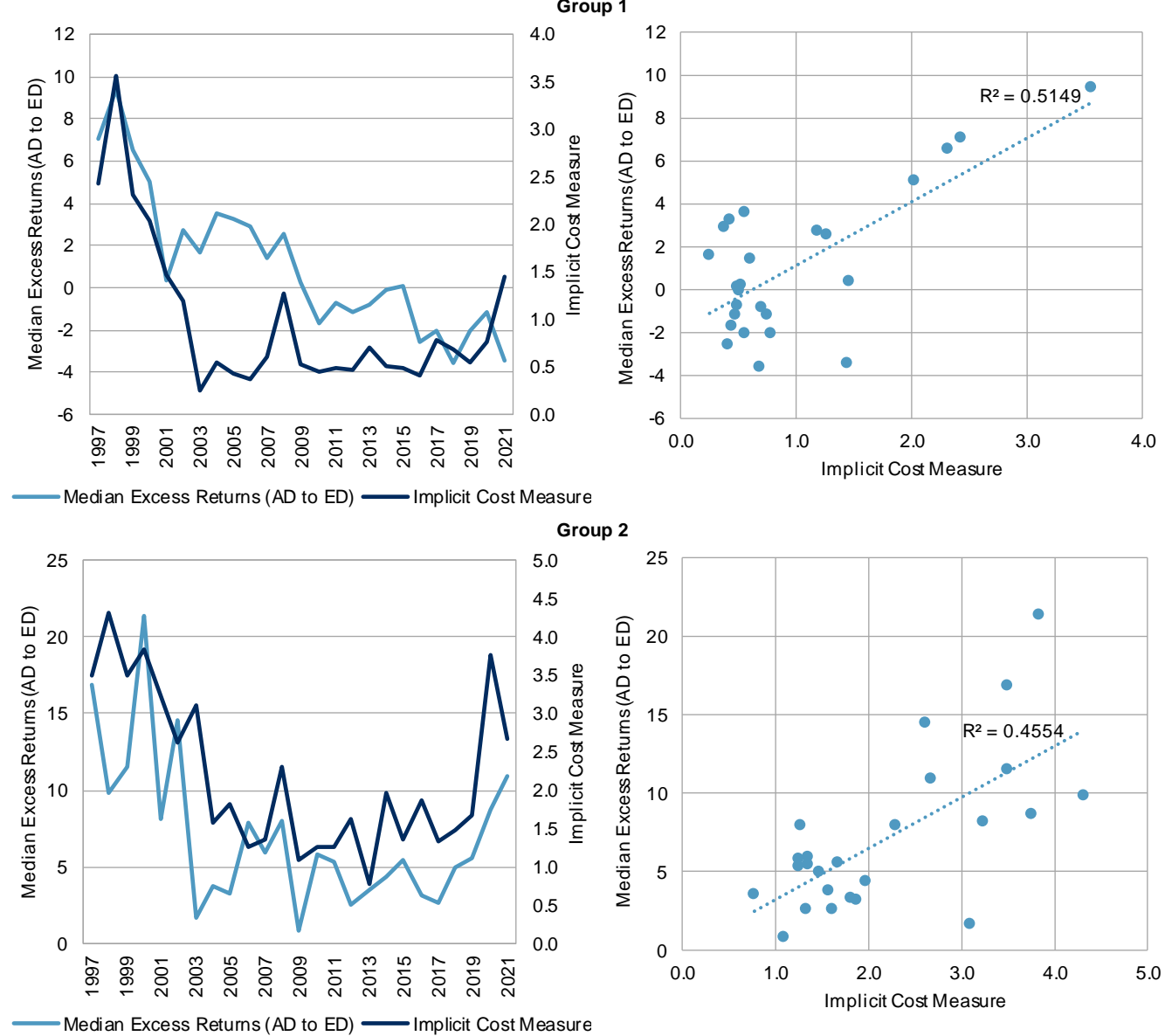
The implicit cost for Group 1 declined over the entire period, corresponding to a decline in the index effect. This suggests that the growth in indexed assets in the S&P 400 and S&P 600 improved the liquidity of these additions, which in turn contributed to less of a price impact of index addition.

An improvement in liquidity helped to explain the attenuation in the index effect, historically.

Additionally, Group 1's median implicit cost measure was always lower than Group 2's. This may help to explain why the median absolute value of the index effect was always lower for Group 1 than Group 2, with the latter group's changes involving greater price impacts. Although Group 2's higher implicit cost measure may appear to contradict the observation that it typically posted higher MDVT (AD-21 to AD), the assumed absence of any indexed assets tracking Group 2 prior to their addition meant that the median incremental indexed assets were far larger than for Group 1. The median range was also typically higher for Group 2 than Group 1.

These observations also helped to explain the jump in Group 2's implicit cost measure in 2020: while the median MDVT figure also rose in 2020, there was a greater increase in median incremental indexed assets and the median range also rose. Overall, though, Group 2's median implicit cost measure declined since 1997.

Exhibit 15: Implicit Cost Measure and the Index Effect – Sample Additions from Groups 1 and 2



Source: S&P Dow Jones Indices LLC, FactSet. Data as of June 31, 2021. Past performance is no guarantee of future results. Charts are provided for illustrative purposes.

CONCLUSION

The growth of index-based passive investing in the past five decades has coincided with greater attention on the impact of index membership on stock prices and volumes. Focusing on a sample of S&P 500 additions and deletions since 1995, this paper shows that the magnitude of median excess returns between the Announcement Date and the Effective Date declined since the 1990s.

One potential reason for the decline in the index effect is the increased depth of the U.S. equity market.

For example, median excess returns of sample additions fell from 8.32% (1995 to 1999) to -0.04% (2011 to 2021), while the magnitude of median excess returns for sample deletions also fell, changing from -9.58% (1995 to 1999) to 0.06% (2011 to 2021). Similar trends were observed when comparing stock returns to the S&P 500 or the appropriate S&P 500 sector index.

One potential reason for the decline in the index effect is the increased depth of the U.S. equity market. The growth of assets tracking the S&P 400 and the S&P 600 since 1996 may have contributed to an improved liquidity environment—especially for additions coming from the S&P 1500—while additions from outside the S&P 1500 appeared to benefit from a general improvement in stock liquidity.

Additionally, stocks added to the S&P 500 typically experienced an increase in MDVT: over a one-month period after the Effective Date, the MDVT was typically higher than for the one-month period before the Announcement Date. This may suggest companies added to the S&P 500 typically benefitted from greater investor attention and analyst coverage. These benefits appeared to remain after deletion from the index, notwithstanding the relatively small sample size of sample deletions.

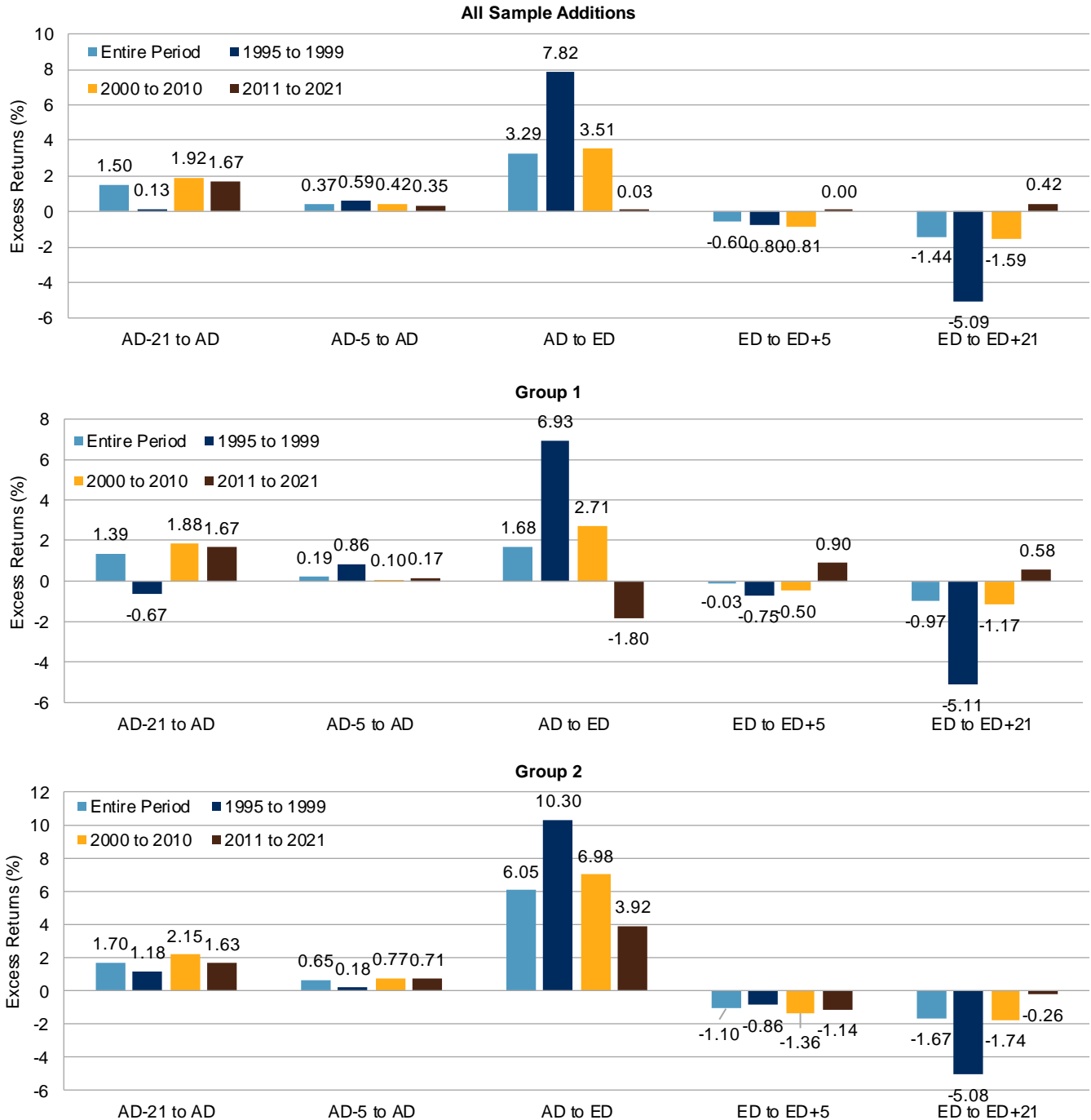
The decline of the index effect over the past 25 years appears to reflect structural changes taking place in the financial industry and the capital markets.

As a result, the decline of the index effect over the past 25 years appears to reflect structural changes taking place in the financial industry and the capital markets. From the rise of the ETF market makers to markets becoming more efficient, the passive investing ecosystem is evolving, with index rebalancing at the heart of it.

APPENDIX

Sample Additions versus GICS

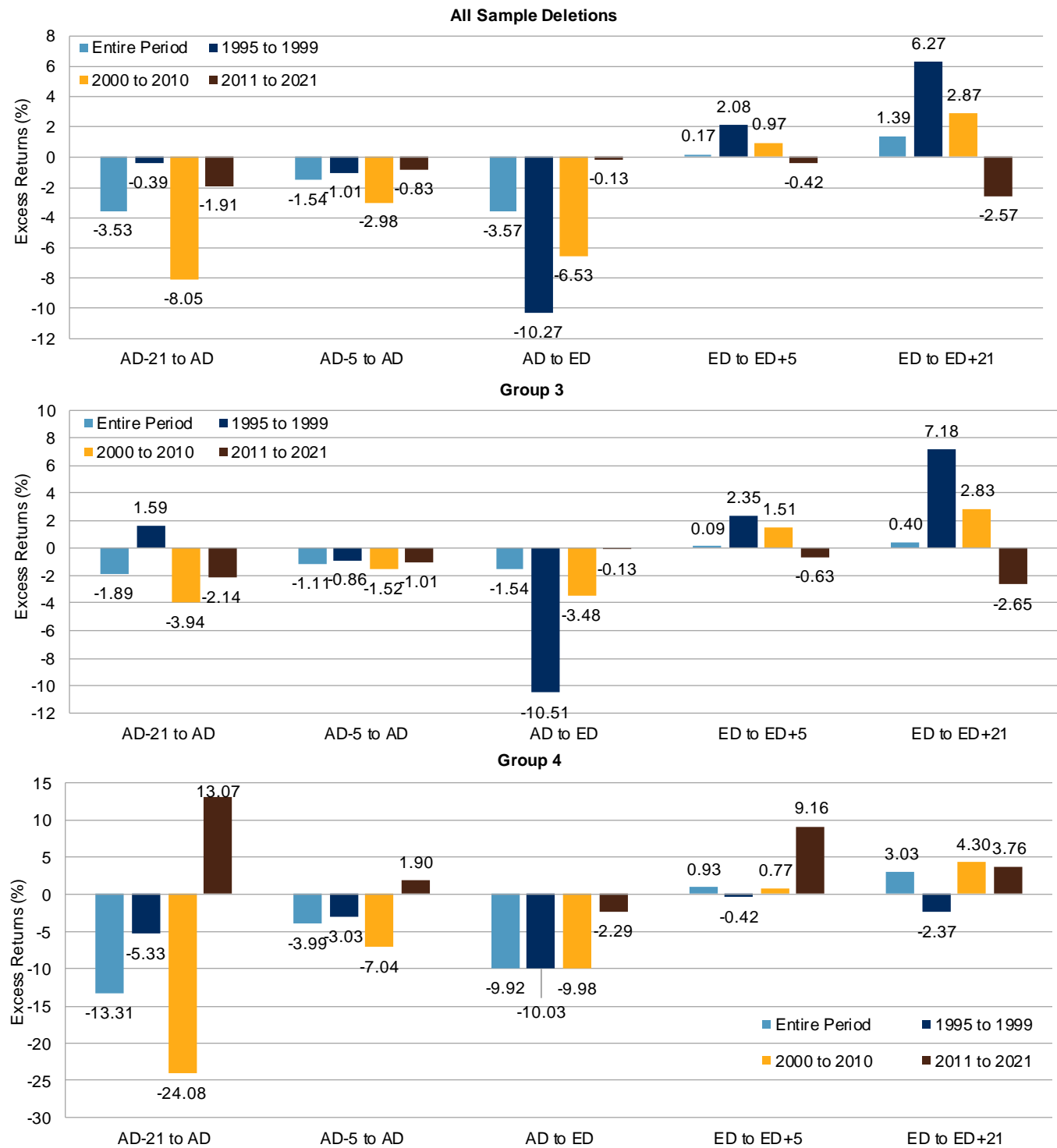
Exhibit 16: Median Excess Returns of Sample Additions



Source: S&P Dow Jones Indices LLC, FactSet. Chart shows median excess total returns in USD of all sample additions, those from the S&P 400 and S&P 600 (Group 1), and those from outside the S&P 1500 (Group 2) between January 1995 and June 2021. The S&P 500 Real Estate Sector was launched on Sept. 19, 2016, while the other 10 S&P 500 Sectors launched on June 28, 1996. All data prior to these launch dates is back-tested. Prior to September 2018, Communication Services was called Telecommunication Services. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Sample Deletions versus GICS

Exhibit 17: Median Excess Returns of Sample Deletions



Source: S&P Dow Jones Indices, FactSet. Chart shows median excess total returns in USD of all sample deletions, those to the S&P 400 and S&P 600 (Group 3), and those to outside the S&P 1500 (Group 4) between January 1995 and June 2021. The S&P 500 Real Estate Sector was launched on Sept. 19, 2016, while the other 10 S&P 500 Sectors launched on June 28, 1996. All data prior to these launch dates is back-tested. Prior to September 2018, Communication Services was called Telecommunication Services. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

PERFORMANCE DISCLOSURE/BACK-TESTED DATA

The S&P 500 Consumer Discretionary, S&P 500 Consumer Staples, S&P 500 Energy, S&P 500 Materials, S&P 500 Industrials, S&P 500 Healthcare, S&P 500 Financials, S&P 500 Information Technology, S&P 500 Communication Services, and S&P 500 Utilities sector indices launched June 28, 1996. The S&P 500 Real Estate sector index was launched September 19, 2016. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. Complete index methodology details are available at www.spglobal.com/spdji. Past performance of the Index is not an indication of future results. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results. Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations. Back-tested performance is for use with institutions only; not for use with retail investors.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the index is set to a fixed value for calculation purposes. The Launch Date designates the date when the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its data feed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Typically, when S&P DJI creates back-tested index data, S&P DJI uses actual historical constituent-level data (e.g., historical price, market capitalization, and corporate action data) in its calculations. As ESG investing is still in early stages of development, certain datapoints used to calculate S&P DJI's ESG indices may not be available for the entire desired period of back-tested history. The same data availability issue could be true for other indices as well. In cases when actual data is not available for all relevant historical periods, S&P DJI may employ a process of using "Backward Data Assumption" (or pulling back) of ESG data for the calculation of back-tested historical performance. "Backward Data Assumption" is a process that applies the earliest actual live data point available for an index constituent company to all prior historical instances in the index performance. For example, Backward Data Assumption inherently assumes that companies currently not involved in a specific business activity (also known as "product involvement") were never involved historically and similarly also assumes that companies currently involved in a specific business activity were involved historically too. The Backward Data Assumption allows the hypothetical back-test to be extended over more historical years than would be feasible using only actual data. For more information on "Backward Data Assumption" please refer to the [FAQ](#). The methodology and factsheets of any index that employs backward assumption in the back-tested history will explicitly state so. The methodology will include an Appendix with a table setting forth the specific data points and relevant time period for which backward projected data was used.

Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices maintains the index and calculates the index levels and performance shown or discussed but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US \$100,000 investment for a 12-month period (or US \$10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US \$1,650), the net return would be 8.35% (or US \$8,350) for the year. Over a three-year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US \$5,375, and a cumulative net return of 27.2% (or US \$27,200).

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