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„The Effect of Passive Ownership on Price Efficiency.
A PEAD Analysis."

verfasst von / submitted by

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Abstract

(English)

In recent years, passive investing has gained popularity, and increasing shares of the stock market are held by passive investors, who tend not to react to new information as fast, if at all, as active investors. The efficient pricing of securities depends on market participants to accurately assess news and adapt their trading behaviour adequately. This thesis aims to examine whether increased passive investing leads to higher price inefficiency by means of a post-earnings-announcement-drift analysis. The results suggest a significant correlation between passive ownership and price inefficiency, confirming the research hypothesis. Surprisingly, the phenomenon of PEAD and market reaction behaviour seems to have changed in the latest years.

(Deutsch)

In den vergangenen Jahren zeichnete sich ein Trend des passiven Investierens am Aktienmarkt ab. Größere Anteile an Unternehmen werden von InvestorInnen gehalten, die, falls überhaupt, weniger oder langsamer auf neue Informationen reagieren. Das effiziente Bepreisen von Wertpapieren bedarf, dass MarktteilnehmerInnen umgehend und adäquat Neuigkeiten beurteilen und ihr Handelsverhalten akkurat justieren. Die vorliegende Arbeit untersucht, ob passives Investieren Auswirkungen auf die Preiseffizienz hat. Dazu wird eine Analyse des Post-Earnings-Annoucement-Drifts (PEAD) herangezogen. Die Ergebnisse der Regressionen zeigen einen signifikanten Zusammenhang von passiven Investments und geringerer Preiseffizienz und bestätigen damit die Forschungshypothese. Unerwartet deuten sie jedoch auch darauf hin, dass sich das Phänomen PEAD und die Reaktionstendenz des Marktes in jüngster Vergangenheit geändert haben könnten.

1. Introduction

This section will outline the recent trends in passive investing and then discuss the aim of the thesis as well as its research question.

1.1 Recent Trends in Passive Investing

In recent years, there has been a significant increase in the popularity of passive investing. As shown in Figure 1, the share of indexed products as a percentage of the total fund market grew from 21% in 2011 to 43% in 2021. This trend is driven by various factors, including the low cost and simplicity of passive investment strategies, as well as the underperformance of active management strategies in the face of market volatility and increasing competition. (Investment Company Institute, 2022)
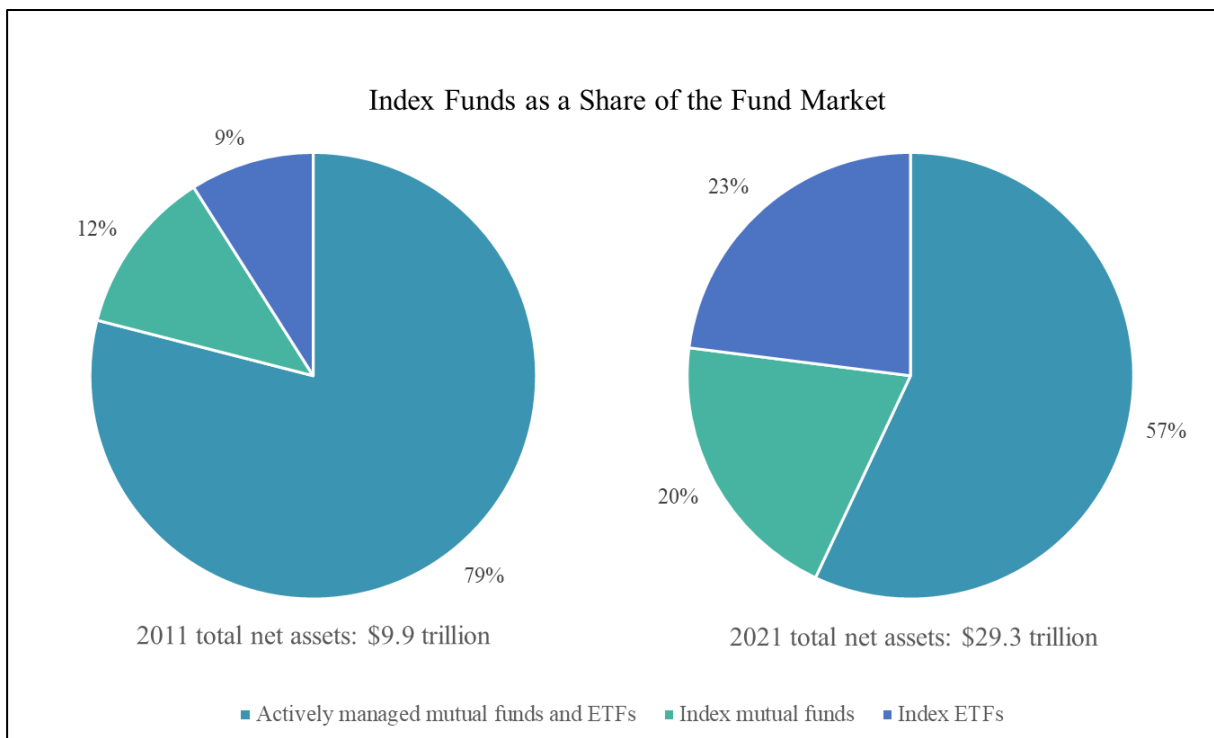
Figure 1 data from 2022 ICI Factbook

An index fund is a type of investment fund that aims to replicate the performance of a specific market index. This approach, known as passive management, typically involves portfolio managers buying and holding all, or a representative sample, of the securities in their target index. This approach often results in index mutual funds and index exchange-traded funds (ETFs) having lower expense ratios compared to other funds. In contrast, active management involves managers having more discretion to adjust their exposure to different sectors or securities within their funds' investment mandates. Active managers may also conduct extensive research on stocks, bonds, market sectors, or geographic regions. This approach can offer investors the potential to earn

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higher returns, or to achieve other investment goals such as limiting downside risk, managing volatility, or altering asset allocations in response to market conditions. These additional factors typically make active management more expensive than managing an index fund. The growth of index mutual funds has contributed to the decrease in the average expense ratios of equity, hybrid, and bond mutual funds. From 2000 to 2021, index mutual fund total net assets grew significantly, from $384 billion to $5.7 trillion (see Figure 2). As a result, the share of index mutual funds in long-term mutual fund net assets more than tripled over this period, from 7.5 percent at the end of 2000 to 25.9 percent at the end of 2021. Among index mutual funds, index equity mutual funds accounted for the majority (82 percent) of index mutual fund net assets at the end of 2021. (Investment Company Institute, 2022)
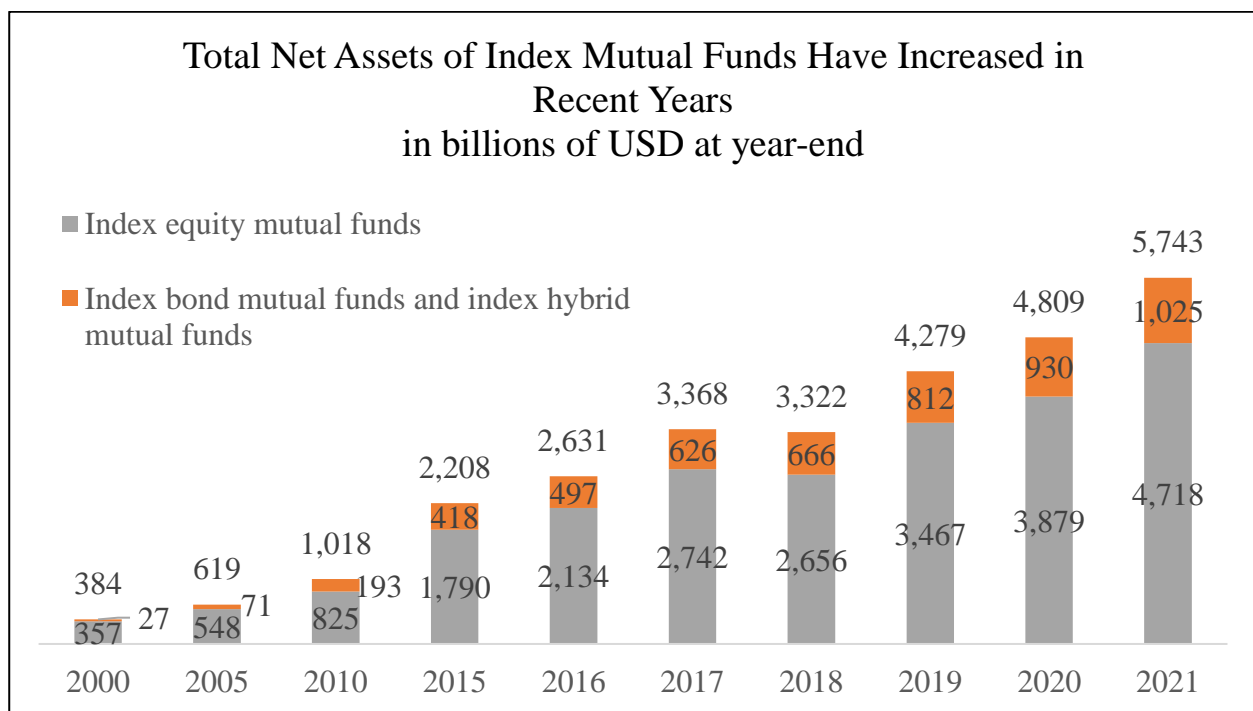
Figure 2 data from 2022 ICI Factbook

1.2 Research Question

Above was outlined the increased intensity of passive investing strategies. Price efficiency depends on markets accurately and swiftly incorporating all new information into securities prices (Fama, 1970). The implications of a growing number of passive investors on capital markets and price formation is not entirely clear but by definition, passive investors exhibit less trading behaviours than active ones (Shushko & Turner, 2018). In light of these two circumstances, this thesis aims to investigate whether there is a connection to be empirically found, and answer the

research question: "How does passive ownership affect price efficiency?" I hypothesize that increased passive ownership leads to decreased price efficiency.

2. Literature Review and Theoretical Considerations

Eugene F. Fama's (1970) efficient market hypothesis (EMH) is a theory that states that financial markets are "informationally efficient." This means that at any given time, the prices of securities in the market reflect all publicly available information about those securities. Fama proposed three forms of market efficiency. The weak form of efficiency states that past prices and trading data of a security are fully reflected in its current price. This means that technical analysis, which is the study of past prices and trading data to predict future prices, will not be able to produce abnormal returns. The semi-strong form efficiency builds on the weak form by stating that not only are past prices and trading data fully reflected in current prices, but also all publicly available information, such as financial statements and news articles. This means that fundamental analysis, which is the study of a company's financial statements and other publicly available information to predict its future performance, will also not be able to produce abnormal returns. And lastly, his strong form of efficiency states that all information, including insider information, is fully reflected in security prices. This means that even insider trading, which is the use of non-public information to make investment decisions, will not be able to produce abnormal returns.

The question is what, if anything, happens to the information content of prices if an increasing number of market participants do not actively participate in price discovery. When analysing prices, researchers necessarily consider the prices of stocks as noted on exchanges. These are nothing more than the price they were last traded for, and a trade needs no more than two parties. A scenario is then conceivable, in which all company shares but one are held by people who absolutely abstain from trading. Participating in market activities are two individuals, who are able to instantly and fully assess all past, present, and forecasted information and conclude the correct price of a security. They trade as long as they are indifferent between holding and selling the stock in absence of market frictions. In this scenario, the security's price would always be efficient, independent of the fraction held by completely passive participants. This argument holds if the market portfolio is considered instead of an individual stock. In the context of a multiasset version of Grossman's rational expectation model (Grossman, 1976, 1978), Baruch and Zhang (2021) argue that market indexing does not change the price of the market portfolio, and therefore does not affect the efficiency of its prices. However, it does have an impact on the efficiency of prices for individual stocks. This happens because indexers do not participate in the process of determining prices for individual assets. This can be explained by looking at systematic and idiosyncratic risks of individual assets. The systematic risk is not affected, but the idiosyncratic risk increases with the level of indexing. This also leads to more similarity in the movement of

stock prices. The reason for this is that the market portfolio's price serves as a public but noisy source of information about individual assets, and as more indexers are present, the information contained in the price of the market portfolio becomes more novel and non-indexers rely more heavily on it when determining prices for individual assets, resulting in similar price movements.

Other authors such as Liu and Wang (2018), and Dávila and Parlatore (2021) maintain that price efficiency is not necessarily affected with the alteration of the mixture of investors. They consider the classic Grossman and Stiglitz (1980) model that stipulates how investors decide whether to incur the cost of obtaining information. Though this model predates the popularity of index investing, it can be applied to understand its effects on changes in the composition of investors. By including an additional choice for investors in the model - the choice between being passive, active and publicly-informed, or active and privately-informed - it can be predicted that the rise of index investing will not affect the efficiency of prices. The reasoning behind this is that in equilibrium, as the cost of index investing decreases and leads to more index investors and fewer active investors, the balance of publicly-informed and privately-informed investors adjusts in such a way that the returns from active investing stay the same, thus maintaining the efficiency of prices. Coles et al. (2022) have presented the first empirical evidence that specifically tests the diverse predictions made in the growing theoretical literature. Their findings support the alternative class of models that predict index investing will not affect price efficiency, in contrast to the numerous models that suggest otherwise.

Gârleanu and Pederson (2021, p. 14) developed the following equation estimating overall market efficiency η as

$$\eta = 2\gamma(f_a - f_p) + \gamma(k_p - k_a) = 2\gamma^R(f_a^{\%} - f_p^{\%}) + \gamma^R(k_p^{\%} - k_a^{\%})$$

where $\gamma^R := \gamma W$ is the relative risk aversion, $f_a^{\%} := f_a/W$ and $f_p^{\%} := f_p/W$ are active and passive fees as a percentage of invested wealth, and $k_a^{\%} := k_a/W$ and $k_p^{\%} := k_p/W$ are the marginal costs of active and passive management per dollar. In this equation, as the difference between active and passive fees $(f_a^{\%}-f_p^{\%})$ increases, market inefficiency increases. Cremers et al. (2009, p. 541) report that "a decline in the fees of indexed funds by 50 basis points is associated with 16 basis points lower fees charged by active funds", meaning that as passive fees decline, the difference in fees grows larger. It is also apparent that passive fees and the fraction of capital invested passively, which can be viewed as the demand for passive investment, stand in the normal, inverse relationship to each other. Bond and Garcia (2022, p. 3177) state this and its implications writing "…as indexing costs fall, and indexing increases, price efficiency of the index as a whole falls,

while the relative price efficiency of individual stocks increases. Moreover, price efficiency is lower for stocks covered by the index than for those outside." In this theoretical framework, given that we have seen passive fees decrease and passive investment popularity increase (Investment Company Institute, 2022), price efficiency should be decreased as well.

In summary, the theory is divided on the effect of passive ownership on price efficiency. Opinions vary on the framework considered and the type of efficiency in question (Coles et al., 2022). The aim of this thesis is to contribute empirical insight into the price efficiency of individual stocks. The following chapter explains the methodology used.

3. Methodology

This section lays out the methodology for the subsequent empirical analysis. It begins with a description of the approach used to measure passive ownership and non-passive ownership before explaining how the sample was formed and detailing its characteristics. Lastly, the measure of inefficiency, PEAD, as well as control variables are introduced in order to then enable the progression to the regression setup that will be shown in the subsequent chapter.

3.1 Measures of Passive and Nonpassive Ownership

The measures of passive ownership (PO) and nonpassive ownership (NPO) are formed in two steps. First, the full list of institutional investors who hold shares of a given company in the sample and at the end of a given quarter of interest is retrieved from Refinitv, as well as their classifications as active or passive. Refinitiv (2022) defines passive investors as follows: the firms benchmark their assets against indices (such as the S&P 500, Russell 1000, etc.) and allow external factors to determine which sectors and regions they make investments in. All sell-side firms are passive because they do not actively manage their assets. Passive managers employ indexing and/or quantitative strategies as the sole basis for stock selection. These investors typically do not meet with company management.

Passive investors, according to Refinitiv (2022), manage their portfolio using a hands-on approach (makes decisions based on company/sector analysis, fundamental research, etc.) to allocate firm assets and determine stock selection. Active managers use fundamental research as the basis for investment decisions and typically meet with company management.

Refinitiv (2022) assert that per their business rule, a firm would be tagged as Passive Investor if its investment strategy is 100% based on index and if the firm has even 1% of its investment strategy based on traditional styles like Growth, Value, Income etc. then the firm would be tagged as an Active Investor.

Further, the database is queried for the number of shares each investor holds. These are then summed for the set of active and passive investors, respectively. They are then weighted by the number of shares outstanding at the respective quarter end.

Relative passive ownership (relPO) is passive ownership as a percentage of total institutional ownership, which in turn is given by the sum of PO and NPO.

This approach stands in contrast to that followed by Qin and Singal (2015) who first construct a sample of passive funds and use it to determine passive ownership of sample stocks. They do this

by examining how closely the funds in the CRSP mutual fund database follow the S&P 100, 400, 500, and 600 indices, as well as the Russell 1000, and 2000, and the NASDAQ 100 indices. For eligibility to be included in their sample, they set an active share (AS) requirement of under 10% as well as an R^2 threshold as 99% and check. They determine AS by comparing fund holdings as fer their forms 13F to index constituents and derive a fund's respective R^2 by regressing fund returns on each indicis returns. The resulting sample of passive funds is then used to determine PO, by defining PO as the fraction of a company's outstanding shares held by the sample funds in aggregate, and consequently setting the PO of any company not held by any fund in their sample to zero. NPO is then defined by the authors as the fraction of a company's shares held by institutional investors who are not part of the sample of passive funds.

3.2 Sample of Stocks

The aim is to construct samples sufficient in diversity to make possible an elicitation of general conclusions based on its analysis. I construct one sample for each of the 35 quarters examined, using the same steps each time. The basis is the list of S&P 500 constituents at the end of a given quarter. This set of stocks is then expanded by a number of each constituent's peers as identified by Refinitiv to form a set of S&P 500 constituents and non-constituents. The S&P 500 is used as a starting point for sample formation because its constituents have properties beneficial to the later analysis. "To be eligible for S&P 500 index inclusion, a company should be a U.S. company, meet market capitalization requirements, be highly liquid, have a public float of at least 10% of its shares outstanding, and its most recent quarter's earnings and the sum of its trailing four consecutive quarters' earnings must be positive." (S&P Dow Jones Indices, 2022) This means that the stocks in the index can be taken to feature a level of liquidity that allows a reliable calculation of returns, trading, and ownership measures, as well as a magnitude of market capitalisation that implies the possibility for a relatively divers shareholder structure. Also, since the index has a cap on its maximum number of constituents, one can assume that the S&P 500 does not include all stocks that would principally fulfil the eligibility requirements, therefore it must be possible to find highly comparable companies who are non-constituents. This is especially important considering the fact that the S&P 500 is the most popular index for indexed asset allocation and has one of the highest portions of indexed assets. Consequently, these stocks can be expected to have relatively high passive ownership (PO), while their peers outside the index should have lower values of PO. This ensures that the sample contains companies that differ in PO but are otherwise fairly similar.

Table 1 Stock Sample Characteristics

Observations	28196
of which of S&P500 Constituents at Time of Sample	14595
Total % in S&P500	52%
Average Number of stocks in S&P500	417.0
Average Number of non-S&P500 Constituents	388.6
Number of Quarters	35
Average number of Stocks per Quarter	805.6
Lowest Number of Stocks	771
Median Number of Stocks	806
Highest Number of Stocks	834
Total Number of Unique Stocks	1109

For this paper's analysis, I consider the timeframe from 31.12.2013 to 30.06.2022 consisting of 35 quarters. The base sample in each quarter is comprised of all S&P 500 constituents, plus a number of their peers who together make up 880 different stocks. A portion of the sample stocks is then removed only in the case that Refinitiv offers inconclusive, or insufficient amounts of, data regarding the variables used in the regression. In almost all cases, this removal was done because Refinitiv did not provide an earnings announcement date for a stock in the given quarter. This means that no cumulative (abnormal) returns can be calculated, rendering a PEAD analysis unfeasible. On average, 805.6 stocks remain per final sample used, with the largest being 834 in the 1st quarter of 2022 and the lowest comprised of 771 in the 4th quarter of 2013. Of the average sample with 805.6 stocks, 417 are S&P 500 constituents at the end of the respective sample's quarter, and 388.6 are non-constituents. Because there is considerable overlap between any two of the quarters in terms of the indicis composition and considered peers, the total number of different stocks over the whole period is much lower than the sum of the stocks in each sample and amounts to 1109 unique ones. For a complete list of companies in the sample, see Appendix 1.

Table 2 presents descriptive statistics concerning the sample and regarding several variables of interest. Average market capitalization increased steadily from 26.53 billion USD in 2013 to 58.23 in 2021 before declining to 53.55B USD in 2022, which is most likely attributable to the general stock market decline resulting from the COVID-19 pandemic. This decrease was stronger in non-constituents of the S&P 500, whose average market capitalization decreased by 10.17% compared to a 7.03% decrease in the group of S&P 500 constituents. In total, all considered stocks have an average market capitalization of 37.97B USD, with S&P 500 constituents being larger with an

average of 54.15B USD and non-constituents with 20.60B USD, which is unsurprising considering that the S&P 500 is a large-cap index. The share of passive ownership rose by 8.13 percentage points over the considered timeframe while non-passive ownership declined by 6.62 percentage points, therefore raising the relative passive ownership, defined as PO divided by the sum of PO and NPO, by 9.46 percentage points. For a more detailed overview, of the sample characteristics by quarter, see Table 3.

Table 2 Summary Descriptive Statistics of Selected Variables

In the year 2013 there is only the fourth quarter in the sample, in the year 2022 the first two quarters are included. Average market capitalization (M. Cap.) is given in billions of US dollars. Passive ownership (PO), non-passive ownership (NPO), institutional ownership (Inst. Own.), and relative passive ownership (Rel. PO) are all stated as their averages over the combined quarter samples in each respective year. Institutional ownership (Inst. Own.) is the sum of PO and NPO. Relative passive ownership is PO divided by institutional ownership.

	Whole Sample					S&P 500 Constituents					Non S&P 500 Constituents				
Year	M. Cap.	PO	NPO	Inst. Own.	Rel. PO	M. Cap.	PO	NPO	Inst. Own.	Rel. PO	M. Cap.	PO	NPO	Inst. Own.	Rel. PO
2013	26.53	23.28%	51.96%	75.24%	30.81%	38.36	26.32%	56.22%	82.55%	32.31%	13.27	19.87%	47.18%	67.05%	29.13%
2014	27.56	23.10%	51.33%	74.43%	31.00%	40.64	26.58%	55.59%	82.17%	32.68%	13.29	19.29%	46.68%	65.97%	29.16%
2015	28.14	24.37%	51.19%	75.56%	32.10%	41.15	27.53%	55.26%	82.79%	33.62%	14.02	20.93%	46.78%	67.70%	30.45%
2016	29.36	26.33%	50.76%	77.10%	33.89%	41.68	29.33%	54.53%	83.86%	35.30%	15.89	23.06%	46.65%	69.70%	32.35%
2017	33.95	28.33%	49.06%	77.39%	36.15%	47.93	31.45%	53.09%	84.53%	37.61%	18.81	24.95%	44.70%	69.65%	34.58%
2018	36.63	29.94%	48.91%	78.85%	37.52%	51.69	32.63%	52.77%	85.40%	38.60%	20.37	27.05%	44.75%	71.80%	36.35%
2019	39.97	31.52%	48.11%	79.63%	38.99%	56.82	34.11%	51.20%	85.31%	40.36%	22.10	28.77%	44.83%	73.59%	37.54%
2020	43.20	31.19%	47.18%	78.36%	39.35%	62.05	33.81%	49.86%	83.67%	40.86%	23.28	28.41%	44.35%	72.76%	37.75%
2021	58.23	30.78%	46.43%	77.21%	39.40%	82.49	33.52%	49.32%	82.84%	40.95%	32.84	27.91%	43.40%	71.31%	37.78%
2022	53.55	31.41%	45.34%	76.75%	40.27%	76.69	34.58%	47.70%	82.29%	42.49%	29.50	28.11%	42.88%	70.99%	37.97%
Total	37.97	28.30%	48.95%	77.24%	36.21%	54.15	31.21%	52.49%	83.70%	37.67%	20.60	25.16%	45.15%	70.31%	34.63%

Table 3 Sample Characteristics by Quarter

Quarter	Average Market Cap (in billion USD)	Average PO	Average NPO	Average relPO	Number of Stocks in Sample
13Q4	26.53	23.28%	51.96%	30.81%	772
14Q1	26.41	22.77%	51.58%	30.90%	782
14Q2	27.31	22.37%	51.22%	30.19%	785
14Q3	27.57	22.80%	51.54%	30.60%	788
14Q4	28.96	24.45%	50.98%	32.30%	787
15Q1	29.32	24.15%	50.95%	32.24%	789
15Q2	28.82	23.85%	51.05%	31.63%	788
15Q3	26.36	23.99%	51.33%	31.60%	792
15Q4	28.08	25.47%	51.43%	32.93%	793
16Q1	28.10	25.54%	50.91%	33.43%	794
16Q2	28.07	25.86%	51.07%	33.40%	793
16Q3	30.34	26.36%	50.85%	33.71%	793
16Q4	30.92	27.58%	50.22%	35.02%	789
17Q1	32.79	28.17%	49.69%	35.96%	791
17Q2	31.06	27.67%	49.09%	35.62%	791
17Q3	35.00	28.37%	48.59%	36.33%	807
17Q4	36.87	29.09%	48.87%	36.69%	806
18Q1	36.44	29.56%	49.07%	37.34%	806
18Q2	37.44	29.27%	49.04%	36.85%	801
18Q3	38.98	29.91%	48.38%	37.64%	811
18Q4	33.60	31.03%	49.15%	38.23%	809
19Q1	39.58	31.13%	48.61%	38.69%	814
19Q2	38.86	31.06%	47.88%	38.60%	812
19Q3	38.78	31.53%	47.45%	39.13%	819
19Q4	42.69	32.35%	48.50%	39.54%	811
20Q1	34.32	31.90%	47.10%	39.85%	818
20Q2	41.38	31.27%	46.78%	39.63%	821
20Q3	45.09	30.64%	46.64%	39.09%	827
20Q4	52.04	30.94%	48.21%	38.82%	815
21Q1	54.39	30.71%	46.73%	39.27%	830
21Q2	59.34	30.52%	46.42%	39.11%	829
21Q3	57.15	30.51%	46.10%	39.20%	831
21Q4	62.04	31.35%	46.47%	40.03%	832
22Q1	58.61	31.37%	45.02%	40.46%	834
22Q2	48.49	31.45%	45.65%	40.08%	836
Total	37.97	28.30%	48.95%	36.21%	28196

3.3 Measure of Price Efficiency - PEAD

For prices to be efficient as described in Eugene F. Fama's efficient market hypothesis (EMH), they must "at any time 'fully reflect' all available information" (Fama, 1970, p. 383), which implies an instant, accurate reaction of investors to new information. Reality shows a deviation from this assumption as under-, and overreactions are common (Fama, 1998). Empirical research beginning in the late 1960s with Ball and Brown (1968) has repeatedly shown markets to underreact to new information, specifically in the case of earnings announcements. What was shown to follow these under-reactions was a "…drift of a firm's stock price in the direction of the firm's earnings surprise for an extended period of time. Contrary to what the efficient market hypothesis predicts, an earnings surprise does not lead to a full, instantaneous adjustment of stock prices, but to a slow, predictable drift" (Fink, 2020, p. 1) termed the Post-Earnings-Announcement Drift. The effect is usually shown by taking some measure of earnings surprise, such as the cumulative abnormal return closely around an announcement date that captures a stock price's immediate reaction to new earnings information. Cumulative abnormal returns in longer timeframes are then regressed on this immediate reaction. A positive correlation then indicates that prices gradually and predictably adjust in the direction of the earnings surprise, i.e. they drift upwards (downwards) if earnings are unexpectedly high (low) instead of pricing in the new information at or very closely to the announcement. A higher magnitude and predictability of PEAD therefore signifies a greater inaptitude of the market to efficiently price securities and with it a higher price inefficiency.

For the longest time, evidence of the existence of PEAD was highly convincing, despite "…no rational economic explanation of the PEAD…" (Richardson & Veenstra, 2022, p. 648) having been brought forth. In more recent years however, authors began to uncover evidence that spurred doubt concerning the persistence of the effect (Richardson & Veenstra, 2022) and others even renounced its remaining entirely (Martineau, 2021).

In the main part of this analysis, I use cumulative abnormal returns (CAR) around the announcement date as earnings surprise, and then regress CAR in subsequent timeframes on them. Each considered quarter's sample is divided into ten deciles based on the stocks' market capitalization. From each decile I then construct one value-weighted portfolio. To calculate the CAR for a specific stock, the cumulative returns of the stock's decile portfolio

are subtracted from the stock's own cumulative returns. For stock *i* and a time period from t_1 to t_2 this approach leads to the following calculation:

$$CAR_i(t_1, t_2) = \prod_{t=t_1}^{t_2}\left(1 + R_{i,t}\right) - \prod_{t=t_1}^{t_2}\left(1 + R_{p,t}\right)$$

As a measure for earnings surprise, I follow Frazzini (2006) and use CAR(-2,1) meaning the cumulated returns from two days preceding the earnings announcement to one day after the event. "This is a fairly clean measure of news since it does not rely on assumptions regarding the market expectation for earnings" (Frazzini 2006, p. 2029). The average value of CAR(-2,1) in each sample is necessarily zero. All CAR(-2,1) measures in one quarter sample are then converted into deciles, forming the DCAR(-2,1) variable, taking values in increments of 0.10 with 0.05 for the smallest, and 0.95 for the largest decile. I use deciles partly because this approach has become a custom in PEAD analysis and because it raises the comparability between works done with different securities and for different time periods. These are then used as an interaction term with each of the other variables used in the respective regression.

Following Qin and Singal (2015), for the CAR measures presenting the gradual price adjustment over short and longer timeframes I use CARs starting at 2 days after the earnings announcement and ending 5, 15, 30, and 60 days after it, respectively.

3.4 Control Variables

Control variables are constructed by interacting the measure for earnings surprise CAR(-2,1) with other control variables. The capital letter D before any of the variable's acronyms signifies that their decile values were used. In each quarter sample, these variables are put into deciles with 0.05 for the smallest, and 0.95 for the largest decile. MV refers to the market value of the stock as given by a company's market capitalization at the end of the last calendar year, which I take instead of the current market cap to decrease the likelihood and severity of high correlation coefficients resulting solely from the necessary connection between a stock's returns and its company's market capitalisation. PRC is the stock price at the end of the previous year following Qin and Singal (2015) who expect a correlation between stock price and price efficiency. VOL means the dollar trading volume as an average of daily dollar trading volume in the 12 months leading up to the respective quarter's end. This acts as a liquidity measure since it would be plausible to assume that

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stocks with higher liquidity see their prices adjusted quicker and more accurately. ANLY is the number of analysts covering the security as retrieved from Refinitiv Eikon. The number of analysts is used as a proxy for information production and following the assumption that a higher degree of information production can increase price efficiency.

4. Empirical Results

Following Qin and Singal (2015) I use the following regression to estimate the effect of passive ownership on the post earnings announcement drift and therefore on price efficiency:

$$
\begin{aligned}
CAR_{i,t}(2,T) = \quad & \alpha_t + \gamma_1 DCAR_{i,t}(-2,1) + \gamma_2 DCAR_{i,t}(-2,1) * DPO_{i,t} \\
& + \gamma_3 DCAR_{i,t}(-2,1) * DNPO_{i,t} + \gamma_4 DCAR_{i,t}(-2,1) * DMV_{i,t-1} \\
& + \gamma_5 DCAR_{i,t}(-2,1) * DPRC_{i,t-1} + \gamma_6 DCAR_{i,t}(-2,1) * DVOL_{i,t} \\
& + \gamma_7 DCAR_{i,t}(-2,1) * DANLY_{i,t}
\end{aligned}
$$

Table 4 reports the main regression results with the combined data from the 35 quarterly samples from the last quarter of 2013 until and including the second quarter of 2022. In panel A, DCAR(-2, 1), i.e. the decile ranks of cumulative abnormal returns in the four days beginning two days before an announcement date and ending with the first day after the announcement, are the only independent variable. The CARs beginning on the second day after the earnings announcement date and ending on the 5th, 15th, 30th, and 60th day, respectively are regressed on those decile ranks, who serve as a proxy for earnings surprise. Unlike previous PEAD analyses, the results do not suggest a clearly discernible drift over multiple timeframes after an earnings announcement with stock prices gradually adjusting in the direction of an earnings surprise following an apparent underreaction to the new information. Rather, panel A shows almost no significant drift. It suggests a short, and notably negative drift ending on the 5th day, meaning in the opposite direction of the earnings surprise, seemingly following an overreaction to the announcement, instead of an underreaction. The result is significant at the 0.10 level.

Panel B, with the decile ranks of passive ownership as well as of non-passive ownership added to the control variables, shows more significant negative correlation between the measure of earnings surprise and the cumulative abnormal returns in the following time windows. The negative correlation is significant for three out of the four considered intervals. Further, panel B's results show the expected positive correlation between passive ownership and the PEAD as it has been found in past analyses. A higher passive ownership is correlated with a stronger drift in the direction of earnings surprise, even when the overall drift appears to be in the opposite direction. These results are also significant for three of the four considered intervals. Beyond that it is noteworthy that a higher non-passive ownership is not significantly correlated with the reduced positive, or increased negative

drift, respectively. A result that stands in contrast to what previous regressions, such as that by Qin and Singal (2015) have shown.

When adding stock characteristics as control variables as shown in panel C, the overall drift is still negative in the (2, 15) window. The significance of the negative correlation of earnings surprise and CARs increases in the timeframe from being significant at the 0.10 to a significance at the 0.05 level. Still, there seems to be no significant correlation with non-passive ownership.

Table 4: Impact of Passive Ownership on Post-Earnings-Announcement Drift – 2013 Q4 to 2022 Q2

Dependent Variable	CAR (2, 5)	CAR (2, 15)	CAR (2, 30)	CAR (2, 60)
Panel A. Independent Variable Includes Only Announcement Returns				
DCAR(−2, 1)	-0.0013*	-0.0018	-0.0031	-0.0026
t-statistic	-1.71	-1.27	-1.59	-0.97
Adj. R²	0.0001	0.0000	0.0001	0.0000
N	28,196	28,196	28,196	28,196
Panel B. Institutional Ownerships Added to Control Variables				
DCAR(−2, 1)	-0.0024*	-0.0048**	-0.0060*	-0.0089**
t-statistic	-1.95	-2.09	-1.90	-2.02
DCAR(−2, 1)∗DPO	0.0027*	0.0050*	0.0043	0.0105**
t-statistic	1.89	1.87	1.17	2.07
DCAR(−2, 1)∗DNPO	-0.0005	0.0008	0.0012	0.0009
t-statistic	-0.37	0.28	0.34	0.17
Adj. R2	0.0001	0.0001	0.0000	0.0001
N	28,196	28,196	28,196	28,196
Panel C. Stock Characteristics Also Added as Control Variables				
DCAR(−2, 1)	-0.0018	-0.0059**	-0.0046	-0.0039
t-statistic	-1.09	-1.98	-1.13	-0.68
DCAR(−2, 1)∗DPO	0.0025*	0.0059**	0.0056	0.0128**
t-statistic	1.67	2.09	1.45	2.37
DCAR(−2, 1)∗DNPO	-0.0001	0.0018	0.0022	0.0029
t-statistic	-0.08	0.63	0.56	0.53
DCAR(−2, 1)∗DMV	-0.0033	-0.0009	0.0060	0.0051
t-statistic	-1.07	-0.16	0.75	0.46
DCAR(−2, 1)∗DPRC	-0.0015	-0.0047	-0.0120***	-0.0262***
t-statistic	-0.96	-1.56	-2.93	-4.57
DCAR(−2, 1)∗DVOL	0.0016	0.0024	-0.0154**	-0.0291**
t-statistic	0.47	0.39	-1.81	-2.44
DCAR(−2, 1)∗DANLY	0.0016	0.0034	0.0162***	0.0338***
t-statistic	0.79	0.93	3.19	4.79

Adj. R2	0.0001	0.0001	0.0007	0.0019
N	28,041	28,041	28,041	28,041

[***]Significant at the 0.01 level.
[**]Significant at the 0.05 level.
[*]Significant at the 0.10 level.

As the COVID-19 pandemic induced unprecedented turmoil in the stock market in the first quarter of 2020 (Baker, 2020), it seems intuitive to hypothesize that market behaviour displays changes when comparing reactions in the period before the impact of the pandemic and the period after. For this reason, I redo the regressions above after separating the total sample into two parts. The first one then encompassing the period before the COVID induced downturn, meaning the period from 2013 Q4 until and including 2019 Q4, and the second one containing the remaining data from 2020 Q1 and ending with the second quarter of 2022 in attempt to capture altered characteristics. Table 5 and Table 6 show these disaggregated results. When comparing panels A from each of the tables, the difference is striking, exhibiting no significant drift in either direction in the pre COVID period and a highly significant negative drift in the post COVID timeframe. Subsequently adding control variables in panels B and C suggests a clearly significant positive correlation between passive ownership and PEAD before 2020, indicating a confirmation of this thesis' hypothesis. This correlation however all but disappears in the period beginning with the quarter of the pandemic's impact on the market in early 2020.

While no significant effect between non-passive ownership and PEAD was apparent in the analysis over the whole timeframe, in the post COVID period, a negative relationship can be found, which is not visible in the pre COVID analysis.

Table 5: Impact of Passive Ownership on Post-Earnings-Announcement Drift pre COVID – 2013 Q4 to 2019 Q4

Dependent Variable	CAR (2, 5)	CAR (2, 15)	CAR (2, 30)	CAR (2, 60)
Panel A. Independent Variable Includes Only Announcement Returns				
DCAR(−2, 1)	0.0012	-0.0008	0.0018	0.0034
t-statistic	1.59	-0.57	0.99	1.26
Adj. R²	0.0001	0.0000	0.0000	0.0000
N	19,923	19,923	19,923	19,923
Panel B. Institutional Ownerships Added to Control Variables				
DCAR(−2, 1)	-0.0009	-0.0059***	-0.0077**	-0.0055
t-statistic	-0.72	-2.70	-2.54	-1.24
DCAR(−2, 1)∗DPO	0.0035**	0.0068***	0.0136***	0.0160***
t-statistic	2.49	2.64	3.81	3.07
DCAR(−2, 1)∗DNPO	0.0003	0.0027	0.0038	0.0000
t-statistic	0.23	1.03	1.06	0.00
Adj. R2	0.0003	0.0003	0.0008	0.0004
N	19,923	19,923	19,923	19,923
Panel C. Stock Characteristics Also Added as Control Variables				
DCAR(−2, 1)	-0.0016	-0.0062**	-0.0059	0.0018
t-statistic	-1.02	-2.18	-1.49	0.31
DCAR(−2, 1)∗DPO	0.0035**	0.0078***	0.0154***	0.0205***
t-statistic	2.34	2.87	4.10	3.71
DCAR(−2, 1)∗DNPO	0.0009	0.0019	0.0037	0.0001
t-statistic	0.58	0.72	0.99	0.02
DCAR(−2, 1)∗DMV	-0.0053*	-0.0092*	0.0007	0.0033
t-statistic	-1.79	-1.70	0.09	0.30
DCAR(−2, 1)∗DPRC	0.0002	0.0013	-0.0069*	-0.0210***
t-statistic	0.12	0.45	-1.76	-3.67
DCAR(−2, 1)∗DVOL	0.0065**	0.0148**	0.0013	-0.0038
t-statistic	2.02	2.54	0.16	-0.32
DCAR(−2, 1)∗DANLY	-0.0006	-0.0065*	-0.0006	0.0002
t-statistic	-0.29	-1.87	-0.13	0.03
Adj. R2	0.0003	0.0005	0.0008	0.0011
N	19,780	19,780	19,780	19,780

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Table 6: Impact of Passive Ownership on Post-Earnings-Announcement Drift post COVID – 2020 Q1 to 2022 Q2

Dependent Variable	CAR (2, 5)	CAR (2, 15)	CAR (2, 30)	CAR (2, 60)
Panel A. Independent Variable Includes Only Announcement Returns				
DCAR(−2, 1)	-0.0074***	-0.0043	-0.0152***	-0.0175***
t-statistic	-3.94	-1.22	-3.15	-2.72
Adj. R²	0.0018	0.0001	0.0011	0.0000
N	8,273	8,273	8,273	8,273
Panel B. Institutional Ownerships Added to Control Variables				
DCAR(−2, 1)	-0.0060**	-0.0022	-0.0018	-0.0169
t-statistic	-1.97	-0.38	-0.23	-1.61
DCAR(−2, 1)∗DPO	0.0004	0.0095	0.0031	0.0015
t-statistic	0.11	1.42	0.34	0.12
DCAR(−2, 1)∗DNPO	-0.0030	-0.0129*	-0.0276***	-0.0026
t-statistic	-0.86	-1.96	-3.11	-0.22
Adj. R2	0.0016	0.0004	0.0020	0.0005
N	8,273	8,273	8,273	8,273
Panel C. Stock Characteristics Also Added as Control Variables				
DCAR(−2, 1)	-0.0023	-0.0070	-0.0034	-0.0186
t-statistic	-0.57	-0.94	-0.34	-1.39
DCAR(−2, 1)∗DPO	-0.0005	0.0145**	0.0077	0.0083
t-statistic	-0.14	2.05	0.81	0.65
DCAR(−2, 1)∗DNPO	-0.0023	-0.0104	-0.0271**	-0.0036
t-statistic	-0.63	-1.48	-2.85	-0.28
DCAR(−2, 1)∗DMV	0.0017	0.0210	0.0181	0.0091
t-statistic	0.20	1.35	0.86	0.32
DCAR(−2, 1)∗DPRC	-0.0052	-0.0191**	-0.0230**	-0.0369**
t-statistic	-1.25	-2.42	-2.15	-2.59
DCAR(−2, 1)∗DVOL	-0.0100	-0.0272	-0.0532**	-0.0914***
t-statistic	-1.13	-1.63	-2.36	-3.04
DCAR(−2, 1)∗DANLY	0.0063	0.0275***	0.0562***	0.1172***
t-statistic	1.26	2.89	4.36	6.83
Adj. R2	0.0019	0.0019	0.0048	0.0072
N	8,261	8,261	8,261	8,261

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

An intuitive reason for a display of more severe market reactions would be that institutional trading increased sharply when the pandemic's effects became apparent. For lack of detailed data on precise trading, I again follow Qin and Singal (2015) and construct lower bounds for passive (PT), and for non-passive trading (NPT) given as the respective changes

in absolute institutional holdings during one quarter, weighted by the number of total shares outstanding. Data was retrieved from Refinitiv.

$$PT_{k,t} = \frac{\sum_{i=1}^{N\ passive}\left|\Delta Holdings_{i,k,t}\right|}{SharesOut_{k,t}}$$

$$NPT_{k,t} = \frac{\sum_{i=1}^{N\ nonpassive}\left|\Delta Holdings_{i,k,t}\right|}{SharesOut_{k,t}}$$

Passive trading was on average 3.56 times lower than NPT. And in 2020 there was considerably increase volatility in non-passive trading, rising sharply by 1.5 percentage points before abruptly dropping again by almost 4 percentage points in the following year (see Table 7). Passive trading did not fluctuate in the same magnitude. This may explain some of the increased negative correlation with NPO after COVID, but more thorough analysis would be needed to draw a conclusion here.

Table 7: Average Passive- and Non-Passive Trading

Year	Average PT	YoY Change PT	Average NPT	YoY Change NPT
2014	2.90%		12.15%	
2015	3.16%	0.26%	12.40%	0.25%
2016	3.33%	0.17%	12.69%	0.29%
2017	3.33%	-0.01%	11.91%	-0.78%
2018	3.56%	0.23%	11.92%	0.00%
2019	3.52%	-0.04%	11.66%	-0.26%
2020	3.75%	0.22%	13.16%	1.50%
2021	3.01%	-0.74%	9.49%	-3.67%
2022	3.36%	0.35%	10.56%	1.07%
Total Average	3.32%		11.83%	

Overall, the results suggest that market behaviour in regards to PEAD has changed since the beginnings of the relevant research. Whereas the positive drift was undeniable when analysing longer timeframes, even ones ending relatively recently (Fink, 2020), studies that looked at periods beginning later, such as 2006, find very little, if any, drift. The paper by Qin and Singal (2015) that this work drew inspiration from used data since the beginning of the stock price decimalization in the first half of 2001 and up to the end of 2013. They found the positive drift as expected, along with the connection between passive ownership and PEAD. This thesis uses data from the time since the end of their data, only considering

the end of 2013 up until and including the first half of 2022 and suggests that at some point since the 1970s and the time of writing, market behaviour changed and the well-studied underreaction turned into overall overreaction, followed by a drift in the opposite direction of the earnings surprise. Without a doubt, as time passes researchers will contribute more PEAD empirics and uncover whether this is an ongoing trend, or an effect specific to this one or multiple time periods.

4.1 Robustness: SUE and AFE as Proxies for Earnings Surprise

As a robustness test, I adapt two alternative specifications for the PEAD regression, differing in their proxy of earnings surprise. First, I take standard unexpected earnings (SUE) from Refinitiv via "TR.EPSActSueScore" and secondly analyst forecast error (AFE) which I define loosely based on Qin and Singal (2015) as

$$AFE_{i,t} = \frac{Mean\ of\ Analysits\ EPS\ Forecasts\ (IBES)_{i,t}}{Actual\ EPS_{i,t}} - 1$$

instead of the cumulative abnormal returns in the regressions above. As before, the decile ranks from each quarter are used rather than nominal values. Table 8 reports the results from the robustness tests. When only considering the alternative earnings surprise proxies as independent variables, the results suggest a positive drift in the (2, 60) window with SUE as proxy, and one in the (2, 15) timeframe with AFE. Both of these significances disappear when institutional ownerships are added as control variables in panels B and D. In both variants, the significant positive correlation between passive ownership and PEAD persists, albeit in fewer of the considered CAR timeframes. Overall, the results suggest weaker robustness than previous studies such as Qin and Singal (2015).

Table 8: Robustness Test of Passive Ownership affecting PEAD - SUE and AFE

Dependent Variable	CAR (2, 5)	CAR (2, 15)	CAR (2, 30)	CAR (2, 60)
Panel A. SUE as only independent variable				
DSUE	0.0007	0.0007	0.0021	0.0110^{***}
t-statistic	0.93	0.46	1.04	3.84
Adj. R²	0.0000	0.0000	0.0000	0.0005
N	26,921	26,921	26,921	26,921
Panel B. SUE with Institutional Ownerships Added to Control Variables				
DSUE	-0.0017	-0.0036	-0.0006	0.0086
t-statistic	-1.18	-1.29	-0.15	1.63
DSUE∗DPO	0.0026^{*}	0.0046	0.0052	0.0138^{**}
t-statistic	1.69	1.58	1.29	2.47
DSUE∗DNPO	0.0016	0.0027	-0.0006	-0.0098^{*}
t-statistic	1.05	0.93	-0.14	-1.77
Adj. R2	0.0001	0.0000	0.0000	0.0008
N	26,921	26,921	26,921	26,921
Panel C. AFE as only independent variable				
DAFE	0.0006	0.0025^{*}	0.0027	0.0020
t-statistic	0.81	1.72	1.34	0.69
Adj. R²	0.0000	0.0001	0.0000	0.0000
N	27,397	27,397	27,397	27,397
Panel D. AFE with Institutional Ownerships Added to Control Variables				
DAFE	0.0002	0.0007	0.0020	-0.0039
t-statistic	0.15	0.25	0.57	-0.79
DAFE∗DPO	0.0004	0.0011	0.0055	0.0178^{***}
t-statistic	0.23	0.38	1.43	3.27
DAFE∗DNPO	0.0004	0.0023	-0.0040	-0.0066
t-statistic	0.28	0.82	-1.05	-1.23
Adj. R2	-0.0001	0.0000	0.0001	0.0003
N	27,397	27,397	27,397	27,397

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

4.2 Limitations

It is important to point out the limitations in the setup and data collection that underly this thesis. Most notably, all data was gathered from Refinitiv, starting with all prices and earnings announcement dates, and including the here most prominent measures of passive and non-passive institutional ownership. Other authors, such as Qin & Singal (2015) who inspired this work used a more sophisticated and arguably cleaner identification of passive and non-passive holdings. They used multiple data sources and identified investors' orientation on the basis of their own analyses and precursing regressions. For this thesis, Refinitiv's classification of investors as passive or non-passive was trusted. The data provider is not transparently disclosing their precise methodologies for classifying investors as being active and passive, even after being explicitly inquired to provide as much details as possible. While Refinitiv is a well-known and trusted data source, the dependence on the correctness of the data and data classifications from this single provider is strong. This could limit the quality of the data used and with it the validity of its results.

5. Conclusion

The aim of this thesis was to explore whether stocks that have a higher percentage held by passive investors display a higher relative price inefficiency as measured by the post earnings announcement drift. The regression results clearly indicate a correlation between passive ownership and positive PEAD. This effect is considerably more pronounced in the time before the stock downturn that resulted from the COVID-19 pandemic in the first quarter of 2020 and remains only slightly post COVID. The results from two robustness test show the correlation fade, but not disappear. Robustness is therefore weaker than in previous studies.

Further, the regression results suggest a change in market behaviour in comparison to earlier findings. While empirical consensus has long been that the market generally underreacts to earnings announcement and lets prices adjust gradually, the results in this work indicate a change in this behaviour, from underreaction to adequate reaction, and then to overreaction followed by a drift in the opposite direction of the surprise. Future research will show how this trend develops.

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Appendix 1: Names and Tickers of the Stocks in the Sample

Name	Ticker
3M Co	MMM
Abbott Laboratories	ABT
Abbvie Inc	ABBV
Accenture PLC	ACN
Adobe Inc	ADBE
Automatic Data Processing Inc	ADP
American Electric Power Company Inc	AEP
AES Corp	AES
CVS Health Corp	CVS
Aflac Inc	AFL
Agilent Technologies Inc	A
American International Group Inc	AIG
Apartment Investment and Management Co	AIV
Air Products and Chemicals Inc	APD
Akamai Technologies Inc	AKAM
Alexion Pharmaceuticals Inc (Pre-Merger)	NULL
Allstate Corp	ALL
Alphabet Inc	GOOGL
Altaba Inc	NULL
Intel Corp	INTC
Altria Group Inc	MO
Amazon.com Inc	AMZN
Ameren Corp	AEE
American Express Co	AXP
American Tower Corp	AMT
Ameriprise Financial Inc	AMP
Amerisourcebergen Corp	ABC
AMETEK Inc	AME
Amgen Inc	AMGN
Amphenol Corp	APH
Occidental Petroleum Corp	OXY
Analog Devices Inc	ADI
Andeavor	NULL
Aon PLC	AON
APA Corp (US)	APA
Apple Inc	AAPL

Name	Ticker
Applied Materials Inc	AMAT
Aptiv PLC	APTV
Archer-Daniels-Midland Co	ADM
Assurant Inc	AIZ
AT&T Inc	T
ATI Inc	ATI
Autodesk Inc	ADSK
AutoNation Inc	AN
Autozone Inc	AZO
Avalonbay Communities Inc	AVB
Avery Dennison Corp	AVY
Baker Hughes Co	BKR
Ball Corp	BALL
Bath & Body Works Inc	BBWI
Baxter International Inc	BAX
Becton Dickinson and Co	BDX
Bed Bath & Beyond Inc	BBBY
Berkshire Hathaway Inc	BRK.A
Best Buy Co Inc	BBY
Biogen Inc	BIIB
BlackRock Inc	BLK
Boeing Co	BA
Bank of America Corp	BAC
Bank of New York Mellon Corp	BK
Booking Holdings Inc	BKNG
Borgwarner Inc	BWA
Boston Scientific Corp	BSX
Boston Properties Inc	BXP
Bristol-Myers Squibb Co	BMY
Brookfield Corp	BN
Brown-Forman Corp	BF.B
Schlumberger NV	SLB
Campbell Soup Co	CPB
Capital One Financial Corp	COF
Capri Holdings Ltd	CPRI
Cardinal Health Inc	CAH
Carmax Inc	KMX
Carnival Corp	CCL
Caterpillar Inc	CAT
CBRE Group Inc	CBRE

CenterPoint Energy Inc	CNP	Discover Financial Services	DFS
Oracle Corp	ORCL	Dollar General Corp	DG
CF Industries Holdings Inc	CF	Dollar Tree Inc	DLTR
CH Robinson Worldwide Inc	CHRW	Dominion Energy Inc	D
		Dover Corp	DOV
Charles Schwab Corp	SCHW	D R Horton Inc	DHI
Chevron Corp	CVX	DTE Energy Co	DTE
Chubb Ltd	CB	Duke Energy Corp	DUK
Cigna Corp	CI	DXC Technology Co	DXC
Cincinnati Financial Corp	CINF	E*Trade Financial Corp	NULL
Cintas Corp	CTAS	Eastman Chemical Co	EMN
Cisco Systems Inc	CSCO	Eaton Corporation PLC	ETN
Citigroup Inc	C	eBay Inc	EBAY
Citrix Systems Inc	NULL	Ecolab Inc	ECL
Cleveland-Cliffs Inc	CLF	Edison International	EIX
Clorox Co	CLX	Edwards Lifesciences Corp	EW
CME Group Inc	CME		
CMS Energy Corp	CMS	Electronic Arts Inc	EA
CNX Resources Corp	CNX	Elevance Health Inc	ELV
Coca-Cola Co	KO	Emerson Electric Co	EMR
Coca-Cola Europacific Partners PLC	CCEP	Entergy Corp	ETR
		EOG Resources Inc	EOG
Cognizant Technology Solutions Corp	CTSH	EQT Corp	EQT
		Equifax Inc	EFX
Colgate-Palmolive Co	CL	Equity Residential	EQR
Comcast Corp	CMCSA	Estee Lauder Companies Inc	EL
Comerica Inc	CMA		
Conagra Brands Inc	CAG	Eversource Energy	ES
Conocophillips	COP	Exelon Corp	EXC
Consolidated Edison Inc	ED	Expedia Group Inc	EXPE
Constellation Brands Inc	STZ	Expeditors International of Washington Inc	EXPD
Corning Inc	GLW		
Costco Wholesale Corp	COST	Exxon Mobil Corp	XOM
Coterra Energy Inc	CTRA	F5 Inc	FFIV
Medtronic PLC	MDT	Fastenal Co	FAST
Crown Castle Inc	CCI	FedEx Corp	FDX
CSX Corp	CSX	Fifth Third Bancorp	FITB
Cummins Inc	CMI	First Solar Inc	FSLR
Danaher Corp	DHR	FirstEnergy Corp	FE
Darden Restaurants Inc	DRI	Fiserv Inc	FISV
DaVita Inc	DVA	FLIR Systems Inc	NULL
Deere & Co	DE	Flowserve Corp	FLS
Delta Air Lines Inc	DAL	Fluor Corp	FLR
DENTSPLY SIRONA Inc	XRAY	FMC Corp	FMC
Devon Energy Corp	DVN	Ford Motor Co	F

Fossil Group Inc	FOSL	International Flavors & Fragrances Inc	IFF
Franklin Resources Inc	BEN	International Paper Co	IP
Freeport-McMoRan Inc	FCX	Intuit Inc	INTU
GameStop Corp	GME	Intuitive Surgical Inc	ISRG
Gap Inc	GPS	Invesco Ltd	IVZ
Garmin Ltd	GRMN	Iron Mountain Inc	IRM
General Electric Co	GE	J M Smucker Co	SJM
General Dynamics Corp	GD	Jabil Inc	JBL
General Mills Inc	GIS	Jacobs Solutions Inc	J
Genuine Parts Co	GPC	Johnson Controls International PLC	JCI
Genworth Financial Inc	GNW		
Gilead Sciences Inc	GILD	Johnson & Johnson	JNJ
Globe Life Inc	GL	JPMorgan Chase & Co	JPM
General Motors Co	GM	Juniper Networks Inc	JNPR
Goldman Sachs Group Inc	GS	Kansas City Southern (Pre-Merger)	NULL
Goodyear Tire & Rubber Co	GT		
Halliburton Co	HAL	Kellogg Co	K
Harley-Davidson Inc	HOG	Keurig Dr Pepper Inc	KDP
Samsung Electronics Co Ltd	005930	KeyCorp	KEY
		Kimberly-Clark Corp	KMB
Hartford Financial Services Group Inc	HIG	Kimco Realty Corp	KIM
		Kinder Morgan Inc	KMI
Hasbro Inc	HAS	KLA Corp	KLAC
Healthpeak Properties Inc	PEAK	Kohls Corp	KSS
Helmerich and Payne Inc	HP	Komatsu Ltd	6301
Hershey Co	HSY	Kroger Co	KR
Hess Corp	HES	Laboratory Corporation of America Holdings	LH
Home Depot Inc	HD		
Honeywell International Inc	HON	Lam Research Corp	LRCX
Hormel Foods Corp	HRL	Leggett & Platt Inc	LEG
Pfizer Inc	PFE	Lennar Corp	LEN
Host Hotels & Resorts Inc	HST	Thermo Fisher Scientific Inc	TMO
Howmet Aerospace Inc	HWM		
HP Inc	HPQ	Eli Lilly and Co	LLY
Humana Inc	HUM	Lincoln National Corp	LNC
Huntington Bancshares Inc	HBAN	Lockheed Martin Corp	LMT
		Lowe's Companies Inc	LOW
International Business Machines Corp	IBM	Lumen Technologies Inc	LUMN
		LyondellBasell Industries NV	LYB
Illinois Tool Works Inc	ITW		
Intercontinental Exchange Inc	ICE	M&T Bank Corp	MTB
		Macerich Co	MAC
Interpublic Group of Companies Inc	IPG	Macy's Inc	M
		Marathon Oil Corp	MRO
		Marathon Petroleum Corp	MPC

Marriott International Inc	MAR	NRG Energy Inc	NRG
Marsh & McLennan Companies Inc	MMC	Nucor Corp	NUE
		NVIDIA Corp	NVDA
Masco Corp	MAS	O-I Glass Inc	OI
Mastercard Inc	MA	Omnicom Group Inc	OMC
Mattel Inc	MAT	ONEOK Inc	OKE
McCormick & Company Inc	MKC	O'Reilly Automotive Inc	ORLY
		Ovintiv Inc	OVV
McDonald's Corp	MCD	Paccar Inc	PCAR
Mckesson Corp	MCK	Parker-Hannifin Corp	PH
Reckitt Benckiser Group PLC	RKT	Patterson Companies Inc	PDCO
		Paychex Inc	PAYX
Merck & Co Inc	MRK	Pentair PLC	PNR
Meta Platforms Inc	META	PepsiCo Inc	PEP
MetLife Inc	MET	PerkinElmer Inc	PKI
Microchip Technology Inc	MCHP	PG&E Corp	PCG
Micron Technology Inc	MU	Philip Morris International Inc	PM
Microsoft Corp	MSFT		
Molson Coors Beverage Co	TAP	Phillips 66	PSX
		Pinnacle West Capital Corp	PNW
Mondelez International Inc	MDLZ	Pioneer Natural Resources Co	PXD
Bayer AG	BAYN		
Monster Beverage Corp	MNST	Pitney Bowes Inc	PBI
Moody's Corp	MCO	PNC Financial Services Group Inc	PNC
Morgan Stanley	MS		
Mosaic Co	MOS	PPG Industries Inc	PPG
Motorola Solutions Inc	MSI	PPL Corp	PPL
Murphy Oil Corp	MUR	Principal Financial Group Inc	PFG
Nabors Industries Ltd	NBR		
Nasdaq Inc	NDAQ	Procter & Gamble Co	PG
NetApp Inc	NTAP	Progressive Corp	PGR
Netflix Inc	NFLX	Prologis Inc	PLD
Newell Brands Inc	NWL	Prudential Financial Inc	PRU
Newmont Corporation	NEM	Public Service Enterprise Group Inc	PEG
News Corp	NWSA		
Nextera Energy Inc	NEE	Public Storage	PSA
Nielsen Holdings Ltd	NULL	Pultegroup Inc	PHM
Nike Inc	NKE	PVH Corp	PVH
NiSource Inc	NI	Diamondback Energy Inc	FANG
Nordstrom Inc	JWN	Qualcomm Inc	QCOM
Norfolk Southern Corp	NSC	Quanta Services Inc	PWR
Northern Trust Corp	NTRS	Quest Diagnostics Inc	DGX
Northrop Grumman Corp	NOC	Ralph Lauren Corp	RL
Gen Digital Inc	GEN	Range Resources Corp	RRC
Nov Inc	NOV		

Raytheon Technologies Corp	RTX	Texas Instruments Inc	TXN
Regeneron Pharmaceuticals Inc	REGN	Textron Inc	TXT
		Walt Disney Co	DIS
Regions Financial Corp	RF	TJX Companies Inc	TJX
Republic Services Inc	RSG	Trane Technologies PLC	TT
Robert Half International Inc	RHI	Transocean Ltd	RIG
		Travel + Leisure Co	TNL
Rockwell Automation Inc	ROK	Travelers Companies Inc	TRV
Roper Technologies Inc	ROP	Truist Financial Corp	TFC
Ross Stores Inc	ROST	Total System Services Inc	NULL
Valaris PLC	NULL	United States Steel Corp	X
Ryder System Inc	R	Union Pacific Corp	UNP
S&P Global Inc	SPGI	UnitedHealth Group Inc	UNH
Salesforce Inc	CRM	Unum Group	UNM
Western Digital Corp	WDC	United Parcel Service Inc	UPS
Warner Bros Discovery Inc	WBD	Urban Outfitters Inc	URBN
		US Bancorp	USB
Seagate Technology Holdings PLC	STX	Valero Energy Corp	VLO
		Varian Medical Systems Inc	NULL
Sealed Air Corp	SEE		
Sempra Energy	SRE	Ventas Inc	VTR
Sherwin-Williams Co	SHW	Verisign Inc	VRSN
Simon Property Group Inc	SPG	Verizon Communications Inc	VZ
SLM Corp	SLM		
Snap-On Inc	SNA	Vertex Pharmaceuticals Inc	VRTX
Southern Co	SO		
Southwest Airlines Co	LUV	Viacom Inc	NULL
Enbridge Inc	ENB	Viatris Inc	VTRS
Stanley Black & Decker Inc	SWK	Visa Inc	V
		Vornado Realty Trust	VNO
Starbucks Corp	SBUX	Vulcan Materials Co	VMC
State Street Corp	STT	Walgreens Boots Alliance Inc	WBA
Harsco Corp	HSC		
Stryker Corp	SYK	Walmart Inc	WMT
SunTrust Banks Inc	NULL	Waste Management Inc	WM
Southwestern Energy Co	SWN	Waters Corp	WAT
Sysco Corp	SYY	WEC Energy Group Inc	WEC
T Rowe Price Group Inc	TROW	Wells Fargo & Co	WFC
Tapestry Inc	TPR	Welltower Inc	WELL
Target Corp	TGT	Western Union Co	WU
TE Connectivity Ltd	TEL	Weyerhaeuser Co	WY
Emera Inc	EMA	Whirlpool Corp	WHR
Tegna Inc	TGNA	Williams Companies Inc	WMB
Tenet Healthcare Corp	THC	Windstream Holdings Inc	NULL
Teradata Corp	TDC	WW Grainger Inc	GWW
		Wynn Resorts Ltd	WYNN

Xcel Energy Inc	XEL	Albemarle Corp	ALB
Xerox Holdings Corp	XRX	Guess? Inc	GES
Advanced Micro Devices Inc	AMD	Teck Resources Ltd	TECK
Xylem Inc	XYL	Federal Home Loan Mortgage Corp	FMCC
Yum! Brands Inc	YUM	Voya Financial Inc	VOYA
Zimmer Biomet Holdings Inc	ZBH	Bridgestone Corp	5108
Zions Bancorporation NA	ZION	Tesla Inc	TSLA
Zoetis Inc	ZTS	SK Hynix Inc	000660
ARMOUR Residential REIT Inc	ARR	Patterson-UTI Energy Inc	PTEN
BASF SE	BAS	New York Community Bancorp Inc	NYCB
Berry Global Group Inc	BERY	Equinix Inc	EQIX
HF Sinclair Corp	DINO	Flex Ltd	FLEX
Lear Corp	LEA	Canadian Pacific Railway Ltd	CP
Bunge Ltd	BG	Regency Centers Corp	REG
Lithia Motors Inc	LAD	Enterprise Products Partners LP	EPD
Advance Auto Parts Inc	AAP	Daikin Industries Ltd	6367
Crown Holdings Inc	CCK	Tempur Sealy International Inc	TPX
Williams-Sonoma Inc	WSM		
SL Green Realty Corp	SLG	Willis Towers Watson PLC	WTW
Bank of Nova Scotia	BNS		
Norwegian Cruise Line Holdings Ltd	NCLH	Fortune Brands Innovations Inc	FBIN
Jones Lang LaSalle Inc	JLL	Unilever PLC	ULVR
J B Hunt Transport Services Inc	JBHT	ON Semiconductor Corp	ON
LPL Financial Holdings Inc	LPLA	Axon Enterprise Inc	AXON
Selective Insurance Group Inc	SIGI	Spectrum Brands Holdings Inc	SPB
Rollins Inc	ROL	Barrick Gold Corp	GOLD
Hyundai Steel Co	004020	Palo Alto Networks Inc	PANW
Church & Dwight Co Inc	CHD	Commerce Bancshares Inc	CBSH
Charter Communications Inc	CHTR	Diebold Nixdorf Inc	DBD
		Extra Space Storage Inc	EXR
Fresenius Medical Care AG & Co KGaA	FME	Lululemon Athletica Inc	LULU
		MasTec Inc	MTZ
Henry Schein Inc	HSIC	ManpowerGroup Inc	MAN
DISH Network Corp	DISH	TC Energy Corp	TRP
Celanese Corp	CE	Sensata Technologies Holding PLC	ST
Take-Two Interactive Software Inc	TTWO		
		Fortis Inc	FTS
Teledyne Technologies Inc	TDY	Nexstar Media Group Inc	NXST
		HCA Healthcare Inc	HCA
AECOM	ACM	Kering SA	KER

Marriott Vacations Worldwide Corp	VAC	Activision Blizzard Inc	ATVI
Sompo Holdings Inc	8630	MSC Industrial Direct Co Inc	MSM
Accuray Inc	ARAY	XPO Inc	XPO
Baidu Inc	BIDU	Stellantis NV	STLA
Martin Marietta Materials Inc	MLM	Teva Pharmaceutical Industries Ltd	TEVA
Potlatchdeltic Corp	PCH	Federal National Mortgage Association	FNMA
Electrolux AB	ELUX B	Mercedes Benz Group AG	MBG
Koninklijke KPN NV	KPN	Sumitomo Rubber Industries Ltd	5110
Las Vegas Sands Corp	LVS		
Allianz SE	ALV	E W Scripps Co	SSP
IDEXX Laboratories Inc	IDXX	Blucora Inc	BCOR
AGNC Investment Corp	AGNC	LG Display Co Ltd	034220
Arkema SA	AKE	Sabra Health Care REIT Inc	SBRA
Edgio Inc	EGIO		
Biomarin Pharmaceutical Inc	BMRN	Kaiser Aluminum Corp	KALU
		Symrise AG	SY1
SBA Communications Corp	SBAC	Packaging Corp of America	PKG
Belden Inc	BDC	Digital Realty Trust Inc	DLR
NXP Semiconductors NV	NXPI	Sanmina Corp	SANM
Visteon Corp	VC	KBR Inc	KBR
Ingredion Inc	INGR	ASML Holding NV	ASML
Deutsche Telekom AG	DTE	IQVIA Holdings Inc	IQV
Carpenter Technology Corp	CRS	ASM International NV	ASM
		KB Home	KBH
PTC Inc	PTC	Mitsubishi Chemical Group Corp	4188
Penske Automotive Group Inc	PAG		
Essex Property Trust Inc	ESS	Swedish Match AB	SWMA
Magna International Inc	MG	Telus Corp	T
Blackstone Inc	BX	Arthur J. Gallagher & Co.	AJG
Pernod Ricard SA	RI	Henkel AG & Co KGaA	HEN3
Royal Caribbean Cruises Ltd	RCL	Factset Research Systems Inc	FDS
Yara International ASA	YAR	Tyler Technologies Inc	TYL
UniFirst Corp	UNF	SEB SA	SK
JSW Steel Ltd	JSWSTEEL	Steel Dynamics Inc	STLD
Cboe Global Markets Inc	CBOE	Toronto-Dominion Bank	TD
Prysmian SpA	PRY	Dr Reddy's Laboratories Ltd	DRREDDY
Continental Resources Inc	NULL		
AGCO Corp	AGCO	Life Storage Inc	LSI
JetBlue Airways Corp	JBLU	Clean Harbors Inc	CLH
W R Berkley Corp	WRB	Kforce Inc	KFRC
Toll Brothers Inc	TOL	Burlington Stores Inc	BURL
Huntsman Corp	HUN	ServiceNow Inc	NOW

United Airlines Holdings Inc	UAL	Verisk Analytics Inc	VRSK
United Natural Foods Inc	UNFI	Cabot Corp	CBT
Gray Television Inc	GTN	Centene Corp	CNC
Universal Health Services Inc	UHS	Old Dominion Freight Line Inc	ODFL
Vivendi SE	VIV	Enphase Energy Inc	ENPH
American Eagle Outfitters Inc	AEO	Jenoptik AG	JEN
		Seiko Group Corp	8050
Bausch Health Companies Inc	BHC	Grupo Mexico SAB de CV	GMEXICOB
HeidelbergCement AG	HEI	Fnac Darty SA	FNAC
Rite Aid Corp	RAD	Applied Industrial Technologies Inc	AIT
Rayonier Inc	RYN		
Arcelik AS	ARCLK.E	First American Financial Corp	FAF
Targa Resources Corp	TRGP		
Konica Minolta Inc	4902	Bayerische Motoren Werke AG	BMW
Assicurazioni Generali SpA	G	Yokohama Rubber Co Ltd	5101
First Republic Bank	FRC	New Oriental Education & Technology Group Inc	EDU
Siemens AG	SIE		
Infosys Ltd	INFY	ICF International Inc	ICFI
Camden Property Trust	CPT	LG Electronics Inc	066570
Akzo Nobel NV	AKZA	Physicians Realty Trust	DOC
Assa Abloy AB	ASSA B	Lenovo Group Ltd	992
UDR Inc	UDR	Graphic Packaging Holding Co	GPK
Nitto Denko Corp	6988		
Lojas Renner SA	LREN3	Olympus Corp	7733
Novartis AG	NOVN	Plexus Corp	PLXS
Hudson Pacific Properties Inc	HPP	Lennox International Inc	LII
		Onto Innovation Inc	ONTO
CGG SA	CGG	Fanuc Corp	6954
Owens & Minor Inc	OMI	Tokyo Electron Ltd	8035
Carnival PLC	CCL	Sleep Number Corp	SNBR
Generac Holdings Inc	GNRC	Anheuser-Busch Inbev SA	ABI
Walker & Dunlop Inc	WD	Site Centers Corp	SITC
SAP SE	SAP	Choice Hotels International Inc	CHH
ABM Industries Inc	ABM		
Kobe Steel Ltd	5406	RPM International Inc	RPM
Epam Systems Inc	EPAM	JAKKS Pacific Inc	JAKK
NGK Insulators Ltd	5333	Owens Corning	OC
Terex Corp	TEX	Asahi Group Holdings Ltd	2502
Spirit Airlines Inc	SAVE	K&S AG	SDF
SM Energy Co	SM	Agnico Eagle Mines Ltd	AEM
Align Technology Inc	ALGN	Silgan Holdings Inc	SLGN
IDEX Corp	IEX	Alliance Resource Partners LP	ARLP

First Industrial Realty Trust Inc	FR	Antero Resources Corp	AR
TrueBlue Inc	TBI	Coca Cola HBC AG	CCH
Abb Ltd	ABBN	Genpact Ltd	G
MSCI Inc	MSCI	Ibiden Co Ltd	4062
Cheniere Energy Inc	LNG	Cogent Communications Holdings Inc	CCOI
Cosmos Pharmaceutical Corp	3349	Hologic Inc	HOLX
Major Drilling Group International Inc	MDI	Air Canada	AC
		Olin Corp	OLN
NuVasive Inc	NUVA	MDC Holdings Inc	MDC
MS&AD Insurance Group Holdings Inc	8725	Evercore Inc	EVR
		Lanxess AG	LXS
Omega Healthcare Investors Inc	OHI	Stepan Co	SCL
		Artivion Inc	AORT
Holcim AG	HOLN	Saia Inc	SAIA
Cascades Inc	CAS	TotalEnergies SE	TTE
Ricoh Co Ltd	7752	TomTom NV	TOM2
Zurich Insurance Group AG	ZURN	EMCOR Group Inc	EME
		Sumitomo Chemical Co Ltd	4005
Mueller Water Products Inc	MWA	Subsea 7 SA	SUBC
Mitsubishi Electric Corp	6503	Citizen Watch Co Ltd	7762
Workday Inc	WDAY	Barclays PLC	BARC
Equity LifeStyle Properties Inc	ELS	BCE Inc	BCE
		Nintendo Co Ltd	7974
Carlisle Companies Inc	CSL	Stewart Information Services Corp	STC
Ajinomoto Co Inc	2802		
American Financial Group Inc	AFG	Toyo Tire Corp	5105
		CBIZ Inc	CBZ
Telephone and Data Systems Inc	TDS	Brunswick Corp	BC
		Medical Properties Trust Inc	MPW
Haynes International Inc	HAYN		
Lintec Corp	7966	Shell PLC	SHEL
Tencent Holdings Ltd	700	Pebblebrook Hotel Trust	PEB
Jtekt Corp	6473	UACJ Corp	5741
CI Financial Corp	CIX	Canon Inc	7751
PGS ASA	PGS	Intesa Sanpaolo SpA	ISP
Sonic Automotive Inc	SAH	Stora Enso Oyj	STERV
Volvo AB	VOLV B	Federated Hermes Inc	FHI
Colliers International Group Inc	CIGI	CACI International Inc	CACI
		Realty Income Corp	O
Domino's Pizza Inc	DPZ	Hitachi Construction Machinery Co Ltd	6305
AXIS Capital Holdings Ltd	AXS		
		Screen Holdings Co Ltd	7735
Deutsche Boerse AG	DB1	BT Group PLC	BT.A
		Solvay SA	SOLB

Brown & Brown Inc	BRO	Acerinox SA	ACX
Armstrong World Industries Inc	AWI	Copart Inc	CPRT
		Americanas SA	AMER3
Morningstar Inc	MORN	Dril-Quip Inc	DRQ
Intrepid Potash Inc	IPI	Sonoco Products Co	SON
Gold Fields Ltd	GFI	Abercrombie & Fitch Co	ANF
Adidas AG	ADS	Integra Lifesciences Holdings Corp	IART
Oceaneering International Inc	OII	DICK'S Sporting Goods Inc	DKS
Commercial Metals Co	CMC	Airbus SE	AIR
ITT Inc	ITT	IHI Corp	7013
Delek US Holdings Inc	DK	Asbury Automotive Group Inc	ABG
NCR Corp	NCR		
Ufp Industries Inc	UFPI	Wendys Co	WEN
Algonquin Power & Utilities Corp	AQN	Black Hills Corp	BKH
		Deutsche Lufthansa AG	LHA
Eastgroup Properties Inc	EGP	Callon Petroleum Co	CPE
CubeSmart	CUBE	Big Lots Inc	BIG
Skyworks Solutions Inc	SWKS	NVR Inc	NVR
Kelly Services Inc	KELYA	Hubbell Inc	HUBB
Alaska Air Group Inc	ALK	Molina Healthcare Inc	MOH
J & J Snack Foods Corp	JJSF	Mid-America Apartment Communities Inc	MAA
CAP SA	CAP		
Globus Medical Inc	GMED	ArcBest Corp	ARCB
Capital Power Corp	CPX	JinkoSolar Holding Co Ltd	JKS
Sinclair Broadcast Group Inc	SBGI		
Precision Drilling Corp	PD	Jack Henry & Associates Inc	JKHY
MDU Resources Group Inc	MDU	Granite Construction Inc	GVA
		Saipem SpA	SPM
Smurfit Kappa Group PLC	SK3	Hyundai Motor Co	005380
Panasonic Holdings Corp	6752	Movado Group Inc	MOV
MGM Resorts International	MGM	PLDT Inc	TEL
Muenchener Rueckversicherungs Gesellschaft in Muenchen AG	MUV2	Innovative Solutions and Support Inc	ISSC
		Hitachi Ltd	6501
		Radian Group Inc	RDN
Toshiba Corp	6502	Reinsurance Group of America Inc	RGA
Wipro Ltd	WIPRO		
CGI Inc	GIB.A	Deutsche Bank AG	DBK
Foxconn Technology Co Ltd	2354	Kumho Tire Co Inc	073240
		Allegion PLC	ALLE
Monolithic Power Systems Inc	MPWR	Bread Financial Holdings Inc	BFH
CNO Financial Group Inc	CNO	Chipotle Mexican Grill Inc	CMG

Fidelity National Information Services Inc	FIS	Aurobindo Pharma Ltd	AUROPHARMA
		Atlas Copco AB	ATCO A
Mohawk Industries Inc	MHK	Acadia Healthcare Company Inc	ACHC
Tractor Supply Co	TSCO		
ANSYS Inc	ANSS	Nippon Electric Glass Co Ltd	5214
Hilton Worldwide Holdings Inc	HLT		
		Synchrony Financial	SYF
Boston Beer Company Inc	SAM	Alibaba Group Holding Ltd	BABA
Hyatt Hotels Corp	H		
Twitter Inc	NULL	Endo International PLC	ENDPQ
ICON PLC	ICLR	HanesBrands Inc	HBI
Group 1 Automotive Inc	GPI	Jazz Pharmaceuticals PLC	JAZZ
Plains GP Holdings LP	PAGP	Axalta Coating Systems Ltd	AXTA
OneMain Holdings Inc	OMF		
American Airlines Group Inc	AAL	Veradigm Inc	MDRX
		Casella Waste Systems Inc	CWST
Community Health Systems Inc	CYH		
		Highwoods Properties Inc	HIW
CommScope Holding Company Inc	COMM	Leidos Holdings Inc	LDOS
		Premier Inc	PINC
Five Below Inc	FIVE	Qorvo Inc	QRVO
Zhejiang Dahua Technology Co Ltd	002236	Spirit Realty Capital Inc	SRC
		ETSY Inc	ETSY
Donaldson Company Inc	DCI	Vista Outdoor Inc	VSTO
SpartanNash Co	SPTN	Kubota Corp	6326
Illumina Inc	ILMN	Summit Materials Inc	SUM
Adtalem Global Education Inc	ATGE	National Retail Properties Inc	NNN
Ally Financial Inc	ALLY	GoDaddy Inc	GDDY
Brixmor Property Group Inc	BRX	Takeda Pharmaceutical Co Ltd	4502
PBF Energy Inc	PBF	Kraft Heinz Co	KHC
Credit Acceptance Corp	CACC	PayPal Holdings Inc	PYPL
Tokio Marine Holdings Inc	8766	Perrigo Company PLC	PRGO
		Signet Jewelers Ltd	SIG
Puma SE	PUM	Westrock Co	WRK
ISS A/S	ISS	Eisai Co Ltd	4523
Huron Consulting Group Inc	HURN	Astellas Pharma Inc	4503
		Sunrun Inc	RUN
Affiliated Managers Group Inc	AMG	TKH Group NV	TWEKA
		Uni-Select Inc	UNS
Navient Corp	NAVI	Shionogi & Co Ltd	4507
Liberty Tripadvisor Holdings Inc	LTRPA	Johnson Outdoors Inc	JOUT
		Sony Group Corp	6758
United Rentals Inc	URI	Dentsu Group Inc	4324
Arista Networks Inc	ANET	Shopify Inc	SHOP
		Daiichi Sankyo Co Ltd	4568

TransUnion	TRU	Shimadzu Corp	7701
Block Inc	SQ	Yokogawa Electric Corp	6841
Performance Food Group Co	PFGC	Herc Holdings Inc	HRI
Spin Master Corp	TOY	Horiba Ltd	6856
Hydro One Ltd	H	Dexcom Inc	DXCM
Cellnex Telecom SA	CLNX	Wonik IPS Co Ltd	240810
Valeo SE	FR	La-Z-Boy Inc	LZB
Wesco International Inc	WCC	National Beverage Corp	FIZZ
Qiagen NV	QGEN	Wayfair Inc	W
Magellan Midstream Partners LP	MMP	Alexandria Real Estate Equities Inc	ARE
American Water Works Company Inc	AWK	Incyte Corp	INCY
		Loews Corp	L
Broadcom Inc	AVGO	Raymond James Financial Inc	RJF
Citizens Financial Group Inc	CFG	Synopsys Inc	SNPS
Federal Realty Investment Trust	FRT	Stifel Financial Corp	SF
		Cadence Design Systems Inc	CDNS
Hewlett Packard Enterprise Co	HPE	Hilton Grand Vacations Inc	HGV
Essential Utilities Inc	WTRG	Park Hotels & Resorts Inc	PK
Pure Storage Inc	PSTG	Heska Corp	HSKA
American States Water Co	AWR	EPR Properties	EPR
Match Group Inc	MTCH	Fujifilm Holdings Corp	4901
California Water Service Group	CWT	MacroGenics Inc	MGNX
		Nutanix Inc	NTNX
National Storage Affiliates Trust	NSA	Everest Re Group Ltd	RE
		Global Payments Inc	GPN
Acuity Brands Inc	AYI	TechnipFMC PLC	FTI
Foot Locker Inc	FL	Fortinet Inc	FTNT
LKQ Corp	LKQ	Snap Inc	SNAP
TransDigm Group Inc	TDG	Scor SE	SCR
Ulta Beauty Inc	ULTA	VMware Inc	VMW
ViewRay Inc	VRAY	Dell Technologies Inc	DELL
DigitalBridge Group Inc	DBRG	Becle SAB de CV	CUERVO*
L'Oreal SA	OR	Borr Drilling Ltd	BORR
Trex Company Inc	TREX	Lloyds Banking Group PLC	LLOY
Apogee Enterprises Inc	APOG	Equity Commonwealth	EQC
Green Dot Corp	GDOT	Insulet Corp	PODD
LSI Industries Inc	LYTS	Masonite International Corp	DOOR
Alliant Energy Corp	LNT		
Cooper Companies Inc	COO	Gildan Activewear Inc	GIL
Fortive Corp	FTV	WW International Inc	WW
Mettler-Toledo International Inc	MTD	Sunstone Hotel Investors Inc	SHO

Granges AB	GRNG	Allegiant Travel Co	ALGT
Exact Sciences Corp	EXAS	Omeros Corp	OMER
Booz Allen Hamilton Holding Corp	BAH	Groupon Inc	GRPN
		Avista Corp	AVA
Teradyne Inc	TER	Coherus BioSciences Inc	CHRS
KAR Auction Services Inc	KAR	BP PLC	BP.
		Infineon Technologies AG	IFX
Bombardier Inc	BBD.B	Barry Callebaut AG	BARN
Tanger Factory Outlet Centers Inc	SKT	A O Smith Corp	AOS
		Brighthouse Financial Inc	BHF
LIXIL Corp	5938	Gartner Inc	IT
Teladoc Health Inc	TDOC	Resmed Inc	RMD
ICL Group Ltd	ICL	Rinnai Corp	5947
LendingClub Corp	LC	Janus Henderson Group PLC	JHG
Kinross Gold Corp	K		
Criteo SA	CRTO	Fisher & Paykel Healthcare Corporation Ltd	FPH
Oil States International Inc	OIS		
ArcelorMittal SA	MT	Bajaj Electricals Ltd	BAJAJELEC
Ambarella Inc	AMBA	Syneos Health Inc	SYNH
Moog Inc	MOG.A	Keysight Technologies Inc	KEYS
Watts Water Technologies Inc	WTS		
		Unisys Corp	UIS
Signature Bank	SBNY	Koninklijke Philips NV	PHIA
Meritage Homes Corp	MTH	STAG Industrial Inc	STAG
Wolfspeed Inc	WOLF	Veeva Systems Inc	VEEV
Encompass Health Corp	EHC	Boyd Gaming Corp	BYD
Oppenheimer Holdings Inc	OPY	Dupont De Nemours Inc	DD
		Switch Inc	NULL
Five9 Inc	FIVN	Evoqua Water Technologies Corp	AQUA
Energy Transfer LP	ET		
Corporate Office Properties Trust	OFC	Funko Inc	FNKO
		Huntington Ingalls Industries Inc	HII
Makita Corp	6586		
Vail Resorts Inc	MTN	IPG Photonics Corp	IPGP
Cathay Financial Holding Co Ltd	2882	Nektar Therapeutics	NKTR
		SVB Financial Group	SIVB
Merit Medical Systems Inc	MMSI	Nutrien Ltd	NTR
		Lumentum Holdings Inc	LITE
Hong Kong Exchanges and Clearing Ltd	388	Alkermes Plc	ALKS
		Cognex Corp	CGNX
Pembina Pipeline Corp	PPL	Ironwood Pharmaceuticals Inc	IRWD
Toray Industries Inc	3402		
CMTSU Liquidation Inc	CBRI	ABIOMED Inc	NULL
Orion Energy Systems Inc	OESX	Broadridge Financial Solutions Inc	BR
Arch Capital Group Ltd	ACGL		

Evergy Inc	EVRG	Telefonica SA	TEF
Fleetcor Technologies Inc	FLT	IAA Inc	IAA
VF Corp	VFC	CrowdStrike Holdings Inc	CRWD
WEX Inc	WEX	Avantor Inc	AVTR
ALLETE Inc	ALE	Amcor PLC	AMCR
Zscaler Inc	ZS	Live Nation Entertainment Inc	LYV
Wellell Inc	4106		
PNM Resources Inc	PNM	STERIS plc	STE
Equitable Holdings Inc	EQH	Zebra Technologies Corp	ZBRA
nLIGHT Inc	LASR	Cloudflare Inc	NET
Comscore Inc	SCOR	Madison Square Garden Sports Corp	MSGS
Ipsos SA	IPS		
Extreme Networks Inc	EXTR	Eventbrite Inc	EB
Wyndham Hotels & Resorts Inc	WH	Impinj Inc	PI
		Cts Eventim AG & Co KgaA	EVD
Xiaomi Corp	1810		
Lamb Weston Holdings Inc	LW	Ingersoll Rand Inc	IR
		Paycom Software Inc	PAYC
Linde PLC	LIN	Cannae Holdings Inc	CNNE
WellCare Health Plans Inc(Pre-Merger)	NULL	Paylocity Holding Corp	PCTY
		Swiss Re AG	SREN
Livent Corp	LTHM	Graco Inc	GGG
National Instruments Corp	NATI	Bio Rad Laboratories Inc	BIO
Check Point Software Technologies Ltd	CHKP	Carrier Global Corp	CARR
		Otis Worldwide Corp	OTIS
Viavi Solutions Inc	VIAV	West Pharmaceutical Services Inc	WST
Atmos Energy Corp	ATO		
Jefferies Financial Group Inc	JEF	Papa John's International Inc	PZZA
Teleflex Inc	TFX	FARO Technologies Inc	FARO
Westinghouse Air Brake Technologies Corp	WAB	Hexagon AB	HEXA B
		Gerresheimer AG	GXI
Sanofi SA	SAN	Catalent Inc	CTLT
Embracer Group AB	EMBRAC B	Cohu Inc	COHU
Elanco Animal Health Inc	ELAN	Jubilant Pharmova Ltd	JUBLPHARMA
DocuSign Inc	DOCU	Advantest Corp	6857
Corteva Inc	CTVA	Pool Corp	POOL
Dow Inc	DOW	Vontier Corp	VNT
Fox Corp	FOXA	Quanex Building Products Corp	NX
Galaxy Entertainment Group Ltd	27		
		LCI Industries	LCII
Bally's Corp	BALY	Caesars Entertainment Inc	CZR
Tradeweb Markets Inc	TW	Trimble Inc	TRMB
CDW Corp	CDW	Solaredge Technologies Inc	SEDG
L3harris Technologies Inc	LHX		
Marketaxess Holdings Inc	MKTX		

SMA Solar Technology AG	S92
Airbnb Inc	ABNB
DraftKings Inc	DKNG
Charles River Laboratories International Inc	CRL
Organon & Co	OGN
Royalty Pharma PLC	RPRX
LG Chem Ltd	051910
Topcon Corp	7732
Bio-Techne Corp	TECH
Moderna Inc	MRNA
Quinstreet Inc	QNST
BioNTech SE	BNTX
Compass Diversified Holdings	CODI
GSK plc	GSK
Vivid Seats Inc	SEAT
CureVac NV	CVAC
Pinterest Inc	PINS
East West Bancorp Inc	EWBC
Samsung SDI Co Ltd	006400
Globant SA	GLOB
Constellation Energy Corp	CEG
Nordson Corp	NDSN
Royal Gold Inc	RGLD
Lincoln Electric Holdings Inc	LECO
Chart Industries Inc	GTLS
Weave Communications Inc	WEAV
VICI Properties Inc	VICI
Under Armour Inc	UAA
Gaming and Leisure Properties Inc	GLPI
Semtech Corp	SMTC
Horizons Holdings International Corp	HZHI
Diodes Inc	DIOD