The Price Isn't Right: Effect of Passive Ownership on Price Informativeness

Kalra, Uddhav
Advisor: Dang, Tri Vi

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Abstract

abstract

Contents

1 Introduction

John Bogle, the founder of Vanguard, introduced the first index fund in 1976, which tracked the S&P 500. Subsequently, in 1993, the first US listed exchange traded fund (ETF) called SPDR, which also tracked the S&P 500, made its debut. These innovations democratised investing, making equity markets accessible to investors who were previously inaccessible.

These instruments have gained popularity since their launch; there are an estimated 12000 ETFs worldwide in 2024 (Investopedia). As assets under management of the ETFs have grown, they have reshaped trading behaviours and market structure. Two of the biggest strategies that grew as a result of the popularity of these instruments are riskless arbitrage of the ETF and Passive investing.

Passive investing has grown significantly over the past decade, surpassing Active investing in equities. It is important to discuss what passive investing is beforehand, as it could be argued that no one is a passive investor, as everyone makes an active decision to invest.

Passive investing has two primary definitions:

a. Passive investors choose a portfolio, buy it, and hold it long-term with no regard for profiting from short term variations or frequent trading. (Moltke & Sløk, 2024)

b. A passive investor holds every security in the market, with each represented in the same manner as in the market. (Sharpe, 1991)

For the purposes of this paper, we will adopt Sharpe's definition.

Recently, Total Assets in Index Funds overtook Total Assets in Non-Index Funds. Figures 1 and 2 illustrate this development, showing the level and share of assets.

Haddad, Huebner and Loualiche (2024) show through their model that an increase in the share of passive investing leads to lower price elasticities of demand, which can lead to higher volatility, lower efficiency and illiquidity. If stocks become less responsive to trading demand, they may also adjust differently to new information. Price informativeness reflects how well prices incorporate firm specific information. A decline in informativeness implies that capital may be misallocated and that prices respond less to fundamentals.

This motivates the research question, "How has passive investing affected the price informativeness of stocks?"

In order to answer this question, we use price volatility around the earnings date as a proxy of price informativeness. The biggest issue of using volatility as a measure of price informativeness is that there are other confounding factors that could lead to changes in volatility. However,

this issue is minimized in our case as we focus on a relatively small window around the earning dates.

Volatility can serve as a good measure within this small window, as we'd expect during the pre-earnings periods, investors to revise estimates based on partial information such as management guidance, analyst revisions, or private signals. In the post-earnings period, if there is an unexpected earnings beat or miss, we expect high volatility for a few days, followed by reduced volatility as uncertainty subsides.

My hypothesis is that high passive ownership leads to lower volatility in the pre-earnings period and much higher volatility after the earnings announcement, thus implying lower price informativeness for the stock.

We will focus on a small window around the earnings date, from 30 days prior to 15 days after. This naturally leads me to use an event study model to analyse the effects of passive investing. There are concerns of endogeneity, such as omitted variable bias and simultaneous causality. To mitigate these concerns, we add fixed effects to the model and run a two-stage least squares model with inclusion in the S&P 500 as the instrument.

The S&P 500 is the most popular index, and so inclusion in the index naturally leads to higher passive ownership. This is true in the sample as well; the median stock in the S&P 500 has a 30.29% passive ownership share while the median stock not in the S&P 500 has a 10.75% passive ownership share. This motivates the relevance of the instrument. Inclusion into the index is driven by rules unrelated to volatility. Inclusion in the S&P 500 is not random; however, conditional on firm size and other observables, residual variation in index membership is exogenous to firm level volatility.

Section 2 reviews the literature. Section 3 describes the data and variables. Section 4 outlines the empirical model. Section 5 presents results, and Section 6 concludes.

2 Literature Review

3 Data Description

3.1 Data

The share of a company passively owned is the main variable of study, and to construct this variable, we need 3 datasets. To construct the share of passive ownership, we combine three datasets: CRSP's Survivor-Bias-Free US Mutual Fund Database, which identifies index funds;

LSEG's S12 filings, which report quarterly mutual fund holdings; and WRDS MFLINKS, which links CRSP fund identifiers to LSEG filings.

The first of the three is CRSP's Survivor Bias Free US Mutual Fund Database. This dataset contains the variable index fund flag, which flags funds that are either index fund based, purely index fund, or index fund enhanced. In this paper, we focus on purely index funds; however, in the robustness analysis, we allow for index fund based funds as well. The second dataset is LSEG's S12 filings, which contain the quarterly holdings for US mutual funds. The third dataset needed is the Wharton Research Data Services' MFLINKS dataset, which provides the codes necessary for merging the LSEG data with the CRSP data.

For each stock-quarter observation, we sum the shares held by funds flagged as index funds to get the total number of shares outstanding owned passively. The drawback of using this method is that we rely on funds flagging themselves as index funds. Funds that don't identify themselves as passive but are in practice index funds are not recorded.

An alternative method to construct the share of passive ownership is to use the 13F filings as employed by Moltke & Sløk (2024). They compute the elasticity of demand of stocks for each fund and if the value is sufficiently close to 0, they flag the fund as a passive investor. A key limitation is that 13F filings do not distinguish between funds owned by the same filing manager. For example, Vanguard may simultaneously operate one fund that follows the index and another that actively trades, but both are aggregated under a single 13F report. Due to this limitation, we adopt the CRSP–LSEG–MFLINKS measurement technique.

In order to construct the dependent variable, we need daily stock data on prices. we use CRSP's daily stock dataset to get daily prices, returns and volume data.

LSEG's IBES dataset provides the earnings dates for each stock. Since exchanges are open from 9:00 am to 4:30 pm, if an earnings announcement takes place after 4:30 pm, we consider the earnings announcement date to be the next day. This is because the markets can only react to announcement after opening the next day.

We use Compustat's quarterly fundamentals for controls and we use Wikipedia to construct data on stocks in the S&P 500 for my instrument.

My sample extends from January 1, 2021 to March 31, 2025 with a total of 17 quarters. The sample starts from 2021 to avoid affects of COVID-19. In total, there are 3999 unique stocks in the dataset before merging the fundamentals data and 3502 unique stocks after merging the fundamentals data.

3.2 Variables

The dependent variable is price volatility, defined as the standard deviation over a window. Since we are looking at a small event window (-30 to +15), we use three different time windows 3, 5 and 7 days. Choosing a large time period, such as 30 days, could lead to other confounding factors affecting the results, which is why we employ to smaller time periods. Figures 3, 4 and 5 provide trends in volatility around earnings dates. These figures clearly suggest that higher passive ownership is correlated with higher volatility and greater spikes in volatility post-earnings.

The main independent variable is the share of stock passively held, defined as:

$$\text{Passive} = \frac{\text{Outstanding Shares Passively Held}}{\text{Total Outstanding Shares}}$$

This variable captures the proportion of a firm's equity passively held by mutual funds, ranging from 0 (no passive ownership) to 1 (fully passive ownership).

Since index-tracking funds must replicate the S&P 500 composition, inclusion in the index mechanically increases passive fund demand for the stock, making it a relevant instrument.cThe instrument variable is a dummy variable equal to 1 if a stock at time t was in the S&P 500 index and 0 otherwise.

Table 1 provides summary statistics for the variables.

4 Empirical Model

Model

5 Results & Discussion

6 Conclusion

7 References

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8 Tables & Figures

8.1 Figures

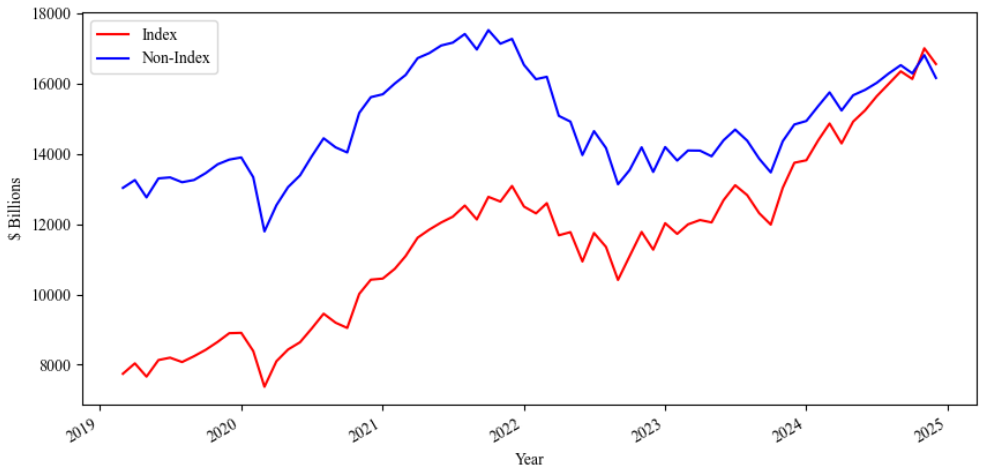

Figure 1: Index vs Non-Index Funds Total Assets

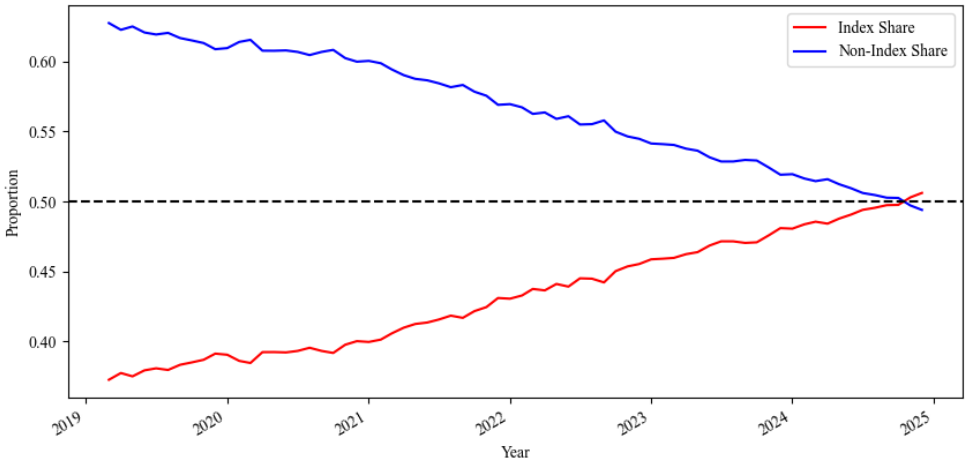

Figure 2: Index vs Non-Index Funds Share of Assets

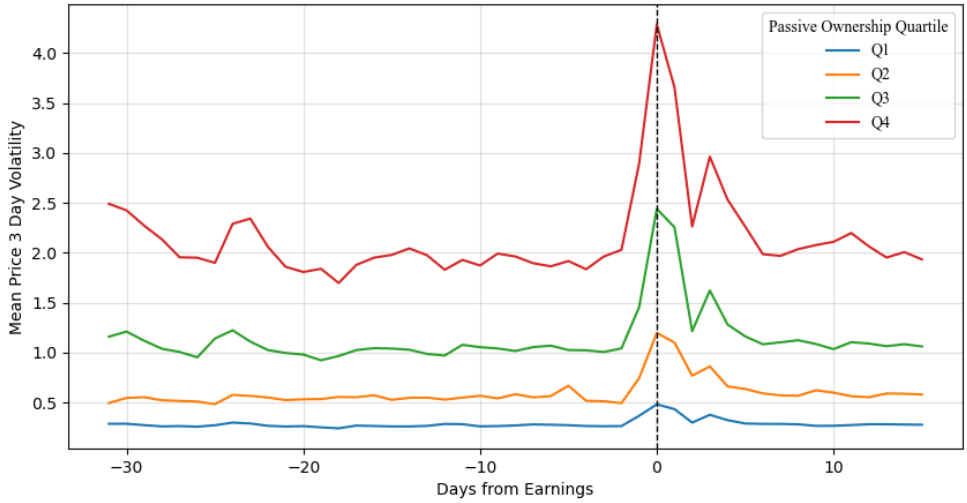

Figure 3: 3 Day Volatility Trends

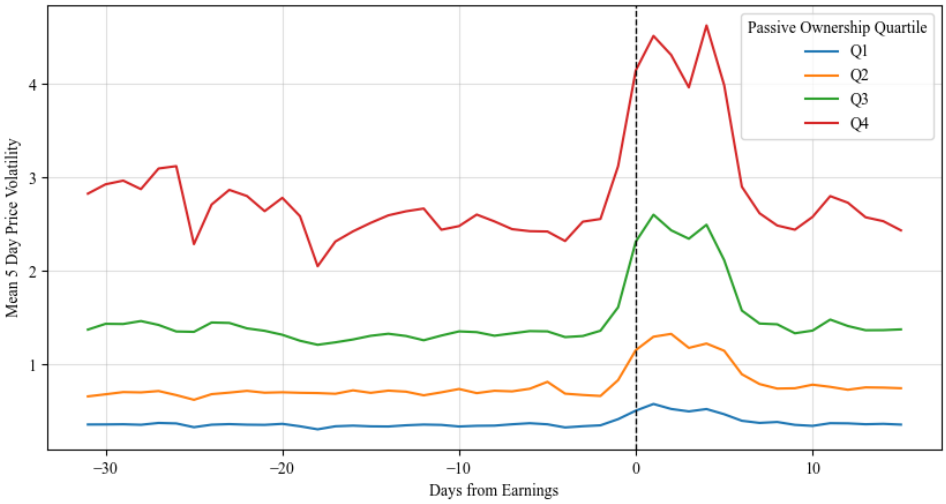

Figure 4: 5 Day Volatility Trends

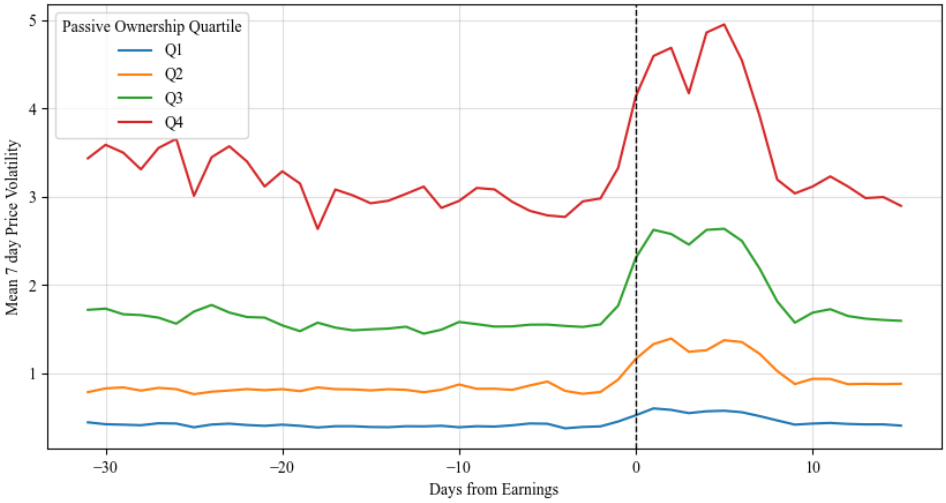

Figure 5: 7 Day Volatility Trends

8.2 Tables

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Price	393682	60.0527	171.4807	0.0201	8382.63
Return	393682	-0.0003	0.0459	-0.8042	5.3827
Passive	393682	0.1402	0.1228	0.0	0.9394
3 Day Volatility	393682	1.0565	3.5338	0.0	374.6247
5 Day Volatility	393682	1.3706	4.2897	0.0	355.7887
7 Day Volatility	393682	1.6234	4.9856	0.0005	355.4092