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Long-term Index Fund Ownership and Stock Returns

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Abstract

We examine the implications of stock ownership by index funds for shareholder value. Consistent with recent findings that stock ownership by passive funds contributes to improved governance, we document a strong positive relation between the duration of passive fund holdings and subsequent stock performance. This positive relation is more pronounced for firms with recent poor performance, and for smaller firms and firms with higher allocation weights in passive funds' portfolios. Our results support the view that index funds, although passive in their investment decisions, successfully contribute to long-term value creation by actively engaging with firms on matters of governance.

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1. Introduction

There has been a dramatic growth in the assets of passively managed index mutual funds in recent years. For example, according to the Investment Companies Institute (ICI), domestic equity index mutual funds and exchange traded funds (ETFs) received $1.2 trillion in net new cash, including reinvested dividends, between 2007 and 2015. In stark contrast, actively managed domestic equity mutual funds experienced net outflows of $835 billion (even after accounting for reinvested dividends) over the same period. As of the end of 2015, domestic index fund assets accounted for about 35% of total assets held by equity mutual funds.

Not surprisingly, the growing importance of passive institutional investors such as index mutual funds has been the focus of much interest and has sparked to considerable debate regarding their impact on firm-level governance. In a recent paper, Appel, Gormley, and Keim (2016) examine the role of passive mutual fund companies in corporate governance and find that such investors are not merely passive owners. In particular, they find that passive investors appear to play an important role in pushing their portfolio companies to adopt shareholder-friendly policies, including an increase in the number of independent directors and the elimination of poison pills and dual-class share structures. More generally, the authors document that passive ownership is associated with a decline in shareholder support for management proposals and an increase in support for governance-related shareholder proposals. Furthermore, longer-term passive stock ownership is associated with significant improvements in the firm's return on assets and Tobin's Q. These results are broadly consistent with the conclusions of earlier studies that found that institutional investors, including those that index a large portion of their portfolios, can affect corporate behavior (e.g., Carleton, Nelson, and Weisbach, 1998; Del Guercio and Hawkins, 1999; Gillan and Starks, 2000; Harford, Kecskés, and Mansi, 2018).

Motivated by recent results in the literature, in this paper we examine whether improvements in firm-level governance due to long-term passive ownership by index funds lead to improved returns to investors in the affected firms. Unlike actively managed funds, index funds do not have discretion over which stocks to hold, and in particular, they do not have the option of selling stocks that underperform. Hence, it could be argued that index funds have a stronger incentive to undertake improvements in the governance of their portfolio firms.[2] As F. William McNabb III, Vanguard's Chairman and CEO, wrote in a recent letter[3] to the boards of directors of Vanguard funds' largest portfolio holdings,

> We are large, we don't make a lot of noise, we are focused on the long term, and we don't tend to rush into and out of investments. In the past, some have mistakenly assumed that our predominantly passive management style suggests a passive attitude with respect to corporate governance. Nothing could be further from the truth. We want to see our clients' investments grow over the long term, and good governance is a key to helping companies maximize their returns to shareholders.

If index funds' efforts in improving firm governance and long-term value are effective, it is reasonable to expect that their substantial holdings will have an impact on stock performance as well. We provide direct evidence on this important issue in this paper.

We identify a sample of U.S. passive and active equity funds during the period 2003:Q1 to 2015:Q3. The sample includes 608 funds classified as passive equity funds, including index

[2] For example, according to the Global Governance Principles adopted by the largest U.S. public pension fund, CalPERS, which has a substantial allocation to indexed portfolio investments, "CalPERS prefers constructive engagement to divesting as a means of affecting the conduct of entities in which it invests. Investors that divest lose their ability as shareowners to influence the company to act responsibly." (Source: CalPERS Global Governance Principles, Updated: March 16, 2015, p. 9)

[3] https://about.vanguard.com/vanguard-proxy-voting/CEO_Letter_03_02_ext.pdf

mutual funds and ETFs. We obtain data on stocks held by funds using the Thomson-Reuters mutual fund holdings (S12) database. It is likely that passive funds' impact on governance would be stronger in the case of stocks they hold for a long time. Accordingly, at the end of every quarter we construct a measure of the duration of ownership of each stock by every fund during the previous 20 quarters, following Cremers and Pareek (2016). We then average this measure across all passive funds to construct an overall duration measure for each stock. For each stock, this measure reflects the weighted duration of the investment in the stock by all passive funds.

Our key hypothesis links the strength of monitoring by passive fund investors, as reflected in the duration of holdings measure, to future stock returns. In tests based on cross-sectional regressions, we find that our passive fund stock holding duration measure is significantly and positively related to future raw and excess returns at horizons up to 24 months. For example, the results imply that a one-standard-deviation increase in the (log of the) passive funds' stock holding duration measure for a particular stock is associated with an increase in the stock's quarterly return by 48 basis points over the next 3 months. The corresponding increase in the stock's annual return is 189 basis points over the next 12 months, and 161 basis points during the second year. Our results are qualitatively similar when using an alternative measure for duration of passive funds' stock holdings based on the funds' portfolio turnover (see, for example, Gaspar, Massa, and Matos, 2005). Interestingly, we find that a similar stock holding duration measure based on the portfolio holdings of actively managed funds has much weaker predictive ability for future stock returns. Specifically, in predictive return regressions, the average coefficients on the active funds' (excluding closet indexers) holdings duration measures are 0.308 and 0.759 for next quarter returns and next year returns, and are only marginally significant at the 10% level for next quarter returns. The coefficients decline in magnitude to 0.247 and 0.492 and become statistically insignificant

when the passive funds' holdings duration measure is included as a control. We also show that our results are not driven by closet indexers: After controlling for passive funds' holding duration, closet indexers have a limited role in predicting returns.

Next, we adopt a portfolio approach and sort funds into quintile portfolios according to the duration measure based on passive funds' stock holdings. A spread portfolio that is long the longest duration fund portfolio and short the shortest duration fund portfolio earns a monthly 4-factor (three Fama-French factors and the Carhart momentum factor) alpha of 70.9 basis points (or 8.5% annually) and a 5-factor (four factors plus the Pastor and Stambaugh liquidity factor) alpha that equals 70.5 basis points (or 8.46% annually) during the period 2003:Q1 to 2015:Q3.

What explains the predictive ability of our measure of the duration of passive funds' stock holdings? To explore this issue further, we split the sample of stocks based on their performance during the previous 12 months and 36 months. If the predictive ability is indeed driven by the improvements in firm-level governance brought about by long-term ownership by passive funds, we would expect a stronger positive relation between the duration of holdings measure and future stock returns for the worst performing stocks. Similarly, we would expect this relation to be stronger for stocks with smaller market capitalization, which may be more susceptible to the influence of passive fund owners, especially when they are large. We also expect a stronger relation between the duration of holdings measure and future stock returns during periods in which the market is more volatile, when passive funds are likely able to exert a stronger influence on management.

Our results based on cross-sectional tests provide support for each of these three predictions. The predictive ability of the duration of holdings measure for future returns at the 3-month, 12-month, and 24-month horizon is stronger for the worst performing stocks (i.e., stocks with below-

median performance during the past 12 months or past 36 months). In addition, the predictive ability of the passive fund stock holdings' duration measure is stronger for smaller firms, i.e., for firms with below-median market capitalization. The measure's predictive ability is also more pronounced during more volatile market periods.

As a further test of the importance of the monitoring role played by passive funds and its impact on future stock returns, we include in our test design a control variable that is a measure of the passive funds' aggregate allocation weight to a particular stock. In cross-sectional tests, the interaction term involving the allocation weight-based variable and the duration of holdings measure is significantly positively related to future stock returns. The relationship is positive and significant at multiple horizons up to 1 year ahead. These results suggest that the passive funds' allocation weight has significant, marginal predictive power for stock returns at both short and long horizons.

Finally, we compare a subsample of stocks that rank at the bottom among stocks in the Russell 1000 index, based on market capitalization, to those that rank near the top among stocks in the Russell 2000 index. Stocks near the boundary of the index membership cutoff are likely to be quite similar in their characteristics, with one important exception. Since index funds' stock allocations are based on market valuations, stocks at the top of the Russell 2000 index would be weighted more heavily in portfolios of index funds (targeting the Russell 2000 index). On the other hand, stocks near the bottom of the Russell 1000 index will be featured less prominently in portfolios of index funds (targeting the Russell 1000 index). This distinction allows us to perform a relatively clean test of the impact of passive fund ownership on stock returns. We find that the predictive ability of passive funds' holdings duration measure for future stock returns is much stronger for stocks at the top of the Russell 2000 index compared to those at the bottom of the

Russell 1000 index. This finding is consistent with the idea that significant holdings of passive funds are associated with more effective monitoring by the funds.

We rule out the possibility that our results are driven solely by the potential persistent buying-related price pressure experienced by stocks that are constituents of various market indexes. In particular, our results are robust to controls for lagged stocks returns that proxy for past asset flows. Furthermore, we confirm the predictive ability of the holdings' duration measure at longer horizons up to 2 years.

We also address concerns that reverse causality can explain our results. Under this explanation, the better performing stocks would mechanically enjoy a longer duration of holdings. To explore this possibility, we examine the correlation between the duration of holdings measure and past stock returns. We find that the correlation is in fact quite weak.

Our paper also contributes to the literature on the duration of fund holdings or trade frequency, and fund performance. In this context, Cremers and Pareek (2016) document that among active funds with high active share, the funds that trade infrequently tend to outperform on average by about 2%per year. Furthermore, among funds with long holding durations, the high active share funds outperform the low active share funds. They attribute their results to the ability of a subset of skilled active fund managers who are better at identifying instances of security mispricing that are eventually corrected over the long term.

Our results are also consistent with the findings of Harford, et al., (2018), who document the favorable impact of long-term investors on shareholder returns. In contrast to Harford et al. (2018), whose primary focus is on the impact of investor horizons on corporate decisions, our analysis

specifically focuses on the implications of stock ownership by index funds.[4] Hence, in our analysis we directly identify passive fund investors, namely, index funds and ETFs, rather than relying on a noisy activeness measure (e.g., the active share) in order to classify investors as being active or passive. It should also be noted that index funds are long-term investors by design, and their investors are more likely to be patient compared to investors in active funds. Since index funds do not engage in active security selection, our results suggest that the monitoring role of passive investors is the most likely explanation for our findings. On the other hand, closet indexers (identified using the active share measure) have considerable flexibility and discretion in their investment choices. Their motivations and investment constraints can be quite different from that of genuine index funds. Indeed, our results show that after controlling for the effect of index funds and ETFs, duration measures related to stock ownership by either closet indexers or active funds with long-term horizons are unrelated to future stock returns.

The rest of the paper is organized as follows. Section 2 develops our main testable hypotheses. Section 3 discusses the data, sample, and variable construction. Section 4 presents the main findings on the effect of passive funds' long-term investments on stock performance and discusses tests of various hypotheses. Section 5 compares passive funds and active funds, and Section 6 concludes.

2. Testable hypotheses

Appel, Gormley, and Keim (2016) show that passive funds are not merely passive owners; instead, they play an important role in firm governance. If passive funds have the incentive to

[4] As Harford et al. (2018) acknowledge, "Itis not our objective to study the consequences of indexing as such." (p. 429). In order to establish a causal link between investor horizons and corporate outcomes, for part of the analysis they classify investors into "indexers" and "non-indexers." This classification is based on an active share measure calculated for the institutional investors in their sample.

monitor firms in their portfolios and are effective in improving the firms' governance, their long-term holdings should favorably impact their stock performance relative to firms that are not in their portfolio. As we discuss in the introduction (and subsequently in more detail in the data section), we use a stock's passive holdings duration (churn ratio) to measure passive funds' long-term commitment to the stock. We therefore propose the following hypothesis.

H1: A stock's passive holdings duration (churn ratio) positively (negatively) predicts future returns.

As "permanent" shareholders, passive funds do not have the option of selling their positions in underperforming stocks. Hence, we expect that they have a stronger incentive to monitor and influence firms that have been doing poorly in the past. This suggests the following hypothesis.

H2: The return predictability of the passive holdings' duration is stronger for underperforming stocks.

Given their monitoring incentives, passive funds' ability to influence the firm depends on the size of the firm. Everything else equal, we expect that passive funds have a stronger impact on small firm performance. Further, we expect that the passive funds' monitoring incentive would be stronger during more volatile periods, when there is greater uncertainty about the performance of the stocks they invest in. Hence, we have the following hypothesis.

H3: The return predictability of the passive holdings' duration is stronger for smaller firms, and during more volatile market conditions.

Many passive funds invest in hundreds of stocks. Despite the resources available to large funds, it would be difficult for them to pay equal attention to all stocks. Hence, we expect that passive funds would be more effective in monitoring stocks that have greater weights in their

holdings (adjusting for the market weight of the stocks). Accordingly, we have the following hypothesis.

H4: The return predictability of passive funds holdings duration is stronger for stocks with greater excess weights (relative to market value weights) in passive funds' portfolios.

Recent literature has argued that active funds' long-term holdings outperform passive funds' holdings. We note that by their design, passive funds are long-term investors and have incentives to monitor and influence firm governance and performance. If their monitoring is effective and favorably impacts stock returns, it is possible that some "long-term" active funds mimic passive funds' long-term investment holdings. This suggests the following hypothesis.

H5: Controlling for the passive funds' holdings duration effect, the return predictability of the active funds' holdings duration is diminished.

3. Data and sample construction

3.1. Passive and active funds sample construction

Our data for U.S. mutual funds comes from the CRSP Survivor Bias Free U.S. mutual fund database and Thomson Reuters mutual fund holdings (S12) database linked by MFLINKS. We exclude bond funds and international funds to ensure that only domestic equity mutual funds are left in the sample. Additionally, we require that equity funds in our sample have allocations to common stocks between 80% and 105%, hold at least 10 stocks, and manage assets in excess of $5 million. Since fund characteristics provided by CRSP are at the share class level, we calculate value-weighted fund characteristics, such as turnover ratio, across multiple share classes within a fund using total net assets (TNA) as weights. Finally, we require that funds in our sample have available shareholding information and have at least 1year's worth of holdings history.

To classify funds as either passively managed funds or actively managed funds, we examine the CRSP index fund/ETF indicators. To identify passive funds that are not explicitly identified by these indicators, we follow Appel, et al.(2016) and screen the remaining sample using keywords in their names.[5] The remaining funds in our sample are classified as active funds. This procedure yields 608 passive funds and 2,732 active funds over the period from first quarter of 2003 to third quarter of 2015. We use 2003 as the starting year for the sample since there are substantially fewer passive funds prior to this year. We compute the percentage of stocks' shares outstanding owned by passive funds (*index*%) and by active funds (*active*%) at the end of each quarter.

3.2. Stock long-term ownership by passive (active) funds

We focus on U.S. common stocks (share code 10 or 11) that are listed on NYSE, AMEX, or NASDAQ from 2003.Q1 to 2015.Q3. We eliminate stocks with prices below $1 or above $1,000. Further, we require that a stock be held by a fund for at least 2 consequent quarters to exclude the occasional addition (removal) of stocks into (out of) funds.

We construct two measures of funds' (long-term) investment on a stock. The first measure is the stock-level "duration" measure, as motivated by Cremers and Pareek (2016). By tracing back the holding periods and weighting the buys and sells in each period, this measure captures how long a stock has continuously been held by one fund at a particular time. Specifically, at the end of quarter *t*, the holding duration of stock *i* in passive fund *j* is given by:

$$Duration_{i,j,T} = \sum_{t=T-W+1}^{T} \left(\frac{(T-t)\alpha_{i,j,t}}{H_{i,j,T-w} + B_{i,j}} \right) + \frac{W * H_{i,j,T-W}}{H_{i,j,T-w} + B_{i,j}}, \quad (1)$$

[5] The Strings we use to identify index funds are: Index, Idx, Indx, Ind_, Russell, S&P, S & P, SandP, SP, DOW, Dow, DJ, MSCI, Bloomberg, KBW, NASDAQ, NYSE, STOXX, FTSE, Wilshire, Morningstar, 100, 400, 500, 600, 900, 1000, 1500, 2000, 5000, ishares, powershares, SPDR, QQQ, ETF, EXCHANGE TRADED, EXCHANGE-TRADED, PROFUNDS, SPA MG, MARKET GRADER.

where $\alpha_{i,j,t}$ is change in percentage of shares outstanding of stock *i* held by index *j* between quarter *t*-1 and quarter *t*, and $\alpha_{i,j,t} > 0$ for buys and $\alpha_{i,j,t} < 0$ for sells. The term $H_{ij,T-W}$ is the percentage of total shares outstanding of stock *i* held by fund *j* at the end of quarter T-W; and $B_{i,j}$ is percentage of total shares outstanding of stock *i* bought by fund *j* during time period between quarters T-W and T. Consistent with the literature, we choose w=20, since any trading prior to 5 years ago would not be as relevant when assessing holding decisions in year 0. Next, we compute stock duration across all passive funds by either equally weighting $Duration_{i,j,T}$or averaging $Duration_{i,j,T}$ using passive fund ownership of the stock *index* % as the weight across all passive funds that hold the stock:

$$Dur - equal_{i,T} = \frac{\sum_j Duration_{i,j,T}}{N_j} \quad (2)$$

$$Dur - weighted_{i,T} = \frac{\sum_j Duration_{i,j,T} * Index\%_{i,j,T}}{\sum_j Index\%_{i,j,T}} \quad (3)$$

Similarly, we construct the duration measures based on active funds $Duration - ac_{i,j,T}$. We next compute stock duration in active funds by equally weighting $Duration - ac_{i,j,T}$ or averaging Duration-$ac_{i,j,T}$ using active fund ownership of the stock *active*% as the weight across all active funds that hold the stock:

$$Dur - equal - ac_{i,T} = \frac{\sum_j Duration - ac_{i,j,T}}{N_j} \quad (4)$$

$$Dur - weighted - ac_{i,T} = \frac{\sum_j Duration - ac_{i,j,T} * Active\%_{i,j,T}}{\sum_j Active\%_{i,j,T}} \quad (5)$$

The second long-term fund investment measure we consider is the churn ratio. The churn ratio has been widely used to proxy for fund investment horizon (see, for example, Gaspar, et al.,

2005; Yan and Zhang, 2009; Cella, Ellul, and Giannetti, 2013). Instead of focusing on the fund level churn ratio, we measure the average churn ratio across passive funds for a stock, as follows:

First, the turnover of stock *i* by passive fund *j* in quarter *t* is given by:

$$CR_{i,j,t} = \frac{|N_{i,j,t}P_{i,t} - N_{i,j,t-1}P_{i,t-1} - N_{i,j,t-1}\Delta P_{i,t}|}{\frac{N_{i,j,t}P_{i,t} + N_{i,j,t-1}P_{i,t-1}}{2}}, \quad (6)$$

where $P_{i,t}$ and $N_{i,j,t}$ are price and number of shares of stock *i* held by passive fund *j* at the end of quarter *t*. We then calculate the churn ratio of passive fund *j* for stock *i* by averaging across the prior 4 quarters:

$$CR_{i,j,t(r)} = \frac{1}{4} \sum_{r=1}^{4} CR_{i,j,t-r+1} \quad (7)$$

Similarly, we calculate stock-level churn ratio by equally averaging $CR_{i,j,t(r)}$ or averaging $CR_{i,j,t(r)}$ using passive fund ownership of stock *i* as the weight across all passive funds holding that stock:

$$CR - equal_{i,t} = \frac{\sum_j CR_{i,j,t(r)}}{N_j} \quad (8)$$

$$CR - weighted_{i,t} = \frac{\sum_j CR_{i,j,t(r)} * Index\%_{i,j,t}}{\sum_j Index\%_{i,j,t}} \quad (9)$$

We also select active funds and calculate stock-level churn ratio in active funds, by equally averaging $CR - ac_{i,j,t(r)}$ or averaging $CR - ac_{i,j,t(r)}$ using active fund ownership of stock *i* as the weight across all active funds holding that stock:

$$CR - equal - ac_{i,t} = \frac{\sum_j CR - ac_{i,j,t(r)}}{N_j} \quad (10)$$

$$CR - weighted - ac_{i,t} = \frac{\sum_j CR - ac_{i,j,t(r)} * Active\%_{i,j,t}}{\sum_j Active\%_{i,j,t}} \quad (11)$$

Panel A of Table 1 reports the time-series mean, standard deviation, minimum, median, and maximum values of the cross-sectional averages of duration, churn ratio, and proportional stock

ownership for passive funds and active funds across 51 quarters. The holdings duration's measure is winsorized at the 1st percentiles and expressed in number of quarters. The churn ratio and ownership measure are winsorized at the 1st and 99th percentiles.

Stocks in passive funds have an ownership- (equal-) weighted average holding duration of 7.910 quarters (7.118 quarters). In comparison, stocks have an ownership- (equal-) weighted average duration of 5.785 quarters (5.289 quarters) in active funds, which suggests that passive funds tend to hold stocks for relatively longer periods. Similarly, stocks in passive funds have a smaller churn ratio compared with those in active funds. On average, index funds own 4.7% of the outstanding shares of stocks they invest in. As expected, active funds hold less diversified portfolios, and on average, they hold a larger proportion of the shares of stocks they own with a mean of 10.3%. Panel B of Table 1 reports the time-series averages of cross-sectional correlations between duration, churn ratio, and index ownership. As expected, the correlation between duration and churn ratio is negative and equals -0.434 for the ownership-weighted measures, and -0.38 for equal-weighted measures. Moreover, ownership- (equal-) weighted duration is positively related to index ownership at 25.3% (21.9%), but as expected, the churn ratio measures display much lower correlations with index ownership. We also calculate fund level churn ratio and duration for passive funds, and the correlation is negative and equals -0.625.

Figures 1, 2, and 3 depict the time-series trends for our key variables. Figure 1 shows that passive ownership increases over the years, from around 2% in early 2003 to over 8% in late 2015. The obvious increase occurs in late 2008, which coincides with the growing importance of passive funds, especially following the global financial crisis. In contrast, active ownership is relatively stable at around 10% during the sample period, except for a decrease during late 2008. Figures 2 and 3 compare stock holding's duration and stock churn ratio for passive funds and active funds,

respectively. Duration is slightly increasing and the churn ratio is more volatile but decreases over time, suggesting that in general, stocks tend to be held by funds for longer than before. Second, passive duration is always larger than active duration, and passive churn ratio is always smaller than active churn ratio. Third, during the financial crisis there is a decline in passive duration and an obvious increase in passive churn ratio.

3.3. Measures of relative importance of a stock in passive fund holdings

In some of our tests, we examine the relative importance of a portfolio weight of a stock held by passive funds for the funds' monitoring incentive. If passive funds overweight a particular stock relative to the stock's weight in the market portfolio, we would expect the funds to have a stronger incentive to monitor the stock.

Accordingly, we construct an excess weight measure for stock *i* at the end of quarter *t*:

$$Excess\ Weight_{i,t} = w_{it} - \overline{w_{it}} \tag{12}$$

where $w_{i,t}$ is weight of stock *i* in overall passive fund holdings, and $\overline{w_{i,t}}$ is the weight of stock *i* in the market portfolios. We use the value-weighted portfolio of the U.S. domestic equity stocks in our sample as a proxy for the market portfolio. We then sort all stocks in our sample each quarter into halves based on the excess weight measure, and define a dummy variable *important*, which equals one if a stock's excess weight is above the cross-sectional median value, and 0 otherwise.

3.4 Additional stock characteristics as regression control variable.

In the subsequent regressions, we include the following stock characteristics as control variables:

Price: share price from CRSP. We exclude stocks priced below $1 or above $1,000.

Size: stock market capitalization in million~~thousand~~s.

Btm: book to market, book value for the fiscal year ended before the most recent June 30, divided by market capitalization of December 31 during that fiscal year using data from Compustat and CRSP. Btm is winsorized at the 1st and 99th percentiles.

Volatility: standard deviation of monthly returns over the previous 2 years.

Turnover: average monthly traded shares divided by shares outstanding, calculated over the previous3 months.

Age (months): number of months since first returns appear in CRSP

Beta: market beta calculated each quarter by regressing a stock's daily excess return on the daily market excess return during the quarter.

SP_500 dummy: dummy variable for S&P 500 index membership.

Ret(t, t-3): cumulative gross returns over the past 3 months.

Ret(t-3, t-12): cumulative gross returns over the 9 months preceding beginning of the filing quarter.

Ret(t-12, t-36): cumulative gross returns over 2 years before the last year.

All of the variables except returns are measured quarterly. Panel A of Table 1 shows that there are on average 3,726 stocks every quarter. The average firm has a stock price of $27.157, a market capitalization of $4.44 million, a book-to-market ratio of 1.107, and a beta of 1.025. Average stock volatility and turnover are 12.1% and 17.1%, respectively. Panel B of the table shows that duration (churn ratio) has strong positive (negative) correlation with firm age and the SP500 dummy, and negative (positive) correlation with volatility and turnover, suggesting that these two measures can capture stock-level holding horizons in funds. Following Yan and Zhang (2009), we express all variables in natural logarithms with the exception of stock returns, beta, S&P500 dummy, and churn ratio.

4. Return predictability of the long-term investment of passive funds

4.1 Long-term passive fund ownership and future stock returns

Appel et al. (2016) show that passive funds ownership affects firms' governance and investment decisions. If the monitoring role of passive funds were effective, their long-term ownership could have positive impacts on stock performance, everything else equal. We formally test this hypothesis (H1 in Section 2) in this subsection. We measure passive funds' long-term ownership by duration and churn ratio, both defined in Section 3. We measure future stock returns with three holding periods: return for the next 3 months (3-month-ahead return), return for the next 12 months (1-year-ahead return), and return from the end of month 12 to month 24 (2-year-ahead return). Each quarter, for each future return measure, we conduct cross-sectional regressions of future returns on the passive duration (churn ratio) measure, controlling for other firm characteristics. Firm-level control variables include stock market capitalization; book-to-market ratio; stock turnover ratio; monthly stock volatility; firm age (number of months since IPO); stock beta; SP_500 dummy (equal to 1 if the stock belongs to the SP500 index); past 3-month returns; past-12-month returns. Except for beta, the SP_500 dummy, and the past-return measures, all variables are in natural logarithms. All returns are in percent. We report the time-series average of coefficient estimates from quarterly cross-sectional regressions, as well as the T-statistics (Newey-West adjusted standard errors).

Table 2 reports the regression results. The main message is that the duration measure based on passive funds holdings strongly predicts future stock returns.[6] For 3-month-ahead return regressions, the average coefficient on the ownership-weighted passive duration measure (equal-

[6] We also conduct regression analysis with index% only (1) and with index% and log(duration) together (2). Under both circumstances, index% is not statistically significant. Our results stress the role of long-term index holdings rather than index holdings at a certain period.

weighted passive duration measure) is 0.805 (0.968), statistically significant at the 1% level. The effect is also economically significant. For example, a one-standard-deviation increase in ownership- (equal-) weighted passive duration is associated with an increase in the 3-month-ahead returns of 0.48% (0.52%). The return predictability of the index fund holdings duration measure extends up to 2 years. The average coefficient for the ownership- (equal-) weighted passive duration is 3.133 (3.279) for the 1-year-ahead return regressions, and that for the 2-year-ahead return regressions is 2.665 (3.295) for the ownership- (equal-) weighted passive duration. All estimates are statistically significant at the 1% level. In terms of economic significance, a one-standard-deviation increase in ownership- (equal-) weighted passive duration is associated with a 1.89% (1.76%) increase in 1-year-ahead returns, and the corresponding increase is 1.61% (1.77%) for 2-year-ahead returns. Other control variables in our sample period are almost all statistically insignificant. In the appendix, we also find that the duration measure based on passive funds holdings can predict future excess returns.

Our second measure for passive funds' long-term investment in stocks is the churn ratio based on the quarterly holdings of passive funds, as defined previously in Section 3. Similar to the duration measure, we construct both equal- and ownership-weighted churn ratio measures. We repeat the same cross-sectional regression analysis, by replacing duration measures with the churn ratio. Table 3 presents the results. Column (1) reports the results for the ownership-weighted churn ratio measure, and Column (2) the equal-weighted measure. The results are consistent with those of the duration measures. Specifically, for the ownership-weighted measure, the average coefficient on the churn ratio is -2.056 for 3-month-ahead and statistically significant at the 1% level; and -6.940 and -9.016 for 1-year-ahead, and 2-year-ahead returns, respectively, and statistically significant at the 5% level. As the churn ratio is negatively correlated with the duration

measure, the negative coefficient is consistent with the notion that stocks that are held longer by passive funds have higher future returns. In terms of economic significance, a one-standard-deviation increase in the churn ratio measure is associated with a 0.236% (0.798%, 1.037%) increase in 3-month (1-year, 2-year) ahead returns. Results for the equal-weighted churn ratio are negative but less significant. Overall, results based on churn ratio measures are consistent with those based on holdings duration measures. To save space, we will only present the duration-based results from now on. Churn ratio-based results are available upon request.

4.2. Passive holdings duration and future stock returns: A portfolio approach

At the end of each quarter, we rank stocks in our sample based on their weighted passive duration measure and form five portfolios, with portfolio 1 being the quintile with the shortest duration measure and portfolio 5 the longest. These portfolios are held for 3 months, 1 year, or 2 years, respectively. As a result, for 1-year and 2-year holding periods, there will be overlapping portfolios each quarter, similar to the design of the momentum portfolio strategy adopted by Jegadeesh and Titman (1993). For each month, monthly equal-weighted returns are recorded for each portfolio, as well as the average return of the overlapping portfolio returns for each quintile. Table 4 reports the time-series averages of monthly returns for each portfolio, as well as the return differences between the longest and shortest passive duration portfolios. For each holding horizon, we also report portfolio alphas from the time-series regressions of the four-factor model (the Fama and French (1993) three factors plus the momentum factor), and the five-factor model (the four factors plus the Stambaugh and Pastor (2003) liquidity factor). The results suggest that portfolios that have the longest passive duration outperform those with the shortest passive funds duration, consistent with the cross-sectional regression analysis. Specifically, when the holding period is 3 months, the monthly return difference between quintile 5 and quintile 1 is 0.57% based on portfolio

raw returns. The corresponding difference in the four-factor (five-factor) alpha is 0.709% (0.705%) per month, and all differences are statistically significant at the 1% level. The results for portfolios with 1-year and 2-year holding periods are very similar. The performance difference is due to both the outperformance of the long holdings' duration portfolios and the underperformance of the short duration portfolios. For example, for the 3-month holding period, quintile portfolio 5 has a monthly 5-factor alpha of 0.423%, while the corresponding 5-factor alpha for quintile portfolio 1 is -0.282%, with both alphas being significant at the 5% level. We also rank stocks in our sample based on their weighted passive churn ratio measure and form five portfolios, with portfolio 1 being the quintile with the shortest churn ratio measure (longest holding) and portfolio 5 the longest churn ratio measure (shortest holding). We have similar results in Appendix A2. Overall, the results reported in Table 2 to Table 4 are consistent with hypothesis H1.

4.3 Return predictability of passive holdings duration: Evidence based on past stock performance

The evidence presented in the previous sections shows the strong return predictability of passive duration measures, which is consistent with passive funds' effective monitoring role in firms' management. If the permanent ownership of these passive funds provides incentives for them to closely monitor firms' governance and performance, their incentives should be especially strong for underperforming firms in which passive funds have had substantial holdings over a long period of time. The return predictability of passive holdings duration would in turn be stronger for those firms. We test this hypothesis (H2 in Section 2) next.

To examine this hypothesis, each quarter we split our sample into halves based on either the past 1-year or 3-year stock performance. We then create a dummy variable *low*, which equals one if the past 1-year (3-year) return is below the cross-sectional median, and 0 otherwise. We then

include both the dummy variable *low* and the interaction term *log (dur-weighted) *low* in the cross-sectional regressions. The interaction term captures the marginal return predictability of passive holdings duration for firms with low past returns. If passive funds have stronger incentive to monitor underperforming firms, we would expect the coefficient for the interaction term to be positive and significant. Table 5 reports the results. Columns on the left show results for the case in which the prior stock return performance is measured over the past 1-year period, and columns on the right show results where the past return performance is defined over the past 3-year period. Consistent with the monitoring hypothesis, the predictability of the passive duration measure is stronger for firms with poor past 1-year (3-year) performance. For example, for the 3-month return regressions, the average coefficient on the passive duration measure is 0.321, which is only statistically significant at the 10% level. The interaction term involving the dummy variable *low,* however, is 0.981, which is significant at the 1% level. The implied coefficient on the passive holdings' duration for firms with low prior returns is 1.302, and is again significant at the 1% level. For 1-year-ahead return regressions, the average coefficient for the passive duration measure is 1.889, which is statistically significant at the 1% level. The coefficient for the interaction term is 2.481, again highly significant at the 1% level. This implies that for 1-year-ahead returns, the return predictability of passive holdings duration for firms with low past returns is more than twice as strong as that for high past return firms. For the regression specification involving 2-year-ahead returns, the coefficient on the interaction term becomes insignificant. The marginal effect of passive holdings duration seems to be diminished at the 2-year horizon[7].

[7] We also conduct analysis by splitting our sample into quintiles based on past 1-3 year returns and then introducing a quintile variable [-2, -1, 0, 1, 2] that we interact with duration. Our results remain the same. In the following subsample analysis, we also use quintile sorts as a robustness check but our results remain the same.

Interestingly, although the past 1-year return is itself not a significant predictor of future returns in our sample, the low past return dummy variable strongly predicts future stock returns. For example, when the *low* dummy is defined over the past 1-year returns, the coefficient on the *low* dummy is -2.905 for 3-month-ahead returns, and statistically significant at the 1% level. This implies that on average, the next quarter return would be 0.85% lower for stocks in the bottom half of past 1-year returns, compared to stocks in the upper half. The results are qualitatively consistent for 1-year- and 2-year- ahead returns, and when *low* dummy is defined over the past 3-year returns.

Overall, the evidence presented in Table 5 is consistent with hypothesis H2, in that passive funds have stronger incentive to monitor underperforming firms' management, and their monitoring is quite effective in bringing about performance improvements.

4.4 Return predictability of passive funds' holdings duration: Firm size and market conditions

We further hypothesize that monitoring would be more effective for smaller stocks and stocks with a greater degree of uncertainty, where passive funds can exert greater influence on the firms' management. We examine this hypothesis (H3 in Section 2) in this subsection.

Similar to the analysis based on past stock returns, each quarter we split our sample firms into two halves based on their market capitalization. We then create a dummy variable *small*, which equals one if the market capitalization is below the sample median value for the quarter, and zero otherwise. We include the *small* dummy and the interaction term *log (dur-weighted) *small* in our regression specifications and examine the marginal effect of duration on smaller firms.

Panel A of Table 6 presents the results. For stocks at the bottom of the market capitalization, passive duration significantly predicts future stocks returns. For 3-month-ahead returns, the

average coefficient for the duration measure is 0.282 and is statistically insignificant. The interaction term with *small* is, however, significant at the 5% level, with an average coefficient of 0.715. The implied coefficient on the passive duration measure for smaller stocks is 0.997 and significant at the 1% level. For 1-year-ahead returns, the average coefficient for passive duration is larger at 1.544, and only statistically significant at the 10% level. However, the coefficient for the interaction term is even larger at 2.231. The implied coefficient on the passive duration is 3.775 for smaller stocks, which is more than double that for larger stocks. For 2-year-ahead returns, the coefficient on the duration is insignificant again. The coefficient for the interaction term is less significant, with an average coefficient of 2.129, and the implied coefficient on the passive duration for smaller stocks is 3.199. Interestingly, in our sample, stocks in the smaller half of the market cap have lower returns on average. The marginal effect of the *small* stock dummy variable is reflected in its coefficient of -1.996 for 3-month-ahead returns, which implies that on average, the returns of stocks in the bottom half of the market capitalization are 0.51% lower for the next 3 months. Results are similar for 1-year- and 2-year-ahead returns.

In terms of market conditions, we expect that the passive funds' monitoring incentive would be stronger during more volatile periods, when there is greater uncertainty about the performance of the stocks they invest in. We use the CBOE VIX index as a proxy for market volatility, and repeat the cross-sectional regression analysis for the low market volatility periods (i.e., periods in which the VIX measure is below the sample median of 17%) and high market volatility periods (with VIX above the sample median value) separately. Panel B of Table 6 shows that the average coefficient for passive holdings duration during the high-volatility periods is 0.931 for 3-month-ahead returns. The coefficient for the 1-year- and 2-year-ahead returns is 4.111 and 3.509, respectively, and both coefficients are statistically significant at the 1% level. In contrast, holdings

duration coefficients for the low-volatility periods remain less statistically significant. Their magnitudes are much smaller: The corresponding coefficients for 3-month-, 1-year-, and 2-year-ahead return regressions are 0.671, 2.159, and 1.674, respectively.

In summary, the results in Table 6 suggest that passive funds' monitoring is indeed more effective for small stocks and stocks with a greater degree of uncertainty, consistent with hypothesis H3.

4.5 Passive duration return predictability: Limited resources

Even though passive funds have strong incentives to monitor a firm's governance and improve stock performance, given their holdings of hundreds of stocks it is unlikely that they have the resources to pay equal attention to all of their stocks. We conjecture that the passive funds duration measure would have stronger predictability for stocks that are more important in passive funds' holdings (hypothesis H4 in Section 2).

4.5.1 A stock's importance in passive funds' holdings

To measure a stock's relative importance in passive funds' holdings, we calculate a stock's excess portfolio weight in passive funds. As discussed in Section 3, for each stock, we calculate the excess weight as the ratio of passive funds' dollar holdings of the stock relative to total net assets of passive funds, and then subtract the stock's percentage weight in the market portfolio (we use the U.S. domestic equity market as the proxy for the market portfolio.). Everything else equal, a stock would be relatively more important to passive funds if the excess weight is higher. We then split the sample into equal halves each quarter using the median value of the excess weight measure as the cutoff point. We define a dummy variable *important* that equals one if the stock is in the top half based on the relative weight measure, and zero otherwise. We then include the dummy

variable and the interaction term with duration in the cross-sectional regressions. If stocks in the top half are indeed more important for passive funds in their holdings, we would expect passive funds to have stronger incentives and to allocate more resources for effective monitoring, and hence a positive coefficient on the interaction term.

Table 7 presents the regression results. Indeed, the interaction between passive holdings duration and the dummy variable *important* have a positive effect on future returns. The average coefficient on the interaction term is 0.576 (1.167) for the 3-month- (1-year-) ahead return regression, and is statistically significant at the 5% level. However, the average coefficient for the 2-year-ahead return regression is insignificant from zero. The passive duration itself is significant at the 5% level. Overall, the results presented in Table 7 show that the return predictability of the passive duration is much stronger for stocks that are more important in passive funds' overall portfolio holdings, consistent with hypothesis H4.

4.5.2 Russell 1000 vs Russell 2000 stocks

So far, our analysis is based on the entire sample of U.S. equity index funds and ETFs. Although we controlled for a number of firm characteristics in the cross-sectional regressions, it is quite possible that our specifications omit certain relevant variables. An alternative approach is to compare subgroups of stocks that otherwise have similar characteristics, but have different weights in passive funds' portfolio holdings. To do so, we follow Appel et al. (2016) to directly compare stocks at the bottom of the Russell 1000 and the top of the Russell 2000. Stocks near the cutoff boundaries of the indexes should share similar characteristics, including market capitalization. As the top 250 stocks in the Russell 2000 index have greater proportional weights in the index, however, the passive funds' ownership of these stocks would be much larger than that of stocks among the bottom 250 of the Russell 1000 stocks. We would then expect the

predictability of the passive funds' holdings duration to be stronger for the top 250 stocks in the Russell 2000 compared to the bottom 250 stocks in the Russell 1000 index.

We require that the stocks in both the Russell 1000 and Russell 2000 indexes stay in the index for at least 2 consecutive years, and the stocks must also be represented in the S12 fund holdings data. [8] We then select the bottom 250 stocks in the Russell 1000 index and the top 250 stocks in the Russell 2000 index at the end of June each year. Panel A of Table 8 reports summary statistics for these two samples over the period 2011:Q2 – 2015:Q3. On average, we have 210 stocks from the bottom 250 stocks of the Russell 1000 index, and 230 stocks from the top 250 stocks of the Russell 2000 index in our sample. As expected, the average market capitalization of the bottom Russell 1000 stocks is larger than that of the Russell 2000 stocks. The average market capitalization for the bottom Russell 1000 stocks in our sample is $2.88 billion, and that for the top Russell 2000 stocks is $2.49 billion. The passive funds' percentage holding of the top Russell 2000 stocks (11.2%) are considerably higher than those in the bottom Russel 1000 stocks (8.4%). The difference in passive funds' ownership is quite significant at the 1% level. The average passive funds' holdings duration for the top Russell 2000 stocks is also higher, at 10.30 quarters, compared to that for the bottom Russell 1000 stocks at 9.68 quarters.

Panel B of Table 8 reports the regression results. Indeed, the return predictability of passive funds' holdings duration is only significant for the top Russell 2000 stocks. For the top Russell 2000 stocks, the average coefficient on the passive holdings' duration measure is 1.583 for the 3-month-ahead return regressions, with a t-statistic of 1.850. For 1-year- and 2-year-ahead return regressions, the corresponding coefficients are 5.208 and 8.680, and the associated t-statistics are

[8] Our results are qualitatively unchanged, as we impose the requirement that stocks continuously remain in the Russell 1000/2000 index for the past 5 years.

2.90 and 2.26, respectively. On the other hand, none of the coefficients on the passive duration measure is significant for the bottom Russell 1000 stocks. Consistent with evidence from tests based on stock excess weight, results for the bottom (top) Russell 1000 (2000) stocks suggest that passive funds would indeed spend more efforts and be more effective in monitoring the performance of stocks that are more important in their portfolio holdings.[9]

4.6. Alternative explanations

One possible alternative explanation for the predictive ability of passive funds' holdings duration is that the increasing popularity of index funds and the investor flows to these funds lead to higher valuations for stocks in the relevant indexes. Figure 1 shows that the size of index funds has increased dramatically over our sample period. However, several aspects of the evidence from our empirical tests suggest that investor flow-driven price changes are unlikely to explain our findings. First, we require that all stocks have 2 consecutive quarters of passive funds' holdings data to be included in the sample. Therefore, short-term positive shocks to investor flows cannot directly explain the predictability of future returns at horizons of up to 2 years.

Second, it is well documented that investors chase past performance. Hence, investor flow-driven return predictability should be more pronounced for stocks that have been performing well. Our evidence, however, shows that the return predictability of passive holdings duration is stronger for poorly performing stocks. To more directly control the effect of fund flows, we include an additional control variable, namely, the percentage change in quarterly passive funds' holdings. If fund flows affect our results, we would expect the corresponding coefficient to be positive and significant, and after controlling for the fund flow effect, the impact of the passive holdings'

[9] We advise caution in interpreting the results presented in this table, as they are based on only 5 years of Russell 1000/2000 index constituent data we were able to obtain from FTSE Russell.

duration on future stock returns should be weakened. However, we find that the coefficient for the percentage change in quarterly passive funds' holdings is insignificant. Controlling for the change in passive fund holdings, the average coefficient for passive fund holdings duration remains virtually unchanged.

Another potential explanation for our findings is that the better performing stocks would mechanically enjoy a longer duration of ownership by passive funds' holdings. To the extent that such stocks continue to perform well in the future, one would expect a positive relation between passive funds' holdings duration and future stock returns. To explore this potential reverse causality, we examine the correlation between the duration of holdings measure and past stock returns. In untabulated results, we find that the correlations are in fact quite weak and, in some cases, negative.

5. Long-term return predictability: Passive funds vs active funds

We have presented evidence that duration measures based on passive fund holdings predict future stock returns, and our results are consistent with passive funds' incentive to monitor firms' governance and performance. A number of recent papers on mutual funds (e.g., Cremers and Pareek, 2016; Lan, Moneta, and Wermers, 2016) argue that long-term funds' investors may have information about firms' long-term performance, and their patient investment strategy outperforms passive funds, especially for active funds whose holdings are different from their benchmarks. Given the long-term nature of investments in both cases, it is possible that long-term active funds are also simply investing in stocks that benefit from passive fund ownership (Hypothesis H5).

5.1. Passive fund duration, active fund duration, closet index duration, and stock returns

We test Hypothesis H5 using the same Fama-Macbeth regression framework as in Section 4, by regressing future 3-month/12-month stock returns on duration measures based on active funds holdings and passive funds holdings. First, we decompose active funds into pure active funds and closet indexers. Following Cremers and Pareek (2016), we define those funds with more than 60% active shares as pure active funds, and the rest as closet indexers. Since the holdings' duration measure connects funds' overall holding history, we require that a fund has high/low active shares during the entire sample period. Next, we construct duration measures based on holdings of closet indexers and pure active funds, separately. Finally, for each return horizon (3-month and 1-year), we examine two models. In Model (1), we compare the effect of duration measures based on closet indexers and on active funds, and in Model (2) we also include the duration measure based on passive funds holdings.

Columns (1) and (3) of Table 9 report the results for Model (1). For 3-month returns, the coefficient of duration based on pure active funds is marginally significant at the 10% level, while it becomes insignificant for 12-month returns. The duration measure based on closet indexers is 0.071 at the 3-month horizon, albeit statistically insignificant. For the 1-year horizon, the coefficient is 0.872 and statistically significant at the 1% level. These results are consistent in spirit with Harford, Kecskes, and Mansi (2018) that holdings of long-term investors predict higher future returns.

Harford, et al. (2018) include closet indexers as index funds. Closet indexers might be able to mimic index funds, but they still have the flexibility to exit their stock positions. Hence, they do not necessarily have the same incentives as genuine index fund investors. We next test the marginal effects of duration measures based on passive funds holdings and closet indexer holdings,

respectively. When we include the passive funds' holdings duration measure in Columns (2) and (4), the coefficients on active funds duration decline to 0.247 (0.492) for 3-month (12-month) returns, compared to Model (1), and they are statistically insignificant at the 10% level. The coefficient on closet indexers' duration declines to -0.013 (0.512) for 3-month (12-month) returns. It is statistically insignificant for 3-month returns, and only significant at the 10% level for 12-month returns. By contrast, the coefficient for passive funds holdings duration is 0.390 (3-months) and 1.948 (12-months), and remains statistically significant at the 5% level.[10]

5.2. Double sorts by stocks in passive funds duration and active funds duration

To further compare the long-term holdings' effect on stock returns between passive funds and active funds, we employ double sorts of stocks into 5x5 portfolios by passive fund duration and by active fund duration. Table 10 reports the results. In panel A, we first sort the sample of stocks into quintiles by the passive duration (*dur-weighted*) each quarter. Within each passive duration quintile, we further sort stocks into quintiles by the active fund duration (*dur-weighted-ac*) each quarter. In Panel B, we switch the order of sorting. Therefore, panel A examines the effect of active fund duration, controlling for passive fund duration, while Panel B examines the effect of passive fund duration, controlling for active fund duration.

These portfolios are held for 1 quarter and1 year, respectively. We calculate monthly equal-weighted returns for each portfolio. For each holding horizon, we also report portfolio alphas from the time-series regressions of the five-factor model (the Fama and French (1993) three factors plus the Carhart momentum factor and the Stambaugh and Pastor (2003) liquidity factor), as well as

[10] We also compare duration in passive funds and in active funds directly, without dividing active funds by active share. Results are similar: for 1-quarter returns and 1-year returns, after controlling for passive fund duration, the coefficient on active fund duration decreases in magnitude and is no longer statistically significant.

the difference in alphas between the longest and shortest active durations in panel A (passive durations in panel B).

In panel A, for the 1-quarter holding period, the difference in monthly alphas is significant at the 5% level only for the two shortest passive fund duration quintiles, with the point estimates being 0.537%, and 0.343%, respectively. Alpha differences for the other three passive fund duration-sorted quintiles are statistically insignificant at the 10% level. Results for the 1-year holding period are similar. The alpha difference (0.556% per month) is significant at the 5% level only for the quintile with the shortest passive fund duration (the 1st quintile). For the next two passive duration quintiles (2nd, 3rd), alpha differences are smaller at 0.265% and 0.279% per month, and significant only at the 10% level. For the 4th and 5th passive fund duration quintiles, the differences in alpha are statistically insignificant.

In panel B, for each of the active fund duration-sorted quintile portfolios, alpha differences between the portfolio with the longest passive duration and that with the shortest passive duration are statistically significant for almost all subportfolios. For example, for portfolios with a 1-year holding period, the difference in the 5-factor alpha is 0.665% and statistically significant at the 1% level for the shortest active-fund duration quintile, and remains significant for quintiles with longer active fund duration. For quintile 5 with the longest active fund duration, the monthly alpha difference is 0.436% and significant at the 5% level. The results are similar for portfolios with a 1-quarter holding period. The only exception is for quintile 5 with the longest active fund duration, where the alpha difference becomes statistically insignificant at the 10% level.

Overall, our results show that it is the long-term ownership by the genuine index funds and ETFs, rather than the active funds' long-term investment that best predicts future stock returns. The evidence is consistent with our hypothesis H5, as described in Section 2.

6. Concluding Remarks

Recent years have witnessed a significant shift in investor interest from actively managed funds to low-cost passive funds designed to match the performance of market indexes. The implication of this shift for the governance of publicly traded firms owned by passive funds has been the subject of considerable interest and debate. The conventional view is that ownership by passive funds weakens corporate oversight. However, recent research on this issue has offered a very different viewpoints on this issue. Specifically, Appel, et al. (2016) demonstrate that passive fund investors do in fact play an important role in bringing about positive changes in firms' governance policies that lead to improvements in profitability and firm valuation. Motivated by these results, in this paper we further explore the implications of stock ownership by index funds for firms' stock performance over the short-term and the long-term.

We document a strong positive relation between the duration of passive fund holdings and subsequent performance of the stocks they own, both in the short term and at longer horizons of up to 2 years. The positive relationship between holdings duration and future stock returns is stronger in the case of poorly performing firms, smaller firms, and firms with larger proportional ownership by passive funds. Further, we find that the predictive ability of the passive funds' holdings duration measure for future stock returns is much stronger for stocks at the top of the Russell 2000 index compared to those at the bottom of the Russell 1000 index. These findings are

consistent with the notion that significant holdings of passive funds are associated with more effective monitoring by the funds. We rule out a number of alternative explanations for our findings, including investor fund flow-driven price pressure and the potential for reverse causality. We also provide evidence that our results are not driven by closet indexers. Overall, the evidence in this study confirms that passive fund investors contribute to shareholder value creation. Since 'exit' is not an option for passive funds, they appear to bring about improvements in firm performance by actively engaging with the firms they own and exercising the power of their 'voice' over the long-term.

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Table 1. Summary statistics

Table 1 reports summary statistics. The sample consists of U.S. common stocks from 2003.q1 to 2015.q3. *Dur-weighted* is the weighted average time that a stock has been held by passive funds over the previous 5 years (in quarters), using passive ownership as a weight. *Dur-equal* is the equal-weighted average time a stock has been held by passive funds over the previous 5 years (in quarters). *CR-weighted* is the weighted average of turnover of passive funds holding a stock, using passive ownership as a weight. *CR-equal* is the equal-weighted average of turnover of passive funds holding a stock. *Index%* is percentage of shares held by passive funds. Duration, Churn Ratio, and ownership in active funds are similarly defined. These variables and other control variables are defined in Section 3. We eliminate stocks with missing market capitalization or book value of equity data, and stocks with prices below $1 or above $1,000. We require that a stock be held by one fund for at least two consequent quarters. Duration is winsorized at 1st percentiles, and expressed in quarters. Churn Ratio, ownership, and book-to-market ratio are winsorized at 1st and 99th percentiles.

Panel A: Time-series statistics of cross-sectional averages

Variable	Mean	Std dev.	Min	Median	Max
Passive Funds:					
Dur-weighted	7.910	1.458	5.287	7.581	10.179
Dur-equal	7.118	1.260	5.071	6.827	9.100
CR-weighted	0.118	0.027	0.084	0.116	0.213
CR-equal	0.132	0.019	0.104	0.127	0.181
Index%	0.047	0.019	0.010	0.047	0.079
Active Funds:					
Dur-weighted-ac	5.785	1.171	3.944	5.567	7.582
Dur-equal-ac	5.289	1.346	3.265	4.847	7.472
CR-weighted-ac	0.161	0.017	0.133	0.160	0.198
CR-equal-ac	0.182	0.023	0.142	0.182	0.229
Active%	0.103	0.007	0.084	0.105	0.114
Control Variables:					
# Stocks	3726	280	2595	3714	4303
Price	27.157	5.245	15.841	26.715	38.014
Size(millions)	4436.570	1130.440	2634.710	4194.000	6967.550
Btm	1.107	0.310	0.578	1.136	1.753
Volatility	0.121	0.025	0.094	0.112	0.180
Turnover	0.171	0.025	0.128	0.169	0.234
Age (months)	220.723	17.719	193.064	217.063	254.184
Beta	1.025	0.113	0.746	1.022	1.243
Ret(t,t-3)	0.038	0.109	-0.277	0.034	0.342
Ret(t-3,t-12)	0.133	0.236	-0.371	0.115	0.795
Ret(t-12,t-36)	0.374	0.410	-0.456	0.330	1.611

Panel B: Time-series mean of cross-sectional correlations

	Churn ratio_fund	Dur-weighted	Dur-equal	CR-weighted	CR-equal	Index%
Duration _fund	-0.625					
Dur-weighted		1.000				
Dur-equal		0.842	1.000			
CR-weighted		-0.434	-0.412	1.000		
CR-equal		-0.327	-0.380	0.728	1.000	
Index%		0.253	0.219	0.008	0.089	1.000

	Price	Size	Btm	Volatility	Turnover	Age	Beta	SP_500 dummy	Ret(t,t-3)	Ret(t-3,t-12)	Ret(t-12,t-36)
Dur-weighted	0.071	0.057	0.045	-0.161	-0.105	0.455	-0.062	0.238	0.014	-0.011	-0.080
Dur-equal	0.010	-0.009	0.094	-0.138	-0.144	0.448	-0.086	0.212	0.009	-0.037	-0.147
CR-weighted	0.016	0.092	-0.048	0.141	0.227	-0.208	0.182	-0.135	0.034	0.077	0.014
CR-equal	0.177	0.262	-0.093	0.037	0.270	-0.110	0.157	0.036	0.075	0.156	0.072
Index%	0.234	0.307	-0.070	-0.091	0.344	0.304	0.290	0.205	0.020	0.021	0.003

Table 2: Stock duration and future returns

This table reports quarterly Fama-Macbeth regression estimates for 1-quarter-ahead, 1-year-ahead, and 2-year-ahead stock returns on passive funds' stock duration and stock characteristics. Stock-level passive duration is *dur-weighted* by ownership weighted in Column (1) and *dur-equal* by equal weighted in Column (2) across all the passive funds holding that stock. Sample period is from 2003.q1 to 2015.q3. All variables except beta, SP500 index membership, and returns are expressed in natural logarithms. Returns are in percent. Standard errors are based on the Newey-West (1987) estimator. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	Ret(t,t+3)		**Ret(t,t+12)**		**Ret(t+12, t+24)**	
	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	1.590	1.392	2.937	2.760	1.007	0.483
	(0.853)	(0.754)	(0.297)	(0.278)	(0.104)	(0.049)
Log(Dur-weighted)	0.805***	0.968***	3.133***	3.279***	2.665***	3.295***
	(3.663)	(3.890)	(3.056)	(3.492)	(3.431)	(3.462)
Log(Size)	-0.144	-0.136	-0.146	-0.145	0.082	0.089
	(-0.767)	(-0.738)	(-0.245)	(-0.244)	(0.138)	(0.150)
Log(Btm)	0.164	0.143	1.568	1.513	1.453	1.391
	(0.615)	(0.535)	(1.356)	(1.288)	(1.507)	(1.413)
Log(Turnover)	-0.007	0.008	-0.817	-0.781	-0.437	-0.407
	(-0.032)	(0.033)	(-1.339)	(-1.255)	(-0.715)	(-0.651)
Log(Volatility)	0.541	0.498	2.719	2.588	3.477	3.442
	(0.632)	(0.584)	(1.510)	(1.425)	(1.357)	(1.325)
Log(Age)	-0.133	-0.142	-0.336	-0.265	-0.249	-0.338
	(-1.055)	(-1.033)	(-0.910)	(-0.799)	(-0.490)	(-0.619)
Log(Price)	-0.002	-0.002	0.007	0.007	0.005	0.005
	(-0.637)	(-0.624)	(0.824)	(0.857)	(0.949)	(1.027)
Beta	-0.192	-0.165	-0.912	-0.813	-1.148	-1.083
	(-0.511)	(-0.441)	(-1.368)	(-1.173)	(-1.638)	(-1.535)
SP_500 dummy	0.175	0.168	1.180	1.204	1.292	1.313
	(0.390)	(0.382)	(0.684)	(0.676)	(0.719)	(0.716)
Ret(t,t-3)	-0.003	-0.003	-0.025	-0.025	-0.041	-0.041
	(-0.291)	(-0.292)	(-0.839)	(-0.825)	(-1.559)	(-1.545)
Ret(t-12,t-3)	-0.001	-0.000	-0.036	-0.035	-0.029	-0.027
	(-0.043)	(-0.022)	(-1.214)	(-1.190)	(-1.354)	(-1.311)
Adjusted R-square	0.056	0.056	0.051	0.050	0.035	0.035
Quarters	51	51	51	51	48	48
Obs	188807	188807	180296	180296	159702	159702

Table 3: Stock churn ratio and future returns

This table provides quarterly Fama-Macbeth regressions for future 1-quarter-ahead, 1-year-ahead, and 2-year-ahead returns on stock churn ratio in passive funds and stock characteristics. Stock level churn ratio is *CR-weighted* by ownership weighted in Column (1) and *CR-equal* by equal weighted in Column (2) across all the passive funds holding that stock. Sample period is from 2003.q1 to 2015.q3. All variables except Churn Ratio, beta, SP500 index membership, and returns are expressed in natural logarithms. Returns are in percent. Standard errors are based on the Newey-West (1987) estimator. *, **, and *** denote significance at the 10%, 5%, and 1% level.

	Ret(t,t+3)		**Ret(t,t+12)**		**Ret(t+12,t+24)**	
	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	2.370	2.195	6.213	5.851	4.197	3.741
	(1.261)	(1.169)	(0.598)	(0.568)	(0.423)	(0.381)
CR-weighted	-2.056***	-0.886	-6.940**	-3.512	-9.016**	-6.929
	(-3.445)	(-1.271)	(-2.280)	(-0.963)	(-2.626)	(-1.531)
Log(Size)	-0.143	-0.152	-0.190	-0.227	0.080	0.086
	(-0.755)	(-0.797)	(-0.328)	(-0.398)	(0.137)	(0.147)
Log(Btm)	0.176	0.169	1.578	1.542	1.426	1.376
	(0.664)	(0.642)	(1.382)	(1.338)	(1.481)	(1.427)
Log(Turnover)	-0.001	-0.008	-0.806	-0.825	-0.411	-0.405
	(-0.003)	(-0.036)	(-1.332)	(-1.347)	(-0.661)	(-0.618)
Log(Volatility)	0.527	0.501	2.636	2.549	3.431	3.326
	(0.614)	(0.581)	(1.454)	(1.399)	(1.347)	(1.304)
Log(Age)	0.075	0.112	0.475**	0.576***	0.356	0.452
	(0.642)	(0.937)	(2.294)	(2.752)	(0.909)	(1.199)
Log(Price)	-0.002	-0.002	0.007	0.007	0.003	0.004
	(-0.663)	(-0.604)	(0.717)	(0.783)	(0.616)	(0.727)
Beta	-0.170	-0.170	-0.782	-0.754	-1.048	-1.000
	(-0.454)	(-0.455)	(-1.165)	(-1.122)	(-1.480)	(-1.412)
SP_500 dummy	0.178	0.239	1.299	1.445	1.327	1.437
	(0.395)	(0.524)	(0.759)	(0.835)	(0.740)	(0.789)
Ret(t,t-3)	-0.003	-0.003	-0.023	-0.023	-0.039	-0.038
	(-0.239)	(-0.249)	(-0.749)	(-0.749)	(-1.532)	(-1.519)
Ret(t-12,t-3)	-0.000	-0.001	-0.036	-0.036	-0.028	-0.029
	(-0.036)	(-0.044)	(-1.201)	(-1.223)	(-1.360)	(-1.379)
Adjusted R-square	0.055	0.055	0.049	0.049	0.034	0.034
Quarters	51	51	51	51	48	48
Obs	188807	188807	180296	180296	159702	159702

Table 4: Portfolio approach

This table reports monthly equal-weighted portfolio raw returns and alphas after controlling for Fama French three factors (market factor, size factor, value factor), Carhart momentum factor and market liquidity factor (Pastor and Stambaugh,2003). Stocks are divided into quintiles each quarter from 2003.q1 to 2015.q3 according to stock duration in passive funds *dur-weighted*, with quintiles 1 and 5 consisting of short- and long-duration stocks, respectively. We then report returns for these five portfolios and the return differences, which are calculated over the next one quarter, next 1 year, and next 2 years. For returns longer than one quarter, we use the Jegadeesh and Titman (1993) approach to adjust overlaps. All reported returns are in percent per month. *, **, *** represent significance for return difference at 10%, 5%, and 1% levels. Standard errors are based on the Newey-West (1987) estimator. To save space, we only report ownership-weighted duration.

Dur-weighted						
Monthly Equal-Weighted Return and Alpha						
	1	2	3	4	5	5-1
Ret(t,t+3)						
Raw return	0.540	0.736	0.931	0.918	1.114	0.574***
	(0.943)	(1.324)	(1.798)	(1.862)	(2.252)	(3.281)
4-factor Alpha	-0.286	-0.074	0.120	0.129	0.422	0.709***
	(-1.816)	(-0.710)	(1.742)	(1.721)	(2.996)	(4.804)
5-factor Alpha	-0.282	-0.073	0.119	0.128	0.423	0.705***
	(-1.799)	(-0.690)	(1.726)	(1.693)	(3.025)	(4.757)
Ret(t,t+12)						
Raw return	0.656	0.843	0.963	1.007	1.145	0.489***
	(1.160)	(1.539)	(1.940)	(2.143)	(2.418)	(3.048)
4-factor Alpha	-0.211	-0.015	0.111	0.181	0.416	0.627***
	(-1.386)	(-0.149)	(1.848)	(2.779)	(3.324)	(4.592)
5-factor Alpha	-0.209	-0.013	0.111	0.179	0.416	0.625***
	(-1.353)	(-0.135)	(1.838)	(2.699)	(3.338)	(4.467)
Ret(t,t+24)						
Raw return	0.738	0.885	1.017	1.096	1.184	0.447***
	(1.590)	(1.976)	(2.412)	(2.742)	(2.926)	(3.349)
4- factor Alpha	-0.180	-0.021	0.119	0.218	0.403	0.584***
	(-1.210)	(-0.196)	(1.950)	(3.320)	(3.401)	(4.213)
5-factor Alpha	-0.182	-0.022	0.118	0.220	0.403	0.585***
	(-1.198)	(-0.201)	(1.915)	(3.366)	(3.385)	(4.126)

Table 5: Subsample results based on past stock returns

This table provides quarterly Fama-Macbeth regressions for future one-quarter-ahead, 1-year-ahead, and 2-year-ahead returns on stock duration in passive funds interacted with "*low*" dummy variable and stock characteristics. Each quarter, we divide the total sample by past 1- year (3-year) cumulative returns into halves. If past 1-year (3-year) returns are below the cross-sectional median, then *low* equals to one, else zero. Sample period is from 2003.q1 to 2015.q3. All variables except beta, SP500 index membership and returns are expressed in natural logarithms. Returns are in percent. Standard errors are based on the Newey-west (1987) estimator. *, **, and *** represent significance at the 10%, 5%, and 1% levels. To save space, we only report results based on ownership-weighted holdings duration measure.

	Ret(t,t+3)	**Ret(t,t+12)**	**Ret(t+12,t+24)**	**Ret(t,t+3)**	**Ret(t,t+12)**	**Ret(t+12,t+24)**
	Past 1-year cumulative returns			Past 3-year cumulative returns		
Intercept	4.254*	9.620	5.155	3.504*	7.820	3.780
	(1.847)	(0.870)	(0.534)	(1.801)	(0.908)	(0.437)
Log(Dur-weighted)	0.321*	1.889***	2.366***	0.568***	2.094**	1.997**
	(1.719)	(2.882)	(3.442)	(3.023)	(2.070)	(2.253)
Log(Dur-weighted)*low	0.981***	2.481***	0.531	0.576**	2.318***	1.595
	(3.922)	(3.233)	(1.287)	(2.337)	(3.414)	(1.391)
Low	-2.905***	-8.404***	-3.101***	-1.872***	-7.472***	-3.803
	(-5.924)	(-4.350)	(-4.015)	(-3.537)	(-4.673)	(-1.640)
Log(Size)	-0.046	0.163	0.377	-0.026	0.195	0.293
	(-0.353)	(0.325)	(0.676)	(-0.211)	(0.434)	(0.536)
Log(Btm)	0.119	1.429	1.372	0.153	1.535	1.359
	(0.461)	(1.238)	(1.406)	(0.578)	(1.218)	(1.398)
Log(Turnover)	0.082	-0.579	-0.309	0.094	-0.607	-0.035
	(0.302)	(-0.818)	(-0.433)	(0.338)	(-0.752)	(-0.043)
Log(Volatility)	0.236	2.071	2.718	0.182	2.295	2.614
	(0.365)	(1.219)	(1.215)	(0.295)	(1.432)	(1.299)
Log(Age)	-0.102	-0.217	-0.191	-0.019	0.013	0.115
	(-0.979)	(-0.652)	(-0.418)	(-0.199)	(0.041)	(0.294)
Log(Price)	-0.483	-1.169	-1.107	-0.617	-1.615	-1.192
	(-0.929)	(-0.982)	(-0.909)	(-1.195)	(-1.477)	(-1.037)
Beta	-0.261	-1.174*	-1.060	-0.308	-0.979	-1.050*

	(-0.716)	(-1.685)	(-1.596)	(-0.807)	(-1.392)	(-1.678)
SP_500 dummy	0.052	0.828	0.988	0.083	1.031	0.706
	(0.139)	(0.477)	(0.558)	(0.237)	(0.624)	(0.391)
Ret(t,t-3)	-0.010	-0.047*	-0.048**	-0.008	-0.034	-0.030
	(-0.956)	(-1.795)	(-2.354)	(-0.769)	(-1.289)	(-1.531)
Ret(t-12,t-3)	-0.003	-0.049*	-0.033**	0.001	-0.036	-0.016
	(-0.316)	(-1.909)	(-2.242)	(0.106)	(-1.342)	(-1.009)
Ret(t-36,t-12)				-0.001	-0.004	-0.003
				(-0.334)	(-0.701)	(-1.035)
Adjusted R-square	0.060	0.056	0.037	0.063	0.058	0.038
Quarters	51	51	48	51	51	48
Obs	188807	180296	159702	174820	167066	148537

Table 6: Subsample results by firm size and market conditions

This table reports estimates from the quarterly Fama-Macbeth regressions for future one-quarter-ahead, 1-year-ahead, and 2-year-ahead returns on stock duration in passive funds and stock characteristics divided by firm size and market conditions. In Panel A, we divide the total sample by firm market capitalizations into halves each quarter. If the stock size is lower than cross-sectional median, then *small* dummy equals to one, else zero. In Panel B, we divide sample periods into halves by CBOE *VIX* index median (17%) in our sample period. Sample period is from 2003.q1 to 2015.q3. All variables except beta, SP500 index membership, and returns are expressed in natural logarithms. Returns are in percent. Standard errors are based on the Newey-West (1987) estimator. *, **, *** represent significance at 10%, 5%, and 1% confidence intervals. To save space, we only report ownership-weighted duration.

Panel A: Subsample results by firm size

	Ret(t,t+3)	**Ret(t,t+12)**	**Ret(t+12,t+24)**
Intercept	4.681**	14.604	10.589
	(2.198)	(1.362)	(1.349)
Log(Dur-weighted)	0.282	1.544*	1.070
	(1.021)	(1.683)	(0.777)
Log(Dur-weighted)*small	0.715**	2.231***	2.129
	(2.081)	(2.964)	(1.344)
Small	-1.996**	-7.709***	-6.369
	(-2.463)	(-4.504)	(-1.578)
Log(Size)	-0.163	-0.592	-0.212
	(-1.276)	(-1.107)	(-0.567)
Log(Btm)	0.126	1.408	1.324
	(0.520)	(1.259)	(1.389)
Log(Turnover)	0.039	-0.833	-0.490
	(0.145)	(-1.189)	(-0.702)
Log(Volatility)	0.240	2.091	2.841
	(0.364)	(1.208)	(1.275)
Log(Age)	-0.082	-0.206	-0.122
	(-0.798)	(-0.639)	(-0.276)
Log(Price)	-0.448	-1.063	-1.080
	(-0.870)	(-0.901)	(-0.848)
Beta	-0.225	-1.026	-0.976
	(-0.555)	(-1.392)	(-1.425)
SP_500 dummy	0.277	2.059	2.137
	(0.714)	(1.213)	(1.524)
Ret(t,t-3)	-0.002	-0.019	-0.032
	(-0.227)	(-0.725)	(-1.664)
Ret(t-12,t-3)	0.002	-0.027	-0.022
	(0.212)	(-1.047)	(-1.370)
Adjusted R-square	0.061	0.055	0.038
Quarters	51	51	48
Obs	188807	180296	159702

Panel B: Subsample results based on market conditions

	Ret(t,t+3)		Ret(t,t+12)		Ret(t+12,t+24)	
	VIX>=17%	**VIX<17%**	**VIX>=17%**	**VIX<17%**	**VIX>=17%**	**VIX<17%**
Intercept	3.797	1.378	10.566	-0.829	12.292**	-6.752
	(1.072)	(0.655)	(1.228)	(-0.096)	(2.599)	(-0.543)
Log(Dur-weighted)	0.931***	0.671**	4.111***	2.159**	3.509***	1.674**
	(3.624)	(2.221)	(5.305)	(2.477)	(6.420)	(2.804)
Log(Size)	0.048	-0.109	0.227	0.208	0.724	0.128
	(0.267)	(-0.640)	(0.464)	(0.367)	(0.845)	(0.233)
Log(Btm)	-0.174	0.439	0.922	2.025	1.433	1.428
	(-0.525)	(1.309)	(0.973)	(1.435)	(1.104)	(1.069)
Log(Turnover)	0.525	-0.381***	0.491	-1.749***	0.447	-1.144***
	(1.098)	(-2.850)	(0.376)	(-7.191)	(0.346)	(-4.491)
Log(Volatility)	-0.205	0.656	0.647	3.326	6.857**	-1.261
	(-0.189)	(0.883)	(0.459)	(0.895)	(2.484)	(-0.320)
Log(Age)	-0.040	-0.156	-0.268	-0.185	-1.280***	0.932***
	(-0.216)	(-1.614)	(-0.899)	(-0.770)	(-4.270)	(3.639)
Log(Price)	-1.509	0.596*	-3.781**	1.648***	-3.239**	1.209
	(-1.710)	(1.965)	(-2.452)	(3.164)	(-2.305)	(1.596)
Beta	-0.220	-0.289	-1.258	-1.065	-2.031	-0.128
	(-0.307)	(-1.126)	(-1.338)	(-1.250)	(-1.117)	(-0.197)
SP_500 dummy	-0.553	0.546	-0.462	1.882	2.009	-0.227
	(-1.178)	(1.245)	(-0.410)	(1.273)	(0.833)	(-0.253)
Ret(t,t-3)	-0.014	0.008	-0.064	0.023*	-0.084**	0.021
	(-0.968)	(0.603)	(-1.242)	(1.757)	(-2.664)	(1.465)
Ret(t-12,t-3)	-0.005	0.010*	-0.058	0.002	-0.067***	0.024***
	(-0.260)	(2.035)	(-1.214)	(0.272)	(-5.475)	(3.110)
Adjusted R-square	0.080	0.040	0.065	0.044	0.037	0.037
Quarters	25	26	25	26	24	24
Obs	92215	96592	88393	91903	80148	79554

Table 7: Importance of underlying stocks holding in passive funds

This table provides quarterly Fama-Macbeth regressions for future one-quarter-ahead, 1-year-ahead, and 2-year-ahead returns on stock duration in passive funds interacted with "*Important*" dummy and stock characteristics. Stock excess weight is measured as the difference between a stock's passive holding weight in total passive funds and the stock's value weight in market portfolios. We then sort the total sample by the excess weight into halves each quarter. If a stock's excess weight is above the cross-sectional median, *important* equals to one, else zero. Sample period is from 2003.q1 to 2015.q3. Standard errors are based on the Newey-West (1987) estimator. *, **, *** represent significance at the 10%, 5%, and 1% levels. To save space, we only report ownership-weighted duration.

	Ret(t,t+3)	**Ret(t,t+12)**	**Ret(t+12,t+24)**
Intercept	3.230	5.186	1.004
	(1.609)	(0.525)	(0.112)
Log(Dur-weighted)	0.564**	2.540***	2.517**
	(2.564)	(2.856)	(2.575)
Log(Dur-weighted)*important	0.576**	1.167**	-0.182
	(2.140)	(2.610)	(-0.159)
Important	-1.431**	-1.500	2.568
	(-2.116)	(-1.080)	(0.914)
Log(Size)	-0.078	0.329	0.769
	(-0.632)	(0.845)	(1.569)
Log(Btm)	0.139	1.438	1.382
	(0.619)	(1.290)	(1.491)
Log(Turnover)	0.087	-0.699	-0.467
	(0.330)	(-0.908)	(-0.617)
Log(Volatility)	0.227	2.064	2.866
	(0.340)	(1.250)	(1.299)
Log(Age)	-0.060	-0.306	-0.408
	(-0.636)	(-0.811)	(-0.888)
Log(Price)	-0.446	-1.036	-1.048
	(-0.895)	(-0.881)	(-0.842)
Beta	-0.268	-1.236*	-1.142*
	(-0.552)	(-1.737)	(-1.753)
SP_500 dummy	0.105	0.811	0.740
	(0.305)	(0.487)	(0.436)
Ret(t,t-3)	-0.003	-0.019	-0.029
	(-0.262)	(-0.720)	(-1.528)
Ret(t-12,t-3)	0.002	-0.026	-0.021
	(0.254)	(-1.026)	(-1.319)
Adjusted R-square	0.060	0.055	0.038
Quarters	51	51	48
Obs	188807	180296	159702

Table 8: Stocks in Russell 1000 Index vs Russell 2000 Index

This table compares stocks in Russell 1000 and Russell 2000 indexes. We select the sample as: (1) a stock is held by Russell 1000 (Russell 2000) at the end of June in the previous year and (2) this stock is ranked in the bottom 250 of Russell 1000 (top 250 of Russell 2000) at the end of June in this year. Panel A compares the summary statistics between the two groups. We provide the mean level of each variable, the difference of the mean between the two groups and associated t-values after clustering on individual firms. Panel B provides quarterly Fama-Macbeth regressions for future one-quarter-ahead, 1-year-ahead, and 2-year-ahead returns on stock duration and stock characteristics by comparing stocks in Russell 1000 and Russell 2000 indexes. Sample period is from 2011.q2 to 2015.q3. Standard errors are based on the Newey-West (1987) estimator. *, **, *** represent significance at the 10%, 5%, and 1% levels. To save space, we only report ownership-weighted duration.

Panel A: Summary statistics

	Bottom 250 stocks of Russell 1000	Top 250 stocks of Russell 2000	Difference	T statistics
	(1)	(2)	(1)-(2)	(1)-(2)
Size (1000s)	2878.956	2489.414	389.542	2.65
Dur-weighted	9.684	10.301	-0.617	-3.85
CR-weighted	0.090	0.081	0.009	3.24
Index%	0.084	0.112	-0.028	-11.52

Panel B: Fama-Macbeth regressions

	Ret(t,t+3)		**Ret(t,t+12)**		**Ret(t+12, t+24)**	
	Russell1000	Russell2000	Russell1000	Russell2000	Russell1000	Russell2000
Intercept	3.739	8.534	2.408	64.029	26.858	83.541**
	(0.446)	(0.596)	(0.100)	(1.439)	(1.493)	(2.276)
Log(Dur-weighted)	1.115	1.583*	-0.606	5.208***	-3.999	8.680**
	(1.033)	(1.850)	(-0.216)	(2.901)	(-0.839)	(2.260)
Log(Index%)	0.449	-0.503	3.785	-4.189	5.325*	-6.767***
	(0.740)	(-0.363)	(1.527)	(-1.101)	(1.845)	(-3.609)
Log(Size)	0.628	-0.632	4.645*	-4.592	-0.189	-8.387*
	(0.736)	(-0.526)	(1.824)	(-0.999)	(-0.143)	(-2.111)
Log(Btm)	-0.064	-0.488	-0.544	-0.247	-2.750**	0.328
	(-0.129)	(-0.742)	(-0.445)	(-0.131)	(-2.612)	(0.207)
Log(Turnover)	-0.48	-2.548***	-1.675	-7.824***	-3.108*	-3.814***
	(-0.798)	(-3.381)	(-0.800)	(-6.450)	(-1.906)	(-3.148)
Log(Volatility)	-1.797	1.798	-5.073	1.862	2.753	-2.039
	(-1.353)	(1.697)	(-1.707)	(0.603)	(0.603)	(-0.308)
Log(Age)	-1.068**	0.119	-3.233**	0.292	-0.833	0.31
	(-2.129)	(0.371)	(-2.352)	(0.371)	(-0.417)	(0.377)
Log(Price)	-0.004	-0.02	0.005	0	-0.01	0.079
	(-1.018)	(-1.183)	(0.364)	(0.001)	(-1.052)	(1.625)
Beta	0.855	0.064	-2.983**	-1.852	-9.276***	-1.114
	(0.887)	(0.082)	(-2.357)	(-0.719)	(-3.183)	(-0.398)
Ret(t,t-3)	-0.018	-0.006	-0.143*	0.058	-0.033	0.029
	(-0.693)	(-0.243)	(-1.922)	(0.820)	(-0.284)	(0.444)
Ret(t-12,t-3)	0.018	0.021	0.054	0.06	0.082	-0.013
	(1.001)	(1.551)	(1.254)	(1.631)	(1.340)	(-0.573)
Adjusted R-square	0.094	0.095	0.094	0.090	0.114	0.103
Quarters	18	18	18	18	15	15
Obs	3413	3831	3344	3728	2723	2989

Table 9: Comparing passive funds and active funds

This table provides quarterly Fama-Macbeth regressions for future one-quarter-ahead and 1-year-ahead on stock duration and stock characteristics. We first divide active mutual funds into closet indexers and pure active funds by active share (cutoff 60%) following Cremers and Pareek (2016), and only select the funds that continuously belong to either group during the sample period. In columns (1) and (3), we compare stock duration in closet indexers and in pure active funds. Next, in columns (2) and (4), we introduce stock duration in passive funds and compare the long-term holding effect of passive funds, closet indexers, and pure active funds respectively**.** Sample period is from 2003.q1 to 2015.q3. All variables except beta, SP500 index members, and returns are expressed in natural logarithms. Returns are in percent. Standard errors are based on the Newey-West (1987) estimator. *, **, *** represent significance at the 10%, 5%, and 1% levels. To save space, we only report ownership-weighted duration.

	Ret(t,t+3)		**Ret(t, t+12)**	
	(1)	(2)	(3)	(4)
Intercept	4.163*	3.728*	10.308	8.229
.	(1.771)	(1.767)	(0.912)	(0.741)
Log(Dur-weighted)		0.390**		1.948**
		(1.979)		(2.579)
Log(Dur-weighted-closet indexers)	0.071	-0.013	0.872***	0.512*
	(0.520)	(-0.096)	(3.068)	(1.797)
Log(Dur-weighted-active funds)	0.308*	0.247	0.759	0.492
	(1.842)	(1.605)	(0.956)	(0.688)
Log(Size)	-0.117	-0.109	-0.206	-0.148
.	(-0.790)	(-0.710)	(-0.343)	(-0.246)
Log(Btm)	-0.132	-0.138	0.177	0.179
.	(-0.454)	(-0.543)	(0.151)	(0.154)
Log(Turnover)	0.011	0.003	-0.138	-0.172
.	(0.035)	(0.011)	(-0.163)	(-0.206)
Log(Volatility)	0.121	0.155	1.398	1.582
.	(0.183)	(0.223)	(0.829)	(0.949)
Log(Age)	-0.002	-0.066	-0.063	-0.404
.	(-0.012)	(-0.482)	(-0.167)	(-0.869)
Log(Price)	-0.499	-0.486	-1.101	-1.064
.	(-1.077)	(-1.105)	(-0.958)	(-0.939)
Beta	-0.319	-0.315	-1.293**	-1.330**
	(-0.588)	(-0.539)	(-2.076)	(-2.171)
SP_500 dummy	0.015	0.059	0.903	0.798
	(0.044)	(0.197)	(0.528)	(0.479)
Ret(t,t-3)	-0.009	-0.009	-0.016	-0.017
.	(-0.621)	(-0.676)	(-0.451)	(-0.477)
Ret(t-12,t-3)	0.000	0.000	-0.017	-0.016
	(0.038)	(0.037)	(-0.563)	(-0.553)
Adjusted R-square	0.070	0.071	0.064	0.065
Quarters	51	51	51	51
Obs	128234	128234	123455	123455

Table 10: Double sort by stock duration in passive funds and active funds

This table reports monthly equal-weighted double sort (5*5) portfolio five-factor alphas after controlling for Fama French three factors, Carhart momentum factor and Pastor and Stambaugh (2003) market liquidity factor. Panel A first sorts all the stocks each quarter into quintiles by passive fund ownership-weighted duration. Then within each quintile, stocks are second sorted into quintiles by active fund ownership-weighted duration. Panel B switches the sequence: First sort all the stocks into quintiles each quarter by active fund ownership-weighted duration, and second within each quintile group, sort stocks into quintiles by passive fund ownership-weighted duration. The portfolios are held for either 3 months or 12 months. We report the monthly five-factor alphas (in percent) as well as the difference in alphas between portfolio 5 and portfolio 1 for the second sorting sequence. We follow Jegadeesh and Titman (1993) to adjust overlaps. *, **, *** represent significance at 10%, 5%, and 1% level. Standard errors are based on the Newey-West (1987) estimator.

Panel A: First sort by passive duration (rows), and then sort by active duration (columns)

		Ret (t, t+3)						**Ret (t, t+12)**					
		Second sort: Stock duration in active funds (Dur-weighted-ac)						**Second sort: Stock duration in active funds (Dur-weighted-ac)**					
		1	2	3	4	5	5-1	1	2	3	4	5	5-1
1	5-factor alpha	-0.628	-0.383	-0.138	-0.171	-0.091	0.537**	-0.528	-0.341	-0.379	-0.051	0.028	0.556**
		(-3.177)	(-2.552)	(-0.909)	(-1.020)	(-0.465)	(2.223)	(-2.512)	(-1.861)	(-3.472)	(-0.319)	(0.118)	(2.246)
2	5-factor alpha	-0.141	-0.259	-0.073	-0.049	0.202	0.343**	-0.216	-0.130	-0.035	-0.000	0.049	0.265*
		(-1.108)	(-1.699)	(-0.608)	(-0.368)	(1.337)	(1.995)	(-1.569)	(-1.091)	(-0.272)	(-0.003)	(0.307)	(1.695)
3	5-factor alpha	-0.031	0.025	0.076	0.185	0.199	0.230	-0.109	-0.076	0.149	-0.001	0.170	0.279*
		(-0.258)	(0.281)	(0.995)	(2.191)	(1.642)	(1.334)	(-0.759)	(-0.857)	(1.338)	(-0.005)	(1.618)	(1.972)
4	5-factor alpha	-0.042	0.129	0.129	0.107	0.211	0.253	0.186	0.097	0.194	0.172	0.247	0.061
		(-0.354)	(1.414)	(1.615)	(1.331)	(1.893)	(1.612)	(1.832)	(1.743)	(3.807)	(1.711)	(2.207)	(0.462)
5	5-factor alpha	0.132	0.196	0.264	0.329	0.458	0.326	0.225	0.291	0.423	0.510	0.610	0.385
		(0.809)	(1.680)	(2.044)	(2.789)	(1.764)	(1.596)	(1.297)	(2.749)	(2.741)	(2.922)	(1.910)	(1.339)

Panel B: First sort by active duration (rows), and then sort by passive duration (columns)

		Ret (t, t+3)						**Ret (t, t+12)**					
		Second sort: Stock duration in passive fund(Dur-weighted)						**Second sort: Stock duration in passive fund(Dur-weighted)**					
		1	2	3	4	5	5-1	1	2	3	4	5	5-1
1	5-factor alpha	-0.649	-0.192	-0.305	-0.231	-0.168	0.481***	-0.579	-0.257	-0.345	-0.310	0.086	0.665***
		(-3.072)	(-1.343)	(-2.016)	(-1.923)	(-1.059)	(2.668)	(-2.528)	(-1.662)	(-2.326)	(-2.028)	(0.493)	(3.080)
2	5-factor alpha	-0.198	0.023	-0.017	0.159	0.198	0.396**	-0.014	-0.109	-0.173	-0.011	0.245	0.259*
		(-1.156)	(0.188)	(-0.191)	(1.972)	(1.421)	(2.240)	(-0.098)	(-1.024)	(-2.163)	(-0.106)	(2.216)	(1.898)
3	5-factor alpha	-0.076	0.017	0.064	-0.022	0.156	0.231*	0.042	0.085	-0.003	0.153	0.360	0.318**
		(-0.465)	(0.158)	(0.801)	(-0.292)	(1.448)	(1.685)	(0.303)	(0.745)	(-0.030)	(1.848)	(2.852)	(2.429)
4	5-factor alpha	0.024	0.004	0.187	0.278	0.309	0.286**	-0.003	0.058	0.108	0.156	0.398	0.401***
		(0.160)	(0.042)	(2.143)	(3.380)	(2.926)	(2.204)	(-0.024)	(0.578)	(1.499)	(2.393)	(2.753)	(3.461)
5	5-factor alpha	0.160	0.181	0.251	0.357	0.376	0.216	0.203	0.188	0.280	0.435	0.640	0.436**
		(1.173)	(1.738)	(2.214)	(3.992)	(1.610)	(1.034)	(1.309)	(1.665)	(2.731)	(4.327)	(2.462)	(2.022)

Figure 1: Time-series trends of fund ownership

This figure plots time-series trends of passive fund ownership and active fund ownership from 2003 to 2015

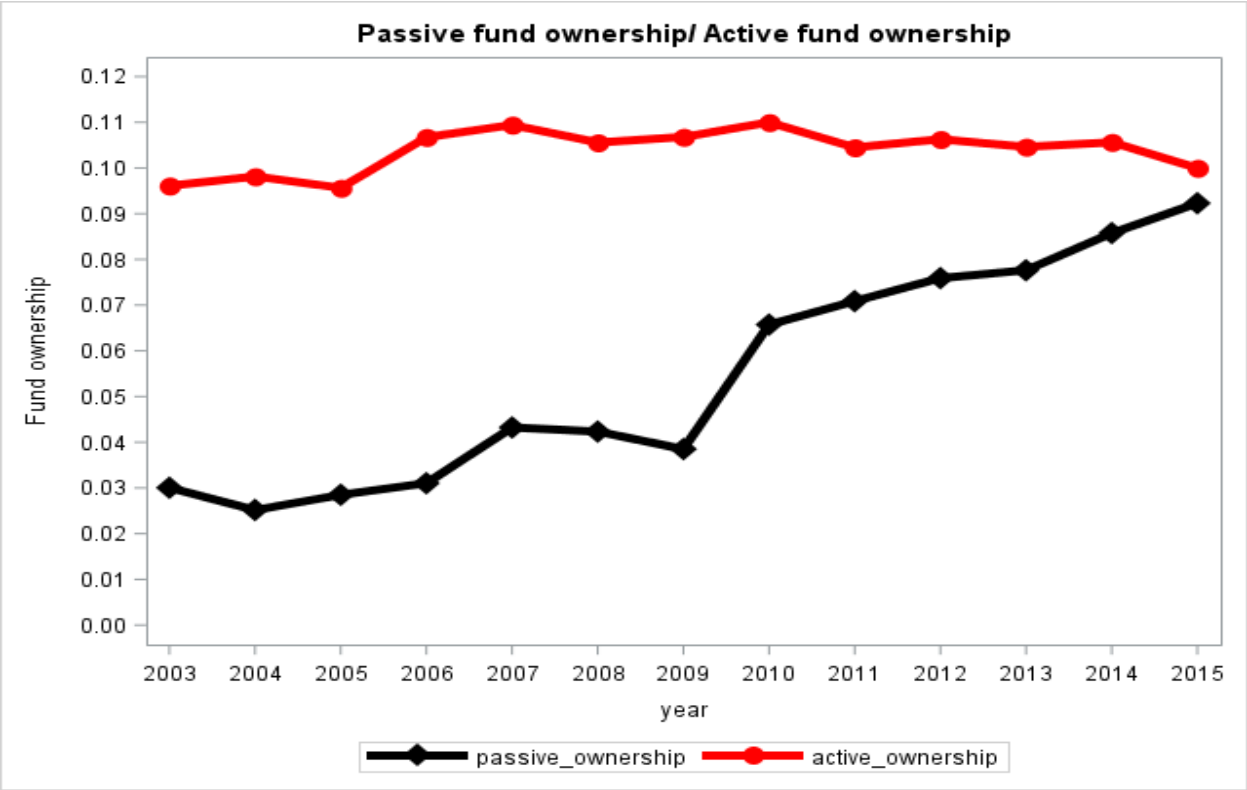


Figure 2: Time-series trends of stock level duration

This figure plots time-series trends of stock duration in passive funds and in active funds from 2003.q1 to 2015.q3

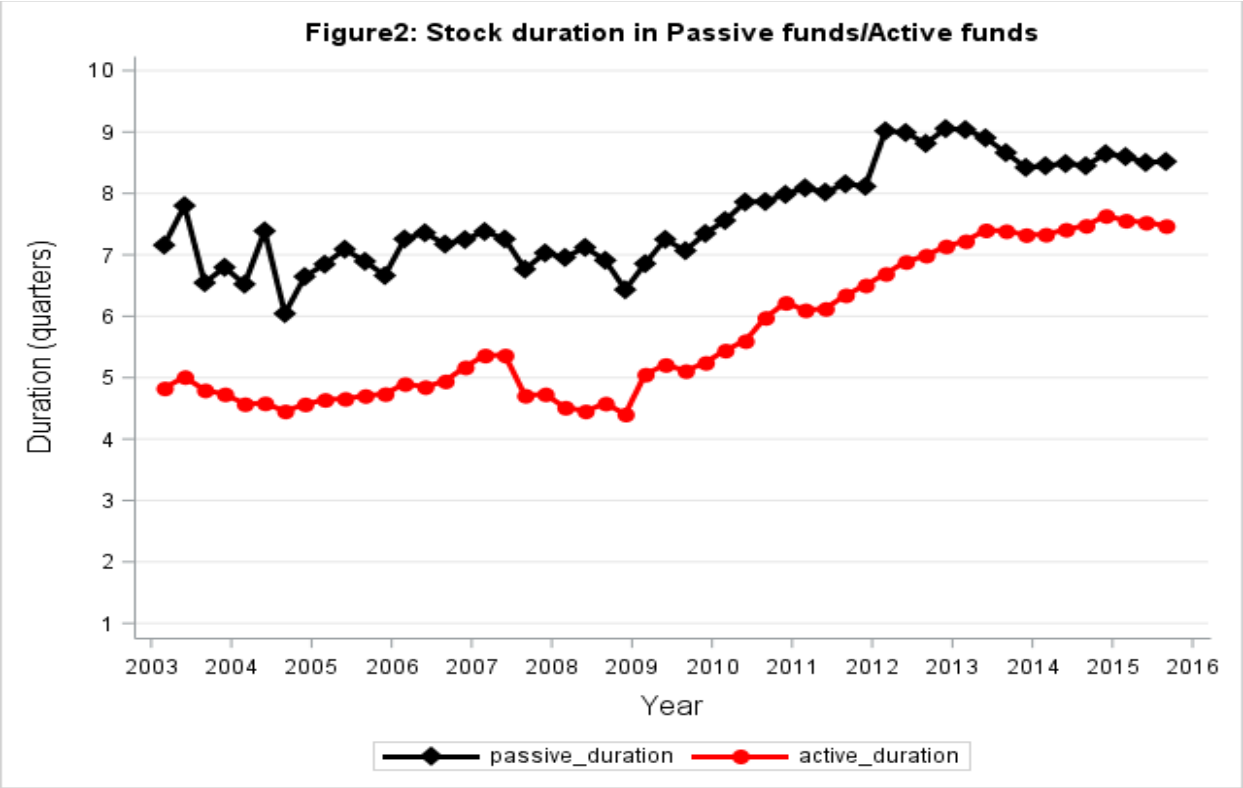
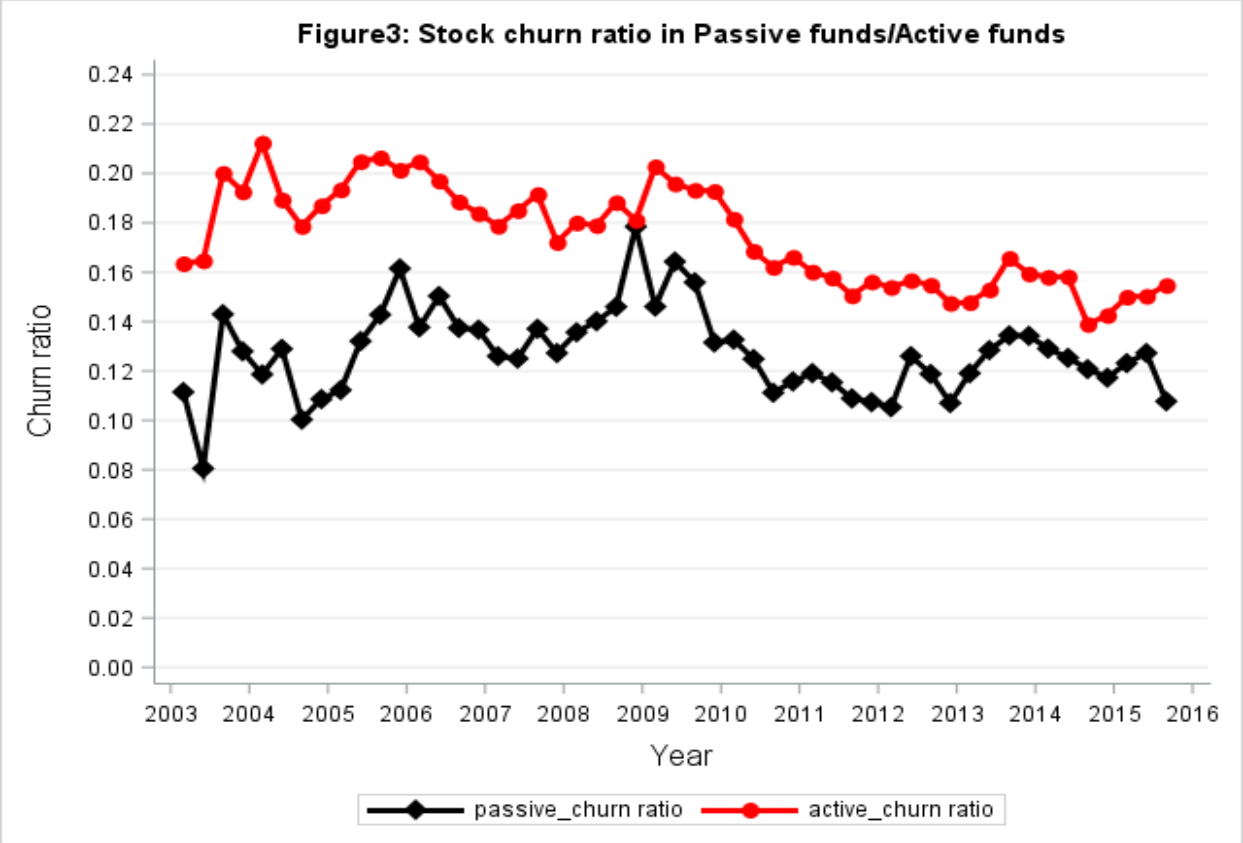


Figure 3: Time-series trends of stock level churn ratio

This figure plots time-series trends of stock churn ratio in passive funds and in active funds from 2003.q1 to 2015.q3



Appendix Table A_1: Stock duration and future excess stock returns

This table reports estimates from quarterly Fama-Macbeth regressions for future one-quarter-ahead, 1-year-ahead and 2-year-ahead returns on stock weighted-duration in passive funds and stock characteristics. Excess returns are calculated as raw returns minus risk-free rates in Column (1), raw returns minus value weighted market returns in Column (2), and raw returns minus value-weighted industry returns, which use Fama French 49 industry classifications, in Column (3). Sample period is from 2003.q1 to 2015.q3. All variables except beta, SP500 index membership, and returns are expressed in natural logarithms. Returns are in percent. Standard errors are based on the Newey-West (1987) estimator. *, **, *** represent significance at the 10%, 5%, and 1% level. To save space, we only report ownership-weighted duration.

	Ret(t,t+3)			**Ret(t,t+12)**			**Ret(t,t+24)**		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	2.256	-0.155	0.304	3.717	-6.933	-2.489	1.780	-7.769	-3.095
	(0.982)	(-0.079)	(0.198)	(0.348)	(-0.944)	(-0.536)	(0.173)	(-1.124)	(-0.737)
Log(Dur-weighted)	0.799***	0.783***	0.792***	3.110***	2.843***	2.583***	2.584***	2.481***	2.077***
	(3.850)	(3.856)	(4.478)	(3.186)	(3.453)	(4.661)	(3.478)	(3.642)	(4.191)
Log(Size)	-0.033	-0.026	0.002	0.205	0.300	0.261	0.414	0.472	0.328
	(-0.243)	(-0.196)	(0.016)	(0.406)	(0.631)	(0.803)	(0.718)	(0.862)	(0.751)
Log(Btm)	0.137	0.138	0.139	1.446	1.251	1.070	1.389	1.268	0.966
	(0.521)	(0.533)	(0.752)	(1.279)	(1.178)	(1.653)	(1.450)	(1.413)	(1.631)
Log(Turnover)	0.065	0.074	0.033	-0.629	-0.560	-0.728	-0.333	-0.247	-0.586
	(0.237)	(0.272)	(0.117)	(-0.895)	(-0.892)	(-1.206)	(-0.470)	(-0.374)	(-0.944)
Log(Volatility)	0.232	0.160	0.044	1.946	1.773	0.690	2.735	2.503	1.284
	(0.352)	(0.239)	(0.063)	(1.173)	(1.132)	(0.422)	(1.222)	(1.207)	(0.692)
Log(Age)	-0.099	-0.087	-0.186*	-0.233	-0.094	-0.533**	-0.183	-0.089	-0.443
	(-0.951)	(-0.837)	(-1.878)	(-0.717)	(-0.302)	(-2.098)	(-0.406)	(-0.213)	(-0.995)
Log(Price)	-0.436	-0.378	-0.363	-1.036	-0.694	-0.601	-1.037	-0.753	-0.395
	(-0.841)	(-0.769)	(-0.724)	(-0.893)	(-0.676)	(-0.581)	(-0.843)	(-0.678)	(-0.354)
Beta	-0.257	-0.246	-0.254	-1.155	-0.681	-0.249	-1.071	-0.723	-0.028
	(-0.700)	(-0.668)	(-0.799)	(-1.643)	(-1.001)	(-0.331)	(-1.621)	(-1.150)	(-0.053)
SP_500 dummy	0.008	-0.049	-0.111	0.749	0.119	-0.075	0.903	0.306	0.112
	(0.022)	(-0.127)	(-0.290)	(0.434)	(0.069)	(-0.046)	(0.498)	(0.174)	(0.067)
Ret(t,t-3)	-0.002	-0.002	-0.005	-0.020	-0.017	-0.025	-0.032*	-0.026	-0.024*
	(-0.215)	(-0.176)	(-0.633)	(-0.758)	(-0.713)	(-1.349)	(-1.698)	(-1.515)	(-1.803)

Ret(t-12,t-3)	0.002	0.003	-0.000	-0.027	-0.023	-0.024	-0.022	-0.015	-0.012
	(0.213)	(0.272)	(-0.004)	(-1.049)	(-1.025)	(-1.226)	(-1.372)	(-1.128)	(-1.254)
Adjusted R-square	0.060	0.059	0.050	0.054	0.053	0.048	0.037	0.036	0.032
Quarters	51	51	51	51	51	51	48	48	48
Obs	188807	188807	184540	180296	180296	176259	159702	159702	156912

Appendix A_2: Portfolio approach

This table reports monthly equal-weighted portfolio raw returns and alphas after controlling for Fama French three factors (market factor, size factor, value factor), Carhart momentum factor and market liquidity factor (Pastor and Stambaugh,2003). Stocks are divided into quintiles each quarter from 2003.q1 to 2015.q3 according to stock churn ratio in passive funds c*r-weighted*, with quintiles 1 and 5 consisting of short- and long-churn ratio stocks, respectively. We then report returns for these five portfolios and the return differences, which are calculated over the next one quarter, next 1 year, and next 2 years. For returns longer than one quarter, we use the Jegadeesh and Titman (1993) approach to adjust overlaps. All reported returns are in percent per month. *, **, *** represent significance for return difference at 10%, 5%, and 1% levels. Standard errors are based on the Newey-West (1987) estimator. To save space, we only report ownership-weighted duration.

CR-weighted						
Monthly Equal-Weighted Return and Alpha						
	1	2	3	4	5	5-1
Ret(t,t+3)						
Raw return	0.978	0.904	0.842	0.768	0.736	-0.242
	(1.918)	(1.911)	(1.664)	(1.377)	(1.252)	(-1.521)
4-factor Alpha	0.308	0.153	0.041	-0.071	-0.131	-0.439***
	(1.745)	(2.109)	(0.542)	(-0.786)	(-0.982)	(-2.979)
5-factor Alpha	0.312	0.154	0.039	-0.070	-0.130	-0.441***
	(1.788)	(2.128)	(0.520)	(-0.772)	(-0.968)	(-3.028)
Ret(t,t+12)						
Raw return	1.047	0.990	0.937	0.844	0.775	-0.272**
	(1.990)	(2.128)	(1.913)	(1.626)	(1.384)	(-2.105)
4-factor Alpha	0.332	0.193	0.095	-0.032	-0.130	-0.462***
	(1.742)	(3.480)	(2.048)	(-0.499)	(-1.032)	(-3.040)
5-factor Alpha	0.334	0.193	0.094	-0.031	-0.128	-0.462***
	(1.783)	(3.425)	(1.959)	(-0.484)	(-0.999)	(-3.081)
Ret(t,t+24)						
Raw return	1.137	1.094	0.990	0.862	0.822	-0.314**
	(2.473)	(2.738)	(2.420)	(2.012)	(1.832)	(-2.556)
4- factor Alpha	0.372	0.244	0.099	-0.066	-0.126	-0.499***
	(1.986)	(4.033)	(2.076)	(-0.926)	(-0.940)	(-2.907)
5-factor Alpha	0.371	0.244	0.100	-0.067	-0.128	-0.498***
	(1.973)	(4.029)	(2.073)	(-0.908)	(-0.922)	(-2.892)