Do ETFs Increase Volatility?
Internet Appendix

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The Internet Appendix (I.A.) includes a more detailed description of the data and the additional results that are referenced in the main text. In addition, it reports ancillary results that do not appear in the main paper.

Holdings Data Construction

We proceed as follows to identify and clean ETF holdings data in Thomson. First, we identify the Thomson's *fundno* of the ETFs in our sample by using a historical ticker-date merging with the s12type8 table in Thomson, which contains the historical tickers of each mutual-fund share class. Then we double-check this link by manually verifying the names of the fund in the Thomson-Reuters database and in our sample to ensure those links are valid.

Because the fund holdings in the Thomson data are at the portfolio level, many of the links between the ETF share class and the associated fund portfolio can include the holdings of non-ETF open-end share classes. For example, many Vanguard ETFs are not standalone ETFs, because they are structured as share classes within the overall fund portfolio.[1] To address this issue, we adjust the holdings of the fund portfolio to reflect only the holdings of the ETF share class as follows. First, we compute the ownership of each stock in the fund portfolio as a percentage of the total assets of all the equity holdings in that portfolio. Then we multiply these portfolio weights by the market capitalization of the ETF share class to compute the accurate ownership in that stock by the ETF share class exclusively. Using the updated market capitalization of the ETF at the end of every period, we also follow this approach to update the ETF ownership in that stock every period until the next available quarterly holding snapshot by this ETF.

At the end of every period, to create the total ETF ownership measure in the shock, we sum the ownership in each stock across all ETFs that own it. Therefore, the ETF ownership variable is computed as

[1] https://advisors.vanguard.com/iwe/pdf/standAloneTrans.pdf

$$ETF\ ownership_{i,t} = \frac{\sum_{j=1}^{J} w_{i,j,t} AUM_{j,t}}{Mkt\ Cap_{i,t}}. \quad (A.1)$$

In this equation, $w_{i,j,t}$ is computed as the most recently available fund portfolio weight of ETF *j* in stock *i* (i.e., the dollar ownership by the fund portfolio in the stock, divided by the total equity assets in the fund portfolio). These fund-portfolio weights are computed from the most recent quarterly investment company report (at fiscal period end), available in the Thomson-Reuters Mutual Fund Ownership database.

Importantly, we noticed some errors in the Thomson-Reuters Mutual Fund Ownership data after June 2015 (e.g., Apple Inc. is missing in mid-2015). Hence, we decided to rely on other sources, such as the Thomson-Reuters Global Ownership database, as a cleaner source of holdings data.

$AUM_{j,t}$ in equation (A.1) is the daily updated market capitalization of ETF *j*, which equals the assets under management. Due to daily creation and redemption, the total shares outstanding of the ETF change on a daily basis, and we use the more accurate Bloomberg information.

The product $w_{i,j,t} AUM_{j,t}$ in equation (A.1) reflects the dollar ownership of ETF *j* in stock *i* updated to the current period, assuming the weight of each stock in the ETF portfolio is constant between fiscal-period end and current-period end, which is a legitimate assumption given that most ETFs track index portfolios. This approach provides cleaner separation of many index-fund assets from ETF assets, especially for non-standalone ETFs.

Finally, $Mkt\ Cap_{i,t}$ is the market capitalization of stock *i* at the end of the period.

Identification of Buy/Sell Orders in TAQ

We use the TAQ intraday data to properly classify every trade between 2000 and 2015 into buy or sell. We use the legacy TAQ Monthly database in the earlier period between 2000 and 2006, and the TAQ Daily database with millisecond timestamps in the period between 2007 and

2015, and classify every trade using the following algorithm. First, for each trade, we compute the prevailing National Best Bid and Offer (NBBO) quote at the end of the previous millisecond. Then we compare the trade price for every trade in the next millisecond to the prevailing best bid and best offer. The midpoint reference inherent to the Lee and Ready (1991) algorithm does not take into consideration the "outside trades" that are not permitted under the Reg NMS rules, and therefore are less likely to occur in recent years, especially after 2007. For this reason, we follow Holden and Jacobsen (2014) and use a modified quote test based on Ellis, Michaely, and O'Hara (2000), because the quote test is less accurate when trades are not executed at the ask or the bid. Therefore, once an executed trade price crosses the prevailing NBBO within a millisecond, we stop using the quote test for the rest of the millisecond. Instead, and for the remaining trades during this millisecond, we rely on the tick test. Therefore, our modified Ellis, Michaely, and O'Hara (2000) algorithm takes into consideration that buys are more likely to be executed at the ask, and sales on the bid price, and whenever an outside trade is observed during that millisecond, the algorithm relies instead on the tick test until the end of the millisecond.

Internet Appendix Tables Description

Internet Appendix Table AI. Variable Definitions

The table describes the variables used in the empirical analysis of the paper, including the data sources.

Internet Appendix Table AII. Institution Type Definitions

The table lists the institutional types as defined by Thomson-Reuters Global Ownership database Owner Types.

Internet Appendix Table AIII. Churn Ratio from Trade-Level Data

The table reports statistics for the data that are used in Table IV, Panel C, including the churn ratio and adjusted churn ratio for ETFs and stocks using trade-level data from Ancerno, aggregated at the manager-stock-quarter level.

Internet Appendix Table AIV. ETF Ownership and Tail Risk

The table tests whether ETF ownership increases tail risk in the underlying stocks. We construct the daily marginal expected shortfall at the 5% level as the worst daily return in a given month. Note that a month contains about 20 trading days; hence, the worst daily return represents the bottom 5% of the observations. Then, in an ordinary least squares (OLS) framework, we regress the marginal expected shortfall on ETF ownership at the end of the prior month. The results are in column (1) of I.A. Table AIV. We find that a one-standard-deviation increase in ETF ownership is related to a decrease of about 13.7% of a standard deviation in the marginal expected shortfall. This finding suggests left-tail risk is significantly higher for stocks that are more exposed to ETFs.

Next, we investigate whether the right tail is affected as well. In column (2), we regress the best daily return in a month on ETF ownership and the usual controls. The positive and significant slope suggests the right tail is also stretched out as ETF ownership increases.

At first sight, then, both the left and right tails seem to move out by a similar magnitude with ETF ownership. This result finds confirmation in column (3), where we find that, although negative, the relationship between ETF ownership and daily skewness, estimated non-parametrically as in Ghysels, Plazzi, and Valkanov (2016), is not significant. Hence, this evidence suggests our main result of an increase in volatility for ETF-owned securities translates into a symmetric outward stretch of the return distribution.

However, a more rigorous formulation of the hypothesis behind these tests suggests return asymmetries should emerge in cases of large liquidations of ETFs by the institutions that hold them. These fire sales are not likely to happen in normal times. Rather, we should expect institutional investors to massively dump ETFs in turbulent markets.

To test this refined conjecture, we use two proxies for bad times. First, focusing on the VIX index, which captures dry-ups in aggregate liquidity (e.g., Nagel (2012)), we define bad months as those lying in the bottom quartile of the VIX distribution. In column (4) of I.A. Table AIV, we regress skewness on the interaction between ETF ownership and the dummy that identifies bad times. The negative and significant slope on the interaction suggests that in high-VIX periods, ETF ownership is associated with significantly more negatively skewed returns, consistent with the conjecture. In these months, a one-standard-deviation increase in ownership makes skewness more negative by 4.3% of a standard deviation.

Second, we take a more direct route and focus on aggregate ETF flows, which are measured as the quarterly change in ETF holdings by all institutional investors, using the 13F filings in the Thomson-Reuters Global Ownership dataset. Periods of liquidations are those with a negative aggregate value of institutional trades in all US-listed ETFs. In column (5), we regress skewness on the interaction of ETF ownership and the dummy for quarters of institutional liquidations. Confirming the conjecture, we find that returns of stocks with higher ETF ownership are significantly more negatively skewed during periods of ETF liquidations by institutional investors. The magnitude of this effect is non-negligible, at about 4.7% of a standard deviation of daily skewness.

Focusing on the Russell 3000 sample, columns (6)–(10) of I.A. Table AIV, the results on the marginal expected shortfall remain significant, whereas the results on skewness do not. The

lack of significance in this sample resonates with the rest of the evidence in the paper, where the effects are mostly significant in the S&P 500 sample.

Internet Appendix Table AV. Number of Index Switchers

The table reports the number of companies moving across indexes at each yearly reconstitution. The years range between 2000 and 2015.

Internet Appendix Table AVI. Regression Discontinuity, Excluding May and June

The table shows instrumented results that exclude the months of May and June. The estimates in I.A. Table AVI show this choice does not affect the conclusions.

Internet Appendix Table AVII. Regression Discontinuity, Linear, Quadratic, and Cubic Specifications

In addition to the main specification in the main body of the study, we provide two additional versions of the instrumental setting. In particular, in I.A. Table AVII, Panel A, we control for a linear polynomial of the rank variable, extending the sample to 2015. The results are comparable to Table X, Panel B. In I.A. Table AVII, Panel B, we control for quadratic polynomials of the rank variable. In I.A. Table AVII, Panel C, we control for cubic polynomials of the rank variable.

Internet Appendix Table AVIII. Russell Switching Instrument, Sample Splits

The table presents the IV analysis using sample splits. Panel A of I.A. Table AVIII has the results of the sample ending in May 2007. Panel B of Table AVIII shows the estimates for the subsample that starts with the reconstitution of June 2007. In this case, the estimates are more unstable, and significance is not consistent across specifications. We tend to attribute this

instability to the noise that the banding procedure introduces in this experiment. Because of the banding procedure, fewer stocks become eligible for switching indexes (see Table AV).

Internet Appendix Table AIX. Magnitude Estimation

To gauge the economic significance of the OLS estimates in Table IV, we allocate stocks to the percentiles of the distribution of daily volatility in each month. Then we compute the standard deviation of ETF ownership within each percentile, across stocks and over time. We focus on the 50th and 51st percentiles, because they provide an estimate of the variation in ETF ownership to which the median stock in the sample is exposed. Then we ask the question: What is the effect of a one-standard-deviation change in ETF ownership for the median stock in the sample? To address this question, we multiply the estimated OLS coefficient by the estimated standard deviation of ETF ownership in those percentiles. Then we add this term to the volatility of the median stock in the last month of the sample.[2] The result is expressed in terms of the percentiles of the distribution volatility, in the last month of the sample. In Panel A of I.A. Table AIX, we report the median volatility, which is the starting point before applying the variation in ETF ownership, the estimated standard deviation of ETF ownership, the new level of volatility after applying the variation, and the new percentile in the volatility distribution that is achieved after applying the change in ETF ownership. For the S&P 500 sample, when the regressions do not contain lags of the dependent variable (corresponding to column (2) of Table IV), the standard deviation in ETF ownership is about 1.8%, which leads the daily volatility of the median stock to increase by about 20 bps to 2.3%. This new level corresponds to the 64th percentile of the

[2] We focus on the end of the sample because we need the entire sample to estimate the standard deviation of ETF ownership for a given percentile. Hence, these estimates of standard deviation can only be known at the end of the sample.

volatility distribution. Including three lags of the dependent variable (as in column (4) of Table IV) reduces the economic magnitude of the effect of a one-standard-deviation change in ETF ownership, as the median stock shifts to the 58th percentile of the volatility distribution. The effects are smaller in the Russell 3000 sample, consistent with the smaller OLS estimates. When no lags are included, the median stock shifts to the 57th percentile, and when controlling for the lags, it moves to the 55th percentile.

Although the economic magnitudes appear significant, they do not seem excessively large. Of course, one can make a more informed claim about their size when they are compared to a benchmark. To this purpose, we refer to the asset-pricing literature to identify another determinant of volatility. In particular, we focus on the well-known negative relation between realized returns and volatility (see, e.g., French, Schwert, and Stambaugh (1987)). Although the direction of the causality in this relationship is unknown, strong evidence suggests realized returns are a significant predictor of volatility (Schwert (1989), Campbell and Hentschel (1992)). Accordingly, we estimate monthly regressions with volatility as the dependent variable and replace ETF ownership with the prior-month return, keeping the same controls as in the original regressions. The estimated coefficients, reported in I.A. Table AIX, Panel C, are negative and significant, consistent with the literature. Using an identical approach to the one used for ETF ownership, we compute the economic magnitude of these estimates and report them at the bottom of I.A. Table AIX, Panel A. Especially when the specifications include the lagged dependent variable, we note that the shift in volatility induced by a one-standard-deviation move in the prior-month return is in the same ballpark as the effect of ETF ownership. Therefore, we conclude the economic magnitude of the effect of ETF ownership in this setup is comparable to that of a well-known determinant of volatility.

To assess the economic magnitude of the IV estimates, two issues are relevant. First, the estimated coefficients reflect a local average treatment effect (LATE; Imbens and Angrist (1994)). In brief, the IV estimate, resulting from a natural experiment inducing a switch between a control and a treatment group, measures the effect of treatment only on the units that switch groups because of the outcome of the natural experiment. These units would not otherwise receive treatment. Applied to our context, the IV estimates capture the effect of ETF ownership on the stocks that enter the ETF basket only because of the index switch. As discussed in the paper, these stocks drastically change status from being intensively utilized by arbitrageurs in their replication of the index (when they are at the top of the Russell 2000) to being neglected by arbitrageurs (when they are at the bottom of the Russell 1000), and vice versa for a switch in the other direction. Arguably, this drastic change in status results in a greater impact of a given amount of ETF ownership than for the average stock in the sample. This argument can explain why the LATE effect is larger than the OLS effect.

The second issue is the computation of the economic magnitude of the IV estimates. The index-switching stocks experience, on average, a change in ETF ownership of about 50 bps. Therefore, multiplying the IV estimates by the standard deviation of ETF ownership in computing the economic magnitude makes little sense. The amount of "treatment" for these stocks corresponds to the actual change in ETF ownership to which they are exposed because of the index switch. Therefore, a more natural approach in this context is to compute the economic magnitude by multiplying the IV estimates by the change in ETF ownership that results from the index switch.

In I.A. Table AIX, Panel B, we compute economic magnitudes by assessing the shift in volatility for the median stock in the last month of the sample period. The organization of the table mirrors the outline of Table V in terms of the bandwidth of the experiment and the direction

of the index switch. Moreover, it includes specifications for the different polynomial degrees of the ranking variable that are included in the regressions (linear, quadratic, and cubic). In a first set of rows, for comparability purposes, we replicate the methodology from Panel A; that is, we apply a change in ETF ownership corresponding to the standard deviation of this variable for the median stock. These results highlight the large magnitude of the LATE estimates in comparison to the OLS estimates. Across specifications, after the shock to ETF ownership, volatility ranges between the 65th and the 85th percentile (on average, the 76th percentile).[3] The second set of rows reports the more conservative results in which the median volatility is perturbed by (the absolute value of) the change in ETF ownership triggered by the index switch. In this case, the median stock's volatility shifts to between the 55th and 65th percentiles (on average, to the 60th percentile). These economic magnitudes are arguably more realistic and consistent with the magnitude of the shock to ETF ownership these stocks undergo. Moreover, these magnitudes are comparable to those from OLS regressions.

We conclude that a normal shock to ETF ownership causes the median stock volatility to shift to between the 55th and 65th percentiles of the volatility distribution. This conclusion is drawn using the more conservative approaches, which are the OLS regressions including lagged volatility and the IV estimates interacted with the shock to ETF ownership induced by the index switch. We also note the upper bound of this range coincides with estimates that are subject to the LATE interpretation and therefore are not necessarily generalizable to the entire sample. Overall, while remaining economically significant, these effects appear more realistic when compared to

[3] We indeed group stocks into 20 vigintiles according to the volatility distribution each month, because the reduced number of stocks that appear in the sample would not allow us to create 100 groups every month. We express the results in percentiles by multiplying them by 5.

the average magnitude of ETF ownership in the sample and are of similar size to the effect of another known determinant of volatility, namely, the lagged stock return.

Internet Appendix Table AX. Turnover Analysis

Given that retail investors tend to generate smaller-sized trades, the liquidity demand they direct to the ETF market could be manageable by market makers, and the resulting price pressure could be limited. This fact would limit the amount of noise that migrates from the ETF market to the underlying securities.

To address this possibility, we start from the observation that the level of institutional ownership in ETFs matters as far as it generates trading volume. Trading volume is the ultimate determinant of price pressure. For this reason, we need an assessment of institutional investors' turnover in ETFs. Using Ancerno data, we compute turnover at the security-day level, aggregating the share volume generated by all the institutions in the dataset and normalizing it by the security's shares outstanding. From I.A. Table AX, Panel A, we note the institutional daily turnover in ETFs is 42.7 bps. This magnitude is striking in comparison to the turnover of the same institutions in common stocks, which is 9.5 bps and 12.7 bps, for the S&P 500 and Russell 3000 samples, respectively. I.A. Table AX, Panel B, confirms the difference in institutional turnover between ETFs and stocks is also statistically significant, with and without day fixed effects and standard errors clustered at the security and day level. Thus, under the assumption that Ancerno institutions' behavior is representative of the broader universe, we find institutions generate a very large turnover in ETFs.

However, a large turnover is not enough to conclude that institutions cause a significant price impact. In fact, ETFs might be so liquid that this large trading volume does not alter prices significantly. To investigate the impact of institutional trades on ETF prices, we again use the

Ancerno dataset. In a trade-level sample, we regress the price impact for trade *d* in stock *i* on day *t* on the corresponding volume of the trade,

$$Price\ Impact_{i,d,t} = \gamma Trade\ Volume_{i,d,t} + q_i + w_t + \varepsilon_{i,d,t}, \quad \text{(A.2)}$$

where $Price\ Impact_{i,d,t}$ is defined as the percentage difference between the trading price and the price at the time of order placement, as in Anand et al. (2012). $Trade\ Volume_{i,d,t}$ is the number of shares that are traded divided by the number of shares outstanding. The regressions include day (w_t) and security fixed effects (q_i), and the standard errors are clustered at the security and day level. Panel C of I.A. Table AX reports the results. The 0.203 estimate for the ETF sample reveals that a volume of 1% of shares outstanding moves prices by 20.3 bps. To gauge this magnitude, we can contrast it with the price-impact estimates for S&P 500 stocks, 1.54%, and Russell 3000 stocks, 1.27%. Hence, ETFs are significantly more liquid than stocks, because the price impact of the same amount of trading volume in stocks is between 6.3 and 7.6 times larger than in ETFs.

Therefore, on the one hand, institutional trading volume in ETFs is large; on the other hand, ETFs are very liquid. The relevant question is how large the overall institutional price impact is when the two elements are combined. To address this question, we compute the cumulative daily price impact on ETFs as the product of the estimated price-impact coefficient γ from equation (A.2) and the daily institutional turnover, reported in I.A. Table AX, Panel A. This computation returns a cumulative daily impact of Ancerno institutions on ETF prices of about 8.6 bps (i.e., 0.203×0.00427). To assess this magnitude, we provide the cumulative impact of Ancerno institutions on stock prices, which is 14.6 bps in the S&P 500 sample (i.e., 1.544×0.00095) and 16.1 bps in the Russell 3000 sample (i.e., 1.273×0.00127).

Although the cumulative price impact institutions impart on ETFs is smaller than the price impact on stocks, the former is still a sizeable fraction of the latter, being at least half of it. The

paper's main conjecture is that the pressure on ETF prices represents an additional layer of volatility that eventually propagates to the underlying stocks through arbitrage activity. Therefore, the non-fundamental volatility that institutional turnover indirectly adds to stock prices through the ETF channel is potentially a non-negligible part of the noise they impound by directly trading in stocks.

A natural benchmark against which we can contrast the price impact of institutional trades in ETFs is the daily volatility of ETFs, which in our sample is on average 1.4% (estimated from daily returns within a month). Hence, the average price impact of Ancerno institutions' ETF trades is about 6.1% of the total daily volatility of ETFs (i.e., 8.6/140). This magnitude seems reasonably important.

Internet Appendix Table AXI. Predictability of Order Imbalance

We attempt to reconcile the difference between our results about how long stock prices take to revert following ETF flows and the empirical studies on the resiliency of the limit-order book. In particular, the empirical work in Biais, Hillion, and Spatt (1995), Dufour and Engle, (2000), Degryse et al. (2005), and Large (2007) points out high resiliency for the order book of large stocks, suggesting liquidity is replenished in a few minutes, if not seconds. More recently, Hendershott and Menkveld (2014) estimate a half-life of convergence following price pressure of 0.92 days. By contrast, our evidence on the price impact of ETF flows, which we have updated through 2015 and reported in Table VII, suggests that, following ETF flows, the half-life to convergence of prices to the initial level is about 10 days. In Table VII, flows are expressed as a fraction of average daily turnover over the prior month, and they are measured in units of standard deviations.

Two considerations help us solve this apparent inconsistency. The first argument arises from the description of the institutional details of the primary market for ETFs. We refer the

interested reader to the detailed discussion in the ICI Research Perspective (2014) (see, in particular, pp. 14–19). For the present purposes, we note the settlement of the shares of US domestic equity ETFs works on a *T*+3 basis and, in some circumstances, can be extended to *T*+6. In particular, when an authorized participant (AP) issues a creation/redemption order on day *T*, the ETF manager responds on the same day by issuing new shares or withdrawing existing shares through the National Securities Clearing Corporation (NSCC). Thus, on day *T*, the ETF flows are recorded. However, the AP has to deliver the underlying securities (in the case of creation) or the ETF shares (in the case of redemption) only on day *T*+3. The AP can then choose to spread the trade of the underlying securities over a few days to reduce the price impact. Furthermore, if the AP is also a market maker for ETFs, which happens in the large majority of cases, the delivery date can be extended to *T*+6, in case the failure to deliver by *T*+3 is the result of bona fide market making.

This institutional framework implies APs have time to buy (in the case of creation) or short (in the case of redemption) the underlying securities up to *T*+6. Consequently, when we measure flows on day *T*, we should expect the price pressure on the underlying securities to continue over the following days as well. In case of failures to deliver on day *T*+6, day-*T* flows can induce persistence beyond *T*+6. Overall, these arguments can explain the slow reversal of prices to the initial level.

If this explanation is behind the persistence of the price impact, we should observe that flows on day *T* predict order imbalance on the following days. This conjecture finds confirmation in I.A. Table AXI, Panels A and B, which report results from regressions of contemporaneous and future stock-level order imbalance on stock-level ETF flows measured on day *T*. The table shows that day-*T* flows significantly predict order imbalance in the same direction for at least up to seven days in the future. Hence, the evidence is consistent with the view that APs spread their

transactions across multiple days. This prolonged price pressure can slow the reversal of prices following ETF flows.

The second important element that can help us explain the persistence in the price impact of flows is the persistence in flows themselves. If flows on a given day are followed by flows in the same direction on the subsequent days, price pressure on the underlying stocks can continue after day *T*. The predictability of order imbalance in I.A. Table AXI, Panels A and B, would also support this claim. In I.A. Table AXI, Panel C, we provide statistics on the autocorrelation of flows at different lags, for all ETFs in the US market and by style. Overall, the evidence reveals significant persistence in ETF flows. For example, for the entire sample of ETFs, the first-order autocorrelation is about 9%, whereas it is 4.3% for the sample of US large-cap ETFs. In the whole sample, the higher-order autocorrelations remain significant for at least 20 days.

To summarize, we find two reasons for a sustained price pressure of flows. First, the settlement on *T*+3 (on *T*+6 for market makers) allows the APs to continue trading the underlying securities beyond the day on which flows are recorded. Second, flows are persistent, so that price pressure on day *T* is likely to be followed by price pressure in the same direction on the subsequent days.

Internet Appendix Table AXII. Intraday Volatility and Range, and ETF Flows

We develop another strategy to identify the price impact of non-fundamental ETF trades. We observe that daily ETF flows at the stock level can be decomposed into two parts: one that reflects net influxes of money into the ETFs that hold that stock and another that is instead due to the reallocation of capital across the ETFs holding a given stock. The former, which is captured by the net stock-level flows, may partly reflect fundamental information that concerns the securities in the ETF basket. Instead, the latter part depends on investors' decisions to reshuffle money across the ETFs holding a given stock. For example, investors may withdraw money from

the State Street's SPDR S&P 500 ETF and pour it into the IShares S&P 500 ETF. Arguably, these reallocations have non-fundamental explanations, such as the fact that some ETFs change their fees and become more attractive. We measure this component of flows as the sum of the absolute stock-level flows. That is, we do not net the flows at the stock level. Only the part of this variable that exceeds the absolute value of net flows captures reallocations across ETFs. Hence, in our analysis, we also need to control for the absolute value of net stock-level flows.

Based on these considerations, we make the identifying assumption that, controlling for net stock-level flows, the sum of absolute stock-level flows captures the across-ETF reallocation of capital that is due to non-fundamental reasons. Then we test whether this non-fundamental component of flows has an impact on stock-level volatility. Because we measure flows daily, we also need measures of price variation at the daily frequency. Thus, we use as dependent variables either intraday volatility computed from second-by-second returns or the price range, computed as the high price minus the low price divided by the average of the two.

I.A. Table AXII reports estimates from regressions of intraday volatility, or price range, on the absolute value of net stock-level flows and the sum of absolute stock-level flows. For these regressions, we standardize flows by stock-level market capitalization. The specifications include stock and day fixed effects, and the standard errors are double clustered. The dependent and explanatory variables are expressed in units of standard deviations. The analysis is carried out for the S&P 500 and Russell 3000 universes.

From column (1), we note the absolute value of net stock-level flows is positively and significantly related to intraday volatility. This relation could be due to both fundamental and non-fundamental ETF flows. In column (2), we implement our strategy to identify non-fundamental flows. We note the sum of absolute flows is significantly related to intraday stock-level volatility, controlling for the absolute value of net flows, which in turn loses much of its

explanatory power. Hence, under our identifying assumption, we conclude that the non-fundamental component of flows is a significant determinant of volatility. Given the magnitude and significance of the different flow variables, we also infer that non-fundamental flows are the most important determinant of volatility, consistent with our evidence in Table VII that the price impact of flows is fully reversed.

A concern about our identification strategy may arise if, for example, investors aiming to reduce exposure to large stocks and increase exposure to small stocks switch from large-cap ETFs (e.g., those covering the S&P 500) to ETFs tracking a broader universe (e.g., the Russell 3000). A large-cap stock that is in both indexes will then experience low net flows but a large sum of absolute flows. Information about the relative prospects of the two groups of stocks could motivate this rebalancing decision. In this case, our identifying assumption will fail. We argue, however, that investors wishing to get exposure to small stocks are unlikely to invest in Russell 3000 ETFs, given that the Russell 3000 index has over a 94% exposure to large stocks. Rather, these investors will buy ETFs tracking the Russell 2000 index, which is fully invested in small stocks.

The argument is more general. If we think about ETFs as tracking investment themes, a stock will enter into only one among the industry themes (e.g., technology vs. automotive), only one among the style themes (e.g., value vs. growth), only one among the size themes, and so on. This stock will then only be exposed to the ETFs following those themes. The net flows into ETFs covering those themes should capture fundamental flows. Controlling for net flows, the sum of absolute flows should measure within-theme reallocation of capital, which is due to non-fundamental considerations.

Internet Appendix Table AXIII. Evidence of Arbitrage Activity

The liquidity-trading hypothesis posits that price pressure in ETFs migrates to stock prices through arbitrage activity. The following analysis searches for evidence of the arbitrage channel.

In both the primary and secondary markets, arbitrageurs respond to a price signal. They compare the ETF price with the NAV of its underlying basket. If this difference, which we label mispricing, is positive, the arbitrage trade involves buying the underlying stocks and selling ETF shares in the secondary market. The ETF shares can be short-sold if they are not already available. On the contrary, if the mispricing is negative, the arbitrage trade consists of buying the ETF and selling the underlying basket. Overall, a positive shock to the ETF price, which causes the mispricing to rise, translates into buying pressure in the underlying stocks, and vice versa for a negative shock. Hence, mispricing is the signal upon which arbitrageurs condition their trading strategies.

To prove the significance of this arbitrage channel, we regress trading volume on prior-day mispricing at the stock level and daily frequency. In some specifications, in which we want to measure the effect on the overall amount of arbitrage activity, we use the absolute value of mispricing as the determinant of arbitrage activity, as in equation (7), noting that both positive and negative gaps between ETF prices and the NAV trigger arbitrage activity. In this case, the dependent variable is share turnover, defined as shares traded over shares outstanding. In another set of tests in which we want to capture the direction of arbitrage activity, we focus on net mispricing as the determinant of arbitrage activity. Net mispricing differs from absolute mispricing for the omission of the absolute value in its definition, so that positive and negative mispricing values net out. For these tests, the dependent variable is the stock-level order imbalance, which is defined as the difference between shares bought and sold, over the sum of the two, for a given stock-day.

In I.A. Table AXIII, we report the estimates of these regressions. The dependent variables are expressed as percentages. For each day, we define a high-mispricing dummy for whether the level of mispricing is above the daily median. To filter out aggregate time variation in mispricing, we use these dummies as our main explanatory variables. Given the persistence of the dependent variables, we also include their lagged value among the controls. Then we have the usual controls and the daily return. The specifications include different combinations of day and stock fixed effects. The standard errors are clustered at the day and stock level.

In columns (1)–(4), we note that high absolute mispricing on a given day predicts higher turnover on the next day. Because we control for the lagged dependent variable and for stock fixed effects, this evidence is unlikely to result from some unobserved source of cross-sectional heterogeneity. Instead, it is consistent with the conjecture that mispricing at the end of a trading day determines the amount of arbitrage trading taking place on the next day.

In columns (5)–(8), we provide a tighter test of the arbitrage channel by measuring the correlation of mispricing and trading. We recall that positive mispricing entails arbitrageurs buying the underlying securities, and vice versa for negative mispricing. Consistent with this explanation, high positive mispricing (i.e., a level of mispricing above the daily median of positive mispricing) predicts an increase in buy trades over sell trades on the next day, whereas the opposite occurs for high negative mispricing (i.e., a level of mispricing below the daily median of negative mispricing). When we extend the sample to the Russell 3000 universe, the results are robust, but the magnitudes are smaller, possibly because short selling is more difficult for small stocks.

These results help address the concern that ETFs affect the underlying securities only during extreme events, such as the Flash Crashes of May 6, 2010, and August 24, 2015. Because

mispricing occurs on a daily basis, the evidence suggests arbitrage activity can also affect the underlying securities' prices on normal trading days.

Internet Appendix Table AXIV. ETF Ownership and Volatility, Moderated by Investor Sentiment

We investigate whether the effect of ETFs on the underlying securities is stronger during periods of high sentiment, when non-fundamental trading should be heightened. We define periods of high sentiment as the months that fall in the top quintile of the realizations of the Baker and Wurgler (2006) index and of the index of Consumer Sentiment from the Michigan Survey Research Center (Lemmon and Portniaguina (2006)). Then we construct interactions between the high-sentiment dummy and ETF ownership. I.A. Table AXIV reports results from OLS regressions of daily stock volatility on the interaction and the usual controls. For both measures of sentiment, we find the relation between ETF ownership and volatility to be significantly stronger during times of high sentiment. The effect is also economically significant for S&P 500 stocks. The relation is three times as large during high-sentiment periods with the Baker and Wurgler (2006) index, and twice as large with the Michigan index.

To summarize, sentiment shocks constitute non-fundamental motivated demand for stocks. As such, they are part of the liquidity shocks that are propagated through ETF arbitrage to the underlying securities. Therefore, we conjecture that sentiment trading is an important driver of the effects we document. This conjecture finds confirmation in the evidence that the relation between ETF ownership and volatility is stronger at times of high sentiment.

Internet Appendix Table AXV. ETF Ownership and Stock Volatility, Moderated by Arbitrage Capital

The availability of arbitrage capital should increase the trading activity of ETF arbitrageurs. As a result, the effects of ETF ownership on volatility and of ETF flows on price reversal should be larger when arbitrage capital is more abundant. We test this conjecture by

interacting the measures of institutional investors' wealth from Adrian, Etula, and Muir (2014) and He, Kelly, and Manela (2017) with our measures of ETF ownership and flows. In I.A. Table AXV, Panels A and B, we focus on the relation between ETF ownership and volatility. We interact ETF ownership with the variables proposed by He, Kelly, and Manela (2017), columns (1)–(2), and the variable proposed by Adrian, Etula, and Muir (2014), column (3). Contrary to our prior, we find that the interactions tend to be negative and significant, which means the effect of interest is weaker when arbitrage capital is plentiful. Panel B of the table paints a similar picture for the sample of Russell 3000 stocks.

In columns (1)–(5) of I.A. Table AXV, Panels C, D, and E, we study the relationship between ETF flows and stock returns. In particular, we regress returns computed over different horizons, starting on day 0, on flows at day 0. We find the interaction of the three measures of arbitrage capital with ETF flows to be negative and, in some specifications, significant. Again, the evidence runs against our prior, because it suggests ETF flows have a smaller impact on stock prices in periods when arbitrage capital is more abundant.

Given that the evidence tends to be very distant from our prior, we feel compelled to entertain an alternative hypothesis that could explain the results. The proposed measures capture the availability of capital to primary dealers (He, Kelly, and Manela (2017)) and broker-dealers' leverage (Adrian, Etula, and Muir (2014)). Within the theoretical framework of the institutional asset-pricing literature, to which these papers belong, these intermediaries are the marginal price setters in security markets. A direct implication of these theories is that when broker-dealers' capital is more abundant, the price-setting process is more efficient. Then, according to this alternative view, the price dislocations caused by ETFs are smaller when the broker-dealers have more capital.

This explanation resonates with theories that relate liquidity and price efficiency to the availability of arbitrageurs' capital (e.g., Gromb and Vayanos (2002), Brunnermeier and Pedersen (2009)). In these models, shocks to arbitrageurs' capital reduce liquidity and make prices deviate from fundamentals. In particular, in bad times, market makers are less able to absorb noise-trader shocks, and price concessions are larger. Therefore, these theories can also explain why the price pressure of ETF-related demand on the underlying securities is larger when arbitrageurs' capital is scarcer.

The empirical tests of these theories relate liquidity provision by financially constrained intermediaries to aggregate uncertainty. In particular, Nagel (2012) shows that market liquidity is lower at times when the VIX spikes. The explanation is that risk limits on arbitrageurs' strategies become binding when aggregate volatility increases, so their ability to correct mispricing is impaired.

We draw inspiration for a test of the alternative hypothesis from Nagel's (2012) evidence. In particular, if arbitrageurs' liquidity provision counteracts ETF price pressure, the dislocations caused by ETFs should be stronger when the VIX is higher. We test this conjecture in I.A. Table AXV, Panels A and B, by including an interaction between ETF ownership and the VIX, columns (4)–(6). The interaction is positive and strongly statistically significant, consistent with the conjecture. Moreover, the interactions of ETF ownership and the measures of arbitrage capital lose their significance. The latter finding suggests that, indeed, these variables capture liquidity provision, which explains the negative sign on their interactions with ETF ownership. In columns (6)–(10) of I.A. Table AXV, Panels C, D, and E, we similarly modify the specifications in which we estimate the effect of ETF flows on stock prices. Although not always significant, the price pressure of ETF flows tends to be larger at times of higher VIX, consistent with the results in I.A. Table AXV, Panels A and B.

A further test of this alternative hypothesis focuses on the relation between ETF mispricing and the availability of arbitrage capital. If arbitrageurs absorb the shocks coming from ETF demand, the deviation of ETF prices from the NAV should be smaller when arbitrage capital is more abundant. To test this conjecture, in I.A. Table AXV, Panel F, we report estimates from time-series regressions of the monthly average of stock-level absolute ETF mispricing on the proxies of arbitrage capital and the VIX. Confirming the intuition, we find that arbitrage capital is negatively related to the absolute value of ETF mispricing. This relation, however, is driven out when we include the VIX index, which seems to be more directly related to liquidity provision by financial intermediaries.

To summarize, the measures of arbitrageurs' capital can capture two distinct phenomena. First, arbitrageurs generate more volume in ETFs when they have more capital. This channel should magnify the impact of ETFs on the underlying security prices. Second, an increase in arbitrageurs' capital translates into the broker-dealer's ability to provide liquidity, which dampens the price pressure of ETF shocks on the underlying security. The evidence seems to support this alternative hypothesis.

Internet Appendix Table AXVI. The Availability of Arbitrage Capital

To strengthen the argument that the volatility effects we identify in section III are the result of ETF arbitrage activity, we investigate whether these effects are larger when arbitrageurs are more actively trading in ETFs.

To this purpose, we conjecture that the aggregate amount of institutional trading activity in all listed ETFs provides a measure of the turnover in arbitrage capital. In particular, among all institutions, hedge funds are especially interesting because they are the prototypical arbitrageurs. Hence, using quarterly holdings in Thomson-Reuters OP (Ownership & Profiles) data, we construct the trades in each ETF as the quarterly change in ownership by each institution. Then

we aggregate these trades across all institutions, and separately for hedge funds only, and express them as a fraction of the aggregate market capitalization of ETFs. In aggregating the institution-level trades, we follow two routes. First, we sum positive and negative trades and take the absolute value of the net trade. This definition captures the net amount of institutional capital that moves in and out of the ETF sector. Second, we sum the absolute value of all trades. This approach measures the total amount of volume institutions generate in ETFs.

We interact these aggregate ETF institutional trading factors with our measure of ETF ownership at the stock-month level. The institutional trading factors are standardized, as are the ownership variables and volatility. We also control for the interaction with the VIX, which correlates with aggregate market liquidity (Nagel (2012)) and can confound the identification. For the remaining part, the specifications mirror those in Table IV.

In I.A. Table AXVI, we find that aggregate institutional trading and hedge-fund trading in ETFs magnify the impact of ETF ownership on stock volatility, consistent with the view that the volume of arbitrageurs' activity matters for the impact of ETFs on stock prices. Incidentally, in some specifications, the VIX magnifies the effect of ETFs on volatility. This evidence resonates with the results in Table IV, Panel B, showing that the effect of interest is larger during the crisis period.

Overall, these results provide supporting evidence for the arbitrage channel as a driver of the effects of ETFs on volatility.

Internet Appendix Table AXVII. Evidence on the Arbitrage Channel (Russell 3000 Sample)

In this table, we replicate the analysis of Table VIII in the paper for the sample of Russell 3000 stocks.

Internet Appendix Table AXVIII. ETF Ownership Portfolios, Subsamples

The table presents subsample analysis for the tests in Table X, Panel B, in the main paper.

Internet Appendix Figure A1. Price Impact of Trade Turnover

I.A. Figure A1 presents evidence for the correlation between price impact and trade turnover. It is constructed by averaging the price impact in each of the 30 bins of the daily distribution of turnover. Price impact is computed as the percentage difference between execution price and price at time of placement. The quadratic function is motivated by prior literature that finds a concave relation (e.g., Keim and Madhavan (1996)). For each universe of stocks, we provide two specifications: without fixed effects and with day and stock fixed effects. Standard errors are double clustered at the day and stock level. The estimates are very similar irrespective of the fixed effects. We confirm the evidence in prior literature about the convexity of the relation between price impact and turnover.

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Internet Appendix Table AI. Variable Definitions

Variable	Description	Source
ETF ownership	The sum of the ownership of all ETFs holding the stock, using the most recent quarterly investment company reports for equity ETFs. Using each individual ETF portfolio weight at the end of the most recent report, daily ETF ownership in each stock of the ETF portfolio is inferred by multiplying the weight by the day-end ETF AUM and daily stock capitalization to compute daily ETF ownership in the stock. ETF ownership in each stock is then aggregated across all ETFs that hold the stock in their portfolios. The monthly variable is defined accordingly.	Thomson-Reuters, CRSP, Bloomberg
Index (or active) mutual-fund ownership	The sum of the ownership by all index (or active) mutual funds holding the stock, using the most recent quarterly investment company reports. Index funds are identified using CRSP Mutual Fund database index fund dummy, and by identifying fund names containing "index," "S&P," "Russell," NASDAQ," and "Dow Jones."	Thomson-Reuters, CRSP Mutual Fund, and MFLinks
Hedge-fund ownership	The sum of the ownership by all hedge funds holding the stock, using the most recent quarterly.	Thomson-Reuters Global Ownership
Daily volatility	Standard deviation of daily stock returns within a month.	CRSP
Variance ratio 5 days	The ratio of 5-day return variance divided by 5 times the 1-day return variance minus 1. The numerator and denominator are computed using daily and 5-day returns within a quarter. The dependent variable in the regressions is the logarithm of the absolute value of this difference.	CRSP
Intraday price range	Highest trading price during the day minus the lowest trading price, scaled by closing price of the previous day.	CRSP
Intraday volatility	Standard deviation of second-by-second intraday returns.	TAQ Monthly and Daily (millisecond)
Skewness	Non-parametric skewness measure of daily returns estimated following Ghysels, Plazzi, and Valkanov (2016).	CRSP
NBBO size	Average daily measure of the highest bid (offer) quote size of the highest prevailing bid price, i.e., best bid (lowest prevailing offer price, i.e., best offer) computed every second using all prevailing quotes issued by all exchanges where the security is traded.	TAQ Monthly and Daily (millisecond)
Order imbalance	(Buy Shares – Sell Shares) scaled by the daily share volume between 9:30 am and 4:00 pm. Trades are classified to buy and sell using a modified algorithm that combines the methods of Lee and Ready (1991) and Ellis, Michaely, and O'Hara (2000).	TAQ Monthly and Daily (millisecond)

Net(ETF flows)	Stock-day-level measure. Weighted average of the percentage change in ETF shares outstanding across the ETFs holding the stock. The weight is ETF ownership of the stock.	Bloomberg, Compustat
Abs(mispricing)	Sum of absolute dollar mispricing across all the ETFs holding the stock divided by stock capitalization (equation (5)). Dollar mispricing is the product of ETF mispricing (i.e., the difference between the ETF price and its NAV, as a fraction of the ETF price) times dollar holdings of an ETF in the stock.	Thomson-Reuters, CRSP, Bloomberg
Net(mispricing)	Similar construction to abs(mispricing). The only difference is that the ETF-level mispricing is not in absolute value.	Thomson-Reuters, CRSP, Bloomberg
log(Mktcap)	The logged market capitalization of the stock (in $ millions).	CRSP
1/Price	The inverse of the nominal share price.	CRSP
Amihud ratio	Measure of price impact computed as the absolute daily return divided by the total dollar daily volume in $ millions, following Amihud (2002).	CRSP
Turnover	Share volume divided by total shares outstanding.	CRSP, Compustat, Bloomberg
Bid-ask spread	The quoted spread divided by the bid-ask midpoint.	CRSP
Share-lending fee	Share-lending fee at the security level, 7-day average.	Markit
Book-to-market	Book value of assets / market value of assets.	CRSP, Compustat
Gross profitability	(Revenue – cost of goods sold) / total assets, following Novy-Marx (2013).	Compustat
Past 12-month return	Cumulative returns in the previous 12 months.	CRSP
DGTW return	Risk-adjusted excess return computed by subtracting from the total return of every stock, the benchmark return of the matching portfolio of stocks with similar characteristics, namely, size, industry-adjusted book-to-market ratio, and momentum, following Daniel et al. (1997).	CRSP, Compustat
Ret(t_1, t_2)	The total return of the stock between the close of t_1 and the close of t_2.	CRSP
Churn ratio	This measure follows Cella, Ellul, and Giannetti (2013) in computing the investor-level churn ratio, which is then aggregated at the stock level using ownership weights.	CRSP, Thomson-Reuters Global Ownership
Churn ratio (Ancerno)	Equations (1) and (2) in the paper.	Ancerno

Price impact	The percentage difference between execution price and price at time of placement.	Ancerno
Turnover (Ancerno)	Dollar volume of a trade as a fraction of daily dollar volume in CRSP.	Ancerno, CRSP

Internet Appendix Table AII. Institution Type Definitions

Source: Thomson-Reuters Owner Types – Global Equity Ownership Feed

Institution Type	Definition from Thomson-Reuters Global Ownership Database
Bank and Trust	These firms perform all of the functions of a retail bank. As a retail bank, a portfolio of investments is put together by an investment adviser and sold in units to investors by brokers. They may also handle Trust Accounts, which are outside companies or individuals that have a bank manage their money for their own pensions or for various other reasons. They invest the money their customers hold in their accounts in order to make interest payments and their own profits.
Insurance Company	Insurance companies invest in a similar fashion as investment advisors. They reinvest the money they take in, in order to make coverage payouts as well as their own profits.
Investment Advisor /Investment Company	This group includes buy-side institutions that typically invest in stocks (equities) or bonds (fixed income). They are registered with the Securities and Exchange Commission and manage assets for private clients and institutions. They have discretionary power over their assets under management and actually make buy/sell decisions. They include traditional mutual fund management companies, which raise money from shareholders and invest in a groups of assets in accordance with a stated set of objectives.
Hedge Fund	A pure-play hedge fund management firm that, through its hedge fund products, is permitted to use aggressive strategies that are unavailable to mutual funds, including selling short, leverage, program trading, swaps, arbitrage, and derivatives. Many times, they are highly secretive because they use risky investment styles and also involve high-net investors.
Investment Advisor / Hedge Fund	An investment firm that uses both "traditional" and hedge fund (i.e., "alternative") investment techniques.
Pension Fund	A qualified retirement plan set up by a corporation, labor union, government, or other organization for its employees. To be included in the Thomson-Reuters database, the pension fund must manage a portion of its assets internally.
Research Firm	Sell-side research firm that also has an investment-banking side with underwriting business and a proprietary trading operation in some cases. This group includes brokerage firms defined as a sell-side investment firm that acts as an intermediary between a buyer and seller, usually charging a commission. Brokerage firms in the Thomson-Reuters database are typically those that service the institutional investment community. Some sell-side firms have ownership attached to them as a result of a 13F filing. This group also includes independent research firms that write research intended for the buy-side community.
Other Institutions and 13-F Entities	Other institutions include endowments, corporations, private equity, venture capital, sovereign wealth funds, 13F reporting investors, and others. Corporations: Typically a business organization that is given many legal rights as an entity separate from its owners. For ownership purposes, these entities will typically be set up to represent its strategic investments. Individual Investors (in 13-F): Individual investors that file the 13-F because they exercise investment discretion over the account of any other natural person or entity. Venture Capital: A firm that specializes in providing money to startup firms and small businesses with exceptional growth potential. Private Equity: Firm that invests solely in private equity investments (i.e., privately held companies). They provide equity financing to small- and middle-market companies engaged in a variety of industries. They often focus on management buyouts, industry consolidations, recapitalization of existing business, and other private equity opportunities. Sovereign Funds: State-owned institutions that invest public resources to reduce the unpredictability of government revenues, offset the boom-bust cycles' adverse effect on government spending and the national economy, or foster savings for future generations. Endowments: Endowment funds are permanent gifts, often to universities or colleges, that are re-invested to ensure continuing profit.

Internet Appendix Table AIII. Churn Ratio from Trade-Level Data

The table reports statistics for the churn ratio and adjusted churn ratio for ETFs and stocks using trade-level data from Ancerno, aggregated at the manager-stock-quarter level.

Type of Security	Variable	N	Mean	St. Dev.	Min	Median	Max
Stocks	Churn Ratio	26,276	0.105	0.123	0.000	0.068	1.000
	Adj. Churn Ratio	26,276	0.209	0.452	0.000	0.074	12.500
ETFs	Churn Ratio	6,095	0.299	0.319	0.000	0.206	1.000
	Adj. Churn Ratio	6,095	0.780	1.250	0.000	0.337	18.800
All	Churn Ratio	32,371	0.141	0.193	0.000	0.075	1.000
	Adj. Churn Ratio	32,371	0.316	0.714	0.000	0.084	18.800

Internet Appendix Table AIV. ETF Ownership and Tail Risk

The table reports estimates from regressions of measures of tail risk on ETF ownership, interacted with measures of aggregate conditions, in a stock-month sample. The dependent variable is the worst return in a month, capturing the 5% marginal expected shortfall (columns (1) and (6)), the best return in a month (columns (2) and (7)), and a non-parametric measure of skewness (column (3)–(5) and (8)–(10)). ETF ownership is standardized. Aggregate conditions are measured using indicators for the months in which the VIX is in the bottom quartile (I(High VIX)) and months of aggregate ETF liquidations by 13F institutions (I(Aggregate ETF liquidations)). The controls in all panels are logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), lagged volatility, index-fund ownership, active-fund ownership, and hedge-fund ownership. Month and stock fixed effects are included. Variable descriptions are provided in I.A. Table AI. Standard errors are double clustered at the stock and time level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Sample:	S&P 500					Russell 3000				
Dependent Variable:	5% Left Tail	5% Right Tail	Skewness	Skewness	Skewness	5% Left Tail	5% Right Tail	Skewness	Skewness	Skewness
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	-0.137***	0.156***	-0.009	0.003	0.006	-0.002***	0.003***	0.001	0.000	0.001
	(-5.673)	(6.157)	(-0.654)	(0.223)	(0.488)	(-6.392)	(7.450)	(0.374)	(0.015)	(0.197)
× I(High VIX)				-0.043**					0.005	
				(-2.464)					(0.795)	
× I(Aggregate ETF liquidations)					-0.046**					-0.000
					(-2.340)					(-0.043)
log(mktcap (t-1))	-0.068**	-0.052	-0.023	-0.023	-0.019	0.001**	-0.007***	-0.026***	-0.026***	-0.025***
	(-2.147)	(-1.578)	(-1.421)	(-1.433)	(-1.216)	(2.264)	(-9.592)	(-4.047)	(-4.043)	(-3.824)
1/Price (t-1)	-2.220***	2.920***	-0.215	-0.205	-0.177	-0.039***	0.083***	0.125**	0.123**	0.138***
	(-4.231)	(3.887)	(-1.266)	(-1.214)	(-1.058)	(-7.048)	(10.971)	(2.532)	(2.495)	(2.838)
Amihud (t-1)	-26.624**	49.172***	4.303	4.681	3.937	-0.061***	0.091***	0.036	0.041	0.029
	(-2.208)	(3.022)	(0.728)	(0.795)	(0.665)	(-6.584)	(8.527)	(0.378)	(0.433)	(0.304)
Bid-ask spread (t-1)	0.416	1.277	-0.323	-0.506	-0.267	-0.099*	0.119**	0.210	0.210	0.192
	(0.152)	(0.449)	(-0.263)	(-0.410)	(-0.216)	(-1.774)	(2.335)	(0.421)	(0.423)	(0.385)
Book-to-Market (t-1)	-0.142***	0.082*	-0.018	-0.018	-0.017	-0.005***	0.004***	-0.024***	-0.024***	-0.023***
	(-3.427)	(1.879)	(-0.825)	(-0.815)	(-0.783)	(-6.394)	(3.888)	(-2.768)	(-2.771)	(-2.671)
Past 12-month return (t-1)	0.052*	-0.089***	-0.039***	-0.040***	-0.038***	-0.002***	0.001	-0.010*	-0.010*	-0.010*
	(1.771)	(-2.795)	(-2.699)	(-2.736)	(-2.627)	(-3.664)	(0.711)	(-1.939)	(-1.946)	(-1.943)
Gross profitability (t-1)	-0.071	0.016	-0.092	-0.092	-0.079	0.003**	-0.006***	-0.014	-0.014	-0.014
	(-0.786)	(0.169)	(-1.405)	(-1.405)	(-1.201)	(2.276)	(-3.368)	(-0.739)	(-0.740)	(-0.708)
Hedge fund ownership	0.020	0.003	0.013	0.013	0.013	0.001***	-0.001***	0.006**	0.006**	0.006**
	(1.367)	(0.283)	(1.273)	(1.270)	(1.268)	(6.354)	(-3.458)	(2.322)	(2.312)	(2.299)
Index fund ownership	-0.014	0.008	-0.004	-0.004	-0.005	-0.001***	0.001**	-0.003	-0.003	-0.003
	(-1.313)	(0.747)	(-0.563)	(-0.521)	(-0.625)	(-3.123)	(2.329)	(-0.923)	(-0.916)	(-0.914)
Active fund ownership	-0.038***	0.037***	0.002	0.003	0.001	-0.002***	0.002***	0.003	0.003	0.003
	(-3.188)	(2.980)	(0.273)	(0.351)	(0.151)	(-5.823)	(5.291)	(0.924)	(0.906)	(0.825)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	83,348	83,348	83,348	83,348	82,508	431,244	431,244	431,244	431,244	426,555
R^2	0.465	0.480	0.028	0.028	0.028	0.437	0.441	0.025	0.025	0.025

Internet Appendix Table AV. Number of Index Switchers

The table reports the number of companies moving across indexes at each yearly reconstitution. The sample ranges between June 2000 and December 2015.

	Switch to:	
Year	In 2000	In 1000
2000	126	114
2001	106	148
2002	103	126
2003	79	82
2004	63	63
2005	80	82
2006	52	85
2007	9	17
2008	38	42
2009	37	39
2010	15	23
2011	22	35
2012	28	26
2013	26	24
2014	24	27
2015	46	27

Internet Appendix Table AVI. Regression Discontinuity, Excluding May and June

The table reports IV estimates from a quasi-natural experiment relying on the reconstitution of the Russell 1000 and Russell 2000 indexes. The frequency of the data is monthly at the stock level. The dependent variable is daily stock volatility. The explanatory variable is ETF ownership instrumented by a dummy for inclusion in the Russell 2000, for stocks in the Russell 1000 before index reconstitution (columns (1)–(5)), and a dummy for inclusion in the Russell 1000, for stocks in the Russell 2000 before index reconstitution (columns (6)–(10)). Stocks are ranked in terms of market capitalization in May of each year. Different ranges of this rank around the cutoff are used for inclusion in the sample: 100 stocks on each side (columns (1) and (6)), 200 stocks on each side (columns (2) and (7)), 300 stocks on each side (columns (3) and (8)), 400 stocks on each side (columns (4) and (9)), and 500 stocks on each side (columns (5) and (10)). The same stocks enter the sample in the June after index reconstitution and remain in the sample until May of the next year, except if delistings occur. The controls in all panels are logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), lagged volatility, index-fund ownership, and active-fund ownership. The regressions include linear, quadratic, and cubic specifications of the ranking variable in Panels A, B, and C, respectively (not reported). The dependent variable and the ownership variables have been standardized by subtracting the mean and dividing by the standard deviation. Month fixed effects are included. Standard errors are double clustered at the stock and month level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between July 2000 and April 2015. The sample omits observations in May and June.

Panel A: Second-Stage Regressions, First-Degree Polynomial

Dependent variable:	Daily stock volatility									
Instrument:	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	0.584	0.530**	0.363***	0.235**	0.276***	0.495***	0.297***	0.272***	0.279***	0.153**
	(1.426)	(2.602)	(3.151)	(2.478)	(2.997)	(3.299)	(3.293)	(3.268)	(3.377)	(2.271)
log(Mktcap (t-1))	-0.291**	-0.386***	-0.506***	-0.607***	-0.645***	-0.719***	-0.779***	-0.818***	-0.831***	-0.823***
	(-2.083)	(-4.844)	(-9.421)	(-10.648)	(-11.319)	(-8.961)	(-9.395)	(-10.234)	(-10.437)	(-10.945)
1/Price (t-1)	2.220***	1.789***	1.460***	1.389***	1.484***	1.689***	1.104***	1.175***	1.530***	1.562***
	(7.835)	(8.847)	(10.858)	(11.645)	(13.265)	(7.697)	(6.320)	(7.237)	(9.165)	(10.967)
Amihud (t-1)	-1.678*	0.026	1.161	1.550	1.586	-0.585	0.920	2.228**	1.787**	1.631**
	(-1.790)	(0.029)	(1.215)	(1.429)	(1.411)	(-0.918)	(1.164)	(2.216)	(2.417)	(2.606)
Bid-ask spread (t-1)	3.354	2.913	-0.767	-0.848	-0.938	-7.281*	-6.885	-6.961*	-7.633*	-9.057**
	(0.927)	(1.112)	(-0.395)	(-0.366)	(-0.358)	(-1.831)	(-1.510)	(-1.727)	(-1.866)	(-2.284)
Book-to-Market (t-1)	0.122***	0.108***	0.108***	0.090***	0.090***	0.000	-0.053**	-0.089***	-0.085***	-0.082***
	(4.382)	(5.358)	(7.089)	(5.743)	(5.689)	(0.008)	(-2.153)	(-4.061)	(-4.764)	(-4.941)
Past 12-month Return (t-1)	-0.073	-0.064*	-0.030	-0.018	-0.003	0.278***	0.199***	0.214***	0.215***	0.203***
	(-1.264)	(-1.888)	(-1.101)	(-0.645)	(-0.160)	(8.847)	(4.284)	(5.632)	(6.335)	(6.946)
Gross Profitability (t-1)	0.062	0.093	0.055	0.035	0.054	0.139**	0.084**	0.065**	0.062***	0.034
	(0.681)	(1.606)	(1.362)	(0.935)	(1.598)	(2.516)	(2.555)	(2.384)	(2.846)	(1.560)
Volatility (t-1)	0.255***	0.270***	0.259***	0.261***	0.263***	0.292***	0.273***	0.273***	0.273***	0.260***
	(9.421)	(15.450)	(19.797)	(20.479)	(20.635)	(17.006)	(17.720)	(17.905)	(18.120)	(19.810)
Index Fund Ownership	-0.044	-0.085**	-0.057***	-0.030	-0.035**	-0.067**	-0.048**	-0.036**	-0.037**	-0.008
	(-0.772)	(-2.149)	(-2.613)	(-1.573)	(-1.986)	(-2.407)	(-2.356)	(-2.103)	(-2.091)	(-0.537)
Active Fund Ownership	0.039***	0.049***	0.060***	0.068***	0.070***	0.048***	0.074***	0.070***	0.062***	0.058***
	(3.116)	(6.115)	(10.859)	(12.135)	(13.487)	(3.892)	(9.505)	(10.944)	(10.086)	(10.377)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear polynomials of rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,849	14,378	23,110	32,869	43,652	8,487	17,123	25,691	34,925	44,240
R^2	0.478	0.475	0.539	0.566	0.551	0.440	0.478	0.486	0.490	0.516

Internet Appendix Table AVI. Regression Discontinuity, Excluding May and June (Cont.)
Panel B: Second-Stage Regressions, Second-Degree Polynomial

Dependent variable:	Daily stock volatility									
Instrument:	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	4.823	0.647**	0.650***	0.555***	0.456***	0.377***	0.345***	0.425***	0.453***	0.455***
	(0.182)	(2.227)	(2.630)	(2.947)	(2.832)	(3.666)	(3.407)	(3.907)	(4.002)	(3.728)
log(Mktcap (t-1))	1.126	-0.341***	-0.413***	-0.511***	-0.604***	-0.742***	-0.770***	-0.795***	-0.802***	-0.774***
	(0.127)	(-3.241)	(-5.005)	(-7.365)	(-9.311)	(-9.705)	(-9.331)	(-9.830)	(-10.131)	(-10.557)
1/Price (t-1)	3.331	1.829***	1.520***	1.457***	1.560***	1.627***	1.109***	1.216***	1.647***	1.804***
	(0.456)	(8.112)	(9.810)	(11.497)	(12.531)	(7.717)	(6.269)	(7.141)	(8.756)	(10.759)
Amihud (t-1)	3.253	0.216	2.214	2.889**	2.411*	-0.646	1.061	2.816**	2.356**	2.590***
	(0.107)	(0.206)	(1.638)	(1.980)	(1.803)	(-1.080)	(1.240)	(2.310)	(2.568)	(3.118)
Bid-ask spread (t-1)	32.011	3.705	0.155	0.425	-0.028	-7.533*	-6.719	-6.666	-7.374*	-8.736**
	(0.182)	(1.242)	(0.073)	(0.164)	(-0.010)	(-1.923)	(-1.470)	(-1.614)	(-1.744)	(-2.140)
Book-to-Market (t-1)	0.335	0.117***	0.125***	0.108***	0.097***	0.000	-0.056**	-0.102***	-0.097***	-0.111***
	(0.250)	(5.168)	(6.859)	(6.228)	(5.939)	(0.008)	(-2.199)	(-4.297)	(-4.853)	(-5.259)
Past 12-month Return (t-1)	-0.511	-0.071*	-0.040	-0.030	-0.005	0.274***	0.200***	0.216***	0.217***	0.205***
	(-0.185)	(-1.914)	(-1.346)	(-1.048)	(-0.232)	(8.800)	(4.289)	(5.614)	(6.317)	(6.910)
Gross Profitability (t-1)	0.856	0.123	0.132*	0.132**	0.102**	0.122**	0.091***	0.085***	0.078***	0.063**
	(0.171)	(1.600)	(1.851)	(2.183)	(2.156)	(2.501)	(2.659)	(2.899)	(3.278)	(2.525)
Volatility (t-1)	0.508	0.277***	0.279***	0.283***	0.274***	0.283***	0.278***	0.290***	0.291***	0.287***
	(0.322)	(11.567)	(12.780)	(15.239)	(16.300)	(19.258)	(17.803)	(17.790)	(18.470)	(18.852)
Index Fund Ownership	-0.614	-0.106*	-0.109**	-0.093**	-0.071**	-0.045**	-0.058***	-0.069***	-0.076***	-0.075***
	(-0.172)	(-1.909)	(-2.405)	(-2.516)	(-2.257)	(-2.129)	(-2.613)	(-3.040)	(-3.115)	(-2.859)
Active Fund Ownership	0.069	0.049***	0.058***	0.069***	0.072***	0.054***	0.073***	0.067***	0.060***	0.056***
	(0.342)	(5.778)	(9.361)	(11.372)	(12.981)	(4.646)	(9.120)	(10.057)	(9.666)	(9.884)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quadratic polynomials of rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,849	14,378	23,110	32,869	43,652	8,487	17,123	25,691	34,925	44,240
R^2	0.436	0.413	0.400	0.442	0.486	0.486	0.463	0.438	0.436	0.437

Internet Appendix Table AVI. Regression Discontinuity, Excluding May and June (Cont.)
Panel C: Second-Stage Regressions, Third-Degree Polynomial

Dependent variable:	Daily stock volatility									
Instrument:	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	-1.391	1.411	0.690**	0.655***	0.537**	0.387***	0.293***	0.320***	0.394***	0.409***
	(-1.386)	(1.310)	(2.233)	(2.609)	(2.230)	(3.122)	(2.615)	(3.099)	(3.487)	(3.766)
log(Mktcap (t-1))	-0.948***	-0.060	-0.399***	-0.481***	-0.584***	-0.741***	-0.780***	-0.812***	-0.812***	-0.782***
	(-2.776)	(-0.158)	(-4.025)	(-5.712)	(-6.994)	(-9.328)	(-9.299)	(-10.091)	(-10.033)	(-10.101)
1/Price (t-1)	1.685***	2.080***	1.530***	1.482***	1.582***	1.614***	1.103***	1.189***	1.605***	1.768***
	(3.619)	(4.455)	(9.456)	(10.871)	(11.352)	(7.523)	(6.307)	(7.238)	(8.529)	(10.388)
Amihud (t-1)	-4.059**	1.798	2.382	3.349**	2.789*	-0.665	0.949	2.438**	2.174**	2.439***
	(-2.404)	(0.749)	(1.559)	(2.006)	(1.734)	(-1.122)	(1.139)	(2.153)	(2.382)	(3.054)
Bid-ask spread (t-1)	-9.599	7.026	0.308	0.763	0.486	-7.574*	-6.953	-7.021*	-7.503*	-8.781**
	(-1.116)	(1.192)	(0.139)	(0.277)	(0.147)	(-1.963)	(-1.496)	(-1.737)	(-1.791)	(-2.152)
Book-to-Market (t-1)	0.026	0.160***	0.127***	0.114***	0.101***	0.001	-0.054**	-0.094***	-0.093***	-0.107***
	(0.459)	(2.727)	(6.302)	(5.836)	(5.633)	(0.023)	(-2.221)	(-4.119)	(-4.846)	(-5.613)
Past 12-month Return (t-1)	0.124	-0.110	-0.042	-0.035	-0.005	0.276***	0.199***	0.214***	0.217***	0.204***
	(1.128)	(-1.427)	(-1.354)	(-1.154)	(-0.262)	(8.701)	(4.279)	(5.617)	(6.320)	(6.909)
Gross Profitability (t-1)	-0.321	0.304	0.144*	0.163**	0.124*	0.124**	0.084**	0.074**	0.073***	0.059**
	(-1.637)	(1.230)	(1.660)	(2.096)	(1.788)	(2.564)	(2.493)	(2.548)	(3.036)	(2.406)
Volatility (t-1)	0.141**	0.333***	0.282***	0.289***	0.279***	0.284***	0.273***	0.279***	0.285***	0.283***
	(2.314)	(4.170)	(10.864)	(12.913)	(12.914)	(16.727)	(17.368)	(18.024)	(18.482)	(19.850)
Index Fund Ownership	0.215	-0.252	-0.116**	-0.112**	-0.087*	-0.046*	-0.047*	-0.046**	-0.063**	-0.064***
	(1.647)	(-1.221)	(-2.044)	(-2.297)	(-1.867)	(-1.743)	(-1.838)	(-2.154)	(-2.509)	(-2.663)
Active Fund Ownership	0.027	0.049***	0.057***	0.069***	0.073***	0.053***	0.074***	0.068***	0.060***	0.056***
	(1.504)	(4.232)	(9.073)	(10.989)	(12.284)	(4.495)	(9.388)	(10.365)	(9.734)	(9.910)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cubic polynomials of rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,849	14,378	23,110	32,869	43,652	8,487	17,123	25,691	34,925	44,240
R^2	0.402	0.395	0.374	0.383	0.446	0.483	0.480	0.474	0.457	0.453

Internet Appendix Table AVII. Regression Discontinuity, Quadratic and Cubic Specifications

The table reports estimates from regressions of daily stock volatility on the variable of interest (ETF ownership) controlling for hedge-fund ownership. The table presents instrumental variable (IV) regressions around the Russell1000/2000 cutoff. The other controls in all panels are the lag of logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), lagged volatility, index-fund ownership, active-fund ownership, and hedge-fund ownership. The dependent variable and the ownership variables are standardized. Month fixed effects are included. Panel A includes a linear specification of rank. Panel B includes a quadratic specification of rank. Panel C includes a cubic specification of rank. Standard errors are double clustered at the stock and time level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between July 2000 and April 2015.

Panel A: Linear Function of Rank

Dependent variable:	Daily volatility (t)									
Instrument:	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	0.491*	0.479***	0.382***	0.241***	0.303***	0.400***	0.275***	0.257***	0.301***	0.201***
	(1.930)	(2.875)	(3.827)	(2.886)	(3.704)	(3.680)	(3.661)	(3.643)	(4.097)	(3.195)
log(mktcap (t-1))	-0.296***	-0.387***	-0.456***	-0.550***	-0.587***	-0.696***	-0.728***	-0.752***	-0.764***	-0.754***
	(-3.344)	(-6.080)	(-9.371)	(-11.111)	(-11.918)	(-10.361)	(-10.288)	(-11.376)	(-11.574)	(-11.947)
1/Price (t-1)	1.920***	1.695***	1.413***	1.389***	1.477***	1.802***	1.327***	1.354***	1.707***	1.736***
	(9.698)	(10.702)	(12.183)	(12.746)	(13.920)	(7.393)	(6.970)	(8.291)	(10.403)	(12.248)
Amihud (t-1)	1.041	3.532*	4.600***	5.327***	5.636***	4.657*	6.537***	8.897***	8.001***	5.672***
	(0.480)	(1.920)	(3.020)	(3.360)	(3.530)	(1.902)	(4.002)	(6.039)	(6.169)	(6.898)
Bid-ask spread (t-1)	0.466	1.497	-1.326	-1.914	-1.791	-9.690***	-9.459**	-9.397***	-10.251***	-10.686***
	(0.184)	(0.773)	(-0.865)	(-1.127)	(-0.919)	(-3.136)	(-2.590)	(-3.451)	(-3.612)	(-3.710)
Book-to-Market (t-1)	0.121***	0.104***	0.112***	0.092***	0.093***	-0.002	-0.054**	-0.083***	-0.085***	-0.085***
	(5.684)	(6.050)	(8.304)	(6.469)	(6.401)	(-0.070)	(-2.278)	(-4.028)	(-4.936)	(-5.236)
Past 12-month return (t-1)	-0.011	-0.024	-0.002	0.007	0.015	0.291***	0.208***	0.219***	0.220***	0.207***
	(-0.255)	(-0.785)	(-0.093)	(0.276)	(0.741)	(9.218)	(4.459)	(5.878)	(6.605)	(7.176)
Gross profitability (t-1)	0.004	0.057	0.047	0.025	0.046*	0.133***	0.085***	0.070***	0.070***	0.040**
	(0.072)	(1.301)	(1.459)	(0.805)	(1.673)	(2.778)	(2.820)	(2.771)	(3.362)	(2.006)
Volatility (t-1)	0.236***	0.258***	0.251***	0.253***	0.256***	0.274***	0.266***	0.267***	0.269***	0.259***
	(15.726)	(19.061)	(21.749)	(21.651)	(21.732)	(19.026)	(19.874)	(20.316)	(20.277)	(21.789)
Index fund ownership	-0.024	-0.061**	-0.048***	-0.020	-0.031**	-0.049**	-0.037**	-0.026*	-0.035**	-0.013
	(-0.684)	(-1.996)	(-2.707)	(-1.288)	(-2.096)	(-2.401)	(-2.194)	(-1.773)	(-2.268)	(-0.993)
Active fund ownership	0.038***	0.052***	0.063***	0.071***	0.074***	0.063***	0.085***	0.081***	0.072***	0.067***
	(3.600)	(6.996)	(12.674)	(13.585)	(15.069)	(6.158)	(11.737)	(13.283)	(12.760)	(12.366)
Hedge fund ownership	0.111***	0.084***	0.087***	0.075***	0.080***	0.055***	0.031***	0.033***	0.042***	0.038***
	(3.218)	(4.367)	(7.140)	(7.423)	(8.183)	(4.184)	(3.253)	(4.211)	(5.153)	(5.219)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear polynomials of rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,116	17,056	27,420	38,971	51,692	10,204	20,563	30,848	41,888	52,974

Internet Appendix Table AVII. Regression Discontinuity, Quadratic and Cubic Specifications (Cont.)

Panel B: Quadratic Function of Rank

Dependent variable:	Daily volatility (t)									
Instrument:	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	0.469	0.510**	0.591***	0.531***	0.424***	0.300***	0.324***	0.413***	0.458***	0.487***
	(0.614)	(2.387)	(3.067)	(3.365)	(3.177)	(3.772)	(3.880)	(4.451)	(4.582)	(4.364)
log(mktcap (t-1))	-0.305	-0.375***	-0.390***	-0.463***	-0.560***	-0.717***	-0.718***	-0.726***	-0.734***	-0.704***
	(-1.264)	(-4.906)	(-5.613)	(-7.565)	(-10.083)	(-10.976)	(-10.168)	(-10.878)	(-11.267)	(-11.450)
1/Price (t-1)	1.904***	1.698***	1.427***	1.410***	1.510***	1.757***	1.334***	1.414***	1.826***	1.983***
	(9.119)	(10.374)	(11.275)	(12.154)	(13.519)	(7.475)	(6.866)	(7.954)	(9.734)	(11.576)
Amihud (t-1)	0.978	3.752*	6.306***	7.802***	6.731***	3.851*	7.203***	10.727***	9.600***	7.660***
	(0.212)	(1.832)	(2.960)	(3.710)	(3.521)	(1.714)	(4.093)	(6.335)	(6.452)	(6.598)
Bid-ask spread (t-1)	0.689	1.786	-0.940	-1.141	-1.374	-9.590***	-9.537**	-9.740***	-10.619***	-11.028***
	(0.223)	(0.888)	(-0.603)	(-0.638)	(-0.667)	(-3.163)	(-2.583)	(-3.462)	(-3.560)	(-3.658)
Book-to-Market (t-1)	0.120***	0.108***	0.124***	0.109***	0.097***	-0.001	-0.057**	-0.095***	-0.096***	-0.112***
	(3.068)	(5.911)	(8.256)	(7.015)	(6.540)	(-0.046)	(-2.323)	(-4.294)	(-5.039)	(-5.522)
Past 12-month return (t-1)	-0.009	-0.028	-0.013	-0.010	0.013	0.287***	0.208***	0.221***	0.220***	0.205***
	(-0.112)	(-0.878)	(-0.455)	(-0.338)	(0.612)	(9.141)	(4.466)	(5.865)	(6.590)	(7.126)
Gross profitability (t-1)	-0.004	0.065	0.098*	0.104**	0.074**	0.119***	0.094***	0.092***	0.085***	0.068***
	(-0.038)	(1.242)	(1.900)	(2.237)	(2.080)	(2.747)	(2.960)	(3.348)	(3.736)	(2.926)
Volatility (t-1)	0.236***	0.259***	0.263***	0.269***	0.262***	0.268***	0.270***	0.282***	0.283***	0.281***
	(6.994)	(15.874)	(15.895)	(17.406)	(18.554)	(20.101)	(20.114)	(20.566)	(21.016)	(21.098)
Index fund ownership	-0.021	-0.066*	-0.083**	-0.073**	-0.054**	-0.030*	-0.047**	-0.058***	-0.069***	-0.076***
	(-0.213)	(-1.691)	(-2.500)	(-2.509)	(-2.180)	(-1.792)	(-2.583)	(-3.078)	(-3.309)	(-3.248)
Active fund ownership	0.037***	0.051***	0.062***	0.073***	0.076***	0.067***	0.084***	0.080***	0.072***	0.067***
	(2.739)	(6.917)	(11.992)	(13.077)	(14.311)	(6.654)	(11.497)	(12.829)	(12.626)	(12.208)
Hedge fund ownership	0.108	0.086***	0.111***	0.110***	0.094***	0.048***	0.034***	0.044***	0.054***	0.060***
	(1.079)	(3.703)	(5.008)	(5.884)	(5.995)	(4.290)	(3.385)	(4.630)	(5.344)	(5.633)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quadratic polynomials of rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,116	17,056	27,420	38,971	51,692	10,204	20,563	30,848	41,888	52,974

Internet Appendix Table AVII. Regression Discontinuity, Quadratic and Cubic Specifications (Cont.)

Panel C: Cubic Function of Rank

Dependent variable:	Daily volatility (t)									
Instrument:	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	-5.647	0.574	0.608**	0.611***	0.500**	0.282***	0.275***	0.304***	0.380***	0.404***
	(-0.595)	(1.428)	(2.566)	(3.094)	(2.602)	(3.038)	(3.014)	(3.581)	(4.022)	(4.303)
log(mktcap (t-1))	-2.253	-0.353***	-0.383***	-0.439***	-0.541***	-0.724***	-0.727***	-0.744***	-0.749***	-0.720***
	(-0.745)	(-2.630)	(-4.750)	(-6.273)	(-7.807)	(-10.933)	(-10.133)	(-11.122)	(-11.170)	(-11.110)
1/Price (t-1)	1.529*	1.715***	1.430***	1.419***	1.518***	1.737***	1.324***	1.373***	1.763***	1.911***
	(1.733)	(8.933)	(11.171)	(11.858)	(13.076)	(7.401)	(6.926)	(8.196)	(9.721)	(11.486)
Amihud (t-1)	-34.431	4.173	6.452***	8.531***	7.458***	3.567	6.677***	9.476***	8.844***	7.073***
	(-0.617)	(1.389)	(2.666)	(3.527)	(3.158)	(1.516)	(3.653)	(5.888)	(5.999)	(6.661)
Bid-ask spread (t-1)	-17.004	1.832	-0.870	-0.973	-0.998	-9.498***	-9.550**	-9.660***	-10.499***	-10.904***
	(-0.592)	(0.866)	(-0.553)	(-0.530)	(-0.448)	(-3.287)	(-2.601)	(-3.502)	(-3.612)	(-3.710)
Book-to-Market (t-1)	-0.156	0.112***	0.125***	0.113***	0.100***	-0.002	-0.055**	-0.088***	-0.091***	-0.105***
	(-0.375)	(4.445)	(7.780)	(6.810)	(6.378)	(-0.078)	(-2.334)	(-4.118)	(-5.021)	(-5.854)
Past 12-month return (t-1)	0.522	-0.031	-0.015	-0.015	0.011	0.289***	0.208***	0.219***	0.220***	0.206***
	(0.636)	(-0.811)	(-0.491)	(-0.507)	(0.518)	(9.159)	(4.451)	(5.869)	(6.604)	(7.162)
Gross profitability (t-1)	-0.783	0.078	0.102*	0.127**	0.093*	0.115***	0.086***	0.079***	0.077***	0.060***
	(-0.636)	(0.912)	(1.687)	(2.258)	(1.853)	(2.756)	(2.819)	(2.953)	(3.456)	(2.686)
Volatility (t-1)	-0.006	0.262***	0.264***	0.273***	0.265***	0.266***	0.266***	0.272***	0.276***	0.275***
	(-0.015)	(10.054)	(14.119)	(15.812)	(15.683)	(18.285)	(19.839)	(20.965)	(21.209)	(22.130)
Index fund ownership	0.737	-0.077	-0.086**	-0.087**	-0.068*	-0.026	-0.037*	-0.035**	-0.052**	-0.058***
	(0.624)	(-1.071)	(-2.100)	(-2.432)	(-1.921)	(-1.309)	(-1.762)	(-2.022)	(-2.540)	(-2.785)
Active fund ownership	-0.028	0.052***	0.062***	0.074***	0.077***	0.067***	0.085***	0.080***	0.072***	0.067***
	(-0.270)	(6.404)	(11.894)	(12.744)	(13.743)	(6.766)	(11.686)	(13.118)	(12.790)	(12.349)
Hedge fund ownership	-0.708	0.093**	0.113***	0.120***	0.103***	0.047***	0.030***	0.036***	0.048***	0.054***
	(-0.566)	(2.223)	(4.117)	(5.116)	(4.628)	(3.798)	(2.924)	(4.129)	(5.007)	(5.748)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cubic polynomials of rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,116	17,056	27,420	38,971	51,692	10,204	20,563	30,848	41,888	52,974

Internet Appendix Table AVIII. Russell Switching Instrument, Sample Splits

The table reports estimates from a quasi-natural experiment relying on the reconstitution of the Russell 1000 and Russell 2000 indexes. The frequency of the data is monthly at the stock level. The table presents the second stage of the analysis. The variable of interest is ETF ownership instrumented by a dummy for inclusion in the Russell 2000, for stocks in the Russell 1000 before index reconstitution (columns (1)–(5)), and a dummy for inclusion in the Russell 1000, for stocks in the Russell 2000 before index reconstitution (columns (6)–(10)). The dependent variable and the ownership variables have been standardized by subtracting the mean and dividing by the standard deviation. Stocks are ranked in terms of market capitalization in May of each year. Different ranges of this rank around the cutoff are used for inclusion in the sample: 100 stocks on each side (columns (1) and (6)), 200 stocks on each side (columns (2) and (7)), 300 stocks on each side (columns (3) and (8)), 400 stocks on each side (columns (4) and (9)), and 500 stocks on each side (columns (5) and (10)). The same stocks enter the sample in the June after index reconstitution and remain in the sample until May of the next year, except if delistings occur. The controls in all panels are logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), lagged volatility, index-fund ownership, active-fund ownership, and hedge-fund ownership. Month fixed effects are included. Panel A uses years 2000 to 2006. Panel B uses years 2007 to 2015. Standard errors are double clustered at the stock and month level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The whole sample ranges between July 2000 and April 2015.

Panel A: Sample Period: 2000–2006

Dependent variable:	Daily volatility (t)									
Instrument:	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	0.512**	0.384***	0.268***	0.176**	0.249***	0.717**	0.249***	0.198***	0.222***	0.169***
	(2.224)	(2.649)	(3.269)	(2.631)	(3.656)	(2.409)	(3.572)	(3.252)	(3.486)	(3.394)
log(mktcap (t-1))	-0.346***	-0.404***	-0.478***	-0.512***	-0.533***	-0.606***	-0.731***	-0.766***	-0.761***	-0.728***
	(-3.995)	(-5.576)	(-7.079)	(-7.366)	(-7.322)	(-7.121)	(-9.075)	(-9.783)	(-9.504)	(-9.266)
1/Price (t-1)	2.758***	1.815***	1.550***	1.326***	1.461***	1.759***	1.395***	1.322***	1.411***	1.435***
	(5.928)	(6.649)	(8.570)	(8.651)	(9.395)	(6.464)	(6.511)	(8.198)	(8.382)	(9.383)
Amihud (t-1)	1.241	5.238**	4.392***	5.737***	6.139***	13.736**	6.568***	7.135***	7.249***	6.084***
	(0.493)	(2.413)	(2.876)	(3.501)	(3.845)	(2.251)	(3.293)	(5.038)	(6.163)	(7.869)
Bid-ask spread (t-1)	-0.484	0.696	-2.117	-2.833	-3.004	-12.445***	-9.365***	-8.741***	-9.558***	-10.449***
	(-0.163)	(0.319)	(-1.293)	(-1.654)	(-1.571)	(-3.084)	(-2.662)	(-3.349)	(-3.411)	(-3.641)
Book-to-Market (t-1)	0.063**	0.082***	0.095***	0.088***	0.109***	-0.291***	-0.248***	-0.245***	-0.235***	-0.184***
	(2.113)	(3.117)	(4.458)	(4.376)	(5.189)	(-3.162)	(-4.827)	(-5.323)	(-5.208)	(-4.293)
Past 12-month return (t-1)	-0.014	-0.029	0.027	0.008	0.038	0.309***	0.156***	0.152***	0.153***	0.140***
	(-0.227)	(-0.735)	(0.749)	(0.214)	(1.101)	(5.908)	(3.318)	(4.150)	(4.738)	(5.024)
Gross profitability (t-1)	0.004	0.049	0.064**	0.035	0.069***	0.173**	0.109***	0.080***	0.072***	0.033
	(0.051)	(1.084)	(2.167)	(1.265)	(2.852)	(2.421)	(3.443)	(3.176)	(3.339)	(1.500)
Volatility (t-1)	0.229***	0.263***	0.260***	0.267***	0.270***	0.376***	0.290***	0.287***	0.297***	0.294***
	(14.041)	(19.465)	(20.091)	(18.905)	(17.987)	(9.317)	(17.415)	(18.014)	(18.037)	(19.731)
Hedge fund ownership	0.088***	0.076***	0.054***	0.048***	0.050***	0.075**	0.013	0.011	0.011	0.011
	(2.778)	(4.236)	(5.291)	(5.997)	(6.117)	(2.308)	(1.061)	(1.228)	(1.332)	(1.487)
Index fund ownership	-0.002	-0.022	-0.013	0.001	-0.020	-0.059	-0.003	0.005	0.001	0.010
	(-0.074)	(-0.795)	(-0.807)	(0.073)	(-1.354)	(-1.461)	(-0.238)	(0.444)	(0.043)	(0.974)
Active fund ownership	0.105***	0.083***	0.082***	0.088***	0.092***	0.024	0.093***	0.098***	0.092***	0.088***
	(3.878)	(5.868)	(9.452)	(9.880)	(11.305)	(0.957)	(10.297)	(12.991)	(12.698)	(12.378)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear polynomials of rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,857	10,103	16,101	22,303	28,599	6,495	12,735	18,293	23,647	29,060

Internet Appendix Table AVIII. Russell Switching Instrument, Sample Splits (Cont.)
Panel B: Sample Period: 2007–2015

Dependent variable:	Daily volatility (t)									
Instrument:	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF ownership (standardized)	-0.454	0.347	0.249**	0.209**	0.185**	0.184**	0.103*	0.061	0.038	-0.064
	(-1.119)	(1.073)	(2.171)	(2.378)	(2.510)	(2.435)	(1.750)	(1.143)	(0.761)	(-1.238)
log(mktcap (t-1))	-0.785***	-0.455**	-0.527***	-0.635***	-0.707***	-0.758***	-0.852***	-0.852***	-0.882***	-0.887***
	(-3.078)	(-2.570)	(-7.093)	(-8.964)	(-10.581)	(-6.005)	(-6.635)	(-7.368)	(-8.023)	(-8.371)
1/Price (t-1)	1.697***	1.142***	0.817***	0.936***	1.105***	1.980***	1.448***	1.456***	1.755***	1.570***
	(3.638)	(4.561)	(4.785)	(6.348)	(8.168)	(3.319)	(4.799)	(5.036)	(7.411)	(6.784)
Amihud (t-1)	-13.936	0.010	5.260	4.033	2.735	24.798***	7.993**	11.753***	10.296***	4.583*
	(-1.255)	(0.002)	(1.586)	(1.322)	(0.931)	(2.721)	(2.373)	(3.149)	(3.053)	(1.754)
Bid-ask spread (t-1)	-15.864	43.692*	51.758***	57.599***	52.860***	39.211**	17.908*	21.637**	26.479***	22.907**
	(-0.707)	(1.661)	(4.148)	(6.660)	(7.106)	(2.275)	(1.707)	(2.316)	(2.758)	(2.349)
Book-to-Market (t-1)	0.053	0.106***	0.100***	0.084***	0.070***	-0.008	-0.028	-0.043***	-0.051***	-0.053***
	(1.006)	(2.867)	(5.413)	(4.961)	(3.703)	(-0.441)	(-1.568)	(-2.923)	(-4.167)	(-4.297)
Past 12-month return (t-1)	0.120*	0.020	-0.008	0.020	0.017	0.305***	0.332***	0.318***	0.310***	0.302***
	(1.983)	(0.511)	(-0.237)	(0.621)	(0.802)	(6.746)	(7.729)	(8.503)	(7.492)	(8.191)
Gross profitability (t-1)	-0.203	0.087	0.011	0.030	0.007	-0.026	-0.043	-0.044	-0.024	-0.032
	(-1.604)	(0.571)	(0.169)	(0.498)	(0.137)	(-0.411)	(-0.829)	(-0.947)	(-0.658)	(-0.869)
Volatility (t-1)	0.227***	0.249***	0.230***	0.236***	0.227***	0.188***	0.196***	0.195***	0.191***	0.181***
	(7.903)	(9.242)	(13.275)	(16.505)	(17.044)	(13.340)	(15.538)	(16.235)	(18.480)	(20.562)
Hedge fund ownership	-0.031	0.062*	0.083***	0.084***	0.083***	0.064***	0.035***	0.025***	0.031***	0.028***
	(-0.434)	(1.711)	(5.099)	(6.064)	(6.881)	(4.288)	(3.513)	(2.862)	(3.280)	(3.101)
Index fund ownership	0.112	-0.092	-0.057*	-0.041*	-0.027	-0.063**	-0.037	-0.012	0.004	0.041**
	(1.272)	(-1.038)	(-1.937)	(-1.753)	(-1.394)	(-2.108)	(-1.533)	(-0.594)	(0.195)	(2.114)
Active fund ownership	0.005	0.018	0.044***	0.053***	0.057***	0.054***	0.051***	0.045***	0.033***	0.028***
	(0.296)	(1.534)	(6.051)	(8.863)	(9.706)	(5.199)	(6.739)	(7.204)	(5.698)	(5.188)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear polynomials of rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,259	6,953	11,319	16,668	23,093	3,709	7,828	12,555	18,241	23,914

Internet Appendix Table AIX. Magnitude Estimation

The table presents assessments of the economic magnitude of the effects of ETFs on stock volatility. Panel A reports the median volatility, which is the starting point before applying the variation in ETF ownership, the estimated standard deviation of ETF ownership for the median stock, the new level of volatility after applying the variation, and the new percentile in the volatility distribution that is achieved after applying the change in ETF ownership. Panel B computes the economic magnitudes by assessing the shift in volatility for the median stock using estimates from instrumental variable (IV) regressions. In this panel, first we consider the effect of a one-standard-deviation change in ETF ownership. Then we consider the effect of the change in ETF ownership that is induced by the Russell index switch. The organization of the table mirrors the outline of Table V in terms of the bandwidth of the experiment and the direction of the index switch. Panel C reports estimates from a regression of daily stock volatility (estimated within the month) on previous month stock returns and controls. The controls are the lag of logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), lagged volatility, index-fund ownership, and active-fund ownership. Stock and month fixed effects are included. Standard errors are double clustered at the stock and time level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Panel A: Summary Statistics

Sample:	S&P 500		Russell 3000	
Lags of dep. variable in regression:	No lags	Three lags	No lags	Three lags
Median volatility	0.021	0.021	0.027	0.027
Std. dev. of ETF ownership	0.018	0.018	0.023	0.023
New level of volatility	0.023	0.022	0.028	0.028
New quantile of volatility	64	58	57	55
Std. dev. of prior month return	0.085	0.085	0.114	0.114
New level of volatility	0.022	0.022	0.027	0.028
New quantile of volatility	57	57	54	54

Internet Appendix Table AIX. Magnitude Estimation (Cont.)

Panel B: Estimation of Effect Magnitude, per Window Size

	Switch to the Russell 2000					Switch to the Russell 1000				
Bandwidth:	± 100	± 200	± 300	± 400	± 500	± 100	± 200	± 300	± 400	± 500
					Linear Function of Rank					
Median volatility	0.026	0.024	0.025	0.025	0.024	0.031	0.028	0.027	0.027	0.027
Std.dev. of ETF ownership	0.023	0.023	0.022	0.022	0.022	0.020	0.021	0.022	0.023	0.024
New level of volatility	0.035	0.031	0.031	0.029	0.029	0.038	0.033	0.031	0.031	0.030
New quantile of volatility	80	80	75	70	75	75	70	70	70	65
Abs(ΔETF ownership due to switch (%))	0.304	0.460	0.576	0.663	0.649	0.490	0.592	0.565	0.522	0.553
New level of volatility	0.027	0.025	0.027	0.026	0.026	0.033	0.029	0.028	0.028	0.028
New quantile of volatility	65	60	60	60	60	60	60	60	60	55
					Quadratic Function of Rank					
Median volatility	0.026	0.024	0.025	0.025	0.024	0.031	0.028	0.027	0.027	0.027
Std.dev. of ETF ownership	0.023	0.023	0.022	0.022	0.022	0.020	0.021	0.022	0.023	0.024
New level of volatility	0.041	0.032	0.035	0.033	0.031	0.036	0.033	0.033	0.034	0.034
New quantile of volatility	85	80	80	80	75	75	70	80	80	80
Abs(ΔETF ownership due to switch (%))	0.059	0.369	0.374	0.448	0.485	0.641	0.598	0.578	0.531	0.496
New level of volatility	0.027	0.025	0.027	0.027	0.026	0.033	0.030	0.029	0.028	0.029
New quantile of volatility	60	60	60	65	60	60	60	60	60	60
					Cubic Function of Rank					
Median volatility	0.026	0.024	0.025	0.025	0.024	0.031	0.028	0.027	0.027	0.027
Std.dev. of ETF ownership	0.023	0.023	0.022	0.022	0.022	0.020	0.021	0.022	0.023	0.024
New level of volatility	.	0.035	0.035	0.035	0.032	0.036	0.032	0.032	0.032	0.033
New quantile of volatility	.	85	80	85	80	75	70	75	75	75
Abs(ΔETF ownership due to switch (%))	0.066	0.186	0.309	0.355	0.377	0.594	0.598	0.623	0.593	0.599
New level of volatility	.	0.025	0.026	0.026	0.026	0.033	0.029	0.028	0.028	0.029
New quantile of volatility	.	55	60	65	60	60	60	60	60	60

Note: missing values in quintiles correspond to insignificant IV estimates

Internet Appendix Table AIX. Magnitude Estimation (Cont.)

Panel C: Comparing Magnitude or Volatility-Return Regressions

Dependent variable:	Daily stock volatility			
	S&P 500		Russell 3000	
	(1)	(2)	(3)	(4)
Return (t-1)	-0.012***	-0.012***	-0.006***	-0.008***
	(-4.731)	(-8.432)	(-3.843)	(-7.045)
Volatility (t-1)		0.288***		0.215***
		(17.693)		(21.338)
Volatility (t-2)		0.183***		0.157***
		(10.118)		(23.013)
Volatility (t-3)		0.210***		0.179***
		(16.009)		(28.830)
log(Mktcap (t-1))	0.001	0.000	-0.002***	-0.001***
	(0.993)	(0.382)	(-4.990)	(-5.255)
1/Price (t-1)	0.055***	0.017***	0.029***	0.013***
	(4.472)	(3.622)	(9.624)	(7.437)
Amihud (t-1)	0.682**	0.451***	0.033***	0.019***
	(2.508)	(2.897)	(7.302)	(6.383)
Bid-ask spread (t-1)	-0.037	-0.020	0.046*	0.043***
	(-0.680)	(-0.726)	(1.934)	(4.502)
Book-to-Market (t-1)	0.002***	-0.000	0.003***	0.001***
	(3.066)	(-0.290)	(7.901)	(4.024)
Past 12-month Return (t-1)	-0.002**	-0.000	0.000	0.000
	(-2.481)	(-1.332)	(1.031)	(0.311)
Gross Profitability (t-1)	0.000	-0.001	-0.003***	-0.002***
	(0.108)	(-1.360)	(-3.700)	(-3.591)
Index Fund Ownership	0.026	0.023***	-0.033***	-0.006
	(1.084)	(2.660)	(-4.969)	(-1.556)
Active Fund Ownership	0.007***	0.004***	0.008***	0.005***
	(2.866)	(3.549)	(7.340)	(7.794)
Observations	84,261	78,428	446,608	404,861
R^2	0.638	0.743	0.604	0.670

Internet Appendix Table AX. Turnover Analysis

The table presents analysis of the turnover in ETFs and stocks using Ancerno data. Turnover is computed as dollar volume over market capitalization. Panel A presents summary statistics. Panel B shows regressions of turnover on an indicator for whether a security is an ETF. Panel C reports estimates from regressions of price impact on trade volume. Price impact is calculated as the percentage difference between the execution price and the price at the time of placement. Trade volume is the number of shares that are traded divided by the number of shares outstanding. The analysis is at the stock-day level in Panels A and B, and at the trade level in Panel C. Standard errors are double clustered at the security and day level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between 2000 and 2014.

Panel A: Summary Statistics

	Turnover (%)					
	N	Mean	St. Dev.	Min	Median	Max
ETFs	58,778	0.427	1.740	0.000	0.050	25.200
S&P 500 Stocks	1,198,411	0.095	0.127	0.001	0.050	1.170
Russell 3000 Stocks	3,647,470	0.127	0.167	0.001	0.065	1.170

Panel B: Turnover Regressions

Dependent variable:	Turnover (%)			
Sample:	S&P 500		Russell 3000	
	(1)	(2)	(3)	(4)
Security is ETF	0.332***	0.337***	0.300***	0.314***
	(3.678)	(3.863)	(3.321)	(3.521)
Date FE	No	Yes	No	Yes
Observations	1,257,189	1,257,189	3,706,248	3,706,248
Adjusted R^2	0.030	0.034	0.018	0.032

Panel C: Price-Impact Regressions

Dependent variable:	Price Impact of Trade		
Sample:	ETFs	S&P 500	Russell 3000
	(1)	(2)	(3)
Trade Volume	0.203***	1.544***	1.273***
	(8.560)	(48.252)	(57.229)
Date FE	Yes	Yes	Yes
Security FE	Yes	Yes	Yes
Observations	843,158	18,867,594	44,374,985
Adjusted R^2	0.018	0.008	0.010

Internet Appendix Table AXI. Predictability of Order Imbalance

The table reports estimates from regressions of different leads of order imbalance on ETF flows, at the stock-day level. Panel A uses S&P 500 stocks. Panel B uses Russell 3000 stocks. Order imbalance is defined as the difference between shares bought and sold, over the sum of the two, for a given stock-day. The controls in all panels are the lag of logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, and lagged gross profitability (as in Novy-Marx (2013)). Day fixed effects are included. Panel C reports different lags of the autocorrelation of ETF flows across different ETF styles at the daily frequency. Standard errors are double clustered at the stock and day level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Panel A: Predictability of Order Imbalance (S&P 500)

Dependent variable:	Stock-level order imbalance										
Day:	t	t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8	t+9	t+10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ETF flows (t)	0.006***	0.002***	0.001**	0.001***	0.001**	0.000	0.001**	0.001**	0.000	0.000	0.000
	(12.637)	(4.719)	(2.088)	(2.712)	(2.150)	(0.365)	(1.969)	(2.048)	(0.519)	(1.109)	(1.521)
log(mktcap (t-1))	-0.003***	-0.003***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***
	(-2.993)	(-3.512)	(-3.597)	(-3.710)	(-3.735)	(-3.749)	(-3.692)	(-3.674)	(-3.639)	(-3.610)	(-3.691)
1/Price (t-1)	-0.023	-0.011	-0.008	-0.008	-0.007	-0.009	-0.007	-0.007	-0.005	-0.008	-0.007
	(-1.053)	(-0.528)	(-0.381)	(-0.376)	(-0.336)	(-0.419)	(-0.335)	(-0.328)	(-0.237)	(-0.340)	(-0.293)
Amihud (t-1)	-5.781*	-7.516**	-7.974**	-8.232**	-8.390**	-8.413**	-8.234**	-8.118**	-7.878**	-7.635**	-7.955**
	(-1.760)	(-2.270)	(-2.325)	(-2.412)	(-2.469)	(-2.495)	(-2.430)	(-2.397)	(-2.359)	(-2.284)	(-2.279)
Bid-ask spread (t-1)	0.398**	0.465**	0.559***	0.559***	0.633***	0.617***	0.620***	0.576***	0.470**	0.585***	0.361**
	(2.144)	(2.581)	(2.801)	(2.892)	(3.335)	(3.382)	(3.223)	(3.028)	(2.541)	(3.070)	(1.968)
Book-to-Market (t-1)	0.005**	0.005**	0.005**	0.005**	0.005**	0.005**	0.005**	0.005**	0.005**	0.005**	0.005**
	(2.470)	(2.296)	(2.206)	(2.220)	(2.190)	(2.225)	(2.204)	(2.191)	(2.163)	(2.208)	(2.192)
Past 12-month return (t-1)	0.004**	0.004**	0.004**	0.004**	0.004**	0.004**	0.004**	0.004**	0.004**	0.004**	0.004**
	(2.339)	(2.325)	(2.322)	(2.346)	(2.316)	(2.206)	(2.242)	(2.219)	(2.240)	(2.268)	(2.220)
Gross profitability (t-1)	-0.004	-0.004	-0.005	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(-0.998)	(-1.098)	(-1.112)	(-1.059)	(-1.048)	(-1.054)	(-1.075)	(-1.068)	(-1.067)	(-1.076)	(-1.085)
Observations	1,171,675	1,171,597	1,166,409	1,164,448	1,163,007	1,161,873	1,160,493	1,159,176	1,158,006	1,156,991	1,156,097
R^2	0.131	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.129	0.130

Panel B: Predictability of Order Imbalance (Russel 3000)

Dependent variable:	Stock-level order imbalance										
Stock-level order imbalance is measured on day:	t	t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8	t+9	t+10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ETF flows (t)	0.004***	0.007***	0.001*	0.000	0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	(8.601)	(14.377)	(1.870)	(0.048)	(0.649)	(-0.504)	(-0.214)	(0.795)	(0.589)	(0.800)	(0.197)
log(mktcap (t-1))	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***
	(17.587)	(17.755)	(17.264)	(17.079)	(17.118)	(16.999)	(17.015)	(16.862)	(16.773)	(16.787)	(16.928)
1/Price (t-1)	-0.037***	-0.023***	-0.021***	-0.021***	-0.021***	-0.020***	-0.020***	-0.019***	-0.020***	-0.020***	-0.019***
	(-6.851)	(-4.320)	(-3.931)	(-3.827)	(-3.783)	(-3.663)	(-3.731)	(-3.541)	(-3.673)	(-3.634)	(-3.362)
Amihud (t-1)	-0.052***	-0.061***	-0.062***	-0.062***	-0.062***	-0.071***	-0.066***	-0.079***	-0.074***	-0.069***	-0.070***
	(-4.392)	(-5.225)	(-4.934)	(-4.966)	(-5.022)	(-5.687)	(-5.013)	(-5.605)	(-5.304)	(-4.989)	(-5.188)
Bid-ask spread (t-1)	-0.867***	-0.906***	-0.954***	-0.938***	-0.916***	-0.936***	-0.774***	-0.763***	-0.873***	-0.864***	-0.919***
	(-7.374)	(-7.749)	(-8.037)	(-7.397)	(-7.246)	(-7.513)	(-6.185)	(-6.069)	(-6.868)	(-7.059)	(-7.177)
Book-to-Market (t-1)	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.007***
	(8.451)	(8.033)	(8.045)	(7.960)	(7.927)	(7.990)	(8.010)	(7.852)	(8.037)	(7.876)	(7.814)
Past 12-month return (t-1)	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***
	(10.795)	(10.927)	(11.064)	(10.915)	(10.932)	(10.866)	(10.752)	(10.572)	(10.630)	(10.484)	(10.326)
Gross profitability (t-1)	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***
	(4.274)	(4.325)	(4.362)	(4.203)	(4.300)	(4.339)	(4.231)	(4.357)	(4.360)	(4.222)	(4.220)
Observations	6,342,140	6,341,040	6,271,888	6,246,749	6,228,970	6,214,873	6,197,962	6,181,891	6,168,824	6,158,129	6,148,945
R^2	0.059	0.058	0.059	0.059	0.058	0.059	0.058	0.059	0.059	0.058	0.059

Internet Appendix Table AXI. Predictability of Order Imbalance (Cont.)

Panel C: Autocorrelation in ETF Flows

	All Funds	US Large Cap	US Small Cap	US Sector	US Style-based	Foreign Equity	Mixed	Fixed Income	Other
N =	4000	56	65	492	535	626	189	311	1726
Lag 1	0.090***	0.042***	0.043***	0.087***	0.091***	0.104***	0.086***	0.087***	0.084***
Lag 2	0.075***	0.016	0.042***	0.066***	0.076***	0.096***	0.073***	0.073***	0.077***
Lag 3	0.061***	0.030***	0.017	0.048***	0.060***	0.088***	0.061***	0.062***	0.063***
Lag 4	0.056***	0.022**	0.018	0.037***	0.063***	0.078***	0.059***	0.066***	0.053***
Lag 5	0.053***	0.034***	0.008	0.036***	0.056***	0.078***	0.051***	0.064***	0.038***
Lag 6	0.047***	0.022**	0.002	0.032***	0.042***	0.071***	0.054***	0.060***	0.039***
Lag 7	0.042***	0.029***	0.017	0.030***	0.037***	0.061***	0.034***	0.053***	0.036***
Lag 8	0.043***	0.022***	0.004	0.033***	0.038***	0.066***	0.044***	0.049***	0.037***
Lag 9	0.044***	0.030***	0.028***	0.034***	0.036***	0.062***	0.052***	0.053***	0.035***
Lag 10	0.043***	0.025***	0.009	0.031***	0.040***	0.059***	0.044***	0.050***	0.042***
Lag 11	0.039***	0.018***	0.019***	0.029***	0.034***	0.057***	0.044***	0.045***	0.035***
Lag 12	0.036***	0.018***	0.023***	0.028***	0.026***	0.054***	0.033***	0.047***	0.031***
Lag 13	0.036***	0.024***	0.021***	0.029***	0.029***	0.046***	0.036***	0.044***	0.029***
Lag 14	0.033***	0.026***	0.026***	0.021***	0.031***	0.046***	0.025***	0.041***	0.020***
Lag 15	0.033***	0.018*	0.023***	0.024***	0.032***	0.045***	0.032***	0.036***	0.025***
Lag 16	0.033***	0.024***	0.014	0.026***	0.028***	0.047***	0.023***	0.041***	0.020**
Lag 17	0.029***	0.019**	0.010**	0.022***	0.021***	0.045***	0.033***	0.041***	0.013
Lag 18	0.029***	0.024***	0.008	0.021***	0.026***	0.039***	0.026***	0.036***	0.018*
Lag 19	0.032***	0.021**	0.025***	0.023***	0.032***	0.038***	0.031***	0.038***	0.023***
Lag 20	0.029***	0.030***	0.006	0.022***	0.032***	0.037***	0.015*	0.032***	0.023***

Internet Appendix Table AXII. Intraday Volatility and Range, and ETF Flows

The table reports estimates from regressions of intraday volatility, or price range, on the absolute value of net stock-level flows and the sum of absolute stock-level flows. Flows are standardized by stock-level market capitalization. The controls in all panels are the lag of logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, and lagged gross profitability (as in Novy-Marx (2013)). Date and stock fixed effects are included. Standard errors are double clustered at the stock and time level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Dependent variable:	Intraday volatility (standartized)				Intraday range (standartized)			
Sample:	S&P 500		Russell 3000		S&P 500		Russell 3000	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
abs(Net Flows)/Mkt Cap	0.048***	0.007	0.000	-0.005**	0.036***	-0.004	0.006***	-0.004***
	(8.751)	(1.400)	(0.057)	(-2.487)	(11.779)	(-0.975)	(5.573)	(-2.918)
Sum abs(Flows)/Mkt Cap		0.065***		0.007**		0.062***		0.015***
		(5.910)		(2.363)		(8.384)		(6.589)
log(Mktcap (t-1))	0.151***	0.152***	-0.025**	-0.025**	0.006	0.007	-0.061***	-0.061***
	(3.809)	(3.841)	(-2.118)	(-2.123)	(0.352)	(0.408)	(-8.512)	(-8.533)
1/Price (t-1)	5.515***	5.514***	1.925***	1.926***	1.970***	1.969***	0.955***	0.956***
	(5.657)	(5.660)	(18.842)	(18.838)	(5.206)	(5.217)	(14.099)	(14.108)
Amihud (t-1)	4.265	5.150	0.124***	0.124***	29.898***	30.731***	0.314***	0.314***
	(0.304)	(0.367)	(3.166)	(3.167)	(4.292)	(4.407)	(8.022)	(8.023)
Bid-ask spread (t-1)	-5.441***	-5.477***	7.776***	7.777***	0.503	0.467	7.348***	7.348***
	(-2.730)	(-2.750)	(14.666)	(14.665)	(0.541)	(0.502)	(21.766)	(21.759)
Book-to-Market (t-1)	0.092**	0.091**	0.090***	0.090***	0.034	0.034	0.059***	0.058***
	(2.532)	(2.528)	(6.940)	(6.930)	(1.580)	(1.566)	(7.213)	(7.179)
Past 12-month Return (t-1)	-0.164***	-0.164***	-0.041***	-0.041***	-0.070***	-0.070***	-0.009**	-0.009**
	(-8.233)	(-8.246)	(-6.525)	(-6.517)	(-7.033)	(-7.063)	(-2.140)	(-2.111)
Gross Profitability (t-1)	-0.128	-0.127	-0.169***	-0.169***	-0.070	-0.069	-0.114***	-0.114***
	(-0.781)	(-0.780)	(-4.624)	(-4.623)	(-1.152)	(-1.153)	(-5.396)	(-5.390)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,542,880	1,542,880	8,546,816	8,546,816	1,549,715	1,549,715	8,575,670	8,575,670
R^2	0.589	0.589	0.530	0.530	0.507	0.509	0.434	0.434

Table AXIII. Evidence of Arbitrage Activity

The table reports estimates from regressions of turnover and order imbalance on measures of mispricing at the end of the prior day, at the day-stock level. Turnover is defined as shares traded over shares outstanding. Order imbalance is defined as the difference between shares bought and sold, over the sum of the two, for a given stock-day. The analysis is at the stock-day level. The controls in all panels include the lagged dependent variable, the lag of logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, and lagged gross profitability (as in Novy-Marx (2013)). Stock and day fixed effects are included. Standard errors are double clustered at the stock and day level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Dependent variable:	Turnover (%)				Order Imbalance (%)			
Sample:	S&P 500		Russell 3000		S&P 500		Russell 3000	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High absolute mispricing	0.026***	0.021***	0.033***	0.017***				
	(5.243)	(7.282)	(12.803)	(9.095)				
Turnover (%) (t-1)	0.733***	0.577***	0.725***	0.583***				
	(95.255)	(112.957)	(201.923)	(196.332)				
Negative mispricing					-0.137***	-0.121***	-0.024	-0.078
					(-2.621)	(-2.705)	(-0.463)	(-1.586)
Positive mispricing					0.154***	0.132***	0.363***	0.244***
					(3.412)	(3.504)	(6.932)	(4.840)
Order Imbalance (t-1)					0.125***	0.112***	0.124***	0.112***
					(47.448)	(53.297)	(91.414)	(98.638)
log(mktcap (t-1))	-0.060***	-0.155***	0.016***	0.016***	-0.305***	-0.341**	0.501***	0.449***
	(-11.107)	(-13.786)	(9.761)	(3.306)	(-5.955)	(-1.974)	(15.609)	(6.061)
1/Price (t-1)	0.841***	0.519**	0.135***	-0.037**	-0.715	-1.846	-0.871***	-0.239
	(6.272)	(2.101)	(8.508)	(-2.217)	(-0.567)	(-0.760)	(-4.255)	(-1.145)
Amihud (t-1)	-124.811***	-132.838***	-0.411***	-0.311***	-555.273***	-234.613	-1.353***	0.317
	(-8.167)	(-8.456)	(-7.305)	(-7.379)	(-3.390)	(-1.564)	(-3.039)	(0.606)
Bid-ask spread (t-1)	0.507	0.452	-2.659***	-1.213***	5.685	2.929	-39.070***	-15.549***
	(0.735)	(0.909)	(-8.519)	(-6.978)	(0.896)	(0.731)	(-5.855)	(-3.609)
Book-to-Market (t-1)	0.035***	0.035**	0.006	0.025***	0.164	-0.121	0.236***	-0.001
	(3.745)	(2.472)	(1.639)	(6.339)	(1.492)	(-0.939)	(5.342)	(-0.017)
Past 12-month return (t-1)	0.030***	0.019***	0.026***	0.026***	0.301***	0.223**	0.166***	0.136***
	(3.880)	(2.923)	(4.086)	(5.441)	(3.224)	(2.334)	(2.886)	(3.507)
Gross profitability (t-1)	0.077***	0.044	0.061***	0.055***	-0.732***	0.075	0.223**	0.553***
	(4.091)	(1.048)	(8.312)	(3.597)	(-3.077)	(0.104)	(2.560)	(2.669)
Return (t-1)	-0.825***	-0.604***	-0.568***	-0.411***	5.702***	6.628***	6.865***	7.904***
	(-11.313)	(-8.814)	(-19.405)	(-15.857)	(6.902)	(7.998)	(14.035)	(16.345)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,306,791	1,306,791	7,071,752	7,071,751	1,297,863	1,297,862	7,024,827	7,024,825
R^2	0.664	0.695	0.586	0.621	0.118	0.128	0.072	0.081

Internet Appendix Table AXIV. ETF Ownership and Volatility, Moderated by Investor Sentiment

The table reports estimates from regressions of daily stock volatility on ETF ownership, interacted with investor sentiment. The dependent variable is stock-level volatility measured across days within each month. The measures of investor sentiment are top-quartile indicators derived from the distributions of the Baker and Wurgler (2006) index and the Michigan Survey of Consumer Sentiment index. Volatility and ETF ownership are standardized. The controls in all panels are logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), lagged volatility, index-fund ownership, active-fund ownership, hedge-fund ownership, and lags of stock volatility. Month and stock fixed effects are included. Standard errors are double clustered at the stock and time level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Dependent variable:	Daily volatility (t)			
Sample:	S&P 500		Russell 3000	
	(1)	(2)	(3)	(4)
ETF ownership (standardized)	0.072***	0.076***	0.053***	0.052***
	(5.643)	(5.976)	(7.368)	(7.434)
× Top BW sentiment	0.157***		0.070*	
	(2.924)		(1.709)	
× Top Michigan sentiment		0.072**		0.018
		(2.095)		(1.270)
log(Mktcap (t-1))	-0.012	-0.013	-0.064***	-0.064***
	(-0.856)	(-0.902)	(-6.805)	(-6.948)
1/Price (t-1)	1.036***	1.049***	0.809***	0.809***
	(3.272)	(3.533)	(8.536)	(8.624)
Amihud (t-1)	22.127**	21.773**	1.157***	1.165***
	(2.544)	(2.558)	(6.659)	(6.713)
Bid-ask spread (t-1)	0.461	-0.265	2.529***	2.470***
	(0.300)	(-0.168)	(4.763)	(4.588)
Book-to-Market (t-1)	-0.027	-0.027	0.005	0.006
	(-1.315)	(-1.338)	(0.413)	(0.478)
Past 12-month Return (t-1)	-0.004	-0.008	0.016*	0.015
	(-0.264)	(-0.540)	(1.731)	(1.586)
Gross Profitability (t-1)	-0.040	-0.042	-0.081***	-0.083***
	(-1.041)	(-1.093)	(-3.442)	(-3.520)
Hedge fund ownership	-0.026***	-0.026***	-0.023***	-0.023***
	(-4.296)	(-4.228)	(-7.988)	(-7.985)
Index fund ownership	0.002	0.002	0.009***	0.009***
	(0.513)	(0.458)	(3.058)	(3.016)
Active fund ownership	0.015***	0.016***	0.026***	0.026***
	(2.927)	(2.999)	(5.874)	(5.949)
Volatility (t-1)	0.291***	0.291***	0.208***	0.207***
	(17.276)	(17.583)	(20.112)	(20.097)
Volatility (t-2)	0.174***	0.176***	0.154***	0.154***
	(9.534)	(9.682)	(22.617)	(22.781)
Volatility (t-3)	0.201***	0.204***	0.175***	0.177***
	(14.852)	(14.975)	(28.218)	(27.999)
Month FE	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes
Observations	76,834	77,675	388,054	392,684
R^2	0.742	0.740	0.671	0.670

Internet Appendix Table AXV. ETF Ownership and Stock Volatility, Moderated by Arbitrage Capital

The table reports estimates from regressions of daily stock volatility on ETF ownership, interacted with measures of the availability of arbitrage capital. The dependent variable is stock-level volatility measured using daily returns within a month. ETF ownership and volatility are standardized. ETF ownership is interacted with the variables proposed by He, Kelly, and Manela (2017) in columns (1)–(2), and with the variable proposed by Adrian, Etula, and Muir (2014) in column (3). Columns (4)–(6) add the average VIX as a control. Panel A uses a sample of S&P 500 stocks. Panel B uses a sample of Russell 3000 stocks. Month and stock fixed effects are included. Panels C, D, and E report estimates from regressions of daily stock returns on ETF flows, interacted with measures of the availability of arbitrage capital. The dependent variable is the stock-level DWGT-adjusted return measured across different horizons. The ETF-flows variable is expressed as a fraction of the stock's market capitalization and is standardized. The ETF-flows variable is interacted with the variables proposed by He, Kelly, and Manela (2017) in Panel C and Panel D, and with the variable proposed by Adrian, Etula, and Muir (2014) in Panel E. The controls in all panels include logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), index-fund ownership, active-fund ownership, hedge-fund ownership, and lags of stock volatility. Day fixed effects are included. Standard errors are double clustered at the stock and time level. Panel F reports estimates from time-series regressions of the monthly cross-sectional average of stock-level mispricing on measures of arbitrage capital. In columns (1)–(4), arbitrage capital is measured using the variables proposed by He, Kelly, and Manela (2017): intermediary capital and the traded factor based on intermediary capital. In columns (5)–(6), arbitrage capital is measured using the variable proposed by Adrian, Etula, and Muir (2014). In some specifications, the (average within the month) VIX index is also included. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2012, due to the availability of the measures of arbitrage capital.

Internet Appendix Table AXV. ETF Ownership and Stock Volatility, Moderated by Arbitrage Capital (Cont.)

Panel A: S&P 500

Sample:	S&P 500					
Dependent variable:	Daily volatility (t)					
	(1)	(2)	(3)	(4)	(5)	(6)
ETF ownership (standardized)	0.074***	0.073***	0.074***	0.065***	0.065***	0.064***
	(5.012)	(5.080)	(5.079)	(4.869)	(4.847)	(4.851)
× Intermediary capital risk factor	-0.020***			-0.012*		
	(-2.740)			(-1.760)		
× Intermediary capital traded factor		-0.019***			-0.007	
		(-2.863)			(-1.232)	
× AEM leverage factor			-0.014			0.001
			(-1.613)			(0.151)
× VIX				0.021***	0.022***	0.027***
				(3.345)	(3.338)	(3.261)
log(Mktcap (t-1))	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.688)	(-0.714)	(-0.713)	(-0.675)	(-0.692)	(-0.692)
1/Price (t-1)	0.020***	0.020***	0.020***	0.020***	0.020***	0.020***
	(3.440)	(3.429)	(3.437)	(3.413)	(3.403)	(3.395)
Amihud (t-1)	0.351**	0.350**	0.351**	0.335**	0.336**	0.336**
	(2.226)	(2.221)	(2.233)	(2.138)	(2.141)	(2.139)
Bid-ask spread (t-1)	-0.006	-0.005	-0.007	-0.003	-0.003	-0.003
	(-0.198)	(-0.172)	(-0.227)	(-0.117)	(-0.106)	(-0.099)
Book-to-Market (t-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-1.015)	(-1.032)	(-1.020)	(-1.036)	(-1.043)	(-1.039)
Past 12-month Return (t-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.315)	(-0.326)	(-0.343)	(-0.292)	(-0.297)	(-0.288)
Gross Profitability (t-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.188)	(-0.211)	(-0.167)	(-0.200)	(-0.206)	(-0.195)
Hedge fund ownership	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***
	(-3.654)	(-3.645)	(-3.672)	(-3.646)	(-3.647)	(-3.658)
Index fund ownership	0.003	0.004	0.003	0.004	0.004	0.004
	(0.808)	(0.849)	(0.775)	(0.880)	(0.895)	(0.886)
Active fund ownership	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(3.001)	(3.020)	(3.009)	(2.932)	(2.939)	(2.929)
Volatility (t-1)	0.304***	0.303***	0.304***	0.303***	0.302***	0.303***
	(18.010)	(18.054)	(18.078)	(18.074)	(18.072)	(18.097)
Volatility (t-2)	0.174***	0.175***	0.175***	0.174***	0.174***	0.174***
	(8.888)	(8.911)	(8.908)	(8.879)	(8.888)	(8.881)
Volatility (t-3)	0.195***	0.195***	0.196***	0.195***	0.195***	0.195***
	(13.223)	(13.220)	(13.255)	(13.279)	(13.263)	(13.299)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	62,508	62,508	62,508	62,508	62,508	62,508
R^2	0.747	0.747	0.747	0.747	0.747	0.747

Internet Appendix Table AXV. ETF Ownership and Stock Volatility, Moderated by Arbitrage Capital (Cont.)

Panel B: Russell 3000

Sample:	Russell 3000					
Dependent variable:	Daily volatility (t)					
	(1)	(2)	(3)	(4)	(5)	(6)
ETF ownership (standardized)	0.074***	0.073***	0.075***	0.065***	0.065***	0.064***
	(5.013)	(5.081)	(5.082)	(4.852)	(4.823)	(4.819)
× Intermediary capital risk factor	-0.021***			-0.012*		
	(-2.740)			(-1.760)		
× Intermediary capital traded factor		-0.020***			-0.007	
		(-2.863)			(-1.232)	
× AEM leverage factor			-0.014			0.001
			(-1.613)			(0.151)
× VIX				0.022***	0.022***	0.027***
				(3.345)	(3.338)	(3.261)
log(Mktcap (t-1))	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.688)	(-0.714)	(-0.713)	(-0.675)	(-0.692)	(-0.692)
1/Price (t-1)	0.020***	0.020***	0.020***	0.020***	0.020***	0.020***
	(3.440)	(3.429)	(3.437)	(3.413)	(3.403)	(3.395)
Amihud (t-1)	0.351**	0.350**	0.351**	0.335**	0.336**	0.336**
	(2.226)	(2.221)	(2.233)	(2.138)	(2.141)	(2.139)
Bid-ask spread (t-1)	-0.006	-0.005	-0.007	-0.003	-0.003	-0.003
	(-0.198)	(-0.172)	(-0.227)	(-0.117)	(-0.106)	(-0.099)
Book-to-Market (t-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-1.015)	(-1.032)	(-1.020)	(-1.036)	(-1.043)	(-1.039)
Past 12-month Return (t-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.315)	(-0.326)	(-0.343)	(-0.292)	(-0.297)	(-0.288)
Gross Profitability (t-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.188)	(-0.211)	(-0.167)	(-0.200)	(-0.206)	(-0.195)
Hedge fund ownership	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***
	(-3.654)	(-3.645)	(-3.672)	(-3.646)	(-3.647)	(-3.658)
Index fund ownership	0.003	0.004	0.003	0.004	0.004	0.004
	(0.808)	(0.849)	(0.775)	(0.880)	(0.895)	(0.886)
Active fund ownership	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(3.001)	(3.020)	(3.009)	(2.932)	(2.939)	(2.929)
Volatility (t-1)	0.304***	0.303***	0.304***	0.303***	0.302***	0.303***
	(18.010)	(18.054)	(18.078)	(18.074)	(18.072)	(18.097)
Volatility (t-2)	0.174***	0.175***	0.175***	0.174***	0.174***	0.174***
	(8.888)	(8.911)	(8.908)	(8.879)	(8.888)	(8.881)
Volatility (t-3)	0.195***	0.195***	0.196***	0.195***	0.195***	0.195***
	(13.223)	(13.220)	(13.255)	(13.279)	(13.263)	(13.299)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	62,508	62,508	62,508	62,508	62,508	62,508
R^2	0.747	0.747	0.747	0.747	0.747	0.747

Internet Appendix Table AXV. ETF Ownership and Stock Volatility, Moderated by Arbitrage Capital (Cont.)

Panel C: Arbitrage Capital Proxied by Intermediary Capital Risk Factor

Dependent variable:	DGTW returns over…									
	(t)	(t, t+5)	(t, t+10)	(t, t+20)	(t, t+40)	(t)	(t, t+5)	(t, t+10)	(t, t+20)	(t, t+40)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF flows (standartized)	0.118***	0.102***	0.052**	0.033	0.017	0.117***	0.101***	0.050**	0.033	0.017
	(11.374)	(6.160)	(2.319)	(1.134)	(0.406)	(11.479)	(6.173)	(2.292)	(1.155)	(0.403)
× Intermediary capital risk factor	-0.015	-0.065***	-0.057**	-0.081**	-0.073*	-0.011	-0.058***	-0.050*	-0.082**	-0.072
	(-1.475)	(-3.401)	(-2.011)	(-2.431)	(-1.652)	(-1.012)	(-3.091)	(-1.755)	(-2.489)	(-1.633)
× VIX						0.027**	0.044**	0.043	-0.006	0.010
						(1.991)	(2.037)	(1.438)	(-0.155)	(0.192)
log(Mktcap (t-1))	0.034***	0.025***	0.015	0.022	0.032	0.034***	0.025***	0.015	0.022	0.032
	(11.410)	(2.732)	(0.862)	(0.603)	(0.428)	(11.392)	(2.719)	(0.856)	(0.603)	(0.428)
1/Price (t-1)	-0.678***	0.275	1.454**	4.049***	9.341***	-0.678***	0.275	1.455**	4.048***	9.341***
	(-3.903)	(1.090)	(2.471)	(3.218)	(3.217)	(-3.896)	(1.093)	(2.473)	(3.218)	(3.217)
Amihud (t-1)	29.054***	-5.936	-40.582	-81.454	-169.202	29.007***	-6.014	-40.656	-81.444	-169.219
	(5.557)	(-0.437)	(-1.499)	(-1.483)	(-1.541)	(5.553)	(-0.442)	(-1.502)	(-1.483)	(-1.541)
Bid-ask spread (t-1)	-1.512*	3.110	7.050*	19.413***	29.602**	-1.507*	3.118	7.058*	19.412***	29.604**
	(-1.659)	(1.476)	(1.881)	(2.737)	(2.208)	(-1.654)	(1.480)	(1.883)	(2.737)	(2.208)
Book-to-Market (t-1)	0.039***	0.020	0.004	-0.013	-0.046	0.039***	0.020	0.004	-0.013	-0.047
	(4.231)	(0.741)	(0.088)	(-0.135)	(-0.226)	(4.214)	(0.731)	(0.082)	(-0.135)	(-0.226)
Past 12-month Return (t-1)	-0.020**	-0.031	-0.073	0.022	0.250	-0.020**	-0.032	-0.073	0.022	0.250
	(-2.204)	(-1.047)	(-1.284)	(0.203)	(1.099)	(-2.210)	(-1.050)	(-1.286)	(0.203)	(1.099)
Gross Profitability (t-1)	0.040**	0.039	0.009	0.016	0.041	0.040**	0.039	0.010	0.016	0.041
	(2.255)	(0.865)	(0.120)	(0.112)	(0.140)	(2.259)	(0.867)	(0.121)	(0.112)	(0.140)
Lagged dependent variable	-2.397***	-2.296***	-2.348***	-2.737***	-3.401***	-2.397***	-2.296***	-2.348***	-2.737***	-3.401***
	(-7.126)	(-6.941)	(-7.079)	(-7.167)	(-6.753)	(-7.122)	(-6.942)	(-7.080)	(-7.167)	(-6.753)
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631
R^2	0.010	0.009	0.009	0.011	0.014	0.010	0.009	0.009	0.011	0.014

Internet Appendix Table AXV. ETF Ownership and Stock Volatility, Moderated by Arbitrage Capital (Cont.)

Panel D: Arbitrage Capital Proxied by Intermediary Capital Traded Factor

Dependent variable:	DGTW returns over…									
	(t)	(t, t+5)	(t, t+10)	(t, t+20)	(t, t+40)	(t)	(t, t+5)	(t, t+10)	(t, t+20)	(t, t+40)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF flows (standartized)	0.118***	0.105***	0.054**	0.036	0.021	0.117***	0.103***	0.052**	0.037	0.021
	(11.394)	(6.259)	(2.410)	(1.244)	(0.476)	(11.506)	(6.270)	(2.369)	(1.283)	(0.482)
× Intermediary capital traded factor	-0.002	-0.034	-0.036	-0.060*	-0.062	0.008	-0.019	-0.022	-0.065**	-0.062
	(-0.224)	(-1.557)	(-1.361)	(-1.838)	(-1.407)	(0.801)	(-0.854)	(-0.867)	(-2.054)	(-1.420)
× VIX						0.032**	0.047**	0.043	-0.015	-0.000
						(2.375)	(2.062)	(1.498)	(-0.436)	(-0.007)
log(Mktcap (t-1))	0.034***	0.025***	0.015	0.022	0.032	0.034***	0.025***	0.015	0.022	0.032
	(11.428)	(2.738)	(0.862)	(0.602)	(0.427)	(11.414)	(2.730)	(0.859)	(0.603)	(0.427)
1/Price (t-1)	-0.679***	0.275	1.455**	4.050***	9.342***	-0.679***	0.275	1.455**	4.050***	9.342***
	(-3.905)	(1.092)	(2.471)	(3.218)	(3.217)	(-3.898)	(1.092)	(2.472)	(3.217)	(3.217)
Amihud (t-1)	29.074***	-5.906	-40.570	-81.449	-169.214	29.032***	-5.967	-40.626	-81.429	-169.213
	(5.561)	(-0.435)	(-1.499)	(-1.483)	(-1.541)	(5.556)	(-0.439)	(-1.501)	(-1.483)	(-1.541)
Bid-ask spread (t-1)	-1.515*	3.100	7.042*	19.403***	29.593**	-1.510*	3.108	7.050*	19.400***	29.593**
	(-1.663)	(1.471)	(1.879)	(2.736)	(2.208)	(-1.657)	(1.475)	(1.881)	(2.736)	(2.208)
Book-to-Market (t-1)	0.039***	0.020	0.004	-0.013	-0.046	0.039***	0.020	0.004	-0.013	-0.046
	(4.237)	(0.747)	(0.090)	(-0.134)	(-0.225)	(4.217)	(0.736)	(0.085)	(-0.133)	(-0.225)
Past 12-month Return (t-1)	-0.020**	-0.031	-0.072	0.022	0.251	-0.020**	-0.031	-0.072	0.022	0.251
	(-2.197)	(-1.037)	(-1.280)	(0.207)	(1.101)	(-2.206)	(-1.042)	(-1.282)	(0.207)	(1.101)
Gross Profitability (t-1)	0.040**	0.039	0.010	0.017	0.041	0.040**	0.039	0.010	0.017	0.041
	(2.257)	(0.869)	(0.122)	(0.113)	(0.141)	(2.261)	(0.871)	(0.123)	(0.113)	(0.141)
Lagged dependent variable	-2.398***	-2.295***	-2.347***	-2.738***	-3.402***	-2.398***	-2.295***	-2.347***	-2.738***	-3.402***
	(-7.128)	(-6.938)	(-7.076)	(-7.169)	(-6.755)	(-7.125)	(-6.940)	(-7.077)	(-7.169)	(-6.755)
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631
R^2	0.010	0.009	0.009	0.011	0.014	0.010	0.009	0.009	0.011	0.014

Internet Appendix Table AXV. ETF Ownership and Stock Volatility, Moderated by Arbitrage Capital (Cont.)

Panel E: Arbitrage Capital Proxied by AEM Leverage Factor

Dependent variable:	DGTW returns over…									
	(t)	(t, t+5)	(t, t+10)	(t, t+20)	(t, t+40)	(t)	(t, t+5)	(t, t+10)	(t, t+20)	(t, t+40)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ETF flows (standartized)	0.119***	0.107***	0.057**	0.041	0.025	0.117***	0.104***	0.055**	0.042	0.026
	(11.366)	(6.241)	(2.518)	(1.391)	(0.593)	(11.551)	(6.252)	(2.498)	(1.476)	(0.625)
× AEM leverage factor	-0.018	-0.044*	-0.069**	-0.099**	-0.114**	-0.007	-0.025	-0.055	-0.109**	-0.119*
	(-1.417)	(-1.800)	(-2.125)	(-2.458)	(-1.975)	(-0.505)	(-1.009)	(-1.617)	(-2.580)	(-1.911)
× VIX						0.027*	0.047**	0.035	-0.024	-0.013
						(1.899)	(2.068)	(1.121)	(-0.638)	(-0.242)
log(Mktcap (t-1))	0.034***	0.025***	0.016	0.022	0.032	0.034***	0.025***	0.015	0.022	0.032
	(11.417)	(2.747)	(0.865)	(0.606)	(0.429)	(11.402)	(2.735)	(0.860)	(0.607)	(0.429)
1/Price (t-1)	-0.678***	0.275	1.455**	4.050***	9.343***	-0.678***	0.275	1.455**	4.050***	9.343***
	(-3.900)	(1.091)	(2.473)	(3.219)	(3.218)	(-3.896)	(1.092)	(2.474)	(3.219)	(3.218)
Amihud (t-1)	29.076***	-5.840	-40.508	-81.343	-169.104	29.023***	-5.930	-40.574	-81.298	-169.078
	(5.561)	(-0.430)	(-1.497)	(-1.482)	(-1.541)	(5.557)	(-0.436)	(-1.499)	(-1.481)	(-1.541)
Bid-ask spread (t-1)	-1.545*	3.020	6.919*	19.226***	29.392**	-1.520*	3.063	6.951*	19.204***	29.379**
	(-1.697)	(1.433)	(1.847)	(2.712)	(2.193)	(-1.672)	(1.455)	(1.856)	(2.709)	(2.192)
Book-to-Market (t-1)	0.039***	0.020	0.004	-0.014	-0.047	0.039***	0.020	0.004	-0.013	-0.047
	(4.224)	(0.741)	(0.083)	(-0.139)	(-0.228)	(4.213)	(0.733)	(0.080)	(-0.137)	(-0.228)
Past 12-month Return (t-1)	-0.020**	-0.031	-0.072	0.022	0.250	-0.020**	-0.031	-0.073	0.022	0.250
	(-2.202)	(-1.041)	(-1.283)	(0.204)	(1.099)	(-2.207)	(-1.044)	(-1.284)	(0.204)	(1.099)
Gross Profitability (t-1)	0.040**	0.039	0.009	0.016	0.041	0.040**	0.039	0.010	0.016	0.041
	(2.255)	(0.867)	(0.120)	(0.112)	(0.140)	(2.260)	(0.870)	(0.122)	(0.112)	(0.140)
Lagged dependent variable	-2.398***	-2.295***	-2.346***	-2.737***	-3.401***	-2.397***	-2.296***	-2.347***	-2.736***	-3.401***
	(-7.129)	(-6.938)	(-7.075)	(-7.166)	(-6.754)	(-7.125)	(-6.940)	(-7.076)	(-7.165)	(-6.754)
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631	1,250,631
R^2	0.010	0.009	0.009	0.011	0.014	0.010	0.009	0.009	0.011	0.014

Internet Appendix Table AXV. ETF Ownership and Stock Volatility, Moderated by Arbitrage Capital (Cont.)

Panel E: ETF Mispricing and Arbitrage Capital

Dependent variable:	Average Mispricing					
Arbitrage factor:	Intermediary capital		Traded Factor		AEM leverage	
	(1)	(2)	(3)	(4)	(5)	(6)
Arbitrage factor	-0.000**	-0.000	-0.000***	-0.000	-0.000***	-0.000
	(-2.391)	(-0.471)	(-3.374)	(-0.045)	(-3.701)	(-1.189)
VIX		0.000***		0.000***		0.000***
		(7.703)		(7.194)		(7.127)
Constant	0.000***	0.000	0.000***	0.000	0.000***	0.000
	(18.534)	(0.726)	(19.248)	(0.572)	(19.470)	(1.071)
Observations	156	156	156	156	156	156
R^2	0.036	0.305	0.069	0.304	0.082	0.311

Internet Appendix Table AXVI. The Availability of Arbitrage Capital

The table reports estimates from regressions of daily stock-level volatility within the month on ETF ownership interacted with aggregate factors. Volatility and the ownership variables are standardized. The aggregate factors are the VIX, absolute net trades, and the sum of absolute trades, where trades are of all institutional investors (columns (1), (2), (5), (6)), or of hedge funds (columns (3), (4), (7), (8)). Columns (1)–(4) restrict the sample to S&P 500 firms. Columns (5)–(8) use a sample of Russell 3000 stocks. The controls in all panels are logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), lagged volatility, index-fund ownership, active-fund ownership, and hedge-fund ownership, and lags of stock volatility. Panel A uses a sample of S&P 500 stocks. Panel B uses a sample of Russell 3000 stocks. Month and stock fixed effects are included. Standard errors are double clustered at the stock and time level. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Dependent variable:	Daily volatility (t)							
Sample:	S&P 500				Russell 3000			
Institutions in the factor:	All		Hedge Funds		All		Hedge Funds	
Type of factor:	Abs(net trades)	Sum(abs trades)	Abs(net trades)	Sum(abs trades)	Abs(net trades)	Sum(abs trades)	Abs(net trades)	Sum(abs trades)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ETF ownership	0.075***	0.078***	0.072***	0.080***	0.046***	0.048***	0.049***	0.053***
	(7.111)	(6.967)	(6.980)	(7.562)	(9.564)	(9.047)	(9.340)	(9.530)
× Trading factor	0.031***	0.038***	0.028**	0.050***	0.007**	0.011***	0.017***	0.025***
	(3.432)	(4.210)	(2.365)	(4.418)	(2.319)	(2.650)	(3.060)	(4.216)
× VIX	0.025***	0.008	0.025***	0.010	0.018***	0.014***	0.019***	0.011***
	(3.918)	(1.295)	(4.080)	(1.532)	(6.456)	(4.058)	(6.216)	(3.218)
log(mktcap (t-1))	-0.000	-0.000	-0.000	-0.000	-0.001***	-0.001***	-0.001***	-0.001***
	(-0.592)	(-0.547)	(-0.671)	(-0.681)	(-6.749)	(-6.750)	(-6.777)	(-6.793)
1/Price (t-1)	0.020***	0.020***	0.019***	0.019***	0.015***	0.015***	0.015***	0.015***
	(3.371)	(3.355)	(3.340)	(3.091)	(8.551)	(8.543)	(8.540)	(8.482)
Amihud (t-1)	0.396**	0.399**	0.392**	0.402**	0.023***	0.023***	0.023***	0.023***
	(2.448)	(2.463)	(2.434)	(2.450)	(6.831)	(6.825)	(6.890)	(6.901)
Bid-ask spread (t-1)	0.006	0.009	0.006	0.018	0.047***	0.048***	0.048***	0.049***
	(0.203)	(0.333)	(0.205)	(0.637)	(4.650)	(4.683)	(4.669)	(4.810)
Book-to-Market (t-1)	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	(-1.284)	(-1.286)	(-1.272)	(-1.181)	(0.430)	(0.420)	(0.437)	(0.429)
Past 12-month return (t-1)	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	(-0.436)	(-0.403)	(-0.393)	(-0.311)	(1.592)	(1.579)	(1.620)	(1.597)
Gross profitability (t-1)	-0.001	-0.001	-0.001	-0.001	-0.002***	-0.002***	-0.002***	-0.002***
	(-0.986)	(-1.064)	(-0.914)	(-0.905)	(-3.425)	(-3.427)	(-3.421)	(-3.420)
Index fund ownership	-0.000	0.000	-0.000	-0.000	0.007***	0.007***	0.007***	0.007***
	(-0.025)	(0.070)	(-0.042)	(-0.078)	(3.138)	(3.164)	(3.109)	(3.143)
Active fund ownership	0.003***	0.003***	0.003***	0.003***	0.006***	0.005***	0.006***	0.005***
	(2.761)	(2.754)	(2.769)	(2.766)	(5.736)	(5.677)	(5.745)	(5.657)
Hedge fund ownership	-0.007***	-0.007***	-0.007***	-0.007***	-0.006***	-0.006***	-0.006***	-0.006***
	(-4.249)	(-4.161)	(-4.267)	(-4.198)	(-8.110)	(-8.126)	(-8.124)	(-8.159)
Volatility (t-1)	0.289***	0.288***	0.289***	0.287***	0.207***	0.207***	0.207***	0.206***
	(17.691)	(17.755)	(17.725)	(17.558)	(20.299)	(20.304)	(20.282)	(20.279)
Volatility (t-2)	0.174***	0.174***	0.174***	0.173***	0.154***	0.154***	0.154***	0.154***
	(9.585)	(9.601)	(9.534)	(9.519)	(22.477)	(22.482)	(22.483)	(22.515)
Volatility (t-3)	0.201***	0.201***	0.201***	0.199***	0.175***	0.175***	0.175***	0.175***
	(14.929)	(14.864)	(14.849)	(14.762)	(28.240)	(28.278)	(28.249)	(28.286)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	76,834	76,834	76,834	76,834	388,054	388,054	388,054	388,054
R^2	0.743	0.743	0.743	0.743	0.672	0.672	0.672	0.672

Internet Appendix Table AXVI. Evidence on the Arbitrage Channel (Russell 3000 Sample)

The table reports estimates from ordinary least squares (OLS) regressions of intraday volatility (Panel A) and the intraday variance ratio (Panel B) on absolute stock-level mispricing in the prior period interacted with measures of arbitrage costs. The frequency is daily, and the observations are at the stock level. The sample contains Russell 3000 stocks. In columns (2)–(4), the arbitrage cost is captured by the bid-ask spread from the prior day, and in columns (5)–(7), by the average share-lending fee in the month. For both measures of arbitrage costs, we construct dummy variables denoting whether the stock is in the top half of the distribution of that measure in the relevant period. In columns (3) and (6), we restrict the sample to observations for which the stock-level mispricing is positive. In columns (4) and (7), we restrict the sample to observations for which the stock-level mispricing is negative. The controls in all panels are logged market capitalization, the lagged inverse share price, the lagged Amihud (2002) ratio, the lagged average bid-ask spread, the lagged book-to-market ratio, lagged past 12 month returns, lagged gross profitability (as in Novy-Marx (2013)), lagged returns, the lagged dependent variable, and the absolute mispricing in period *t* - 2. Variable descriptions are provided in I.A. Table AI. Standard errors are double clustered at the stock and day levels. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Dependent variable:	Intraday stock volatility						
	All	All	Misp > 0	Misp < 0	All	Misp > 0	Misp < 0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Abs(Mispricing) (t-1)	0.006***	0.005***	0.017***	0.001	0.002	0.008***	-0.001
	(6.452)	(3.424)	(8.650)	(0.326)	(1.220)	(4.531)	(-0.573)
× I(High bid-ask spread)		-0.010***	-0.022***	-0.005			
		(-2.950)	(-6.015)	(-1.391)			
× I(High lending fee)					-0.001	0.001	-0.003
					(-0.635)	(0.376)	(-1.566)
High bid-ask spread		0.077***	0.077***	0.075***			
		(18.020)	(18.166)	(17.012)			
High lending fee					0.040***	0.041***	0.039***
					(16.488)	(16.471)	(15.455)
ETF ownership (t-1)	0.005*	0.004**	0.001	0.004**	0.002	-0.001	0.003
	(1.867)	(2.305)	(0.684)	(2.277)	(1.357)	(-0.433)	(1.635)
log(Mktcap (t-1))	-0.074***	0.000	0.003	-0.001	-0.008***	-0.006***	-0.010***
	(-9.929)	(0.086)	(1.109)	(-0.552)	(-3.661)	(-2.629)	(-4.237)
1/Price (t-1)	1.268***	1.967***	1.919***	2.009***	2.007***	1.953***	2.051***
	(14.093)	(29.945)	(28.858)	(30.159)	(30.126)	(28.995)	(30.335)
Amihud (t-1)	-0.826***	-1.060***	-0.882***	-1.229***	-1.283***	-1.092***	-1.454***
	(-5.635)	(-8.281)	(-7.084)	(-8.955)	(-9.798)	(-8.591)	(-10.352)
Bid-ask spread (t-1)	22.967***	16.286***	14.740***	18.118***	23.517***	22.162***	25.081***
	(11.449)	(9.004)	(8.328)	(9.305)	(11.946)	(11.784)	(11.704)
Book-to-Market (t-1)	0.105***	0.040***	0.036***	0.043***	0.041***	0.038***	0.044***
	(8.495)	(6.712)	(5.935)	(7.218)	(6.911)	(6.100)	(7.426)
Past 12-month Return (t-1)	0.045***	0.052***	0.052***	0.053***	0.052***	0.052***	0.053***
	(11.865)	(13.486)	(13.872)	(12.655)	(13.119)	(13.571)	(12.276)
Gross Profitability (t-1)	-0.038*	0.011	0.011	0.011	0.004	0.005	0.004
	(-1.712)	(1.254)	(1.297)	(1.230)	(0.512)	(0.553)	(0.514)
Ret (t-1)	-0.175***	-0.233***	-0.577***	0.077***	-0.225***	-0.568***	0.085***
	(-8.972)	(-11.616)	(-20.462)	(2.806)	(-11.221)	(-20.130)	(3.114)
Dependent variable (t-1)	0.422***	0.559***	0.572***	0.547***	0.561***	0.574***	0.549***
	(70.202)	(73.167)	(71.125)	(73.810)	(72.839)	(70.634)	(73.617)
Abs(Mispricing) (t-2)	0.003***	-0.001	0.006***	-0.005***	-0.002**	0.005***	-0.006***
	(2.751)	(-1.357)	(3.838)	(-4.198)	(-2.091)	(3.359)	(-5.360)
Day fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock fixed effects	Yes	No	No	No	No	No	No
Observations	4,333,078	4,333,078	2,050,177	2,282,901	4,333,078	2,050,177	2,282,901
R^2	0.513	0.466	0.468	0.465	0.465	0.467	0.464

Internet Appendix Table AXVIII. ETF-Ownership Portfolios, Subsamples

The table reports raw returns and alphas for portfolios based on ETF ownership, split by periods. Each month, five equally weighted portfolios are formed monthly on the basis of the five quintiles of the distribution of ETF ownership in the previous month. The panels present factor model regressions for the High-ETF-ownership minus the Low-ETF-ownership portfolio. The factors are the five Fama and French (2015) factors (MKTRF, HML, SMB, RMW, CMA), Momentum (UMD), and the Pástor and Stambaugh (2003) traded liquidity factor (PS_VWF). Panels A and B present the regressions for the subsamples 2000–2007 and 2008–2015, respectively. *t*-statistics are presented in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. The sample ranges between January 2000 and December 2015.

Panel A: High Minus Low Portfolio, 2000–2007

Dependent variable:	ret(High-minus-Low ETF Ownership)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha	0.158	0.148	0.304	0.420*	0.417	0.309	0.327	0.229
	(0.589)	(0.596)	(1.216)	(1.663)	(1.637)	(1.192)	(1.247)	(0.856)
MKTRF		0.244***	0.175***	0.177***	0.184**	0.260***	0.248***	0.220**
		(4.063)	(2.697)	(2.777)	(2.627)	(3.158)	(2.915)	(2.549)
HML			-0.185**	-0.235***	-0.234***	-0.337***	-0.288**	-0.337**
			(-2.483)	(-3.025)	(-3.001)	(-3.445)	(-2.230)	(-2.552)
SMB				-0.133**	-0.139*	-0.049	-0.045	-0.098
				(-1.991)	(-1.944)	(-0.552)	(-0.502)	(-1.031)
UMD					0.012	0.004	0.007	0.018
					(0.253)	(0.084)	(0.156)	(0.376)
RMW						0.203*	0.184	0.168
						(1.710)	(1.494)	(1.367)
CMA							-0.078	-0.037
							(-0.586)	(-0.272)
PS_VWF								0.122
								(1.538)
# Months	95	95	95	95	95	95	95	95
R^2	0.000	0.151	0.204	0.237	0.238	0.262	0.265	0.284

Internet Appendix Table AXVIII. ETF Ownership Portfolios, Subsamples (Cont.)

Panel B: High Minus Low Portfolio, 2008–2015

Dependent variable:	ret(High-minus-Low ETF Ownership)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha	0.535***	0.507***	0.563***	0.565***	0.564***	0.447***	0.441***	0.445***
	(3.792)	(3.587)	(4.266)	(4.256)	(4.239)	(3.436)	(3.345)	(3.415)
MKTRF		0.043	0.001	0.004	0.009	0.052	0.053	0.050
		(1.471)	(0.031)	(0.136)	(0.297)	(1.602)	(1.626)	(1.563)
HML			0.201***	0.205***	0.218***	0.235***	0.218***	0.272***
			(4.013)	(3.974)	(3.936)	(4.474)	(3.317)	(3.788)
SMB				-0.020	-0.021	0.021	0.021	-0.010
				(-0.334)	(-0.348)	(0.370)	(0.360)	(-0.162)
UMD					0.019	0.015	0.012	0.009
					(0.670)	(0.567)	(0.444)	(0.315)
RMW						0.311***	0.304***	0.304***
						(3.464)	(3.324)	(3.367)
CMA							0.050	0.060
							(0.430)	(0.528)
PS_VWF								0.060*
								(1.766)
# Months	96	96	96	96	96	96	96	96
R^2	0.000	0.022	0.167	0.168	0.172	0.269	0.271	0.296

Internet Appendix Figure A1. Price Impact of Trade Turnover

The figure plots non-parametric estimates of the price impact of trade turnover (measured as a fraction of daily volume) from Ancerno data. The figure reports the average price impact in each of the 30 bins of daily turnover. The sample is trades in S&P 500 stocks (Figure A1a) and Russell 3000 stocks (Figure A1b). The trade-level sample ranges between 1999 and 2014.

Figure A1a. S&P 500 stocks

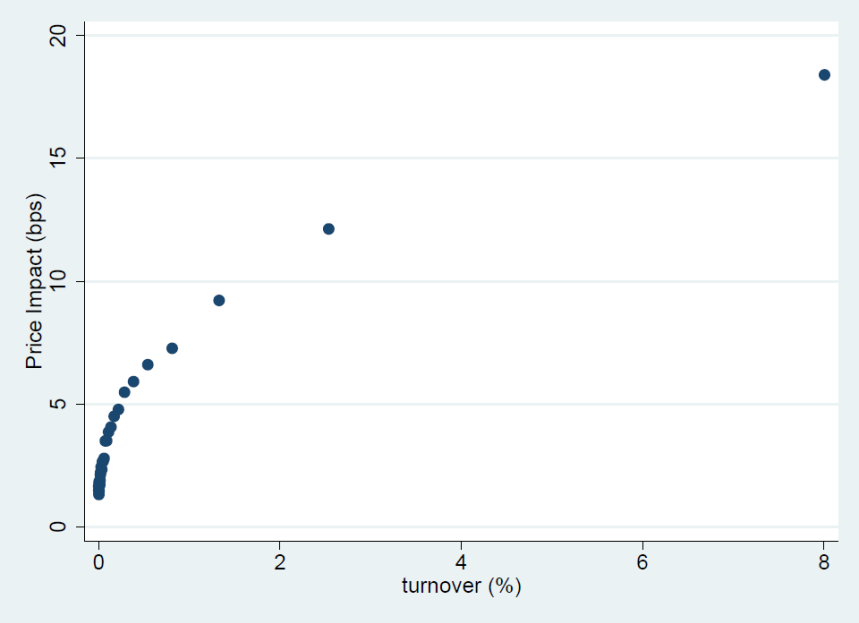

Figure A1b. Russell 3000 stocks