Passive Flows and Company Valuations: A Study of the Swedish Market

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Abstract

This paper analyzes the relationship between index fund flows and the valuations of index constituents listed on the Stockholm Stock Exchange. Using data on the OMXS30 and OMXS30NEXT indices, we run panel regressions of P/E ratios on index fund flows and a set of control variables. Using monthly data, we find a positive contemporaneous correlation between these flows and P/E ratios of OMXS30 companies. At mean values, the aggregate index fund flows correspond to a 1.22% increase in the valuations of OMXS30 constituents. Further, this relationship appears to be limited to the larger market capitalization names on the index. For the OMXS30NEXT, no such correlation is found on the full sample of constituents, but we do find a positive relationship between P/E ratios and concurrent index fund flows on the larger market capitalization companies of this index. Our results also show a significant interaction effect between liquidity and fund flows, indicating that this relationship is stronger for less liquid companies. While the significant positive relationship between P/E and flows may be explained by either feedback trading or a demand driven valuation effect, our results suggest evidence for the latter. Finally, the results suggest that this effect is permanent as we do not find evidence of price reversals, thus providing support of the imperfect substitutes hypothesis.

Keywords: Index, Passive Investing, OMXS30, OMXS30NEXT, Valuation, Fund Flows, Demand Curves for Stocks

JEL Classification: G11 (investment decisions), G12 (asset pricing), G14 (Information and Market Efficiency), G23 (private financial institutions)

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1. Introduction and Hypothesis

Over the past decade, the merits of passively versus actively managed funds have been discussed by academics, the financial media, and a number of high profile investors. Recently, investors are also increasingly allocating their savings toward index funds and away from the more traditional actively managed space. This shift has led researchers and investors alike to ask an important question - could the growth of passive investing have implications for the valuation and efficiency of equity markets?

Since Fama's (1970) introduction of the efficient market hypothesis, much of financial theory has rested on the assumption that a company's valuation depends strictly on information concerning its fundamental value. Any valuation change should reflect new information, meaning that stock prices should not be impacted by supply and demand effects. In academic literature, various studies challenge this view and attempt to establish a connection between stock prices and non-fundamental effects. Of note, Shleifer (1986) suggests the existence of a downward sloping demand curve, where outsized demand for stocks can impact their prices. Shleifer (1986), like many of the studies exploring price effects for non-fundamental driven demand shocks, has focused on event studies contingent on the addition or deletion of stocks from an index. Summarizing previous studies, Brealey (2000) examines price effects of inclusions and removals of S&P 500 constituents between 1966 and 1995, and finds positive abnormal returns of about 3% for inclusions and negative abnormal returns for exclusions. While many studies attempt to determine the ramifications of index composition changes, less attention is given to the relationship between flow of index capital and company valuations. In one such study focusing on index fund flows on the S&P 500, Belasco et al. (2012) finds a statistically significant positive correlation between flows into S&P 500 index funds and Price-to-Earnings (P/E) ratios.

This paper explores the potential valuation implications from index fund flows on the Stockholm Stock Exchange. An exhaustive search suggests that no such study has been previously done on the Swedish market, and the results could have potential implications for trading decisions, long term financial trends, and the degree of efficiency in the Swedish equity market. More specifically, this paper attempts to answer the research questions: Are there significant relationships between index fund flows and the P/E ratios of companies listed on the Stockholm Stock Exchange? If such effects exist, are they persistent or temporary? If such a relationship is established, is it possible to conclude that flows drive valuation or vice versa?

To answer these questions, this paper runs panel regressions of index constituents' P/E ratios on a set of weighted index fund flows and control variables. These control variables include a measure of liquidity as well as accounting variables commonly associated to drive P/E ratios. The samples of companies used in this paper are the historical constituents of the OMXS30 and OMXS30NEXT (in this paper also referred to as the NEXT) indices between 2009 and 2018. Our null hypothesis is that the index fund flow variables should not hold any statistically significant relationship with P/E ratios. The alternative hypothesis is that the coefficients for these variables are different from zero and statistically significant.

The findings provide interesting insights into the relationship between index fund flows and company valuations. When evaluated at mean values of P/E and index fund flows, we find that these fund flows are correlated with average increases of P/E ratios by 122 basis points for OMXS30 companies. When sorting the OMXS30 index by market capitalization, we find that this valuation relationship is limited to only the large cap subsample of the index. The relationship between index fund flows and P/E ratios of the largest cap companies is greater in magnitude and statistically significant at a higher level than the full sample. Further, this paper also find a statistically significant negative interaction term between our liquidity and fund flow variables, indicating that less liquid companies are more susceptible to demand side shocks from index fund flows. For constituents of the NEXT index, we do not find statistical significance on the index fund flow variables for the full sample of companies. However, in our study of market cap sorted subsamples of NEXT companies, we find a statistically significant positive relationship between index fund flows and P/E ratios of the larger market cap companies in the index.

These relationships between flows and P/E levels can be interpreted in two ways. Either index fund flows drive changes in P/E levels, or the reverse holds true and index investors condition their demand to invest in index funds based on the intra-month performance of the indices. The empirical findings appear to support the first causation, meaning that flows cause demand side pressures that result in valuation effects. These effects appear to be permanent, thus providing evidence in support of the imperfect substitutes hypothesis.

2. Literature Review

This section begins by presenting previous studies on the return and valuation effects of index inclusions and fund flows. Next, it presents literature on how these studies relate to theories on asset pricing and investor behavior. Finally, it establishes some important theoretical concepts necessary for the full understanding of this paper.

2.1. Return and Valuation Effects from Index Inclusions and Fund Flows

One of the cornerstones of modern asset pricing theory is Fama's (1970) Efficient Market Hypothesis (EMH). Underlying the three different forms of the EMH is the central idea that prices should reflect only information about the fundamental value of securities, meaning that demand side shocks should have no impact on stock prices. Given this background, one might be surprised with the bulk of literature documenting the tendency of stocks to experience abnormal returns in relation to their inclusions and exclusions to indices. Focusing on the S&P 500, Shleifer (1986), Harris and Gurel (1986), Lynch and Mendenhall (1997) and Dhillon and Johnson (1991) all document positive abnormal returns in relation to index inclusions. Summarizing much of the available literature on S&P 500 inclusions at the time, Brealey (2000) finds that this average abnormal return tends to be in the magnitude of around 3%. In a working paper by Morck and Yang (2001), the authors find a value premium in Tobin's Q ratios for constituents of the S&P 500 index versus similar companies outside of the index, and note that these effects have grown over time as index investing has become more popular. Given this well-documented phenomenon, it is interesting to consider the causes of this price effect. If one posits that Fama's (1970) efficient market hypothesis is correct, the only explanation for the abnormal returns in relation to index inclusions would be that the inclusions themselves convey new information about the fundamental value of the stocks. For example, this logic would be supported if the index inclusions reduce future trading costs due to the increased liquidity from institutional investors, as outlined by Amihud and Mendelson (1986). However, this explanation is refuted by Beneish and Whaley (1996) and Kaul, Mehrotra and Morck (2000), who find that bid-ask spreads were not permanently reduced following inclusions to the S&P 500 and the Toronto Stock Exchange 300 respectively. Further, while some scholars suggest that index inclusions may convey information on future earnings prospects (Brooks et al., 2008; Denis et al., 2003), most studies challenge this notion and argue that they are information free events (Harris and Gurel, 1986; Shleifer, 1986; Wurgler and Zhuravskaya, 2002), with the most common argument being that index inclusion criteria tend to be based purely on public information.

An alternative explanation for the abnormal returns from index inclusions comes from Shleifer (1986), who finds returns to be positively correlated with measures of index fund purchases. Other studies have also documented the relationship between stock prices and mutual fund flows. Taking a macro-level approach, Warther (1995) studies the relationship between aggregate cash flows into all U.S. mutual funds and aggregate security returns on a monthly basis. By using an autoregressive model to estimate expected and unexpected portions of fund flows, he finds that unexpected inflows corresponding to 1% of total fund AUM on average lead to a 5.7% price increase of the stock index. He also finds that expected mutual fund flows do not have an impact on aggregate stock returns. In his study of the Norwegian stock market, Kvamvold (2017) takes a similar approach to Warther (1995) and regresses expected and unexpected portions of fund flows from both actively and passively managed equity funds on stock returns. The author finds that an increase of one standard deviation in unexpected fund flows on average results in an increase of 0.74 percentage points of the monthly returns on the benchmark portfolio. Goetzmann and Massa (2003) and Edelen and Warner (2001) both find that daily S&P 500 market returns are positively correlated with index and equity fund flows respectively.

Focusing instead on the valuation multiples of index constituents, Belasco et al. (2012) run panel regressions of P/E and Price-to-Book (P/B) ratios of S&P 500 companies against index fund flows and a set of accounting variables commonly assumed to drive valuations. As a control group, they run the same regressions on a sample of equivalent companies that are not included in the S&P 500. The authors find that index fund flows on average increase company valuations by 130 to 167 basis points relative to the non-constituent sample.

In examining a "smart money" effect where mutual fund managers are rewarded for persistent performance, Lou (2012) attributes this performance to an investment flow effect where mutual fund managers generally scale up or down their existing portfolio positions depending on if they receive or lose capital investment flows. This in turn causes demand induced abnormal returns to the underlying portfolio, fully accounting for what might have been perceived as fund manager skill. Lou (2012) additionally asserts that mutual fund flows are largely predictable based on past performance and past flows, contending that flow-induced price pressure is predictable.

One thing these studies have in common is that they all provide evidence in violation of the EMH. Because of this, a number of alternative asset pricing hypotheses have emerged which will be presented below.

2.2. Asset Pricing and Investor Behavior Theories

2.2.1. Imperfect Substitutes Hypothesis

Scholes (1972) argues that stocks are not "unique works of art", but instead have very close substitutes. In line with the EMH, this implies that any mispricing would be arbitraged away, thus keeping demand curves flat. In contrast to this, the Imperfect Substitutes Hypothesis (ISH) posits that stocks are imperfect substitutes for one another, and as such the long-term demand curve is downward sloping. This implies that prices can change permanently in response to demand side changes, for example through index inclusions, even if these events do not convey any new information. As Wurgler and Zhuravskaya (2002) point out, if stocks are imperfect substitutes for one another, any would-be arbitrageur who attempts to exploit these mispricings must bear some "arbitrage risk" that the two return streams will not fully cancel out. Numerous studies related to index inclusions and the price effect of fund flows have found results in support of the ISH. Belasco et al. (2012) find that the index fund flow valuation impact of S&P 500 companies does not dissipate over time. In a study of delistings from the S&P 500, Garry and Goetzmann (1986) find a permanent drop in prices following deletions from the index. Shleifer (1986) did not find any price reversals amongst stocks added to the S&P 500 within ten days after the inclusion. Goetzmann and Massa (2003) also find support for the hypothesis that fund flow induced price changes are permanent. Similarly, Warther (1995) finds no evidence of price reversals, but also notes that his reversal tests are weak.

2.2.2. Price Pressure Hypothesis

Another alternative to the EMH is the Price Pressure Hypothesis (PPH). Like the EMH, this hypothesis suggests that long-term demand is perfectly elastic, meaning that stock prices should reflect only information on the fundamental value of the underlying security in the long run. However, as outlined by Harris and Gurel (1986), the PPH suggests that short-term prices may temporarily deviate from this fundamental value in response to demand shifts. The temporary price increase following an index inclusion can be explained as a necessary compensation to previous holders of the stock. This compensation is required due to the transactions cost and portfolio risks that come with exiting their positions. Following this initial increase, prices are then expected to revert back, which has been documented in a number of studies. Lynch and Mendenhall (1997) find that abnormal returns following S&P 500 addition announcements are partially reversed, concluding that this suggests the existence of temporary price pressures caused by index-fund trading. Harris and Gurel (1986) find that the initial price increases associated with additions to the S&P 500 were almost fully reversed after two weeks. Further, Edelen and Warner (2001) find some results of price reversals following an initial price increase due to mutual fund flows, but emphasize that the evidence in support of the PPH is weak. Focusing specifically on index additions of small stocks, Biktimirov et al. (2004) find transitory price effects on stocks added to the small-cap Russell 2000 index, providing support for the PPH. Wurgler and Zhuravskaya (2002) conclude that prices revert to some extent following an initial price hike, but also note the difficulties in determining over which time horizon reversions are expected to take place.

2.2.3. Causation and the Feedback-Trader Hypothesis

Given the numerous studies documenting the correlation between fund flows and stock prices, many researchers also attempt to establish causality. While one might be tempted to interpret any correlation between prices and flows as evidence that flows cause changes in stock prices, one cannot rule out the possibility that the effect comes from the opposite direction. De Long et al. (1990) denotes this behavior positive feedback trading, which means that investors attempt to chase past returns by investing when prices are rising and selling when prices are falling. As outlined by Warther (1995), the feedback-trader hypothesis posits that investors condition their demand, and thus move their money into markets, based on recent market performance. Any documented concurrent flow-price relationship could therefore potentially be explained by positive feedback trading occurring at a higher frequency than the flow and return data used. The empirical evidence in support of this hypothesis is mixed. Edwards and Zhang (1998) find past returns to significantly impact flows into both stock and bond funds. In a micro-level study on the determinants of flows between mutual funds, Ippolito (1992) finds past performance to be an important factor in determining flows. Using quarterly data, Sirri and Tufano (1998) find an asymmetric relationship between consumers' fund purchases and past fund performance, indicating that investors disproportionally buy funds with high past performance more than they sell funds with low performance. Frazzini and Lamont (2008) view mutual fund flows as a proxy for investor sentiment for stocks, and find that high sentiment pushes stock prices above their fundamental value, leading to low future returns.

Further, they find that this “dumb money” effect reflects return-chasing behavior. On the other hand, Kopsch et al. (2015) reject the feedback-trader hypothesis in a study on the determinants of fund flows on the Swedish market. While Warther (1995) finds a positive concurrent relationship between mutual fund flows and index returns, he does not find a positive relationship between flows and lagged returns when using monthly and weekly data and thus rejects the feedback-trader hypothesis, concluding that flows drive returns. Using a similar methodology but focused on the Oslo Stock Exchange, Kvamvold (2017) finds that past returns do not explain unexpected net flows to either actively or passively managed funds. Building on the model used by Warther (1995), Santini and Aber (1998) do not find that past performance significantly explains subsequent fund flows, thus rejecting the feedback-trader hypothesis. Using high-frequency data on mutual fund flows and market returns, Edelen and Warner (2001) conclude that flows are positively correlated with one-day lagged market returns. However, within the trading day, they find that the strongest relation appears to be that of returns responding to flows. Goetzmann and Massa (2003) also suggest that their results imply that the market reacts to daily demand, and not the reverse. Using an instrumental-variable analysis on the relationship between mutual fund flows and market returns in the U.S., Remolona et al. (1997) find only weak evidence in support of the feedback trading hypothesis.

2.3. Index Market Dynamics

An important concept when analyzing index fund flows is the degree to which active fund managers reserve a portion of their AUM for tracking indices. Cremers et al. (2016), explore the relationships between passive and active management in the mutual fund industry worldwide. They find that Sweden has the world’s highest incidence of closet indexing with 56% of TNA invested in closet index funds. They define closet indexing as when funds have less than 60% of their AUM actively managed. They further find that, overall, explicit indexing improves competition in the mutual fund industry.

3. Data

This section first presents an overview of the two indices used in the study, and later introduces sources and definitions of accounting, liquidity and fund flow variables. Finally, summary statistics for these metrics are presented.

3.1. OMXS30

The OMXS30 is comprised of the 30 most actively traded shares on the Stockholm Stock Exchange, and is a commonly used benchmark for both active and passive funds. It's important to note that inclusions and removals occur bi-annually, and are fully transparent to market participants. If during the control period, an index company share falls out of the 45 most traded shares on the Stockholm Stock Exchange, that company will be replaced with the non-index company with the highest nominal trading volume during the same period. Alternatively, if a share listed on the Stockholm Stock Exchange is among the top 15 most traded names during that period, it will replace the index constituent with the lowest trading volume during that time. This bi-annual process attempts to make sure that the index constituents are consistently representative of the most liquid names on the Stockholm stock exchange.

3.2. OMXS30NEXT

The OMXS30NEXT is an index made up of the 30 next most traded stocks after the OMXS30 on the Stockholm Stock Exchange. While NEXT constituents are the closest substitutes to OMXS30 companies on the Stockholm Stock Exchange, there are some clear differences between the samples. First of all, given that these companies are not part of the OMXS30 index, they logically don't receive any of the flows from index funds directly allocated toward tracking the OMXS30. Second, the average market capitalizations and liquidities of NEXT constituents are much lower than for OMXS30 companies. It is however important to note that, because the indices are liquidity and not market capitalization based, in some cases members of the NEXT have higher market capitalizations than OMXS30 companies. This means that they receive a greater amount of fund flows from certain indices. Due to these characteristics, the NEXT index provides a good complementary sample that allows us to better understand the role that market capitalization and liquidity play in the relationship between index fund flows and valuations.

3.3. Index Fund Flow Construction

In gathering and assigning fund flows to specific indices, Morningstar is used to identify the 22 passive index funds dedicated to tracking the Swedish market. Lipper is then used to collect net cash flows (NCF) of these individual funds on a monthly basis. The net fund flows are computed as follows:

$$NCF_{i,t} = TNA_{i,t} - TNA_{i,t-1} * (1+R_{i,t})$$

Where $TNA_{i,t}$ refers to total net assets of fund *i* at time *t*, and $R_{i,t}$ refers to the return on index fund *i*, and time *t*. While some funds have flow data on a daily or weekly basis, certain funds only have monthly data available which limits us to using aggregate monthly data as our interval. Upon reading the descriptions for the funds, it becomes apparent that these index funds are tracking three different benchmarks. The first one is the OMXS30 index, which as described above consists of the 30 most actively traded stocks on the Stockholm Stock Exchange. The second index is the OMX Stockholm Benchmark Index (OMXSB), which is a broader index made up of the 80-90 most actively traded shares on the Stockholm Stock Exchange. Finally, the third group is funds tracking the SIX Return Index (SIX), consisting of all shares listed on the Stockholm Stock Exchange. By adding together the flows belonging to each group, a time series of monthly flow data for each benchmark is computed. OMXS30 constituents receive weighted fund flows from all index fund types, i.e. OMXS30, OMXSB and SIX funds. NEXT constituents only receive weighted fund flows from OMXSB and SIX funds. The weighted fund flows are constructed with the assumption that any net inflows or outflows to the funds are invested in the index constituents with a market capitalization weighting. This is consistent with Lou (2012) who observes a near 1:1 correlation between inflows into index funds and investment into their constituent companies. Further, this is additionally supported by anecdotal conversations with Swedish index fund managers who confirm a direct investment into or divestment from companies following flows. It should be noted that the funds used in this study are purely passively managed funds. As such, no flows from actively managed funds engaged in closet indexing (where active funds to a large extent simply invest according to some index) are included in this data.

Further, data on total aggregate equity fund flows (consisting of both actively and passively managed funds) into the Swedish market was gathered from the Swedish Investment Fund Association. A time series of active fund flows is computed by subtracting the aggregate index fund flows from these flows:

$$Active\ NCF_t = Aggregate\ Equity\ NCF_t - Aggregate\ Index\ NCF_t$$

Where $Aggregate\ Index\ NCF_t$ is the sum of the fund flows from the three subgroups (OMXS30, OMXSB and SIX) as outlined above.

3.4 Samples & Exclusions

Thomson Reuters is used to collect information on the current and historical constituents of the OMXS30 and NEXT indices. Panel datasets are then constructed for the two indices that include only the appropriate constituents at each moment in time. It should be noted however, that while slightly higher for the NEXT, the turnover of both the OMXS30 and the NEXT is relatively low. Full list of constituent turnover can be found in Appendix A and B.

In terms of company selection, firms in real estate, banking, investment, and financial services are excluded as the accounting metrics associated with these firms are non comparable to the rest of the sample. Additionally, data is removed where it is obvious that the market is not using standard valuation metrics. For example, given that companies in the short run can have negative, or near zero equity values and earnings, valuation metrics such as ROIC and P/E can be negative, or with small enough earnings metrics, theoretically approach infinity. The remaining dataset includes some extreme data points which are considered to be outliers, possibly due to incorrect inputs on the part of the data providers. To avoid bias from these potentially faulty inputs, all variables are winsorized at the 1^{st} and 99^{th} percentiles, which is in line with for example Belasco et al. (2012) and Morck and Yang (2001).

3.5 Sources and Definitions

Monthly data has been gathered from Thomson Reuters Datastream and Finbas. Additionally, balance sheets, income statements, and cash flow statements are collected from Thomson Reuters. It should be noted that large portions of the data initially taken from Datastream turned out to be incomplete or inaccurate. Because of this, accounting variables were primarily computed manually using financial statements on each index constituent from Thomson Reuters. All accounting variables have been computed using the same methodology as Belasco et al. (2012). To control for seasonality, income statement and cash flow items are used on a trailing four-quarter basis. For months where companies lacked complete trailing four-quarter data or data was unavailable, the observations were excluded.

Following Belasco et al. (2012) return on invested capital (ROIC), free cash flow growth (FCFG) and sustainable growth rate (SGR) are computed and used as control variables in the regressions, as these accounting metrics are commonly assumed to have an impact on price valuation multiples. ROIC is calculated as trailing four-quarter, after-tax operating income divided by the trailing four quarter book value of invested capital. The applicable tax rate is assumed to be the Swedish marginal corporate tax for the given period. These are 28% during 2003-2008, 26.3% during 2009-2012 and 22% during 2013-2019. Invested capital is defined as the sum of total book value of equity, total long term debt, current portion of long-term debt, and minority interest less cash and cash equivalents.

Free cash flow is calculated as net income plus depreciation and amortization expenses, minus capital expenditure and changes in working capital. FCFG is calculated as the difference between the current trailing four-quarter free cash flow, and the trailing four quarter free cash flow of the year-on-year period prior divided by the absolute value of the earlier period.

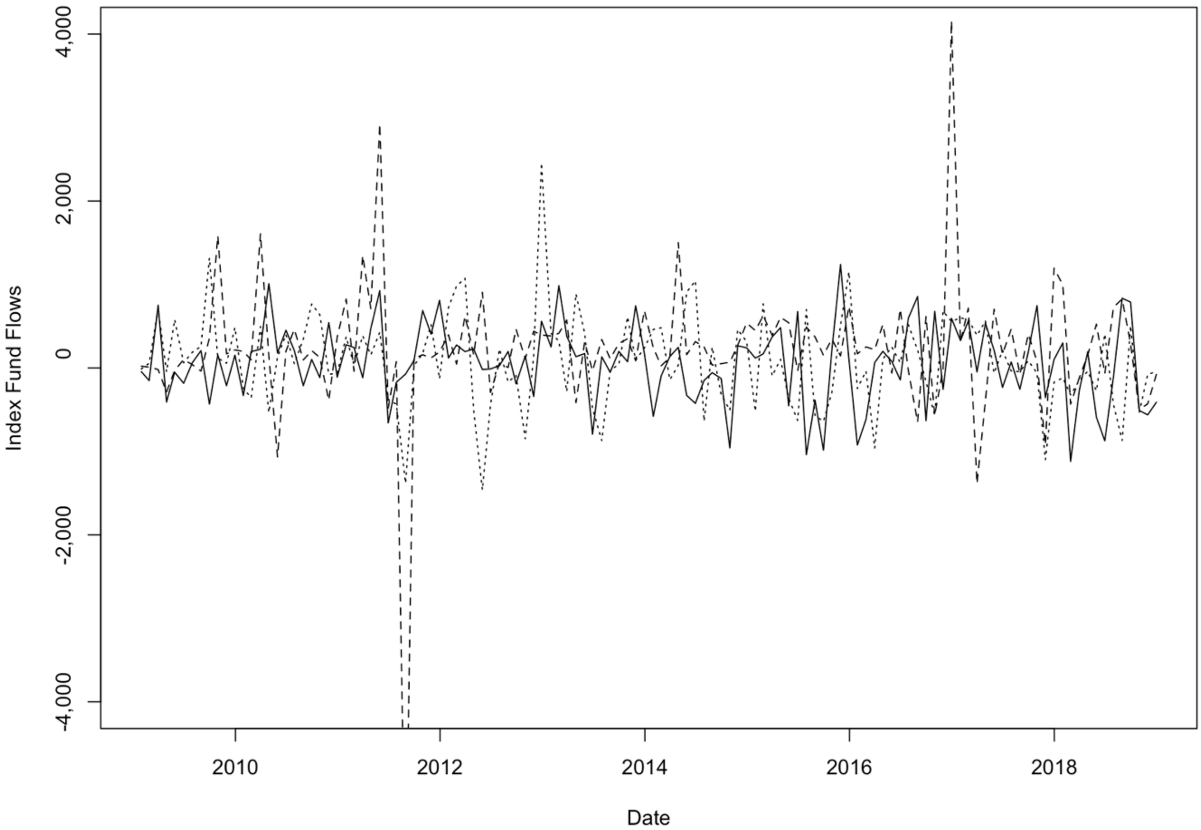
Following Belasco et al. (2012), and inspired by Higgins (1977) the internal growth rate of dividends or sustainable growth rate (SGR) represents the maximum sustainable growth rate of revenues without additional debt and equity financing, and is calculated as the Return on Equity (ROE) multiplied by the plowback ratio. The plowback ratio is defined as the amount of earnings retained in the company after paying out dividends, and represents the portion of earnings that can be invested back into the company's growth.

In addition to the accounting variables, this study also includes a trading volume variable to control for liquidity. Trading volume data was taken from Finbas and represents a company's monthly traded volume in SEK. This is the same liquidity measurement used as the inclusion criteria to determine additions to and deletions from the OMXS30 and NEXT indices.

3.6. Summary Statistics

3.6.1. Fund Flow Statistics

Before presenting the methodology and results of the tests undertaken in this paper, it is necessary to first understand the data being used. As a starting point, a correlation matrix of the fund flows is presented in Table 1. Interestingly, the flows from funds tracking the OMXS30, OMXSB and SIX indices all have a relatively low correlation with one another, implying that investor behavior differs between the indices. It is also possible that these correlation estimates suffer from an upward bias due to periods of extreme market-wide movements in the same direction, such as the large net outflows from all fund types in late 2011. Descriptive statistics of the index fund flows are presented in Table 2, and time series plots are presented in Graph 1.



Graph 1. Time series plots for the three index fund flow groups. The solid line represents the OMXS30, the dashed line represents the OMXSB, and the dotted line represents the SIX flow series. The y-axis is denoted in millions of SEK.

Correlation Matrix

	Active NCF	OMXS30	OMXSB	SIX	Index NCF
Active NCF	1	0.297	0.322	0.441	0.499
OMXS30	0.297	1	0.167	0.171	0.528
OMXSB	0.322	0.167	1	0.259	0.828
SIX	0.441	0.171	0.259	1	0.647
Index NCF	0.499	0.528	0.828	0.647	1

Table 1. Correlation matrix of fund flows used in regressions. Active NCF refers to an aggregate number of net cash flows from actively managed funds investing in Swedish equities. OMXS30, OMXSB and SIX refers to net cash flows from index funds tracking the respective indices. Index NCF is the aggregate number of the flows from funds tracking the OMXS30, OMXSB and SIX funds.

Fund Flow Descriptive Statistics

	Min	1st Q	Median	Mean	3rd Q	Max	Number of Funds
OMXS30	- 1 121	- 195	110	60	268	1 240	4
OMXSB	- 6 496	19	180	224	464	4 161	11
SIX	- 1 461	- 245	59	87	437	2 454	7

Table 2. Descriptive statistics on index fund flows. OMXS30, OMXSB and SIX refers to net cash flows from index funds tracking the respective indices on a monthly basis. Summary statistics are denoted in millions of SEK.

3.6.2. Accounting Variable Statistics

The winsorized accounting variables for the two indices are presented in Tables 3 and 4 respectively. As the tables show, the accounting variables between the two groups are relatively similar to one another, further indicating that the two indices are appropriate for comparison. P/E ratios of the NEXT group are on average slightly higher than the OXMS30 sample, and OMXS30 companies on average exhibit higher FCFG. Of note, the number of observation is greater for OMXS30 companies than for NEXT companies due to a larger amount of industry based company exclusions in the NEXT sample.

OMXS30 Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
P/E	2,161	16.98	6.06	6.84	39.68
ROIC	2,161	0.17	0.15	0.02	0.93
SGR	2,161	0.09	0.07	-0.06	0.32
FCFG	2,161	0.35	1.97	-4.17	12.71

OMXS30NEXT Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
P/E	1,676	19.24	10.05	6.00	67.15
ROIC	1,676	0.17	0.16	0.02	1.05
SGR	1,676	0.10	0.08	-0.04	0.39
FCFG	1,676	-0.02	0.94	-5.20	3.56

Tables 3 and 4. Descriptive statistics of accounting variables used in regressions for OMXS30 and OMXS30NEXT companies. These statistics are computed after industry based exclusions and the removal of outliers. All variables have been winsorized at the 1% and 99% tails respectively.

4. Methodology

This section begins by introducing the econometric tests run on the data to select the appropriate regression model. Next, the actual regressions used in the paper are presented.

4.1. Model Specification

A number of tests are run on the data to determine the appropriate regression models to utilize. Similar to the approach taken by Belasco et al. (2012), this study uses panel regressions with P/E ratios as the dependent variable. While focusing on P/E ratios of individual companies requires more manual labour than a study simply looking at index returns, there are many clear benefits to this approach. First, this methodology enables us to isolate the relationship between fund flows and non-fundamental driven valuation changes. By only focusing on returns, one risks finding a relationship between flows and returns that could be motivated by increases in earnings. As mentioned in the literature review, while most scholars argue that index inclusions are information free events, there are some studies suggesting that index inclusions convey information about future earnings prospects (Brooks et al., 2008; Denis et al., 2003). Given that our sample includes companies being added to the indices, studying P/E ratios ensures that no such fundamentally motivated price increase is interpreted as evidence of demand side valuation effects from fund flows.

As a starting point, a number of econometric tests are run to find that a fixed effects model is the most appropriate. The thought process is intuitive as P/E ratios are affected by a number of factors outside of those included in the model. For example, one might hypothesize that there are some time-invariant, company specific characteristics that drive valuations (as an example, established companies on the OMXS30 might enjoy a brand premium). As such, one might want to control for firm fixed effects. Similarly, it is also plausible that some company-invariant, time-varying factors such as interest rates and economic cycles might affect the P/E ratios of index constituents, indicating that it would be appropriate to control for time fixed effects. To determine whether or not this is the case, we start off by running pooled regressions and then perform the Breusch-Pagan Lagrange Multiplier (LM) test to see whether a pooled OLS or random effects model is appropriate. Consider first the following regression:

$$y_{i,t} = \alpha + \beta x_{i,t} + u_i + \varepsilon_{i,t}$$

Under the null hypothesis of the LM test, the variance of the error term is zero:

$$H_0: Var(u_i) = 0$$

which implies that no significant difference across the individuals is detected. If this null hypothesis is rejected, a pooled OLS regression on the panel data will not be sufficient. If this is the case, the Hausman specification test is used to decide whether a fixed effects or a random effects model is the most appropriate for the regressions. If the test indicates the existence of fixed effects in the sample, a fixed effects model would remove these effects, which allows one to isolate the effects that the regressors have on the independent variable. To understand the logic behind the test, consider first this simple regression:

$$y_{i,t} = \beta_0 + \beta_1 x_{i,t} + \alpha_i + u_{i,t}$$

When testing for firm fixed effects, α_i refers to some time-invariant, company-specific characteristic. Under the null hypothesis of the test, we have:

$$H_0: Cov(\alpha_i, x_{i,t}) = 0$$

with the alternative hypothesis such that:

$$H_1: Cov(\alpha_i, x_{i,t}) \neq 0$$

If the null hypothesis is true, the time-invariant company specific characteristics do not have an impact on the independent variable, and a random effects model would be the preferred model. If on the other hand we can reject the null hypothesis, a fixed effects model is preferred.

4.2. Regressions

While the baseline regression model is inspired by that used by Belasco et al. (2012), this paper also includes a liquidity measure as well as the interaction term between this liquidity variable and the flow variables. The reason for this is that we hypothesize that a company's liquidity could be an important factor in determining how strong any potential relationship is between index fund flows and P/E ratios. By including the interaction terms in the regressions, we hope to better understand the nature of any such relationship. After specifying the appropriate regression type from the tests above, we arrive at the actual specification presented below.

Regression 1:

$$P/E_{i,\,t} = \beta_1 * ROIC_{i,\,t} + \beta_2 * FCFG_{i,\,t} + \beta_3 * SGR_{i,\,t} + \beta_{4*} Volume_{i,\,t} + \beta_5 * Aggregate\ Index\ NCF_{i,t} + \beta_{6*} Volume_{i,\,t} : Aggregate\ Index\ NCF_{i,t} + \varepsilon_{i,\,t}$$

The variable *Aggregate Index* $NCF_{i,t}$ is a weighted flow variable consisting of the index fund flows that company *i* receives at time *t*. If company *i* is a constituent of the OMXS30 index, the variable will be the sum of the weighted flows from the OMXS30, OMXSB and SIX funds as per below:

$$Aggregate\ Index\ NCF_{i,t} = OMXS30\ NCF_{i,\,t} + OMXSB\ NCF_{i,t} + SIX\ NCF_{i,t}$$

If company *i* on the other hand is a constituent of the NEXT index, the variable is the sum of the weighted flows from OMXSB and SIX funds:

$$Aggregate\ Index\ NCF_{i,t} = OMXSB\ NCF_{i,t} + SIX\ NCF_{i,t}$$

The weighting is computed by taking the market cap of each company at the start of each month divided by the sum of the market caps for all companies in the index at the same point on time. Readers interested in further exploring these weighted flow calculations are referred to Appendix C. With regard to Regression 1, the null and alternative hypotheses are on aggregate fund flows and are as follows:

$$H_0: \beta_5 = 0 \quad H_1: \beta_5 \neq 0$$

In order to see if there is a difference between aggregate and individual index fund flows, regressions are also run where the *Aggregate Index* $NCF_{i,t}$ variable is broken out into the separate fund types:

Regression 2:

$$P/E_{i,t} = \beta_1 * ROIC_{i,t} + \beta_2 * FCFG_{i,t} + \beta_3 * SGR_{i,t} + \beta_4 * Volume_{i,t} +$$
$$\beta_5 * OMXS30\ NCF_{i,t} + \beta_6 * OMXSB\ NCF_{i,t} + \beta_7 * SIX\ NCF_{i,t} +$$
$$B_8 * Volume_{i,t} : OMXS30\ NCF_{i,t} + \beta_9 * Volume_{i,t} : OMXSB\ NCF_{i,t} + \beta_{10} * Volume_{i,t} : SIX$$
$$NCF_{i,t} + \varepsilon_{i,t}$$

If company *i* at time *t* is a constituent of the NEXT index, $OMXS30\ NCF_{i,t}$ and $Volume_{i,t} : OMXS30\ NCF_{i,t}$ will naturally be zero. For simplicity, these variables are therefore removed from NEXT regressions when Regression 2 is run. With regard to Regression 2, the null and alternative hypotheses are on individual index fund flows and are as follows:

$$H_{0,a}: \beta_5 = 0 \quad H_{1,a}: \beta_5 \neq 0$$
$$H_{0,b}: \beta_6 = 0 \quad H_{1,b}: \beta_6 \neq 0$$
$$H_{0,c}: \beta_7 = 0 \quad H_{1,c}: \beta_7 \neq 0$$

As a starting point, Regressions 1 and 2 are run on the full two samples of index constituents. Then, market capitalization sorted subsamples are also created to better understand if a company's size have any effect on the potential relationship between index fund flow and P/E ratios. The sorting is done by organizing the companies which have had the largest average market cap each year. For both the OMXS30 and NEXT samples, we denote these newly created subsamples as the *Top* and *Bottom* subsamples, where both subsamples consists of ten companies. This method avoids adding market cap as an independent variable in the regressions which can lead to multicollinearity issues with the volume variable. In addition to determining whether or not market capitalization impacts the fund flow and P/E relationship, this allows us to analyze whether or not any such relationship differs amongst companies considered close substitutes, thus making it possible to better discuss results in terms of the imperfect substitutes hypothesis.

Lastly, Regression 3 also adds lagged fund flow variables to Regression 1. For simplicity, the lagged index fund flow variables are only added to the aggregate index fund flow variable as per Regression 1, and not to the flow variables broken out into separate fund types (as in Regression 2). Following Warther (1995) and Kvamvold (2017), the purpose of these regressions is the determine whether or not any relationship between fund flows and P/E ratios (or returns in their cases) is permanent or temporary. If the PPH is correct and fund flows drive changes in P/E ratios, one would also expect to see a reversal of the P/E ratios some time after the initial increase. If one on the other hand posits that the ISH is correct, this valuation effect is permanent.

Regression 3:

$$P/E_{i,t} = \beta_1 {*} ROIC_{i,t} + \beta_2 {*} FCFG_{i,t} + \beta_3 {*} SGR_{i,t} + \beta_4 {*} Volume_{i,t} + \beta_5 {*} Aggregate\ Index\ NCF_{i,t} + \beta_6 {*} Aggregate\ Index\ NCF_{i,t-1} + \beta_7 {*} Aggregate\ Index\ NCF_{i,t-2} + \beta_8 {*} Volume_{i,t}{:}Aggregate\ Index\ NCF_{i,t} + \beta_9 {*} Volume_{i,t}{:}Aggregate\ Index\ NCF_{i,t-1} + \beta_{10} {*} Volume_{i,t}{:}Aggregate\ Index\ NCF_{i,t-2} + \varepsilon_{i,t}$$

With regard to Regression 3, the null and alternative hypotheses are as follows:

$$H_{0,a}: \beta_5 = 0 \qquad H_{1,a}: \beta_5 \neq 0$$
$$H_{0,b}: \beta_6 = 0 \qquad H_{1,b}: \beta_6 \neq 0$$
$$H_{0,c}: \beta_7 = 0 \qquad H_{1,c}: \beta_7 \neq 0$$

5. Empirical Results and Interpretation

This section presents and analyzes the results of the main regressions used in this paper. First, the results for the Regressions 1 and 2 on the full sample of index constituents are presented. The subsequent section presents the results for the same regressions run on market capitalization sorted subsamples. Then, the results for Regression 3, which include lagged index fund flow variables, are presented. Finally, we present the robustness tests that are used to determine the quality of the empirical findings. Summary statistics of average accounting and weighted flow variables can be found in Appendix D.

5.1. Main Regression

5.1.1. Empirical Results

The results of Regression 1 are presented in Table 5. In all main regressions there exists a positive, significant relationship between ROIC and Volume on P/E. Further, all regressions indicate a significant, negative relationship between SGR and P/E and significant yet mixed direction relationships between FCFG and P/E. The estimated coefficient on the aggregate fund flow variable in column one is 0.021. The interpretation here is that if an inflow spurs an index fund to invest SEK 1 million into a company of the OMXS30, that company will on average experience an increase in its P/E ratio of 0.021[1]. The overall average P/E of OMXS30 constituents is 16.98, and the average aggregate weighted fund flow is SEK 9.87 million. Evaluated at these mean values, the aggregate index fund flows correspond to a 1.22% increase in the valuation of constituents:

$$\frac{0.021 * 9.87}{16.98} = 0.0122$$

Column two presents the same regression, but this time with fund flows broken out by each index fund type. Of these separated index fund flow variables, only flows from OMXSB funds are correlated with the P/E ratios of OMXS30 companies at a statistically significant level. Further, there also exists a statistically significant negative coefficient on the interaction term

[1] Note that the inflow of SEK 1 million referred to here is into a specific company and not into an index fund. An inflow of SEK 1 million into a tracking fund will be divided by weight across its constituents

between the liquidity variable and the OMXSB fund flows. The interpretation of this is intuitive. The less liquid a company is, the more easily it is affected by demand side shocks in the form of index fund flows. As column three and four of Table 5 show, index fund flows are not statistically significantly correlated with the P/E ratios of companies on the NEXT index. To summarize, we are able to reject the null hypothesis of Regression 1 on aggregate fund flows for the OMXS30, but not for the NEXT sample. For Regression 2, we are only able to reject the null hypothesis for the OMXSB flow variable on the OMXS30 sample.

5.1.2. Analysis

As stated above, when breaking out the fund flows on the OMXS30 in Table 5 into separate flow variables in column two, it can be seen that only OMXSB fund flows are significantly correlated with P/E levels of index constituents. To understand these results, it is useful to go back to Table 2, which shows that the average value of flows into OMXSB funds have a larger range and are almost four times greater than those into OMXS30 funds. If one posits that flows drive valuations, it is plausible that OMXSB flows are sufficiently large to have an impact on valuations, whereas OMXS30 and SIX flows do not possess this critical mass. On the other hand, if one believes that investors are feedback traders who condition their demand based on intra-month performance of index constituents, the positive, significant coefficient on the OMXSB flows could be explained by the fact that OMXS30 companies make up a large proportion (at the time of the writing, about 73%) of the total weight of the OMXSB index. With this interpretation, OMXSB investors are attempting to chase the intra-month performance of the index, which is heavily skewed towards the performance of OMXS30 companies.

The fact that index fund flows are not significantly correlated with the P/E ratios of NEXT companies might appear counterintuitive at a first glance. Column one and two of Table 5 shows that the interaction terms between the liquidity measure and the fund flow variables are negative, indicating that relatively illiquid OMXS30 companies have stronger relationships between P/E and fund flows. As such, one might expect P/E ratios on the less liquid NEXT index to have an even stronger correlation with fund flows. However, before drawing any such conclusions, it is important to once again consider the potential drivers of the relationship. If one assumes that the flows are creating changes in P/E ratios, this relationship will be affected by the fact that the flows are market cap weighted. It is therefore possible that only large cap companies on the OMXS30 receive sufficient fund flows to reach a critical mass threshold needed to cause the valuation changes, while NEXT companies do not receive enough flows for this to happen. If one on the other hand posits that the reverse causality holds, meaning that investors condition their demand and invest in index funds based on intra-month index performance, it’s important to note that this performance will be biased towards OMXS30 companies. Whatever the reasons for OMXSB and SIX fund investors to invest in these indices, these investors will ultimately be largely pursuing the performance of the OMXS30. This could help explain the lack of a significant relationship between OMXSB and SIX flows and the P/E levels of NEXT companies. In order to better understand the relationship between market caps and fund flows’ impact on P/E ratios, Section 5.2. will present results on market cap sorted subsamples of the OMXS30 and NEXT indices.

While not carrying statistical significance in these regressions, the SIX fund flows have a negative relationship with the OMXS30 regressions and a positive relationship with the NEXT sample. These diverging signs may be explained by the motivations of SIX investors who wish to reduce their exposure to large caps and diversify onto the broader market. Any increase in SIX fund flows coming at the expense of either active or passive investors in larger cap names will reduce their relative exposure to the OMXS30 and increase their exposure to the names in the NEXT sample. However, if flows are commonly flowing between the large cap and broad index strategies we would expect see a negative correlation between these two. We note from the correlation matrix in Table 1 that these flows are relatively uncorrelated yet positive in direction, but also hypothesise that this correlation could suffer from an upward bias if all investors change their holding in response to macro events, such as the large outflows in late 2011.

While not the central focus of this paper, it's worth briefly mentioning the direction and effects of the control variables. The positive relationship between the ROIC and Volume variables with P/E levels is consistent with our expectations. Here we view a logical correlation between the market rewarding companies with high returns on invested capital and assigning a liquidity premium to highly traded stocks. With regard to SGR, all regressions indicate a highly significant negative correlation with P/E. Potential explanations may be due to the market rewarding companies with high payout ratios, who prefer to fund growth through cheap debt and historically low interest rates. This effect may be especially applicable when considering the low interest rate environment in Sweden during the sample period of 2009-2018. An additional point worth noting is a company’s ability to fund potential growth as marketing and technology expenses on their income statements. This tax efficient, growth funding would correspond to suppression of calculated SGRs. With regard to FCFG, a positive correlation is expected, yet we see mixed directions in our regression. However, in general the market rewards high FCF generating businesses with strong valuations.

Main Regressions

	Dependent variable:			
	P/E			
	OMXS30, Aggregate NCF	OMXS30, Separate NCF	OMXS30NEXT, Aggregate NCF	OMXS30, Aggregate NCF
	(1)	(2)	(3)	(4)
ROIC	9.156^{***}	8.964^{***}	5.706^{*}	5.712^{*}
	(1.418)	(1.418)	(3.307)	(3.310)
FCFG	0.089^{*}	0.090^{*}	-0.322^{*}	-0.326^{*}
	(0.047)	(0.047)	(0.182)	(0.182)
SGR	-67.021^{***}	-67.262^{***}	-58.849^{***}	-58.857^{***}
	(2.216)	(2.214)	(3.452)	(3.464)
Volume	0.220^{***}	0.222^{***}	0.238	0.245
	(0.052)	(0.053)	(0.349)	(0.354)
Aggregate Index Fund Flows	0.021^{***}		-0.072	
	(0.008)		(0.164)	
Volume:Aggregate Index Fund Flows	-0.001^{*}		0.003	
	(0.0004)		(0.058)	
OMXS30 NCF		-0.007		
		(0.015)		
OMXSB NCF		0.055^{***}		-0.073
		(0.015)		(0.209)
SIX NCF		-0.014		0.094
		(0.026)		(0.404)
Volume:OMXS30 NCF		0.001		
		(0.001)		
Volume:OMXSB NCF		-0.002^{***}		-0.005
		(0.001)		(0.071)
Volume:SIX NCF		0.001		-0.019
		(0.002)		(0.136)
Observations	2,087	2,087	1,576	1,576
R^2	0.355	0.357	0.185	0.185
Adjusted R^2	0.308	0.309	0.105	0.103
F Statistic	178.252^{***} (df = 6; 1946)	107.694^{***} (df = 10; 1942)	54.347^{***} (df = 6; 1433)	40.702^{***} (df = 8; 1431)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 5. Regressions of P/E on the accounting and liquidity variables, as well as concurrent flow variables and interaction terms between flows and liquidity. Column one presents the regression for the OMXS30 index, where the flow variable is an aggregate number of the separate index fund types. Column two presents the results of a similar regression, but this time with the flow variables split up per index fund type. Columns three and four present the results for the corresponding regressions, but for the OMXS30NEXT index. All variables have been winsorized at the 1% and 99% tails to prevent biasing by outliers. The variable 'Aggregate Index Fund Flows' is the sum of all index fund flows weighted at each company's market cap.

5.2. Subsample Regressions

To complement the previous section on the full samples of index companies, this section presents and analyzes the results of market cap sorted subsample regressions on the OMXS30 and NEXT indices respectively. The creation and set-up of subsamples is done with the purpose of examining groups of stocks that may be substitutes for one another. The subsamples are created by taking the top and bottom ten companies of each index, sorted by their average market caps each year. This creates the 'Top' and 'Bottom' market cap subsamples for each index.

5.2.1. Empirical results

Table 6 presents the results for the subsample regression on the OMXS30 index. As a starting point, the results in column one show that the coefficient on the aggregate fund flow variable is greater in magnitude, and statistically significant at a higher level in the top subsample as compared with the corresponding regression on the full sample of companies in Table 5. The overall average P/E of the OMXS30 Top subsample is 17.47, and the average aggregate weighted fund flow is SEK 15.74 million. Evaluated at these mean values, the aggregate index fund flows correspond to a 2.97% increase in the valuation of constituents:

$$\frac{0.033 * 15.74}{17.47} = 0.0297$$

Further, the interaction term between the liquidity measure and aggregate fund flow variable is once again statistically significant. Neither the flow variables nor the interaction terms on the bottom subsample are statistically significant. This suggests that there might be a dilutive effect on the estimated coefficients on flow variables in the full-sample regression in Table 5. Additionally, there is a statistically significant, positive relationship between aggregate fund flows on the top subsample of NEXT companies, as presented in column one in Table 7. This stands in contrast to the regression on the full-sample of NEXT companies, where no such relationship exists. The overall average P/E of the NEXT Top subsample is 18.93, and the average aggregate weighted fund flow is SEK 1.69 million. Evaluated at these mean values, the aggregate index fund flows correspond to a 2.66% increase in the valuation of constituents:

$$\frac{0.298 * 1.69}{18.93} = 0.0266$$

Further, the positive coefficient on the SIX flow variable is statistically significant for the first time on the bottom subsample. Finally, the interaction term between the SIX flow variable and the liquidity measure is negative and statistically significant.

To summarize, for the OMXS30 subsample, we are able to reject the null hypothesis of Regression 1 on aggregate fund flows for the top, but not the bottom sample. For Regression

2, we are able to reject the null hypothesis for the OMXSB flow variable on the top sample, but fail to reject all other null hypotheses. For the NEXT subsample, we are able to reject the null hypothesis of Regression 1 on aggregate fund flows for the top, but not the bottom sample. For Regression 2, we reject the null hypothesis for the SIX flow variable on the bottom sample, but fail to reject all other null hypotheses.

5.2.2. Analysis – OMXS30 Subsamples

To better understand the relationships of the OMXS30 subsamples, it is important to revisit the two potential explanations previously presented. If flows drive changes in P/E, then a company's sensitivity to flows may be determined by the weight of flows directed into the company (market cap) and the company's ability to absorb these flows (liquidity). Large companies receive more index fund flows, but at the same time tend to be more liquid, thus logically implying that they should be less affected by the same nominal amount of net flows. The market cap-to-liquidity ratio can be used to better detect nuances in these two counteracting factors, and we hypothesize that it potentially can be used to find the critical mass threshold of fund flows needed to have a valuation impact. The descriptive statistics for market capitalization and liquidity of these subsamples are presented in Tables 8 and 9. Table 10 outlines the ratio between these two factors.

In comparing the two subsamples in the OMXS30, the differences in market caps of the top and bottom subsamples is greater than the differences in their liquidity. As can be seen in Table 10, the market cap-to-liquidity ratio of the top ten companies is almost twice as large as the bottom ten companies. Under the assumption that flows drive changes in P/E, one may interpret the significance of the flow variable on the OMXS30 top subsample but not the bottom as a reflection of the market cap-to-liquidity ratio. On the top companies, the ratio may be sufficiently high for the flows received to achieve the critical mass necessary for a demand shock on P/E. Alternatively, if the reverse relationship holds and investors condition their demand for index funds based on intra-month performance, the statistical significance of the flow variable on the top, but not the bottom subsample is also explained. Here, the market caps of these top companies are so high that any index performance measure will be skewed towards the performance of these companies.

5.2.3. Analysis – OMXS30NEXT Subsamples

If flows drive P/E levels, it is relevant to again look at the average market caps, liquidities and the ratios between these factors as presented in Tables 8, 9 and 10. As a starting point, the market cap-to-liquidity ratio of the top subsample of NEXT companies is very close to the top subsample of the OMXS30. This could potentially explain the positive, statistically significant aggregate flow variable on the top subsample in Table 7. When looking at the bottom subsample of the NEXT, we note that the market cap-to-liquidity ratio is even higher than the top subsample, yet aggregate flows are not statistically significant. This seemingly defies the logic outlined earlier. However, looking at column four, the SIX fund flow variable is statistically significant and positive, yet the aggregate variable is not due to a dilution by the negative sign on the OMXSB. Further, the market cap-to-liquidity ratio on this subsample is much more volatile than the rest of the subsamples, suggesting these companies may not be representative of normal behavior.

The potential that investors condition their index fund demand based on intra-month performance of indices could logically explain correlations for the OMXS30. However, we find this less plausible for the NEXT sample. This is due to the fact that NEXT companies have a relatively low weighting on the total OMXSB and SIX indices, with the performance of these two indices skewed towards the OMXS30. Therefore, it is unlikely that an investor would attempt to capture the performances of NEXT stocks through investing in the OMXSB or SIX. In turn, this makes it improbable that the positive relationship between P/E and either of these flows can be driven by intra-month performance of the NEXT. The most plausible interpretation is that the flows are causing the changes in P/E multiples, which is consistent with Warther (1995), Kvamvold (2017), Santini and Aber (1998), Edelen and Warner (2001) and Goetzmann and Massa (2003).

It should also be noted that the both the R^2 and adjusted R^2 on the regressions in Table 7 are lower in the subsample regressions than in the main regression in Table 5, indicating that these models do not explain much of the total variation in P/E ratios on the subsample of NEXT companies. However, the point of this paper is not to find a model that explains all of the variation in P/E levels, but rather to examine the relationship between index fund flows and P/E. As such, these low adjusted R^2 do not undermine the findings in this study.

OMXS30 Subsample Regressions

	Dependent variable:			
	P/E			
	Top, Aggregate NCF	Top, Separate NCF	Bottom, Aggregate NCF	Bottom, Separate NCF
	(1)	(2)	(3)	(4)
ROIC	10.481***	9.973***	3.206	3.211
	(1.726)	(1.712)	(2.918)	(2.927)
FCFG	0.142**	0.150**	0.062	0.065
	(0.070)	(0.070)	(0.067)	(0.067)
SGR	-67.666***	-68.312***	-67.981***	-67.728***
	(2.685)	(2.657)	(4.441)	(4.456)
Volume	0.188***	0.191***	0.605***	0.620***
	(0.063)	(0.063)	(0.124)	(0.125)
Aggregate Index NCF	0.033***		0.011	
	(0.010)		(0.045)	
Volume:Aggregate Index NCF	-0.001**		-0.002	
	(0.0005)		(0.004)	
OMXS30 NCF		-0.013		0.079
		(0.019)		(0.100)
OMXSB NCF		0.105***		0.047
		(0.019)		(0.080)
SIX NCF		-0.032		-0.199
		(0.032)		(0.152)
Volume:OMXS30 NCF		0.001		-0.011
		(0.001)		(0.012)
Volume:OMXSB NCF		-0.003***		-0.006
		(0.001)		(0.006)
Volume:SIX NCF		0.002		0.029
		(0.002)		(0.020)
Observations	1,111	1,111	989	989
R^2	0.441	0.452	0.294	0.296
Adjusted R^2	0.367	0.378	0.188	0.187
F Statistic	128.749*** (df = 6; 981)	80.668*** (df = 10; 977)	59.569*** (df = 6; 859)	36.027*** (df = 10; 855)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 6. Regressions of P/E on the accounting and liquidity variables, as well as concurrent flow variables and interaction terms between flows and liquidity. Column one presents the regression for the top subsample, where the flow variable is an aggregate number of the separate index fund types. Column two presents the results of a similar regression, but this time with the flow variables split up per index fund type. Columns three and four present the results for the corresponding regressions, but for the bottom subsample. All variables have been winsorized at the 1% and 99% tails to prevent biasing by outliers. The variable 'Aggregate Index Fund Flows' is the sum of all index fund flows weighted at each company's market cap.

OMXS30NEXT Subsample Regressions

	Dependent variable:			
	P/E			
	Top, Aggregate NCF	Top, Separate NCF	Bottom, Aggregate NCF	Bottom, Separate NCF
	(1)	(2)	(3)	(4)
ROIC	-2.039	-2.028	26.519***	27.093***
	(3.504)	(3.506)	(4.128)	(4.128)
FCFG	-0.384**	-0.385**	0.092	0.119
	(0.193)	(0.194)	(0.219)	(0.220)
SGR	-33.559***	-33.799***	-65.235***	-66.392***
	(3.174)	(3.191)	(5.882)	(5.925)
Volume	1.188***	1.189***	1.168**	1.189**
	(0.340)	(0.346)	(0.554)	(0.554)
Aggregate Index NCF	0.298*		0.082	
	(0.175)		(0.234)	
Volume:Aggregate Index NCF	-0.065		-0.045	
	(0.055)		(0.097)	
OMXSB NCF		0.350		-0.124
		(0.234)		(0.282)
SIX NCF		0.478		0.959*
		(0.436)		(0.561)
Volume:OMXSB NCF		-0.074		0.080
		(0.069)		(0.112)
Volume:SIX NCF		-0.090		-0.726**
		(0.122)		(0.328)
Observations	843	843	882	882
R^2	0.158	0.159	0.147	0.152
Adjusted R^2	0.001	0.0004	-0.009	-0.005
F Statistic	22.199*** (df = 6; 710)	16.789*** (df = 8; 708)	21.366*** (df = 6; 745)	16.709*** (df = 8; 743)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 7. Regressions of P/E on the accounting and liquidity variables, as well as concurrent flow variables and interaction terms between flows and liquidity. Column one presents the regression for the top subsample, where the flow variable is an aggregate number of the separate index fund types. Column two presents the results of a similar regression, but this time with the flow variables split up per index fund type. Columns three and four present the results for the corresponding regressions, but for the bottom subsample. All variables have been winsorized at the 1% and 99% tails to prevent biasing by outliers. The variable ‘Aggregate Index Fund Flows’ is the sum of all index fund flows weighted at each company’s market cap.

Subsample Liquidity Descriptive statistics

Statistic	Mean	St. Dev.	Min	Max
OMXS30 Top	8.885	5.215	1.189	23.173
OMXS30 Bottom	4.053	2.562	0.518	15.213
OMXS30NEXT Top	1.205	0.895	0.070	3.831
OMXS30NEXT Bottom	0.780	0.583	0.040	3.547

Table 8. Descriptive statistics of the Volume variable in the different subsamples. All variables have been winsorized at the 1% and 99% tails respectively.

Subsample Market Cap Descriptive statistics

Statistic	Mean	St. Dev.	Min	Max
OMXS30 Top	173.156	108.517	38.082	604.763
OMXS30 Bottom	39.427	17.471	3.786	102.263
OMXS30NEXT Top	23.507	14.669	5.476	80.214
OMXS30NEXT Bottom	11.919	5.828	2.683	26.394

Table 9. Descriptive statistics of the market capitalizations in the different subsamples. All variables have been winsorized at the 1% and 99% tails respectively.

Subsample Market Cap-to-Liquidity Descriptive statistics

Statistic	Mean	St. Dev.	Min	Max
OMXS30 Top	24.758	21.939	3.031	113.348
OMXS30 Bottom	13.720	9.222	3.031	69.392
OMXS30NEXT Top	26.496	17.234	3.771	161.148
OMXS30NEXT Bottom	31.045	60.791	2.280	587.732

Table 10. Descriptive statistics of the market capitalizations-to-liquidity ratios in the different subsamples. The ratio is constructed using the market capitalization and liquidity variables that have been winsorized at the 1% and 99% tails respectively.

5.3. Lagged Regressions

5.3.1. Empirical results

Given the significant relationship between index fund flows and P/E ratios, it is relevant to analyze whether or not this effect is temporary or permanent. To examine the persistence of the relationship, Table 11 contains the results of Regression 3 with concurrent, as well as lagged, index fund flow variables and the interaction terms between the flow and volume measures. For ease of interpretation, this section only focuses on fund flows on an aggregate basis and is not broken out by fund types. As established earlier, Table 11 also shows a significant relationship between aggregate index fund flows and concurrent P/E levels on the full-sample of companies on the OMXS30. The more interesting component of the table is the effect of the lagged flow variables. As column one shows, none of the lagged flow variables are negative and significant, implying that the initial valuation effect does not revert.

To summarize, we are able to reject the null hypothesis of Regression 3 on aggregate fund flows for concurrent flow variables on the OMXS30, but fail to reject all other null hypotheses on the OMXS30 or the NEXT.

5.3.2. Analysis

If market participants correct the established demand driven valuation changes, we would expect to see negative coefficients on some of the lagged index fund flow variables. These results show that P/E changes in response to index fund flows do not appear to revert back within the first two months of the initial flow. Previous literature on price reversals following fund flows is mixed. Findings of a permanent change are consistent with Belasco et al. (2012), Warther (1995), Shleifer (1986) and Garry and Goetzmann (1986), but stand in contrast to Harris and Gurel (1986), Frazzini and Lamont (2008) and Edelen and Warner (2001). Further, as pointed out by Warther (1995), one difficulty with reversal tests is that there is no clear guideline as to the appropriate time horizon for reversals. This paper is only able to analyze these results on a monthly basis. A more granular analysis could potentially detect price reversals at higher frequencies, or alternatively after even longer time periods.

Lagged Fund Flow Regressions

	Dependent variable:	
	P/E	
	OMXS30	OMXS30NEXT
	(1)	(2)
ROIC	9.089***	5.395
	(1.424)	(3.319)
FCFG	0.091**	-0.315*
	(0.046)	(0.182)
SGR	-65.149***	-58.495***
	(2.203)	(3.498)
Volume	0.162***	0.109
	(0.053)	(0.368)
Aggregate Index NCF	0.021***	-0.078
	(0.008)	(0.165)
Aggregate Index NCF, Lag 1	0.011	-0.033
	(0.009)	(0.071)
Aggregate Index NCF, Lag 2	0.012	-0.040
	(0.009)	(0.075)
Volume:Aggregate Index NCF	-0.001*	0.006
	(0.0004)	(0.058)
Volume:Aggregate Index NCF, Lag 1	-0.0002	0.021
	(0.001)	(0.048)
Volume:Aggregate Index NCF, Lag 2	-0.0001	0.061
	(0.001)	(0.057)
Observations	2,039	1,574
R^2	0.356	0.183
Adjusted R^2	0.307	0.100
F Statistic	104.595*** (df = 10; 1896)	32.011*** (df = 10; 1427)
Note:		*p<0.1; **p<0.05; ***p<0.01

Table 11. Regressions of P/E on the accounting and liquidity variables, as well as concurrent and lagged aggregate flow variables and interaction terms between flows and liquidity. Column one presents the regression for the OMXS30 index. Column two presents the results the equivalent regression for the OMXS30NEXT index. All variables have been winsorized at the 1% and 99% tails to prevent the effect of biasing from outliers. The variable 'Aggregate Index Fund Flows' is the sum of all index fund flows weighted at each company's market cap.

5.4. Robustness Tests

In order to determine the robustness of the results, a number of tests have been conducted. As a first step, the main regression in Table 5 is reproduced, but with flow variables run individually as well as in different combinations with one another. Although the correlation matrix of fund flows indicates that their correlations are low, the purpose of the additional regressions is to determine if the results may be impacted by multicollinearity of the flow variables. The results for these regressions on the OMXS30 and NEXT are presented in Appendix E and F respectively. As the tables show, there is no economically significant difference in the coefficients of the flow estimates when adding the flows one by one, thus reinforcing evidence that suggests multicollinearity of flow variables isn’t an issue.

Following the robustness check by Mork and Yang (2001), regressions are also run using data winsorized at the 5th and 95th percentiles. Table 5 is reproduced with this winsorization in Appendix G. While there are some minor differences in the magnitude of the estimated flow coefficients, the aggressive winsorizing produces no differences of economical significance. Appendix H reproduces the results of the subsample regressions on the OMXS30 from Table 6 but with this additional winsorizing. While the estimated coefficients on the top subsample are largely the same, this more aggressive winsorizing makes the OMXSB flow variable and interaction term with the liquidity measure statistically significant at a 5% level. Appendix I presents the equivalent table but for the NEXT subsample regressions. Compared to the initial regression in Table 7, the magnitude of the coefficients on the flow variables is generally greater, and statistically significant at higher levels. We interpret this as evidence suggesting that the estimates are susceptible to outliers in the data. When minimizing the effects of these outliers, the general results of the study are more clear, thus giving us more confidence in our initial interpretations of the results.

One potential issue with the regressions in the main results section is that the coefficients on the index fund flow variables may be biased if they are highly correlated with flows from actively managed funds. In order to understand whether or not this is the case, we run regressions where we control for active fund flows. The results from these regressions are presented in Appendix K. It should be noted that the data on actively managed fund flows cannot be weighted in the same way as the index fund flows, as these actively managed funds do not simply track index performance. Because of this, the panel regression results in Appendix K are run using aggregate, non-weighted fund flows, meaning that we can no longer control for fixed effects across time. Nonetheless, the results still help us understand if index flow estimates are biased by active flows. The point of interest in Appendix K is a comparison between the coefficients on index fund flow variables when regressed on a standalone basis (uneven columns) and when regressed in combination with active flows (even columns). As the table shows, there appears to be no difference in these coefficients, leading us to be more confident in our initial belief that estimates of index fund flows are unaffected by active fund flows.

In addition to the above, all tables from the results section have been reproduced using lagged accounting variables. This provides a sensitivity analysis on the timing of information released to the market. These are presented in Appendices L-O. The results of these regressions are very similar to the original ones. Of note is that the negative coefficient on the SIX fund flow variable on the bottom subsample regression for the OMXS30 becomes statistically significant with the lagged accounting variables. This further strengthens the thought process that funds flowing into the SIX may be at the expense of large cap concentrated strategies. This flow from large cap to the more dispersed SIX funds would lead to downward price pressure and net sales of large cap companies. Appendix N replicates the subsample regression for the NEXT from Table 7. Here the statistical significance on the aggregate flow variable on the top subsample disappears, but the positive statistical significance on the SIX flow variable for the bottom subsample remains. Appendix O presents the replication of the lagged fund flow regression from Table 11, but with lagged accounting variables. In this regression, the significance on the one month lagged flow variable disappears.

Taken in aggregate, these additional robustness tests do not appear to have any major impact on the initial results or interpretations. While some tests provide stronger evidence in favor of our initial interpretations, others have the opposite effect for parts of the results. However, we are in general able to reproduce the main findings of the study using these alternative approaches, and controlling for active fund flows does not appear to affect the results.

6. Discussion

The findings of this paper suggest the existence of a relationship between index fund flows and P/E ratios of Swedish companies. The subsample regressions appear to indicate that the flows are driving valuation changes in the companies, which is consistent with the interpretations by Belasco et al. (2012), Warther (1995), Kvamvold (2017), Santini and Aber (1998), Edelen and Warner (2001) and Goetzmann and Massa (2003). In the context of the Swedish market, Kopsch et al. (2015) also rejected the feedback-trader hypothesis as a determinant for mutual fund flows, further reinforcing the interpretation of a fund flow driven valuation effect. When evaluated at mean flow and P/E values, the valuation effect is 122 basis points for the full-sample of OMXS30 companies. This is slightly lower than the effect on the S&P 500 reported by Belasco et al. (2012). However, the top subsamples of the OMXS30 and NEXT indices carry a greater impact, with average effects in the magnitudes of 266-297 basis points. Given that this effect appears to be permanent, it is interesting to think about the hypothetical implications this could have on index constituents and investors. One possible effect is the existence of an "indexing bubble" as outlined by Morck and Yang (2001). In this scenario, index constituents, knowing that they are overvalued, would be more likely to issue new equity, possibly leading to inefficient over-investments, which is consistent with the findings of Frazzini and Lamont (2008). Ultimately, this is a cost that would be borne by the shareholders.

When considering the imperfect substitutes hypothesis, we would expect to see the largest valuation effects in situations where substitute stocks are not readily available. Referencing Wurgler and Zhuravskaya (2002), any would-be arbitrageur who attempts to exploit these mispricings must bear some "arbitrage risk" that the two return streams will not fully cancel out. Our findings suggest that the valuation effect is the greatest and most significant on the top OMXS30 subsample. Due to their large market caps, these companies have the least obvious substitutes, which supports the analysis of Wurgler and Zhuravskaya. As part of our analysis, we also attempted to examine dual-listed stocks where there would be very little to no arbitrage risk. Given the small number of dual listed companies, our sample size was small and did not produce any significant results. One unexplored topic for future research would be to look at potential fund flow and demand effects between the marketplaces of dual-listed companies.

According to Cremers et al. (2016), there may also be reason to believe that the rate of index investing in the Swedish market is much greater than those funds which explicitly track one of the three common benchmark indices. In their paper, the rate of closet indexing in Sweden is determined to be the highest in the world at 56% of all funds. This study only takes into account those funds with explicit indexing mandates, and therefore may be ignoring a very large portion of the closet-indexed market. A study which takes into account the passive portions of closet indexing mutual funds may have even larger scale or noteworthy implications for market prices and valuation.

Throughout the analysis, we continually visit the relationship between market cap-to-liquidity and flow variables. We introduce the concept of a potential critical mass that may be needed in order to produce a demand driven valuation change in stocks, yet don't explicitly quantify where these tipping points occur. We hypothesize that a relationship between the ratio of market cap-to-liquidity should affect the degree to which these index fund flows have an effect, but were unable to quantify any such statistically significant relationship. Further research into the relationship would be very interesting in predicting future misvaluations and determining how large flows of the passive market must be in order to create these effects.

If index flows lead to valuation changes in their underlying constituents, market forces suggests participation by active funds would mitigate this price pressure by selling the constituents. Here the market relies on these active fund managers to preserve the market's efficiency. However, as the percentage of passive stock ownership increases, there may be fewer or slower efficiency preserving mechanisms. One topic for future studies could therefore be to further research markets with differing degrees of index investing to see what role active management might play in corrections. It would be additionally interesting to compare the technological sophistication of these markets to understand the extent to which electronic trading systems and active trading algorithms may influence the speed and effectiveness of potential corrections. Alternatively, if active fund managers engage in a degree of speculation through purchases instead of sales as documented by De Long et al. (1990), then this would create an opposite effect for valuations. It is interesting to consider the degree that active fund managers may engage in these types of speculative strategies today versus when the paper was written in 1990.

Finally, relationships within the study may be heavily affected by the intervals examined. Intraday, weekly, or intra-month valuation reversions will not be captured by our analysis. It would be interesting to conduct a similar study to ours using daily or weekly intervals. Our analysis was limited to monthly intervals due to the fact that most funds report their fund flows on a monthly basis. However, if access to more granular fund flow information were obtained it would be very interesting to see if there is a degree of valuation changes that occur and then are reversed intra-month.

7. Conclusion

This paper is the first to study the relationship between index fund flows and price-to-earnings ratios of Swedish companies by focusing specifically on the constituents of the OMXS30 and OMXS30NEXT indices. The findings suggest that there is a positive, contemporaneous relationship between aggregate index flows and P/E ratios of companies in the OMXS30. There is also a significant negative interaction effect between liquidity and fund flows, meaning that this relationship is stronger for less liquid companies. Further, this relationship appears to be limited to larger market capitalization companies on the OMXS30. No such relationship is found when studying the NEXT in its entirety. Similar to the OMXS30 however, the results indicate an effect on the larger market capitalization companies of the NEXT. While these documented relationships themselves do not necessarily mean index fund flows drive valuation levels, the results in this paper appear to provide evidence in support of this notion.

If one posits that this causation is true, we also hypothesise that a company's market cap-to-liquidity ratio can be used to explain whether or not that company will be affected by the flows. Large companies receive more index fund flows, but at the same time tend to be more liquid, thus logically implying that they should be less affected by the same nominal amount of inflows. The market cap-to-liquidity ratio can be used to better detect nuances in these two counteracting factors, and we hypothesize that it can potentially be used to find the critical mass threshold of fund flows needed to have a valuation impact. The overall findings of this study are a clear violation of the efficient market hypothesis, and the documented valuation effects appear to be permanent. Further, this result appears to provide support for the imperfect substitutes hypothesis, however our tests used to reject the price pressure hypothesis are limited by the relatively low frequency index fund flow data.

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Appendix

A.

OMXS30NEXT

Company	Index Inclusion Date	Index Exclusion Date
ENRO	2009-07-01	2012-07-02
SAS	2009-07-01	2012-07-02
PAR	2009-07-01	2013-01-02
AOILSDB	2009-07-01	2013-12-09
AXFO	2009-07-01	2014-01-02
KLED	2009-07-01	2014-01-02
KINVB	2009-07-01	2014-07-01
INDUC	2009-07-01	2015-01-02
VOLVA	2009-07-01	2015-01-02
ORISDB	2009-07-01	2015-07-03
MEDA	2009-07-01	2016-08-05
ALIVSDB	2009-07-01	2017-01-02
RATOB	2009-07-01	2018-01-02
HEXAB	2009-07-01	2018-07-02
LUMIN	2009-07-01	2018-07-02
HOLMB	2009-07-01	2019-01-02
CAST	2009-07-01	-
EKTAB	2009-07-01	-
FABG	2009-07-01	-
HUSQB	2009-07-01	-
INTRUM	2009-07-01	-
JM	2009-07-01	-
TIGOSDB	2009-07-01	-
NCCB	2009-07-01	-
SAABB	2009-07-01	-
SSAB	2009-07-01	-
STER	2009-07-01	-
TRELB	2009-07-01	-
ENQ	2011-03-12	2013-07-01
AXIS	2012-07-02	2015-06-01
BETSB	2012-07-02	-
HPOLB	2013-01-02	-
HOGAB	2013-07-01	2013-09-26
ICA	2013-07-01	-
ARCAM	2014-01-02	2015-07-03
FINGB	2014-01-02	2016-01-04
PREC	2014-01-02	-
SOBI	2014-01-02	-
INDUA	2014-07-01	2015-01-02
BILL	2014-07-01	-
AOIC	2015-01-02	2016-07-01
SNTC	2015-01-02	-
HEMF	2015-07-01	-
KINDSDB	2015-07-01	-
ORIFL	2015-07-01	-
PEAB	2015-07-01	-
MTGB	2016-01-04	-
PREC	2016-01-04	-
AXFO	2016-07-01	-
DOMETIC	2017-01-02	-
BALDB	2017-01-02	-
NOK	2017-01-02	-
AHSL	2017-07-03	2019-01-02
LUPE	2018-01-02	-
FINGB	2018-07-02	2016-01-04
EVOG	2018-07-02	-
NETB	2018-07-02	-
EPIRA	2019-01-02	-
EPIRB	2019-01-02	-
VNE	2019-01-02	-

B.

OMXS30

Company	Index Inclusion Date	Index Exclusion Date
SCVB	2007-01-02	2014-05-16
MTGB	2009-07-01	2016-01-04
NOKIA	2007-06-04	2017-01-02
LUPE	2008-12-10	2018-01-02
FINGB	2016-01-04	2018-07-10
ATCOA	1996-06-24	-
ATCOB	1996-06-24	-
ELUXB	1996-06-24	-
ERICB	1996-06-24	-
HMB	1996-06-24	-
SCAB	1996-06-24	-
SKAB	1996-06-24	-
SKFB	1996-06-24	-
VOLVB	1996-06-24	-
SEB	1996-06-24	-
SHB	1996-06-24	-
SWED	1996-06-24	-
NDASE	1998-06-23	-
AZN	1999-04-07	-
ABB	1999-06-23	-
TEL2B	1999-07-02	-
SECUB	2000-01-01	-
TELIA	2000-06-15	-
ASSAB	2001-01-02	-
ALFA	2003-01-02	-
SWMA	2003-01-02	-
BOL	2006-07-03	-
SSABA	2007-07-02	-
GETIB	2009-07-01	-
KINVB	2014-07-01	-
ESSITYB	2017-06-12	-
HEXAB	2018-07-02	-

C.

$$OMXS30\ NCF_{i,t} = OMXS30\ ff_{i,t} * \frac{Market\ Cap_{i,t}}{OMXS30\ Market\ Cap_t}$$

$$OMXSB\ NCF_{i,t} = OMXSB\ ff_t * \frac{Market\ Cap_{i,t}}{OMXSB\ Market\ Cap_t}$$

$$SIX\ NCF_{i,t} = SIX\ ff_t * \frac{Market\ Cap_{i,t}}{SSE\ Market\ Cap_t}$$

Appendix C. Weighting calculations for the index fund flow variables. $OMXS30\ ff_{i,t}$, $OMXSB\ ff_{i,t}$ and $SIX\ ff_i$ refers to the unweighted aggregate fund flows for the OMXS30, OMXSB and SIX indices respectively. The OMXSB Market Cap variable is approximated as the sum of the market capitalizations of the OMXS30 and OMXS30NEXT indices at each time *t*, with 5% of the weight deducted to account for small cap companies included in the index. This is consistent with the current composition of the index, where OMXS30 and OMXS30NEXT companies make up more than 95% of the weight of the OMXSB. Historically, the OMXS30 has made up an even greater portion of the OMXSB, meaning that this methodology computes a conservative approximation.

D.

OMXS30 Bottom Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
P/E	1,016	16.34	6.05	6.84	39.68
ROIC	1,016	0.13	0.09	0.02	0.93
SGR	1,016	0.09	0.06	-0.06	0.32
FCFG	1,016	0.44	2.06	-4.17	12.71

OMXS30 Top Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
P/E	1,155	17.47	6.17	6.84	39.68
ROIC	1,155	0.21	0.18	0.02	0.93
SGR	1,155	0.10	0.08	-0.06	0.32
FCFG	1,155	0.28	1.88	-4.17	12.71

OMXS30NEXT Bottom Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
P/E	973	17.28	9.09	6.00	67.15
ROIC	973	0.19	0.18	0.03	1.05
SGR	973	0.01	0.85	-5.20	3.56
FCFG	973	0.11	0.08	-0.04	0.39

OMXS30NEXT Top Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
P/E	902	18.93	8.97	6.00	67.15
ROIC	902	0.18	0.17	0.02	1.05
SGR	902	0.01	0.93	-5.20	3.56
FCFG	902	0.11	0.08	-0.04	0.39

Subsample Fund Flows Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Max
OMXS30 Top	1,155	15.739	44.550	-102.088	158.569
OMXS30 Bottom	1,155	3.095	13.121	-102.088	68.961
OMXS30NEXT Top	1,155	1.540	4.317	-10.390	20.562
OMXS30NEXT Bottom	1,155	0.948	2.691	-10.390	19.049

Fund Flows Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Max
OMXS30	2,161	9.871	34.322	-102.088	158.569
OMXS30NEXT	2,161	1.254	3.917	-10.390	20.562

E.

OMXS30 Regressions

	Dependent variable:						
	P/E						
	OMXS NCF	OMXSB NCF	SIX NCF	OMXS and OMXSB NCF	OMXS and SIX NCF	OMXSB and SIX NCF	OMXS, OMXSB and SIX NCF
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ROIC	9.306^{***}	9.033^{***}	9.277^{***}	8.993^{***}	9.267^{***}	8.994^{***}	8.964^{***}
	(1.417)	(1.415)	(1.418)	(1.417)	(1.419)	(1.417)	(1.418)
FCFG	0.091^{*}	0.089^{*}	0.090^{*}	0.090^{*}	0.091^{*}	0.089^{*}	0.090^{*}
	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)
SGR	-67.172^{***}	-67.313^{***}	-67.185^{***}	-67.293^{***}	-67.137^{***}	-67.274^{***}	-67.262^{***}
	(2.217)	(2.210)	(2.217)	(2.212)	(2.219)	(2.211)	(2.214)
Volume	0.204^{***}	0.221^{***}	0.205^{***}	0.220^{***}	0.205^{***}	0.223^{***}	0.222^{***}
	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)	(0.053)
OMXS30 NCF	0.002			-0.007	0.002		-0.007
	(0.015)			(0.015)	(0.015)		(0.015)
Volume:OMXS30 NCF	0.0002			0.001	0.0002		0.001
	(0.001)			(0.001)	(0.001)		(0.001)
OMXSB NCF		0.051^{***}		0.053^{***}		0.054^{***}	0.055^{***}
		(0.014)		(0.015)		(0.015)	(0.015)
Volume:OMXSB NCF		-0.002^{**}		-0.002^{***}		-0.002^{***}	-0.002^{***}
		(0.001)		(0.001)		(0.001)	(0.001)
SIX NCF			0.007		0.007	-0.015	-0.014
			(0.025)		(0.025)	(0.026)	(0.026)
Volume:SIX NCF			0.0001		-0.00003	0.001	0.001
			(0.002)		(0.002)	(0.002)	(0.002)
Observations	2,087	2,087	2,087	2,087	2,087	2,087	2,087
R^2	0.352	0.356	0.352	0.357	0.352	0.357	0.357
Adjusted R^2	0.306	0.310	0.306	0.310	0.305	0.310	0.309
F Statistic	176.301^{***} (df = 6; 1946)	179.496^{***} (df = 6; 1946)	176.286^{***} (df = 6; 1946)	134.629^{***} (df = 8; 1944)	132.146^{***} (df = 8; 1944)	134.647^{***} (df = 8; 1944)	107.694^{***} (df = 10; 1942)
Note:							*p<0.1; **p<0.05; ***p<0.01

F.

OMXS30NEXT Regressions

	Dependent variable:		
	P/E		
	OMXSB NCF	SIX NCF	OMXSB and SIX NCF
	(1)	(2)	(3)
ROIC	5.699^{*}	5.630^{*}	5.712^{*}
	(3.308)	(3.304)	(3.310)
FCFG	-0.325^{*}	-0.325^{*}	-0.326^{*}
	(0.182)	(0.182)	(0.182)
SGR	-58.826^{***}	-59.041^{***}	-58.857^{***}
	(3.457)	(3.450)	(3.464)
Volume	0.249	0.235	0.245
	(0.353)	(0.344)	(0.354)
OMXSB NCF	-0.066		-0.073
	(0.207)		(0.209)
Volume:OMXSB NCF	-0.006		-0.005
	(0.070)		(0.071)
SIX NCF		0.071	0.094
		(0.399)	(0.404)
Volume:SIX NCF		-0.021	-0.019
		(0.134)	(0.136)
Observations	1,576	1,576	1,576
R^2	0.185	0.185	0.185
Adjusted R^2	0.105	0.104	0.103
F Statistic	54.332^{***} (df = 6; 1433)	54.251^{***} (df = 6; 1433)	40.702^{***} (df = 8; 1431)
Note:			*p<0.1; **p<0.05; ***p<0.01

G.

Main Regression - Winsorized At 5% Tails

	Dependent variable:			
	P/E			
	OMXS30, Agg.	OMXS30, Sep.	OMXS30NEXT, Agg.	OMXS30NEXT, Sep.
	(1)	(2)	(3)	(4)
ROIC	6.174***	6.140***	9.055***	9.302***
	(1.814)	(1.808)	(2.437)	(2.444)
FCFG	0.092	0.095	-0.699***	-0.701***
	(0.078)	(0.078)	(0.268)	(0.268)
SGR	-62.829***	-63.686***	-42.730***	-42.791***
	(2.530)	(2.530)	(2.891)	(2.894)
Volume	0.249***	0.263***	0.350	0.376
	(0.054)	(0.054)	(0.273)	(0.275)
Aggregate Index NCF	0.028***		0.339*	
	(0.010)		(0.177)	
Volume:Aggregate Index NCF	-0.001		-0.091	
	(0.001)		(0.063)	
OMXS30 NCF		0.014		
		(0.019)		
OMXSB NCF		0.107***		0.122
		(0.023)		(0.227)
SIX NCF		-0.017		0.372
		(0.031)		(0.359)
Volume:OMXS30 NCF		0.0001		
		(0.001)		
Volume:OMXSB NCF		-0.004**		-0.087
		(0.002)		(0.080)
Volume:SIX NCF		0.002		0.025
		(0.002)		(0.130)
Observations	2,087	2,087	1,576	1,576
R^2	0.326	0.333	0.140	0.141
Adjusted R^2	0.278	0.284	0.055	0.055
F Statistic	156.868*** (df = 6; 1946)	97.027*** (df = 10; 1942)	38.994*** (df = 6; 1433)	29.351*** (df = 8; 1431)
Note:				*p<0.1; **p<0.05; ***p<0.01

H.

OMXS30 Subsample Regressions - Winsorized At 5% Tails

	Dependent variable:			
	P/E			
	Top, Aggregate NCF	Top, Separate NCF	Bottom, Aggregate NCF	Bottom, Separate NCF
	(1)	(2)	(3)	(4)
ROIC	9.476***	8.528***	4.042	4.088
	(2.489)	(2.443)	(2.942)	(2.941)
FCFG	0.136	0.174	0.089	0.103
	(0.117)	(0.115)	(0.109)	(0.109)
SGR	-63.388***	-64.277***	-68.701***	-68.936***
	(3.286)	(3.231)	(4.503)	(4.502)
Volume	0.179***	0.196***	0.487***	0.505***
	(0.068)	(0.067)	(0.101)	(0.102)
Aggregate Index NCF	0.050***		0.036	
	(0.013)		(0.040)	
Volume:Aggregate Index NCF	-0.001		-0.004	
	(0.001)		(0.004)	
OMXS30 NCF		0.029		0.037
		(0.025)		(0.083)
OMXSB NCF		0.193***		0.206**
		(0.029)		(0.085)
SIX NCF		-0.018		-0.199
		(0.039)		(0.126)
Volume:OMXS30 NCF		-0.0001		-0.008
		(0.001)		(0.010)
Volume:OMXSB NCF		-0.003*		-0.016**
		(0.002)		(0.008)
Volume:SIX NCF		0.002		0.027*
		(0.002)		(0.015)
Observations	1,111	1,111	989	989
R^2	0.388	0.416	0.316	0.322
Adjusted R^2	0.307	0.337	0.213	0.217
F Statistic	103.621*** (df = 6; 981)	69.604*** (df = 10; 977)	66.185*** (df = 6; 859)	40.696*** (df = 10; 855)
Note:				*p<0.1; **p<0.05; ***p<0.01

I.

OMXS30NEXT Subsample Regressions - Winsorized At 5% Tails

	Dependent variable:			
	P/E			
	Top, Aggregate NCF	Top, Separate NCF	Bottom, Aggregate NCF	Bottom, Separate NCF
	(1)	(2)	(3)	(4)
ROIC	2.372	1.757	21.760***	22.142***
	(3.272)	(3.285)	(2.964)	(2.967)
FCFG	-0.153	-0.138	0.029	0.056
	(0.337)	(0.338)	(0.317)	(0.317)
SGR	-26.533***	-26.559***	-52.217***	-52.946***
	(3.269)	(3.270)	(4.768)	(4.794)
Volume	0.656*	0.712**	1.341***	1.355***
	(0.340)	(0.345)	(0.405)	(0.404)
Aggregate Index NCF	0.956***		0.412*	
	(0.246)		(0.231)	
Volume:Aggregate Index NCF	-0.188***		-0.207*	
	(0.073)		(0.115)	
OMXSB NCF		1.291***		0.120
		(0.334)		(0.312)
SIX NCF		0.531		1.017**
		(0.538)		(0.474)
Volume:OMXSB NCF		-0.242**		-0.047
		(0.094)		(0.146)
Volume:SIX NCF		-0.032		-0.642**
		(0.146)		(0.250)
Observations	843	843	882	882
R^2	0.112	0.114	0.154	0.158
Adjusted R^2	-0.054	-0.053	-0.001	0.001
F Statistic	14.872*** (df = 6; 710)	11.407*** (df = 8; 708)	22.535*** (df = 6; 745)	17.415*** (df = 8; 743)
Note:				*p<0.1; **p<0.05; ***p<0.01

J.

Lagged Regressions - Winsorized At 5% Tails

	Dependent variable:	
	P/E	
	OMXS30	OMXS30NEXT
	(1)	(2)
ROIC	6.351***	8.735***
	(1.810)	(2.443)
FCFG	0.090	-0.684**
	(0.077)	(0.269)
SGR	-61.743***	-42.144***
	(2.539)	(2.909)
Volume	0.186***	0.266
	(0.055)	(0.290)
Aggregate Index NCF	0.026**	0.328*
	(0.010)	(0.177)
Aggregate Index NCF, Lag 1	0.012	-0.028
	(0.013)	(0.077)
Aggregate Index NCF, Lag 2	0.013	0.041
	(0.014)	(0.079)
Volume:Aggregate Index NCF	-0.001	-0.090
	(0.001)	(0.063)
Volume:Aggregate Index NCF, Lag 1	0.0005	0.034
	(0.001)	(0.054)
Volume:Aggregate Index NCF, Lag 2	0.0003	0.024
	(0.001)	(0.057)
Observations	2,039	1,574
R^2	0.324	0.140
Adjusted R^2	0.274	0.052
F Statistic	91.008*** (df = 10; 1896)	23.170*** (df = 10; 1427)
Note:		*p<0.1; **p<0.05; ***p<0.01

K.

Index and Active Regressions

	Dependent variable:			
	P/E			
	OMXS30 Index NCF	OMXS30 Index and Active NCF	OMXS30NEXT Index NCF	OMXS30NEXT Index and Active NCF
	(1)	(2)	(3)	(4)
ROIC	5.474^{***}	5.523^{***}	-5.745^{*}	-5.926^{*}
	(1.480)	(1.480)	(3.382)	(3.388)
FCFG	0.119^{**}	0.115^{**}	-0.319^{*}	-0.313
	(0.048)	(0.048)	(0.192)	(0.192)
SGR	-70.700^{***}	-70.775^{***}	-60.821^{***}	-60.423^{***}
	(2.300)	(2.301)	(3.534)	(3.563)
Volume	0.292^{***}	0.292^{***}	1.161^{***}	1.127^{***}
	(0.046)	(0.046)	(0.311)	(0.313)
OMXS30 NCF	-0.0003	-0.0003		
	(0.0002)	(0.0002)		
OMXSB NCF	0.0004^{***}	0.0004^{***}	0.0003	0.0003
	(0.0001)	(0.0001)	(0.0002)	(0.0002)
SIX NCF	0.0003	0.0002	-0.0004	-0.0004
	(0.0002)	(0.0002)	(0.0003)	(0.0003)
Active NCF		0.00004		-0.00005
		(0.00003)		(0.0001)
Observations	2,064	2,064	1,551	1,551
R^2	0.394	0.394	0.202	0.202
Adjusted R^2	0.384	0.385	0.186	0.186
F Statistic	188.470^{***} (df = 7; 2032)	165.117^{***} (df = 8; 2031)	63.974^{***} (df = 6; 1520)	54.937^{***} (df = 7; 1519)
Note:				*p<0.1; **p<0.05; ***p<0.01

Appendix K. Regressions of P/E on the accounting, liquidity and flow variables. Uneven columns only include the index fund flows, while even columns also add active fund flows to the regression. The data on active fund flows do not contain any information on how these are flows are distributed amongst companies, and as such these regressions will not use weighted flow variables. This also means that we cannot control for time fixed effects, and instead of the twoway fixed effects model used in other regressions, this one only controls for company fixed effects. All variables have been winsorized at the 1% and 99% tails to prevent the effect of biasing from outliers.

L.

Main Regression - Lagged Accounting Variables

	Dependent variable:			
	P/E			
	OMXS30, Agg.	OMXS30, Sep.	OMXS30NEXT, Agg.	OMXS30NEXT, Sep.
	(1)	(2)	(3)	(4)
ROIC	8.405***	8.265***	2.855	2.896
	(1.451)	(1.451)	(3.294)	(3.297)
FCFG	0.107**	0.109**	-0.376**	-0.382**
	(0.044)	(0.044)	(0.182)	(0.182)
SGR	-67.856***	-68.100***	-54.672***	-54.703***
	(2.274)	(2.272)	(3.367)	(3.379)
Volume	0.233***	0.238***	0.237	0.226
	(0.055)	(0.055)	(0.354)	(0.360)
Aggregate Index NCF	0.022***		-0.110	
	(0.008)		(0.165)	
Volume:Aggregate Index NCF	-0.001*		0.018	
	(0.0005)		(0.058)	
OMXS30 NCF		0.004		
		(0.016)		
OMXSB NCF		0.058***		-0.166
		(0.016)		(0.211)
SIX NCF		-0.020		0.191
		(0.027)		(0.407)
Volume:OMXS30 NCF		0.0001		
		(0.001)		
Volume:OMXSB NCF		-0.002***		0.024
		(0.001)		(0.072)
Volume:SIX NCF		0.001		-0.041
		(0.002)		(0.137)
Observations	2,082	2,082	1,575	1,575
R^2	0.350	0.352	0.174	0.175
Adjusted R^2	0.303	0.304	0.092	0.091
F Statistic	174.159*** (df = 6; 1941)	105.408*** (df = 10; 1937)	50.380*** (df = 6; 1432)	37.787*** (df = 8; 1430)
Note:				*p<0.1; **p<0.05; ***p<0.01

M.

OMXS30 Subsample Regressions - Lagged Accounting Variables

	Dependent variable:			
	P/E, Lag 1			
	Top, Aggregate NCF	Top, Separate NCF	Bottom, Aggregate NCF	Bottom, Separate NCF
	(1)	(2)	(3)	(4)
ROIC, Lag 1	9.858***	9.372***	3.583	3.824
	(1.781)	(1.770)	(2.894)	(2.891)
FCFG, Lag 1	0.151**	0.158**	0.083	0.089
	(0.067)	(0.067)	(0.064)	(0.065)
SGR, Lag 1	-67.831***	-68.275***	-72.057***	-72.097***
	(2.744)	(2.723)	(4.573)	(4.567)
Volume	0.192***	0.198***	0.719***	0.744***
	(0.066)	(0.066)	(0.127)	(0.128)
Aggregate Index NCF	0.033***		0.016	
	(0.010)		(0.047)	
Volume:Aggregate Index NCF	-0.001**		0.001	
	(0.0005)		(0.004)	
OMXS30 NCF		0.004		0.102
		(0.020)		(0.103)
OMXSB NCF		0.100***		0.101
		(0.020)		(0.083)
SIX NCF		-0.033		-0.282*
		(0.033)		(0.156)
Volume:OMXS30 NCF		0.0002		-0.019
		(0.001)		(0.012)
Volume:OMXSB NCF		-0.003***		-0.006
		(0.001)		(0.006)
Volume:SIX NCF		0.001		0.052**
		(0.002)		(0.020)
Observations	1,109	1,109	986	986
R^2	0.430	0.440	0.301	0.308
Adjusted R^2	0.355	0.364	0.195	0.201
F Statistic	123.080*** (df = 6; 979)	76.655*** (df = 10; 975)	61.357*** (df = 6; 856)	38.010*** (df = 10; 852)
Note:				*p<0.1; **p<0.05; ***p<0.01

N.

OMXS30NEXT Subsample Regressions - Lagged Accounting Variables

	Dependent variable:			
	P/E			
	Top, Aggregate NCF	Top, Separate NCF	Bottom, Aggregate NCF	Bottom, Separate NCF
	(1)	(2)	(3)	(4)
ROIC	-4.980	-4.979	24.635***	24.913***
	(3.462)	(3.466)	(4.134)	(4.132)
FCFG	-0.328*	-0.328*	0.025	0.029
	(0.186)	(0.187)	(0.211)	(0.211)
SGR	-32.002***	-32.176***	-60.925***	-61.289***
	(3.117)	(3.132)	(5.812)	(5.814)
Volume	1.209***	1.200***	1.299**	1.332**
	(0.345)	(0.350)	(0.561)	(0.560)
Aggregate Index NCF	0.254		0.055	
	(0.176)		(0.236)	
Volume:Aggregate Index NCF	-0.057		-0.061	
	(0.055)		(0.098)	
OMXSB NCF		0.286		-0.210
		(0.235)		(0.285)
SIX NCF		0.452		1.010*
		(0.437)		(0.564)
Volume:OMXSB NCF		-0.058		0.030
		(0.070)		(0.113)
Volume:SIX NCF		-0.094		-0.519
		(0.122)		(0.330)
Observations	842	842	882	882
R^2	0.155	0.156	0.133	0.137
Adjusted R^2	-0.002	-0.004	-0.025	-0.023
F Statistic	21.655*** (df = 6; 709)	16.345*** (df = 8; 707)	19.092*** (df = 6; 745)	14.798*** (df = 8; 743)
Note:				*p<0.1; **p<0.05; ***p<0.01

O.

Lagged Regressions - Lagged Accounting Variabls

	Dependent variable:	
	P/E, Lag 1	
	OMXS30	OMXS30NEXT
	(1)	(2)
ROIC, Lag 1	8.181***	2.500
	(1.457)	(3.305)
FCFG, Lag 1	0.112**	-0.375**
	(0.044)	(0.182)
SGR, Lag 1	-66.105***	-54.273***
	(2.266)	(3.410)
Volume	0.192***	0.106
	(0.056)	(0.373)
Aggregate Index NCF	0.022***	-0.117
	(0.008)	(0.166)
Aggregate Index NCF, Lag 1	0.010	-0.021
	(0.010)	(0.072)
Aggregate Index NCF, Lag 2	0.014	-0.043
	(0.009)	(0.076)
Volume:Aggregate Index NCF	-0.001**	0.021
	(0.0005)	(0.059)
Volume:Aggregate Index NCF, Lag 1	-0.0002	0.018
	(0.001)	(0.049)
Volume:Aggregate Index NCF, Lag 2	-0.0003	0.069
	(0.001)	(0.057)
Observations	2,034	1,573
R^2	0.350	0.172
Adjusted R^2	0.301	0.088
F Statistic	101.896*** (df = 10; 1891)	29.705*** (df = 10; 1426)
Note:		*p<0.1; **p<0.05; ***p<0.01

P.

Funds Per Index Type

OMXS30	OMXSB	SIX
XACT OMXS30	Ohman Sverige A Pivot	Skandia Sverige Exponering
SpotR OMXS30 ETF	SPP Aktiefond Sverige A	Handelsbanken SV Index Criteria
Aktiespararna Topp Sverige	SPP Aktiefond Sverige B	Handelsbanken Sverigefond index
Avanza Zero	Handelsbanken Sverige OMXSB	Catella Sverige Håll, Beta B
	Länsförsäkringar indexnära	Catella Sverige Håll, Beta A
	Nordea Sverige passiv	SEB Sverige Indexfond
	Nordnet Superfonden	SEB Sverige Indexfond Utd
	Ishares OMX	
	Swedbank Robur Access Sverige	
	SPP Sverige Plus B	
	Ohman Sverige B	

Q.

	Dependent variable:		
	P/E		
	All Flows	Only SIX Flows	OMXSB Flows
	(1)	(2)	(3)
ROIC	27.093^{***}	26.908^{***}	26.666^{***}
	(4.128)	(4.115)	(4.130)
FCFG	0.119	0.113	0.094
	(0.220)	(0.219)	(0.219)
SGR	-66.392^{***}	-66.038^{***}	-65.427^{***}
	(5.925)	(5.880)	(5.899)
Volume	1.189^{**}	1.291^{**}	1.061^{*}
	(0.554)	(0.529)	(0.552)
OMXSB NCF	-0.124		-0.053
	(0.282)		(0.280)
SIX NCF	0.959^{*}	0.907	
	(0.561)	(0.553)	
Volume:OMXSB NCF	0.080		0.025
	(0.112)		(0.109)
Volume:SIX NCF	-0.726^{**}	-0.675^{**}	
	(0.328)	(0.319)	
Observations	882	882	882
R^2	0.152	0.152	0.147
Adjusted R^2	-0.005	-0.003	-0.009
F Statistic	16.709^{***} (df = 8; 743)	22.239^{***} (df = 6; 745)	21.333^{***} (df = 6; 745)
Note:			*p<0.1; **p<0.05; ***p<0.01