The Impact of Passive Investing on Corporate Valuations

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ABSTRACT

Over the past 20 years, a trend toward index fund investing has emerged. Currently, more mutual fund assets are indexed to the S&P 500 than any other index. Prior research on downward-sloping demand curves suggests that widespread acceptance of S&P 500 index investing may push prices of companies in the S&P 500 beyond fundamental values. This paper explores the impact of flows into S&P 500 index funds on corporate valuations. The results show that money flow into S&P 500 index funds is inflating the values of companies in the index relative to those outside of the index.

JEL Classifications: G11 (investment decisions), G12 (asset pricing), G23 (private financial institutions)

Keywords: Active management, passive management, indexing, index fund, index premium, demand curves for stocks, S&P 500.

I. Introduction

Neoclassical asset pricing theory assumes that the prices of stocks change as a result of new information about a corporation's value to its shareholders. Event studies on changes to the composition of an index are frequently used to examine whether a non-valuation motivated change in the quantity demanded of a given security results in a change in its price. This is because many do not consider a demand shock from passive investors to be indicative of a stock's intrinsic value.

In a broad review of studies investigating indexation price effects, Brealey (2000) identifies a trend over the period 1966 – 1995 toward larger positive abnormal returns following the addition of a stock to the S&P 500 and larger negative abnormal returns following a deletion of a stock from the index. Petajisto (2008) finds that the average abnormal returns to additions are 8.8% in the period 1990 through 2005, and the average abnormal returns to deletions are -15.1%. French (2008) shows that the percentage of U.S. equity mutual fund assets invested in index funds increased from 1.0% in 1984 to 12.4% in 2003, which suggests that the growth of the event effects may be largely due to the shift toward passive investing. Shleifer (1986) and Petajisto (2008) estimate that the price elasticity of demand is near unity. Contrary to the predictions of Fama's (1970) efficient market hypothesis, arbitrage trades have not flattened the demand curve. Petajisto (2008) also discovers that in the period 1990 through 2005 the average abnormal returns to additions to the Russell 2000 was 8.0% and the average abnormal

returns to deletions was -13.4%. Price effects in the purely market cap-based Russell 2000 that are similar to those observed in the S&P 500 index provide further evidence of downward-sloping demand curves for stocks.

In a related strand of research, Barberis, Shleifer, and Wurgler (2005) theorize that, in the presence of limited arbitrage, money flowing into a segment of the market impacts the correlation of returns between stocks in that segment. Consistent with the authors' habitat theory of return comovement, they find that a stock's correlation with other stocks in the S&P 500 increases when it is added to the index and, commensurate with the trend towards S&P 500 index fund investing, the correlations have increased in recent years.

Event studies only partially address price effects associated with index fund investing. This is because investor cash is continuously flowing into and out of index funds, yet changes to the composition of an index only occur a few times a year. It is possible that changes in the quantity of a stock demanded by index fund managers as a result of fund flows may also impact the price of the stock if equities within the index exhibit downward-sloping demand curves. Goetzmann and Massa (2003) examine the relation between index fund flows and returns on the index and find that a strong same-day relationship exists. However, it is difficult to determine whether the flows are driving the returns or vice versa. To disentangle demand effects from potential feedback effects, the authors perform a Geweke-Messe-Dent (1982) (GMD) test. The GMD test confirms that

the direction of causality is from flows to returns. However, the GMD test is weak if the causality is at a higher frequency than the data. This motivated the authors to conduct a series of tests using higher frequency data which arrive at the same results as the GMD test. Hence, strong evidence suggests that flows drive returns. However, the question of whether or not companies that are constituents of the index have become *overvalued* relative to fundamentals as a result of S&P 500 index fund money flow has not yet been determined.

We hypothesize that flows into S&P 500 index funds positively impact the PE ratio of companies that are in the index relative to those that are not. In an unpublished manuscript, Morck and Yang (2002) find evidence that money flow into index funds alters the Tobin's Q ratios. Our empirical work is an extension of Morck and Yang and is different in several ways. First, we perform regressions that involve net cash flows rather than time-series plots. Second, we take a comprehensive view of index fund assets by looking at all S&P 500 index funds, including exchange traded funds. Third, we focus on ratios that are more commonly used by practitioners to gauge valuation. Fourth, we use more recent data. This paper examines the extent to which price multiple measures of valuation are impacted by the trend toward passive investing. To conduct this analysis, we run panel regressions of price-to-earnings ratio (PE) on aggregate money flow into S&P 500 index funds controlling for various accounting variables that impact price

multiple valuation ratios. Additionally, regressions also incorporate price-to-book (PB), an alternative valuation measure. [1]

The results obtained from the full model demonstrate that, when evaluated at mean levels of S&P 500 index fund money flow and PE, the PE ratio of S&P 500 index constituents increased by 0.19 (0.9%) due to index fund money flow and the PE ratio of nonconstituents decreased by 0.21 (0.9%). The results obtained through the use of PB ratio show that the PB ratio of constituents increased by 0.06 (1.5%) due to index fund money flow while the PB ratio of nonconstituents did not change. Index constituent stock price is sensitive to index fund money flow, which may drive the market value of constituent stocks away from their intrinsic value.

II. Data

To maximize coverage of index fund assets, we incorporate both mutual fund and exchange traded fund (ETF) data into our analysis. Mutual fund and ETF data come from Morningstar Direct. Index and individual stock data come from Compustat. Because Morningstar's coverage of fund flows begins in February 1993 and Compustat's

[1] Some advantages of PB ratio are that it provides more meaningful valuation estimates in the event that earnings are negative and book values tend to be less volatile than earnings. However, it is important to bear in mind that one downside of book value is that it does not consider human capital as an operating factor. Additionally, it is difficult to compare companies in different industries based on PB ratios due to differing levels of hard asset intensity across industries.

coverage of individual stock data ends in February 2007, the sample period spans February 1993 to February 2007.

A. Description of data on fund flows.

Monthly net fund flows are gathered from Morningstar Direct's Fund Flows database on all US-domiciled open-end mutual funds and ETFs excluding money market funds and funds of funds[2]. We gather two time series of flows. The first consists of all S&P 500 index funds which, based on conversations with Morningstar, is defined as all funds with an Institutional Category of "S&P 500 Tracking". The second consists of all US Equity funds and is used to control for market-wide fund flows in our regression analysis; it consists of all funds with a US Broad Asset Class of "U.S. Stock".

B. Description of data on S&P 500 index valuation.

For each month in the sample, information on month-end closing prices, earnings per share, book value per share, and a variable indicating historical S&P 500 index constituency status is gathered from Compustat on all publically-traded large-cap companies. Following Fama and French (1996) we define large-cap as greater than median NYSE market capitalization and gather monthly market capitalization breakpoints from Kenneth French's website. We restrict our analysis to only large-cap

[2] Details on the methods employed by Morningstar to estimate net cash flows can be found at http://corporate.morningstar.com/us/documents/Direct/INS_MDT_EstimatedNetFlowsMethodology.pdf

companies in order to prevent the "size premia" from biasing our results. We exclude non-operating establishments, financial services companies (due to non-reporting of working capital data), and companies headquartered outside of the United States (ADRs, ADSs, AMs, and GDRs)[3] from our analysis. We define earnings per share as 12-month moving average quarterly as reported basic earnings per share. We define book value per share as the total value of common equity excluding intangible assets based on fiscal year end data divided by common shares outstanding.

Additionally, for each month in the sample, data on various accounting line items are gathered from Compustat to control for Return on Invested Capital (ROIC), Free Cash Flow Growth, and the internal growth rate of dividends, which are commonly regarded to impact price multiple ratios[4]. To control for seasonality, all income statement and statement of cash flow items are defined as the cumulative value of the associated variables over the prior four quarters. Balance sheet items are defined as the associated value as of the most recent quarter. Companies lacking four quarters of continuous source data in a given month are excluded from analysis for that period. Line item values that are coded by Compustat as "not meaningful" or "insignificant" are imputed as zero.

Following Damodaran (2007), ROIC is calculated as After-Tax Operating Income divided by the book value of lagged four-quarter invested capital, where after-tax

[3] Non-operating establishments are detected through industry name. Following the method of Petersen and Rajan (1997), financial services companies are considered to be those with a Standard Industrial Classification code ranging from 6,000 to 7,000. ADRs, ADSs, AMs, and GDRs are detected through the company name (i.e. –ADR in a company name indicates that the security is an ADR).

[4] For a discussion of how these factors impact valuations, see Koller, et al. (2005) and Damodaran (2007).

Operating Income is calculated as Net Income plus After-Tax Interest Expense minus After-Tax Non-Operating Income. The applicable tax rate is assumed to be the maximum marginal tax rate in the associated time period. Based on information provided by the Urban Institute and the Brookings Institution (2008), the effective tax rate was 34% prior to 1993 and 35% from 1993 through 2007.

Following Brealey, Allen, and Myers (2006), Free Cash Flow is calculated as Net Income plus Depreciation and Amortization expense minus the change in Working Capital minus Capital Expenditures. In the interest of preserving degrees of freedom, Free Cash Flow Growth is defined as its percentage change between the current and lagged fourth quarter.

Following Brealey, et al. (2006), the internal growth rate of dividends is calculated as the product of the plowback ratio and return on equity. The plowback ratio is equal to one minus the indicated annual dollar value of dividends paid to common shareholders divided by income before extraordinary items (adjusted for common stock equivalents). The return on equity is calculated as income before extraordinary items divided by lagged four-quarter book value of equity.

To control for the effect of outliers and data entry errors from the data feeds, all accounting variables are Winsorized (i.e. truncated) at the 1% tails.

III. Methods

A series of least-squares regressions are used to analyze the impact of money flow into S&P 500 index funds on the valuation of individual companies. Our choice of a panel study involving individual companies in contrast to time-series analysis involving portfolios of stocks was driven by two rationales. First, the panel study approach allows us to better control for effects across the cross-section and time domains. Second, more information is utilized through the panel approach as our results are not limited to a single portfolio or a moment in time. We employ a fixed-effects model with a one-way error term in our regression analysis to account for company-specific individual effects. The use of this model is supported by the results from the Hausman's Specification Test for Fixed versus Random Effects.

Tables 2 and 3 summarize the results from our regressions. In table 2 the dependent variable is Price-to-Earnings ratio and in table 3 the dependent variable is Price-to-Book ratio. The odd columns present results from regressions involving the sample of S&P 500 index constituents. The even columns present results from regressions involving the sample of large-cap stocks that are not constituents of the S&P 500 index. Columns 1 and 2 involve only the accounting ratio control variables, which are Return on Invested Capital, Free Cash Flow Growth, and the internal growth rate of dividends. The third and fourth columns add US equity fund net cash flow, measured in billions of dollars. The fifth and sixth involve the accounting ratio control variables and also the regressor of interest, S&P 500 index fund net cash flow (measured in billions of dollars). The seventh and eight are the unrestricted models which add structure to the other models through

incorporating the valuation control variables and also both US equity fund and S&P 500 index fund net cash flow into the models.

IV. Results

Table 1 presents summary statistics on the main variables of interest. Table 2 presents the results from equations that relate PE ratio to the explanatory variables.

A. Description of results from the analysis of price-to-earnings ratio.

The results in table 2 show that the impact of money flow into S&P 500 index funds on corporate valuations is economically significant. The results from regressions that do not control for US equity fund net cash flow imply that, when evaluated at mean levels, the PE ratio of companies that were not constituents of the S&P 500 index decreased by 0.04 (0.2%) due to S&P 500 index fund net cash flow, albeit insignificantly. However, the PE ratio of companies that are constituents of the index increased by a significant (at the one percent level) 0.41 (1.9%) due to S&P 500 index fund net cash flow. The asymmetric magnitudes of the effects may be attributable to S&P 500 index fund net cash flow subsuming the effect of aggregate US equity fund net cash flow. After controlling for aggregate US equity fund net cash flow, when evaluated at mean levels the S&P 500 index fund net cash flow is associated with a 0.21 (0.9%) decrease in the PE ratio of nonconstituents and a 0.19 (0.9%) increase in the PE ratio of constituents. When comparing these results between the two groups with those obtained from the regressions that do not control for aggregate US equity fund net cash flow, there is greater symmetry

in the absolute value of the slope coefficient values on S&P 500 index fund net cash flow yet the differences in values are quantitatively unchanged. Furthermore, the effects are highly significant, with S&P 500 index fund net cash flow being associated with *p*-values of .02 or lower.

Because money flow into S&P 500 index funds is quite volatile over our sample period, with a standard deviation of $2.2 billion, we also interpret our results when evaluated at levels of S&P 500 index fund net cash flow that are one-standard deviation greater than the average. When evaluated at these levels through the use of models that don't control for aggregate US equity fund net cash flow, the PE ratio of nonconstituents decreased by 0.11 (0.5%) due to S&P 500 index fund net cash flow, while the PE ratio of constituents rose by 1.31 (6.2%). After controlling for aggregate US equity fund net cash flow, the PE ratio of nonconstituents fell by 0.67 (3.0%) while the PE ratio of constituents rose by 0.62 (2.9%).

B. Description of results from the analysis of price-to-book ratio.

Table 3 presents the results from equations that relate PB ratio to the explanatory variables. The results pertaining to this alternative valuation metric are similar to those obtained through the use of Price-to-Earnings ratio in terms of the impact of S&P 500 index fund net cash flow on the valuation of constituents relative to nonconstituents. When evaluated at mean levels of S&P 500 index fund net cash flow and PB ratio, the PB ratio of constituents increased by 0.10 (2.4%) due to S&P 500 index fund net cash flow,

while the PB ratio of nonconstituents also increased but only by 0.03 (0.6%). We attribute the slight increase in the value of nonconstituents to aggregate US Equity fund net cash flow, which were omitted from this set of regressions. After controlling for aggregate US Equity fund net cash flow, when evaluated at mean levels the PB ratio of constituents increased by 0.06 (1.5%) while the value of nonconstituents were quantitatively unchanged. When parameters estimated from the full model are evaluated at mean levels of levels of PB ratio but levels of S&P 500 index fund net cash flow that are one-standard deviation greater than the mean, the PB ratio of constituents increased by 0.21 (4.9%) and the PB ratios of nonconstituents decreased by 0.01 (0.3%).

Lastly, we acknowledge the concern that our results may be partially an artifact of the price effects associated with changes to the S&P 500 index. Evidence of asymmetric price responses upon changes to index constituency status, detailed in Chen, Noronha, and Singal (2004), and competing explanations for the price effect validate this concern. To examine how sensitive our results are to the event effects, we run an additional set of regressions in which we exclude companies from our samples if they were either added to or deleted from the S&P 500 index over the prior two months. The results obtained from these regressions were quantitatively unchanged.

V. **Concluding Remarks**

This study is the first to explore the long-run relationship between S&P 500 index fund money flow and corporate valuations. Through a series of panel regressions, we examine

whether money flow into S&P 500 index funds impacts price-to-earnings ratio and price-to-book ratio. The results are consistent with the hypothesis that money flow into S&P 500 index funds positively impacts the price multiples of companies that are in the index relative to those that are not. Additionally, it lends empirical support to the theory of downward sloping (i.e. not horizontal) demand curves for stocks.

Based on the results from our empirical study, it appears that the preference shift towards index fund investing is reducing the informational efficiency of stock prices. Informed investors may recognize the oversupply of capital allocated to stocks in indices and then place arbitrage trades which counteract the effect. However, the speed of adjustment back to equilibrium valuations will be slow in the presence of inattentive investors (Duffie, 2010). By their nature, index fund investors are inattentive to asset valuations and, as described in De Long, et al. (1990) and Shleifer and Vishny (1997), arbitragers (and perhaps most importantly those who provide them with capital) are rather impatient[5]. To elaborate, prior theoretical work implies that, in the specific setting examined in this study, the preference shift towards index fund investing is an endogenous determinant of the speed of adjustment and as a result intertemporal arbitrage opportunities stemming from the shift will be unattractive. Moreover, until the preference shift abates, attempting to arbitrage the mispricing away may drown those informed traders swimming against the tide of passive investment. This is because, as discussed in

[5] De Long, et al. (1990) suggest that this is because investor's evaluations of professional money managers often occur over short time intervals. Gromb and Vayanos (2010) provide a detailed review of the literature on the limits of arbitrage.

De Long, et al. (1990), the impact of noise trader risk on asset prices is increasing in the proportion of noise traders in the market.

Mispricing among equities within the index may have adverse implications, including a reduction of the allocative efficiency of the stock market and investors' performance evaluations of actively managed funds. These and other economic consequences are discussed in Wurgler (2010).

Grossman and Stiglitz (1980) show that profits from valuation motivated trades are increasing in the proportion of uninformed participants in the market. Alexander Cici, and Gibson (2007) find that valuation-motivated trades by mutual fund managers outperform non-valuation motivated trades, and that this outperformance was greater in the more recent period (1992- 2003) than it had been between 1980 – 1991. The increased magnitude of the effect over a period characterized by a preference shift towards passive investing lends credence to Grossman and Stiglitz (1980) theory. This implies that heavy passive investment in a single segment of the market may eventually lead to valuations that reflect a lower cost of equity capital for firms that benefit from passive investment. Conversely, firms outside of popular indexes may have a higher cost of capital and may present increasingly attractive opportunities for investment.

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Table 1: Summary Statistics

This table reports summary statistics of regression variables. Net cash flow variables are reported in billions of dollars.

	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
Panel A: Net cash flow variables					
S&P 500 index fund net cash flow	0.97	2.18	0.14	0.88	2.06
US Equity fund net cash flow	8.22	7.43	4.07	8.44	12.20
Panel B: Financial variables - constituents sample - PE runs					
Price-to-earnings ratio	21.01	39.18	13.95	19.60	28.21
Return on invested capital	0.17	0.42	0.06	0.12	0.19
Free cash flow growth	-1.23	4.94	-2.07	-1.23	-0.41
Expected growth rate of dividend stream	0.17	0.25	0.08	0.16	0.24
Panel C: Financial variables- nonconstituents sample - PE runs					
Price-to-earnings ratio	22.21	47.02	13.48	20.69	32.02
Return on invested capital	0.15	0.41	0.06	0.12	0.19
Free cash flow growth	-1.23	5.78	-2.34	-1.40	-0.38
Expected growth rate of dividend stream	0.15	0.31	0.08	0.16	0.25
Panel D: Financial variables- constituents sample - PB runs					
Price-to-book ratio	4.24	4.29	2.03	3.07	4.90
Return on invested capital	0.17	0.43	0.06	0.12	0.19
Free cash flow growth	-1.24	4.97	-2.08	-1.24	-0.42
Expected growth rate of dividend stream	0.16	0.24	0.07	0.16	0.24
Panel E: Financial variables- nonconstituents sample - PB runs					
Price-to-book ratio	4.72	5.14	2.14	3.30	5.46
Return on invested capital	0.15	0.41	0.06	0.12	0.19
Free cash flow growth	-1.24	5.80	-2.35	-1.41	-0.39
Expected growth rate of dividend stream	0.15	0.29	0.07	0.16	0.24

Table 2: Price-to-Earnings Ratio Regression Results

Odd-numbered columns report results from the sample of stocks in the S&P 500 index. Even-numbered columns report results from the sample of stocks outside of the S&P 500 index with greater than median market capitalizations. Coefficients are estimated using the fixed effects model. *$p < .10$. **$p < .05$. ***$p < .01$.

	Constituents	Nonconstituents	Constituents	Nonconstituents	Constituents	Nonconstituents	Constituents	Nonconstituents
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	48.12***	31.90*	47.49***	31.78*	48.19***	31.90*	47.61***	31.72*
	(11.04)	(16.31)	(11.03)	(16.31)	(11.04)	(16.31)	(11.03)	(16.31)
Return on Invested Capital	2.07***	5.36***	2.20***	5.42***	2.15***	5.35***	2.22***	5.40***
	(0.42)	(0.47)	(0.42)	(0.47)	(0.42)	(0.47)	(0.42)	(0.47)
Free Cash Flow Growth	-0.04	0.01	-0.04	0.01	-0.04	0.01	-0.04	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Expected Growth Rate of Dividend Stream	14.96***	14.93***	14.84***	14.90***	14.95***	14.93***	14.86***	14.91***
	(0.77)	(0.71)	(0.77)	(0.71)	(0.77)	(0.71)	(0.77)	(0.71)
Aggregate Net Cash Flow			0.18***	0.10***			0.15***	0.12***
			(0.02)	(0.02)			(0.02)	(0.02)
S&P 500 Index Fund Net Cash Flow					0.42***	-0.04	0.20**	-0.21***
					(0.07)	(0.07)	(0.08)	(0.08)
Observations	622	1865	622	1865	622	1865	622	1865
R-Squared	0.14	0.30	0.14	0.30	0.14	0.30	0.14	0.30

Table 3: Price-to-Book Ratio Regression Results

Odd-numbered columns report results from the sample of stocks in the S&P 500 index. Even-numbered columns report results from the sample of stocks outside of the S&P 500 index with greater than median market capitalizations. Coefficients are estimated using the fixed effects model. *$p < .10$. **$p < .05$. ***$p < .01$.

	Constituents	Nonconstituents	Constituents	Nonconstituents	Constituents	Nonconstituents	Constituents	Nonconstituents
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	9.83***	6.01***	9.71***	5.83**	9.85***	6.05***	9.75***	5.82**
	(0.86)	(2.28)	(0.85)	(2.27)	(0.86)	(2.28)	(0.85)	(2.27)
Return on Invested Capital	0.05	0.48***	0.07**	0.50***	0.07**	0.49***	0.08**	0.49***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)
Free Cash Flow Growth	-0.00	0.01***	-0.00	0.01***	-0.00	0.01***	-0.00	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Expected Growth Rate of Dividend Stream	5.95***	2.20***	5.92***	2.19***	5.95***	2.19***	5.93***	2.19***
	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)
Aggregate Net Cash Flow			0.04***	0.02***			0.03***	0.02***
			(0.00)	(0.00)			(0.00)	(0.00)
S&P 500 Index Fund Net Cash Flow					0.11***	0.03***	0.07***	-0.00
					(0.01)	(0.01)	(0.01)	(0.01)
Observations	619	1857	619	1857	619	1857	619	1857
R-Squared	0.56	0.62	0.57	0.62	0.57	0.62	0.57	0.62