Conventional Mutual Index Funds versus Exchange Traded Funds[†]

Anna Agapova[*]

Barry Kaye School of Finance, Insurance and Economics, College of Business, Florida Atlantic University,

777 Glades Rd, Boca Raton, FL 33431, USA

[†]I would like to thank Eugene Kandel (the editor), the anonymous referee, Jason Greene, Vikas Agarwal, Conrad Ciccotello, Gerald Gay, and seminar participants at the 2007 annual meetings of the Financial Management Association, the Eastern Finance Association, and the Academy of Financial Services for valuable comments and suggestions. Special thanks to David Roda for his help in editing the paper.

[*]Tel.: +1 561 297 3493; fax: +1 561 297 2956.
E-mail address: aagapova@fau.edu

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Abstract

This paper examines implications of substitutability of two similar investment vehicles: conventional index mutual funds and exchange traded funds (ETFs). It seeks to explain the coexistence of these vehicle types, which offer a claim on the same underlying index return process, but have distinctly different organizational structures. This study compares aggregate flows into conventional open-end index funds to those into ETFs for various underlying indexes. The study shows that conventional funds and ETFs are substitutes, but not perfect substitutes. Evidence suggests that the coexistence of both instruments can be explained by a clientele effect that segregates the two vehicles into different market niches.

JEL Classifications: G11, G23

Keywords: ETF, Index Fund, Substitute, Clientele

1. Introduction

Exchange traded funds (ETFs) are a relatively recent example of financial innovation. ETFs offer a claim on the same underlying assets as conventional open-end mutual index funds do, but are structured differently and, accordingly, may satisfy different needs of investors.[1] This paper examines ETFs as financial innovations that compete with existing open-end index mutual funds based on their alternative organizational form and characteristics.

Mutual funds have existed for almost seven decades, offering a broad array of products and wide ranging benefits to investors. Index funds, first offered in 1972, represented more than $1 trillion in assets as of December 31, 2008. ETFs, which were originally introduced to the marketplace in 1993, have become increasingly popular alternatives to conventional index mutual funds in recent years. Some argue that ETFs are more efficient and will gradually replace conventional index mutual funds. However, even though these financial products seem very similar, the choice of investing through a conventional index fund or an ETF may largely depend on investor-specific circumstances. This paper studies the substitutability of conventional mutual funds and ETFs and examines potential explanations of their coexistence in the market.

Despite the differences between conventional index funds and ETFs, which include varying trading features, fees, and trade-related tax implications, results of this study show that the two investment vehicles are substitutes. Aggregated by index, one dollar of ETF flows should be expected to reduce conventional open-end index fund flows by 22 cents. Tests of the conventional fund flows separated into purchases and

[1] Some other examples of competing innovations are money market accounts offered by both mutual funds and banks, and futures contracts with the same underlying assets and/or trading on different exchanges.

redemptions show that an increase in ETF flows is associated with an increase in conventional fund purchases. However, redemptions of conventional funds over the same time period exceed their inflow, which supports the findings of substitution effect.

While investor accessibility to ETFs is not universal, this does not appear to be the primary driver of the study's results. A test of the clientele effect reveals that ETFs and conventional funds are not perfect substitutes. Specifically, there is evidence of a tax clientele, suggesting that ETFs may be preferred by tax-sensitive investors while conventional funds may be preferred by tax-exempt investors or those insensitive to taxes who value the services of conventional mutual funds. A test for institutional clientele does not reveal a significant difference between the reactions of institutional and retail investors to the availability of ETFs.

The remainder of the paper includes a literature review in Section 2 and a comparison of index mutual fund investments and exchange traded fund investments in Section 3. Data and empirical analysis are presented in Sections 4 and 5, respectively, and Section 6 concludes the paper.

2. Literature review

An extensive pool of literature exists on conventional mutual funds, covering performance, management, and fund structure, among other factors (e.g., Sirri and Tufano, 1998; Edelen, 1999; and Carhart, 1997 among others.). However, few studies are available on ETFs due to limited data given their short period of existence.

Gastineau (2004) examines the performance of index ETFs relative to their respective benchmarks and conventional index funds by analyzing the operating

efficiency of the funds. Employing the strategy discussed in Blume and Edelen (2003, 2004), Gastineau shows that conventional index funds outperform their benchmarks and similar index ETFs by eschewing the exact replication strategy.[2] Gastineau argues that a structural weakness in ETFs, which is non-reinvestment of dividends, partially explains their underperformance. Elton, Gruber, Comer, and Li (2002) also investigate the performance of an ETF relative to the underlying index. They examine the characteristics and performance of the Standard & Poor's Depository Receipts (SPDR) and find that its market price is kept close to its net asset value (NAV) by its ability to create and delete shares via in-kind transactions. The authors find that the SPDR underperforms the S&P 500 Index and low-cost index funds primarily due to the lost income caused by holding dividends received on the underlying shares in cash.

Another related topic is the impact of capital gains taxes on after-tax returns for shareholders of conventional index mutual funds. Dickson and Shoven (1994) show that it is possible to utilize tax minimization strategies to improve the post-tax returns of open-end and closed-end S&P 500 Index funds. Plancich (2003) examines mutual fund capital gains distributions and the Tax Reform Act of 1997, which lowered the maximum made long-term capital gains less taxable. She finds that managers appear to tilt their distributions towards the long-term after 1997 to make their returns more attractive after-tax and attract more cash inflows.

Poterba and Shoven (2002) examine the perception of ETFs as tax-efficient alternatives by comparing the pre- and post-tax returns of the largest ETF, the SPDR, with the returns of the largest equity index fund, the Vanguard Index 500 Fund. The

[2] Blume and Edelen (2003, 2004) show that S&P 500 indexers' strategy of trading at the announcement rather than at the change itself is profitable but substantially increases the tracking error. The authors find that less than half of the studied indexers always follow the exact replication strategy.

results suggest that between 1994 and 2000, the pre- and post-tax returns of the two funds were very similar.

Kostovetsky (2003) compares two methods of passive investment using a theoretical model based on investor trading preferences, tax implications, and other variables that weigh the advantages and disadvantages of ETFs relative to index funds. Kostovetsky shows that the key areas of difference are management fees, taxation efficiency, and qualitative differences.

Guedj and Huang (2008) investigate whether ETFs have a superior organizational structure by examining liquidity differences between ETFs and conventional index funds. In their equilibrium model, they show that conventional funds are beneficial to risk-averse investors due to the partial insurance against future liquidity shocks embedded in the conventional index fund structure. However, the fund structure creates moral hazard problems, which induce excessive trading. The authors find that the overall transaction costs to all investors are the same in conventional funds and ETFs, but allocation of the costs is different. The authors conclude that investors with similar liquidity needs should be indifferent between the two fund types.

This paper contributes to the literature by empirically investigating the substitutability of conventional index funds and ETFs. Furthermore, this paper examines the structural differences between the two investment vehicles and how those differences may impact their long-term coexistence. The intended contribution of this study is a thorough comparison and analysis of the substitution and clientele effects of ETFs and conventional index funds using a comprehensive data set of both conventional index funds and index ETFs.

3. Comparison of conventional open-end and exchange traded index funds

The similarities of conventional index mutual funds and ETFs that track market indexes are numerous. In terms of explicit and implicit costs, both have operating expenses and experience tracking error in matching pre-tax returns of their targeted indexes (Blume and Edelen, 2003, 2004; Gastineau, 2002, 2004; Elton, Gruber, Comer, and Li, 2002).Based on economic theory, substitutes, complements, and independent products have different reactions to price changes, or costs, of other products. As such, depending on the cross-product relationship between conventional index funds and ETFs, investors would react differently to variances in returns and fees in conventional index funds and ETFs.

3.1 Substitution effect

If conventional open-end mutual index funds and ETFs are substitutes, they will negatively affect each other's fund flows. Furthermore, the demand for these products and the level of the substitution relation will be determined by their "prices".

In the fund industry, demand can be measured by fund flows and "price" can be measured by fees or fee-adjusted returns. Thus, to gain a price advantage, funds must either reduce fees or enhance their performance through returns. However, for index funds, tracking error and total fees are the primary factors for consideration; the funds with the smaller value of both are generally able to attract more investor money. The organizational structure suggests, and data indicate, that ETFs have lower fund level fees.

A detailed analysis of the tracking error and fees is available in a later section of this paper.

If these two fund types are good substitutes, the fee and trading advantages of ETFs would suggest that conventional index funds would gradually disappear or lose significant market share to ETFs. ETFs have gained market share, but the market share loss of conventional index funds appears to be primarily due to fund industry growth, including growth in ETFs (Fig. 1).

Regardless of their level of substitutability, competitive actions the funds may enact can impact the negative flow relation between the two vehicles. For example, conventional index funds can modify their operations to match the fee levels of ETFs, emphasizing the substitution effect. However, non-price competition, as reflected in different organizational structures and services provided, may diminish the substitution effect by segregating investors into different niches.

3.2 Clientele effect

Coexistence of conventional and exchange traded index funds may be explained by clientele effects: ETFs might be preferred by investors with higher liquidity and trading needs and/or higher marginal taxes and conventional index funds might be preferred by investors with lower liquidity and trading needs and/or tax- insensitive investors due to brokerage fees associated with ETF trading.

The elimination of individual shareholder book-keeping reduces operating costs for ETFs, with the cost savings potentially reflected in their overall expenses (See Table 1). However, individual investors might face different marginal costs when investing

through ETFs due to brokerage commissions. This could lead to investor segregation from a clientele effect based on investors' time horizon: long-term investors might prefer ETFs' lower management fees and short-term active investors might prefer mutual funds' absence of commission costs.

While ETFs are generally expected to be more tax-efficient, investors with tax-exempt or tax-deferred retirement accounts may not gain additional value from ETFs' tax efficiency. As such, there may be a tax clientele effect, with tax-sensitive investors generally preferring ETFs and investors insensitive to tax issues preferring conventional index funds for the additional services provided.

The increased trading flexibility of ETFs might be valuable to institutional or professional investors who are sensitive to volatility, such as hedgers, speculators, and intraday traders. This creates a potential basis for an institutional clientele effect. Additionally, marginal costs of ETFs to institutional investors are generally lower than those to retail investors. If ETFs and conventional funds are substitutes and ETFs are expected to be more suitable for institutional investors, the substitution effect between institutional index funds and ETFs should be larger than the substitution effect between retail index funds and ETFs.

4. Data sources and descriptive statistics

Industry trend analysis, illustrated by Fig. 1, is based on aggregate data from the Investment Company Institute (ICI). Equity mutual fund assets increased almost six times from 1993 to 2004, indicating an increase in investors' interest in this type of investment.

Over the same period, the ETFs grew from almost no assets to 5% of the amount invested in equity mutual funds.

The study's primary source of fund-level data for both fund types is the Center for Research in Security Prices (CRSP) survivor-bias-free U.S. mutual fund database. The data on purchases and redemptions of conventional index funds were manually collected from NSAR SEC (EDGAR) filings for each fund in the sample. The resulting complete data set on ETFs is available only for the years after 1999. Thus, the study period range is restricted to 2000-2004.

The study matches ETFs with conventional index funds tracking the same indexes. The conventional index fund list is obtained from www.indexfunds.com, and the ETF list is collected from www.etfconnect.com.[3] From a universe of 180 ETFs and 369 conventional index funds, nine indexes tracked by both types of funds are identified, giving a sample of 171 conventional index funds (excluding enhanced index funds) and 11 ETFs (See Appendix Table A). The sample is an uneven panel of monthly fund data aggregated by tracked indexes between 2000 and 2004. Differences in the number of funds per time period result from the introduction of new funds. Index return data are collected from index providers.

Table 1 presents the descriptive statistics of ETFs and conventional index funds during the 2000-2004 time period, separated into institutional and retail funds and grouped by index. The statistics indicate that more retail than institutional funds existed within each index group, and each group had more conventional funds than ETFs. The sample retail funds are, on average, larger than institutional funds within an index group, and ETFs are, on average, larger than conventional funds for six out of nine indexes.

[3] Wharton Research Data Services refers to the same source used by researchers to identify index funds.

Expense ratios are the lowest for ETFs, but institutional conventional funds are substantially cheaper than retail funds. For most of the indexes, ETFs do not have capital gains distributions, while conventional index funds have capital gains distributions averaging around $0.2 million per year. On average, flows to ETFs are positive and substantially higher than those to conventional index funds and retail funds experience negative average flows for several indexes during the study period.

5. Empirical analysis

5.1 Performance

Performance dispersion between the fund types is caused by differences in the ability to react to index change announcements (Blume and Edelen, 2004; and Gastineau 2004 among others) and differences in fund expenses as measured by expense ratios. Univariate analyses of effectiveness and tracking errors of conventional index funds and ETFs are conducted to test the performance. The effectiveness is measured as the difference between fund return and tracked index return, while tracking error is an absolute value of the effectiveness variable. Equal-weighted and value-weighted means are calculated in each index group of funds and the means of the two groups are compared.

Panel A of Table 2 shows statistics for the differences between fund and index returns and tracking errors, gross of fees, while Panel B presents similar statistics on a net basis. The means of these variables are calculated across the funds that track one of the nine studied indexes. The difference in means between conventional index funds and ETFs is also calculated for each index and tested for statistical significance.

Gross of fees, the difference in the means of tracking errors between conventional funds and ETFs is positive and statistically significant at the 1% level or better for all but the Dow Jones Industrial Average (DJIA) (equal- and value-weighted) and S&P 500 Index (value-weighted). This indicates that ETFs generally track their underlying indexes more closely than their conventional fund counterparts on a gross of fees basis.

Net of fees, the mean tracking error is statistically different from zero for both fund types and for all nine indexes, at the 1% level or better. Univariate analysis shows that, on average, ETFs and conventional index funds that track the DJIA do not statistically outperform or underperform the index. However, both have substantial tracking errors (before and after fees) on average, and the means of tracking errors are not statistically different between fund types. This indicates that DJIA ETFs and conventional funds are not statistically distinguishable in their ability to track the index.

While a tradeoff between effectiveness and tracking error exists, tracking error is a more important factor for index investors expecting the return of the underlying index. Based on the analysis, ETFs have smaller tracking errors and are more effective in returns after fees, on average.

5.2 Substitution effect

The most effective way to test for the substitution effect between index funds and ETFs is to analyze trades in personal investment accounts, as we can expect that both enter an investor's utility function since they offer similar underlying products. However, as data at the individual investor level are not available, all investors in the economy are examined in aggregate and considered as a single representative investor. Therefore,

aggregate flows to conventional index funds and ETFs are used as the indicator of the representative investor choice, and the substitution effect between funds is tested with the following system of equations.

$$FlowCF_{i,t} = \alpha_{i,t} + \beta_1 FlowETF_{i,t} + \beta_2 FlowCF_{i,t-1} + \beta_3 FlowETF_{i,t-1} + \beta_4 FlowIndustry_{i,t} + \beta_5 IndexRet_{i,t-1} + \beta_6 Ret_{i,t} + \beta_7 Ret_{i,t-1} + \beta_8 Expenses_{i,t} + \beta_9 LogTNA_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowCF_{i,t} + \beta_2 FlowCF_{i,t-1} + \beta_3 FlowETF_{i,t-1} + \beta_4 FlowIndustry_{i,t} + \beta_5 IndexRet_{i,t-1} + \beta_6 Ret_{i,t} + \beta_7 Ret_{i,t-1} + \beta_8 Expenses_{i,t} + \beta_9 LogTNA_{i,t} + \varepsilon_{i,t}$$

where dependent variables are flows to conventional funds (*FlowCF*) and to ETFs (*FlowETF*). Flows are measured using the methodology of Sirri and Tufano (1998) and calculated as: $Flow_{i,t} = TNA_{i,t} - TNA_{i,t-1} * (1 + R_{i,t})$, where $TNA_{i,t}$ is fund *i*'s total net assets at time *t*, and $R_{i,t}$ is the fund's return over the prior month. $Flow_{i,t}$ reflects the dollar growth of a fund in excess of the growth that would have occurred with no fund flows and all dividends reinvested.

Explanatory and control variables include lagged flows to ETFs and conventional funds; lagged index return; current and lagged return in conventional funds and ETFs, calculated as the value-weighted average across funds tracking the same index; expense ratio; and the log of TNA, also calculated as the value-weighted average across funds tracking the same index. Flow to industry is measured as the sum of flows to equity, bond, and hybrid mutual funds, net of flows to index funds.

If both β_1 coefficients are positive, the hypothesis that conventional index funds and ETFs are complements cannot be rejected. However, if either of the β_1 coefficients is negative, the hypothesis can be rejected and we can conclude that conventional index funds and ETFs are substitutes (Yan, 2006).

The rest of the variables are for control purposes. Flows to the mutual fund industry indicate investor sentiment and level of industry investment, and β_4 is expected to be positive. Expenses measure investors' costs and are expected to have a negative relation to the flows. Lagged index return measures the attractiveness of index products and current and lagged returns of a fund are performance measures used in equity funds flow studies (Sirri and Tufano (1998)). TNAs are used to control for a size effect.

To control for the endogeneity problem, where flows to conventional funds and ETFs enter both equations as dependent and explanatory variables, the seemingly unrelated regressions (SUR) approach is used to test the substitution effect hypothesis. For ordinary least squares (OLS) and SUR, fixed effects are controlled by including year and index dummy variables.

To test if substitution is a result of outflows from conventional index funds or from new sales of conventional index funds, the above model is tested with *FlowCF* separated into *PurchaseCF* and *RedemptionCF*. The SUR approach, with control for year and index fixed effects, is used on three equations with dependent variables *PurchaseCF*, *RedemptionCF* and *FlowETF*. In the presence of substitution effect, ETF flows are expected to be negatively related to purchases and positively related to redemptions of conventional funds. The difference in the extent of the substitution effect might explain coexistence of the fund types by indicating that the two are not perfect substitutes.

Panel A of Table 3 reports results for the substitution effect on net flows to funds. Coefficients β_1 on flows to conventional funds and ETFs are negative in both equations and statistically significant at the 1% level or better with all test specifications. Therefore, we can reject the null hypothesis, that conventional funds and ETFs are complements and

conclude they are substitutes in attracting investors' flows. The results also show that fund flows are positively related to lagged flows for conventional index funds and ETFs under the SUR fixed year effects specification and for conventional index funds with the other model specifications. Flows to conventional index funds are also positively related to the industry flows, while flows to ETFs are positively related to fund returns at the 5% level or better. SUR with fixed year effects indicates that flows to ETFs are negatively related to fund expenses, flows to conventional index funds are positively related to fund expenses, and flows to both fund types are positively related to fund size.

Panel B of Table 3 reports results on purchases and redemptions of conventional index funds and net flows of ETFs. ETF flows positively affect both purchases and redemptions of conventional funds at the 1% level or better, which is consistent with the predictions for redemptions and opposite the predictions for purchases. However, only conventional fund redemptions negatively affect ETF flows at the 1% level or better and conventional fund purchases do not affect ETF flows. The results are consistent with the expectation that ETFs and conventional funds are not perfect substitutes, supporting their coexistence in the market.

5.3 Clientele effect

5.3.1 Tax clientele

Changes in tax law and capital gains tax rates are used to test the tax clientele hypothesis. Managers of mutual funds can adjust trades to realize long-term gains instead of short-term capital gains. Plancich (2003) shows that after 1997, managers appear to tilt

their distributions toward the long term when the tax rate on long-term capital gains become more favorable relative to the short-term capital gains rate.

An additional change to the tax code in May 2003 lowered the maximum tax rate on long-term capital gains from 20% to 15%, while keeping the tax rate on short-term capital gains unchanged. The expectation is that, as a result of these tax changes, the substitution effect between conventional index funds and ETFs increased, due to the potential increased tax efficiency of conventional index funds. The following model tests for the tax clientele effect around this specific event with a system of equations:

$$\begin{aligned} FlowCF_{i,t} = {} & \alpha_{i,t} + \beta_1 FlowETF_{i,t} + \beta_2 After*FlowETF_{i,t} + \beta_3 FlowCF_{i,t-1} + \beta_4 FlowETF_{i,t-1} + \\ & \beta_5 FlowIndustry_{i,t} + \beta_6 IndexRet_{i,t-1} + \beta_7 Ret_{i,t} + \beta_8 Ret_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogTNA_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

$$\begin{aligned} FlowETF_{i,t} = {} & \alpha_{i,t} + \beta_1 FlowCF_{i,t} + \beta_2 After*FlowCF_{i,t} + \beta_3 FlowCF_{i,t-1} + \beta_4 FlowETF_{i,t-1} + \\ & \beta_5 FlowIndustry_{i,t} + \beta_6 IndexRet_{i,t-1} + \beta_7 Ret_{i,t} + \beta_8 Ret_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogTNA_{i,t} + \varepsilon_{i,t} \end{aligned}$$

where *After* = 1 for the period after May 2003 and is equal to zero otherwise, and *After*Flow* is an interaction term that captures the marginal effect of tax changes on flows to the funds. The expectation is that β_2 will be negative in both equations, indicating that the tax change and the resulting decreasing tax advantage of ETFs increased the substitution effect between conventional index funds and ETFs. The β_1 coefficient is still expected to be negative, showing a substitution effect between the fund types. The rest of the variables are defined as in earlier tests.

Including continuous variables for tax rates or capital gains distributions in the model is another way to test for differences in the tax clientele between conventional index funds and ETFs. The coefficients on these variables are expected to be negative. The following system of equations is used to test this hypothesis.

$$\begin{aligned} FlowCF_{i,t} = {} & \alpha_{i,t} + \beta_1 FlowETF_{i,t} + \beta_2 CapGainsCF_{i,t} + \beta_3 CapGainsETF_{i,t} + \beta_4 FlowCF_{i,t-1} + \beta_5 FlowETF_{i,t-1} + \\ & \beta_6 FlowIndustry_{i,t} + \beta_7 IndexRet_{i,t-1} + \beta_8 Ret_{i,t} + \beta_9 Ret_{i,t-1} + \beta_{10} LogTNA_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowCF_{i,t} + \beta_2 CapGainCF_{i,t} + \beta_3 CapGainsETF_{i,t} + \beta_4 FlowETF_{i,t-1} + \beta_5 FlowETF_{i,t-1} + \beta_6 FlowIndustry_{i,t} + \beta_7 IndexRet_{i,t-1} + \beta_8 Ret_{i,t} + \beta_9 Ret_{i,t-1} + \beta_{10} LogTNA_{i,t} + \varepsilon_{i,t}$$

where $CapGainsCF_{i,t}$ and $CapGainsETF_{i,t}$ are value-weighted capital gains distributions to conventional funds and ETFs by index, respectively. The rest of the variables are as defined in earlier tests.

Panel A of Table 4 reports the event study results related to the change in capital gains tax. As predicted, coefficient β_2 is negative and statistically significant at the 1% level or better in both equations. This indicates that as the tax advantages of ETFs diminish, the conventional index funds and ETFs become better substitutes. The rest of the variables show similar results, as in the previous model of the substitution effect.

Panel B of Table 4 shows that, as predicted, the capital gains distributions of conventional funds have a negative effect on their flows. This indicates that tax-sensitive investors in conventional funds are redeeming and investing in other products as capital gains increase. The absolute value of coefficient on *FlowETF*, which measures substitution between conventional funds and ETFs, increased with inclusion of capital gains variables in the model (compared to the result in Table 3).

5.3.2 Retirement accounts and ETFs

Defined contribution plans and individual retirement accounts represent the two types of retirement accounts in which investors have decision-making power. Defined contribution plans usually have restrictions on investment choices and typically do not offer ETFs, while individual retirement accounts have no restrictions on investment choices, which allows for investments in ETFs. Many investors can have both types of

accounts, allowing for access to ETFs. According to the ICI, defined contribution plans accounted for 30% of all index fund assets from 1999-2002 (see Appendix Table B).

The ETF restriction in the investment opportunity set for defined contribution plans may contribute to the coexistence of conventional index funds and ETFs. However, since the majority (about 70%) of conventional index funds are outside of defined contribution plans, this is most likely not the only reason for the coexistence. As section 5.3.1 results show, a tax clientele effect may increase coexistence.

5.3.3 Institutional clientele

The hypothesis regarding the institutional clientele effect between retail and institutional investors and the intensified substitution effect between institutional index funds and ETFs is tested using the same initial model for the substitution effect, but with separate subsamples of institutional and retail fund data. If ETFs are more suitable for institutional investors, the β_1 coefficients are expected to be larger for the institutional subsample. An F-test determines if the coefficients in the two subsample regressions are statistically different from each other.

To make a meaningful comparison of coefficients across regressions, fixed effects OLS are run on a model that includes flows to ETFs as a dependent variable and flows to institutional and retail conventional funds as explanatory variables. The model is as follows:

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowInst_{i,t} + \beta_2 FlowRetail_{i,t} + \beta_3 FlowInst_{i,t-1} + \beta_4 FlowRetail_{i,t-1} + \beta_5 FlowETF_{i,t-1} + \beta_6 FlowIndustry_{i,t} + \beta_7 IndexRet_{i,t-1} + \beta_8 Ret_{i,t} + \beta_9 Ret_{i,t-1} + \beta_{10} Expenses_{i,t} + \beta_{11} LogTNA_{i,t} + \varepsilon_{i,t} \quad (4)$$

If there is a clientele effect and institutional funds are better substitutes for ETFs, then coefficients β_1 and β_2 would be negative, with β_1 being larger in absolute value.

Panel A of Table 5 reports the findings of the initial model (1) for the substitution effect on two separate subsamples. The coefficient of flows to ETFs with the dependent variable of flows to institutional funds is -0.108 and the coefficient of flows to ETFs with the dependent variable of flows to retail funds is -0.090. These are statistically significant at the 1% level or better, suggesting that institutional funds may be better substitutes for ETFs. However, the result of the F-test shows that only the coefficients of lagged flows to conventional funds are statistically different from each other across subsample regressions.

Panel B of Table 5 presents the fixed effects OLS results, with flows to institutional and retail funds included in one regression as explanatory variables. It shows that flows to both types of conventional funds are negatively related to ETFs' flows. However, the magnitude of this relationship is larger for retail funds, though the economic difference is not large.

6. Conclusion

This study analyzes the substitutability of conventional index funds and ETFs and evaluates the clientele effects created from their differing features, which extend competition beyond price or cost. The study finds that conventional index funds and ETFs are substitutes, but not perfect substitutes. ETFs have not replaced the conventional index funds, but have introduced a new investment vehicle that has added to the completeness of the market by offering new features previously unavailable in the conventional funds. Their introduction has been useful to investors and the market, increasing competition in prices and adding new service and product features.

Appendix

Table A

Index	Conventional Funds		ETFs
	Retail	Institute	
Barra Large Cap Growth	3	2	1
Barra Large Cap Value	1	3	1
Barra Small Cap Growth	1	1	1
Dow Jones Industrial	4	0	1
Russell 2000	8	4	1
Standard & Poors Midcap 400	6	4	2
Standard & Poors Smallcap 600	5	2	1
Wilshire 5000	10	6	1
Standard & Poors 500	75	36	2
All indexes	113	58	11

Table B: Index mutual fund assets and retirement accounts (billions of dollars)

Source: Investment Company Institute

	Defined Contribution Plans				Individual Retirement Accounts				Index Funds (IF)	
year	Assets in IF	% of all IF assets	Flow	% of all IF flow	Assets in IF	% of all IF assets	Flow	% of all IF flow	Assets	Flow
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1999	115	30			63	16			384	
2000	113	30	-2	67	62	16	-1	33	381	-3
2001	109	30	-4	33	60	16	-2	17	369	-12
2002	97	30	-12	29	53	16	-7	17	327	-42
2003	130	29	33	26	78	17	25	20	455	128
2004	158	28	28	28	95	17	17	17	555	100
2005	178	29	20	30	104	17	9	14	621	66
2006	211	28	33	25	129	17	25	19	751	130
2007	232	27	21	21	144	17	15	15	850	99

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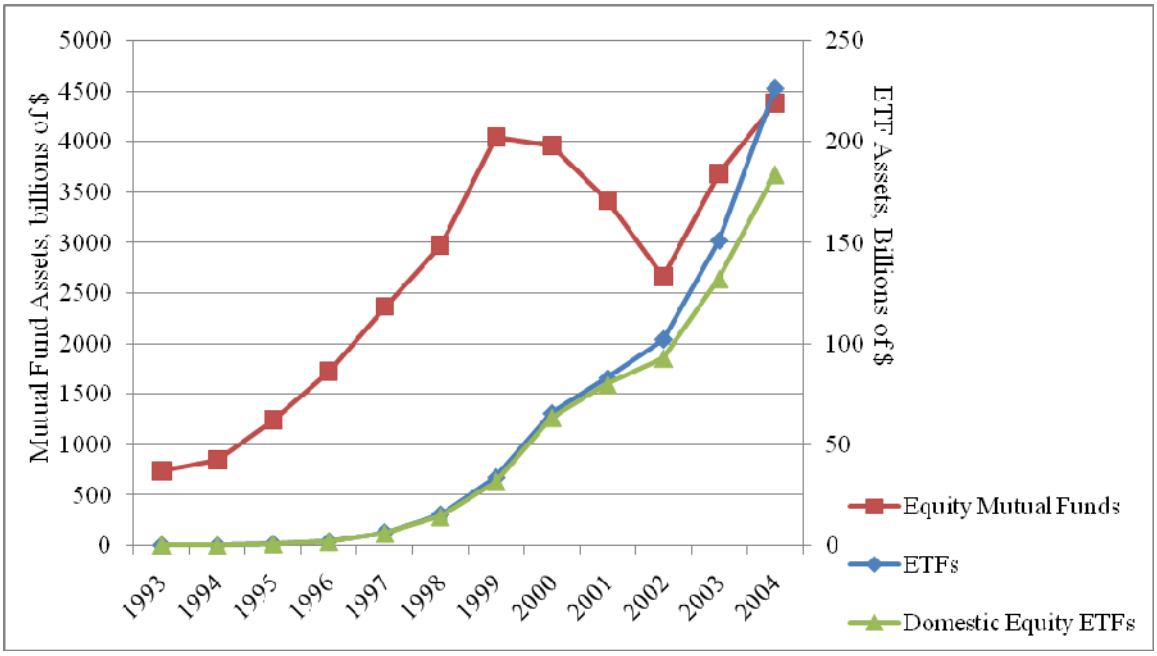
Figure 1
Assets in Equity Mutual Funds and Exchange Traded Funds, 1993-2004



Source of data: Investment Company Institute

Table 1: Descriptive statistics of ETFs and Conventional Index Funds Grouped by Index

This table presents the descriptive statistics of ETFs and institutional and retail conventional open-end index funds grouped by tracked index during the 2000-2004 period. For each variable, the mean is reported, and the standard deviation is given in parentheses. N is the number of fund-month observations, TNA is total net assets in millions of dollars, Exp is expense ratio (%), CapGain is capital gains distributions per share in dollars, and Flow is the net flow to a fund in millions of dollars.

	ETF					Institute					Retail				
Index	N	TNA	Exp	CapGain	Flow	N	TNA	Exp	CapGain	Flow	N	TNA	Exp	CapGain	Flow
Barra Large Cap	56	738.2	0.18	0.016	35.0	108	853.3	0.13	0.000	14.6	156	3471.0	1.34	0.000	-17.87
Growth		(601.8)	(0.00)	(0.040)	(36.5)		(159.8)	(0.03)	(0.000)	(39.0)		(4819.4)	(0.99)	(0.000)	(95.62)
Barra Large Cap	56	932.9	0.18	0.021	44.5	156	489.4	0.17	0.250	6.8	60	2978.4	0.22	0.391	-1.57
Value		(773.1)	(0.00)	(0.052)	(53.1)		(315.6)	(0.06)	(0.409)	(31.5)		(477.1)	(0.00)	(0.483)	(34.55)
Barra SmallCap	48	379.7	0.25	0.000	16.5	56	69.0	0.11	0.204	0.5	60	567.5	0.27	0.114	16.04
Growth		(277.2)	(0.00)	(0.000)	(47.1)		(40.4)	(0.01)	(0.276)	(15.4)		(348.3)	(0.01)	(0.230)	(22.01)
Dow Jones Industrial	48	4,861.6	0.18	0.000	92.4						144	108.3	2.40	0.101	-0.32
		(1,848.0)	(0.01)	(0.000)	(269.2)							(56.1)	(3.69)	(0.333)	(3.67)
Russell 2000	56	2,719.8	0.20	0.024	94.0	228	437.4	0.40	0.339	6.1	422	625.4	0.85	0.309	3.27
		(1,945.0)	(0.00)	(0.058)	(296.7)		(402.0)	(0.34)	(0.825)	(24.8)		(1,419.3)	(0.49)	(0.764)	(23.55)
S&P Midcap 400	104	3,008.5	0.23	0.023	39.7	182	545.4	0.32	0.399	14.5	266	794.5	0.55	0.480	16.38
		(2465.8)	(0.03)	(0.080)	(246.9)		(359.7)	(0.20)	(0.591)	(24.1)		(1,131.4)	(0.33)	(0.881)	(31.65)
S&P Smallcap 600	56	1,209.6	0.20	0.160	61.1	120	22.3	1.43	0.165	-0.04	300	307.1	0.69	0.391	2.68
		(960.6)	(0.00)	(0.397)	(155.1)		(15.8)	(2.89)	(0.286)	(2.9)		(253.6)	(0.53)	(0.566)	(7.22)
Wilshire 5000	44	1,842.4	0.15	0.000	82.2	308	2,358.9	0.15	0.007	47.53	564	2,719.8	0.52	0.047	27.84
		(1,074.4)	(0.00)	(0.000)	(120.3)		(2,705.2)	(0.08)	(0.028)	(111.7)		(6,028.7)	(0.41)	(0.134)	(118.58)
S&P 500	104	19,284.8	0.10	0.005	346.7	2,035	2,609.3	0.31	0.232	15.3	3,955	1,778.1	0.72	0.230	-1.26
		(16,557.0)	(0.01)	(0.019)	(1,577.9)		(5,667.0)	(0.21)	(1.220)	(132.3)		(9,643.0)	(0.49)	(1.102)	(181.64)
All indexes	572	5,183.2	0.18	0.027	108.8	3,193	2,006.3	0.33	0.218	16.4	5,927	1,672.6	0.75	0.229	2.56
		(9,859.4)	(0.05)	(0.138)	(702.1)		(4,698.8)	(0.64)	(1.019)	(112.5)		(8,177.7)	(0.81)	(0.959)	(154.30)

Table 2: Univariate Analysis of Effectiveness and Tracking Error: Conventional versus Exchange Traded Index Funds

This table presents the descriptive statistics of effectiveness and tracking error of monthly gross returns at the index level, measured in percentage. Effectiveness is a difference between fund gross return and return on the tracked index. Tracking error (TE) is the absolute value of the effectiveness measure. Corresponding statistics, along with t-tests for the difference in means, are provided for the sample of 171 conventional and 11 exchange traded index funds tracking nine indexes. The full sample contains 9,692 fund-month observations for the 2000-2004 period. The symbols *, ** and *** indicate statistical significance at less than the 10-percent, 5-percent, and 1-percent levels, respectively.

Panel A	Equally-Weighted						Value-Weighted					
	Conventional		ETF		Mean		Conventional		ETF		Mean	
Index	Mean	$\mu \neq 0$	Mean	$\mu \neq 0$	difference	$\mu_1 \neq \mu_2$	Mean	$\mu \neq 0$	Mean	$\mu \neq 0$	difference	$\mu_1 \neq \mu_2$
Gross Effectiveness: NetRet – indexRet+1/12Exp												
Barra Large Cap Growth	0.012		-0.001		0.013		0.033		-0.001		0.034	
Barra Large Cap Value	0.012		0.000		0.012		0.013		0.000		0.014	
Barra SmallCap Growth	0.027		0.001		0.026		0.034		0.001		0.033	
Dow Jones Industrial	0.219		0.273		-0.054		0.113		0.273		-0.160	
Russell 2000	0.015	*	-0.003		0.019	*	0.041		-0.003		0.045	
Standard & Poors Midcap 400	0.029	**	0.004		0.025		0.050		0.005		0.045	
Standard & Poors Smallcap 600	0.024	*	0.004		0.021		0.010		0.004		0.006	
Wilshire 5000	0.160	***	0.119	***	0.041		0.172	***	0.119	***	0.053	
Standard & Poors 500	0.025	***	0.001		0.024	***	0.007	***	0.002		0.005	
Gross TE: abs(NetRet – indexRet+1/12Exp)												
Barra Large Cap Growth	0.190	***	0.012	***	0.178	***	0.242	***	0.012	***	0.230	***
Barra Large Cap Value	0.186	***	0.009	***	0.176	***	0.207	***	0.009	***	0.198	***
Barra SmallCap Growth	0.376	***	0.020	***	0.356	***	0.356	***	0.020	***	0.336	***
Dow Jones Industrial	5.496	***	4.989	***	0.507		5.266	***	4.989	***	0.277	
Russell 2000	0.121	***	0.017	***	0.104	***	0.202	***	0.017	***	0.185	***
Standard & Poors Midcap 400	0.122	***	0.034	***	0.088	***	0.158	***	0.055	***	0.103	***
Standard & Poors Smallcap 600	0.131	***	0.011	***	0.120	***	0.103	***	0.011	***	0.091	***
Wilshire 5000	0.422	***	0.180	***	0.242	***	0.342	***	0.180	***	0.163	***
Standard & Poors 500	0.134	***	0.015	***	0.119	***	0.019	***	0.016	***	0.003	

Table 2: Continued

This table presents the descriptive statistics of effectiveness and tracking error of monthly net returns at the index level, measured in percentage. Effectiveness is a difference between fund net return and return on the tracked index. Tracking error (TE) is the absolute value of the effectiveness measure. Corresponding statistics, along with t-tests for the difference in means, are provided for the sample of 171 conventional and 11 exchange traded index funds tracking nine indexes. The full sample contains 9,692 fund-month observations for the 2000-2004 period. The symbols *, ** and *** indicate statistical significance at less than the 10-percent, 5-percent, and 1-percent levels, respectively.

Panel B	Equally-Weighted						Value-Weighted					
	Conventional		ETF		Mean		Conventional		ETF		Mean	
Index	Mean	$\mu \neq 0$	Mean	$\mu \neq 0$	difference	$\mu_1 \neq \mu_2$	Mean	$\mu \neq 0$	Mean	$\mu \neq 0$	difference	$\mu_1 \neq \mu_2$
Net Effectiveness: NetRet – IndexRet												
Barra Large Cap Growth	-0.058	**	-0.016	***	-0.043	*	0.016		-0.016	***	0.031	
Barra Large Cap Value	-0.004		-0.015	***	0.011		-0.003		-0.015	***	0.011	
Barra SmallCap Growth	0.016		-0.020	***	0.035		0.015		-0.020	***	0.034	
Dow Jones Industrial	0.019		0.258		-0.239		0.051		0.258		-0.207	
Russell 2000	-0.044	***	-0.024	***	-0.020		0.018		-0.024	***	0.042	
Standard & Poors Midcap 400	-0.011		-0.015		0.004		0.025		-0.016		0.041	
Standard & Poors Smallcap 600	-0.051	***	-0.013	***	-0.038	***	-0.054	***	-0.013	***	-0.042	***
Wilshire 5000	0.128	***	0.106	***	0.022		0.157	***	0.106	***	0.051	
Standard & Poors 500	-0.023	***	-0.008	***	-0.015	*	-0.011	***	-0.007	**	-0.004	
Net TE: abs(NetRet – IndexRet)												
Barra Large Cap Growth	0.235	***	0.018	***	0.217	***	0.242	***	0.018	***	0.224	***
Barra Large Cap Value	0.186	***	0.017	***	0.169	***	0.208	***	0.017	***	0.190	***
Barra SmallCap Growth	0.357	***	0.029	***	0.327	***	0.354	***	0.029	***	0.324	***
Dow Jones Industrial	5.521	***	4.989	***	0.531		5.267	***	4.989	***	0.277	
Russell 2000	0.142	***	0.036	***	0.106	***	0.200	***	0.036	***	0.164	***
Standard & Poors Midcap 400	0.137	***	0.044	***	0.093	***	0.160	***	0.064	***	0.096	***
Standard & Poors Smallcap 600	0.132	***	0.018	***	0.114	***	0.125	***	0.018	***	0.107	***
Wilshire 5000	0.403	***	0.177	***	0.225	***	0.330	***	0.177	***	0.153	***
Standard & Poors 500	0.158	***	0.017	***	0.141	***	0.025	***	0.017	***	0.008	***

Table 3: Substitution Effect: Exchange Traded and Conventional Index Funds – Aggregate Flows

This table presents results from estimating the pooled OLS and SUR regressions of substitution effect between exchange traded and conventional index funds. The sample includes U.S. open-end index mutual funds and ETFs that track the same indexes over the 2000-2004 period. Tests were performed with aggregate figures for the sample of 418 index-months. The estimated coefficients are from the regression specification of the following equations:

$$FlowCF_{i,t} = \alpha_{i,t} + \beta_1 FlowETF_{i,t} + \beta_2 FlowCF_{i,t-1} + \beta_3 FlowETF_{i,t-1} + \beta_4 FlowIndustry_{i,t} + \beta_5 IndexRet_{i,t-1} + \beta_6 Ret_{i,t} + \beta_7 Ret_{i,t-1} + \beta_8 Expenses_{i,t} + \beta_9 LogTNA_{i,t} + \varepsilon_{i,t}$$

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowCF_{i,t} + \beta_2 FlowCF_{i,t-1} + \beta_3 FlowETF_{i,t-1} + \beta_4 FlowIndustry_{i,t} + \beta_5 IndexRet_{i,t-1} + \beta_6 Ret_{i,t} + \beta_7 Ret_{i,t-1} + \beta_8 Expenses_{i,t} + \beta_9 LogTNA_{i,t} + \varepsilon_{i,t}$$

where dependent variables are aggregated monthly flows to conventional index funds and to ETFs grouped by the index that the funds track. The independent variables include: lagged aggregate flows to both types of funds, industry flow, lagged index return, value weighted current and lagged funds returns, expenses, and log of aggregated by index TNA of conventional funds and ETFs. The regressions include index and year dummies. T-statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at less than the 10-percent, 5-percent, and 1-percent levels, respectively. SUR reports system weighted R square.

Panel A	*FlowCF*						*FlowETF*					
	OLS		SUR		SUR		OLS		SUR		SUR	
Intercept	-182.50		-224.04		-804.72	***	700.30		672.15		142.40	
	(-0.37)		(-0.47)		(-6.27)		(0.33)		(0.33)		(0.38)	
FlowETF	-0.117	***	-0.215	***	-0.194	***						
	(-6.03)		(-11.56)		(-9.93)							
FlowCF							-0.712	***	-1.317	***	-1.063	***
							(-5.98)		(-11.51)		(-9.68)	
$FlowCF_{t-1}$	0.202	***	0.185	***	0.316	***	-0.009		0.126		0.293	***
	(4.43)		(4.05)		(7.15)		(-0.07)		(1.09)		(2.67)	
$FlowETF_{t-1}$	0.003		0.014		0.037	*	0.095	*	0.090	*	0.145	***
	(0.16)		(0.67)		(1.78)		(1.89)		(1.79)		(2.91)	
FlowIndustry	0.004	***	0.004	***	0.004	**	-0.002		0.001		-0.001	
	(3.25)		(2.77)		(2.51)		(-0.64)		(0.25)		(-0.32)	
$IndexRet_{t-1}$	-73.784		-167.795		-241.220		-900.967		-893.598		-953.05	
	(-0.10)		(-0.23)		(-0.32)		(-0.49)		(-0.49)		(-0.51)	
Ret	202.028		444.642		342.821		2,223.09	**	2,200.19	**	2,253.37	**
	(0.51)		(1.11)		(0.83)		(2.22)		(2.20)		(2.28)	
Ret_{t-1}	196.021		277.043		174.329		734.353		834.165		696.29	
	(0.27)		(0.38)		(0.23)		(0.40)		(0.45)		(0.38)	
Expenses	19,779.9		16,786.6		27,973.9	***	-981,636		-888,591		-359,689	***
	(0.57)		(0.51)		(2.86)		(-0.86)		(-0.80)		(-3.18)	
logTNA	-1.450		13.478		92.172	***	148.295		126.053		111.563	***
	(-0.02)		(0.17)		(7.55)		(1.23)		(1.09)		(3.57)	
N of obs	418		418		418		418		418		418	
R-2	0.45		0.47		0.39		0.19		0.47		0.39	
Adj R-2	0.42						0.15					
Year Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Index Dummies	Yes		Yes		No		Yes		Yes		No	

Table 3 Cont'd

This table presents results from estimating the SUR regressions of substitution effect between exchange traded and conventional index funds. The estimated coefficients are from the regression specification of the equations presented above, except the *FlowCF* is split into *PurchaseCF* and *RedemptionCF*.

Panel B	*PurchaseCF*			*RedemptionCF*			*FlowETF*		
Intercept	-800.53	***	-788.88	-707.06	***	-665.52	228.43		-161.95	
	(-1.53)		(-4.23)	(-1.47)		(-3.87)	(0.12)		(-0.46)	
FlowETF	0.111	***	0.212	0.268	***	0.349				
	(5.61)		(9.96)	(14.98)		(17.23)				
PurchaseCF							-0.108		0.150	
							(-0.93)		(1.43)	
RedemptionCF							1.623	***	1.430	***
							14.22		13.93	
$PurchaseCF_{t-1}$	0.420	***	0.840	***			-0.386	***	-0.501	***
	(11.20)		(42.63)				(-3.50)		(-4.91)	
$RedemptionCF_{t-1}$				0.336	***	0.810	-0.504	***	-0.809	***
				(8.41)		(37.03)	(-4.12)		(-7.49)	
$FlowETF_{t-1}$	0.005		0.010	-0.018		-0.074	0.094	**	0.129	***
	(0.28)		(0.44)	(-0.90)		(-3.26)	(2.03)		(2.81)	
FlowIndustry	0.004	***	0.002	-0.001		-0.002	0.001		0.001	
	(2.70)		(1.05)	(-0.80)		(-1.56)	(0.41)		(0.29)	
$IndexRet_{t-1}$	247.9		199.9	433.8		570.9	-1095.0		-1199.2	
	(0.34)		(0.24)	(0.61)		(0.69)	(-0.66)		(-0.72)	
Ret	-498.8		-323.2	-682.1	*	-411.8	1807.6	**	1700.4	*
	(-1.23)		(-0.71)	(-1.75)		(-0.91)	(1.97)		(1.89)	
Ret_{t-1}	-88.72		-2.27	-161.70		136.82	287.65		221.96	
	(-0.12)		(0.00)	(-0.23)		(0.16)	(0.17)		(0.13)	
Expenses	17,018		22,909	2,907		21,737	-626,580		36,520	
	(0.49)		(2.00)	(0.09)		(1.99)	(-0.63)		(0.33)	
logTNA	111.17		88.88	119.79		79.37	104.52		16.66	
	(1.36)		(4.71)	(1.59)		(4.68)	(1.02)		(0.53)	
N of Obs	418		418	418		418	418		418	
R-2	0.95		0.94	0.93		0.91	0.23		0.22	
Year Dummies	Yes		Yes	Yes		Yes	Yes		Yes	
Index Dummies	Yes		No	Yes		No	Yes		No	

Table 4: Tax Clientele

This table presents results from estimating pooled OLS and SUR regressions of tax clientele between ETFs and conventional index funds. The sample includes U.S. open-end index mutual funds and ETFs that track the same indexes over the 2000-2004 period. Tests are performed with aggregate figures for the sample of 418 index-months. The estimated coefficients are from regression specification of the following equations:

$$FlowCF_{i,t} = \alpha_{i,t} + \beta_1 FlowETF_{i,t} + \beta_2 After*FlowETF_{i,t} + \beta_3 FlowCF_{i,t-1} + \beta_4 FlowETF_{i,t-1} + \beta_5 FlowIndustry_{i,t} + \beta_6 IndexRet_{i,t-1} + \beta_7 Ret_{i,t} + \beta_8 Ret_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogTNA_{i,t} + \varepsilon_{i,t}$$

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowCF_{i,t} + \beta_2 After*FlowCF_{i,t} + \beta_3 FlowCF_{i,t-1} + \beta_4 FlowETF_{i,t-1} + \beta_5 FlowIndustry_{i,t} + \beta_6 IndexRet_{i,t-1} + \beta_7 Ret_{i,t} + \beta_8 Ret_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogTNA_{i,t} + \varepsilon_{i,t}$$

where dependent variables are aggregated monthly flows to conventional funds and to ETFs, grouped by the index that the funds track. The independent variables include: the interaction term of flows with dummy variable (*After*) indicating the change in capital gains taxes, lagged aggregate flows to both types of funds, flow to industry, lagged index return, value-weighted current and lagged funds returns, expenses, and log of aggregated by index TNA of conventional funds and ETFs. The regressions include index and year dummies. T-statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at less than the 10, 5, and 1-percent levels, respectively. SUR reports system weighted R square.

Panel A	*FlowCF*						*FlowETF*					
	OLS		SUR		SUR		OLS		SUR		SUR	
Intercept	-160.3		-154.9		-745.6	***	765.7		786.9		173.3	
	(-0.33)		(-0.33)		(-5.94)		(0.37)		(0.40)		(0.47)	
FlowETF	-0.026		-0.127	***	-0.096	***						
	(-0.96)		(-4.88)		(-3.57)							
*After*FlowETF*	-0.174	***	-0.146	***	-0.167	***						
	(-4.74)		(-4.11)		(-4.50)							
FlowCF							-0.269	*	-0.874	***	-0.617	***
							(-1.83)		(-6.16)		(-4.36)	
*After*FlowCF*							-0.878	***	-0.731	***	-0.732	***
							(-4.88)		(-4.20)		(-4.15)	
$FlowCF_{t-1}$	0.214	***	0.197	***	0.324	***	-0.030		0.092		0.260	**
	(4.81)		(4.43)		(7.53)		(-0.27)		(0.81)		(2.42)	
$FlowETF_{t-1}$	-0.004		0.007		0.027		0.097	**	0.092	*	0.145	***
	(-0.18)		(0.34)		(1.32)		(1.97)		(1.87)		(2.98)	
FlowIndustry	0.004	***	0.004	***	0.004	***	-0.002		0.0004		-0.001	
	(3.40)		(2.96)		(2.68)		(-0.68)		(0.13)		(-0.39)	
$IndexRet_{t-1}$	-112.1		-189.7		-272.2		-644.5		-681.1		-739.0	
	(-0.16)		(-0.27)		(-0.37)		(-0.36)		(-0.38)		(-0.41)	
Ret	158.9		383.3		287.3		1831.6	*	1862.1	*	1846.2	*
	(0.41)		(0.98)		(0.71)		(1.87)		(1.91)		(1.91)	
Ret_{t-1}	257.7		323.9		242.5		656.0		743.3		548.9	
	(0.36)		(0.45)		(0.33)		(0.36)		(0.41)		(0.30)	
Expenses	18,439.7		15,044.9		24,491.7	***	-736,042		-770,809		-371,454	***
	(0.55)		(0.46)		(2.56)		(-0.66)		(-0.71)		(-3.35)	
logTNA	-6.019		0.767		84.585	***	77.762		79.860		105.916	***
	(-0.08)		(0.01)		(7.05)		(0.66)		(0.70)		(3.46)	
N of obs	418		418		418		418		418		418	
R-2	0.48		0.48		0.40		0.23		0.48		0.40	
Adj R-2	0.45						0.19					
Year Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Index Dummies	Yes		Yes		No		Yes		Yes		No	

Table 4: Tax Clientele, Continued

The estimated coefficients are from regression specification of the following equations:

$$FlowCF_{i,t} = \alpha_{i,t} + \beta_1 FlowETF_{i,t} + \beta_2 CapGainsCF_{i,t} + \beta_3 CapGainsETF_{i,t} + \beta_4 FlowCF_{i,t-1} + \beta_5 FlowETF_{i,t-1} + \beta_6 FlowIndustry_{i,t} + \beta_7 IndexRet_{i,t-1} + \beta_8 Ret_{i,t} + \beta_9 Ret_{i,t-1} + \beta_{10} LogTNA_{i,t} + \varepsilon_{i,t}$$

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowCF_{i,t} + \beta_2 CapGainCF_{i,t} + \beta_3 CapGainsETF_{i,t} + \beta_4 FlowETF_{i,t-1} + \beta_5 FlowETF_{i,t-1} + \beta_6 FlowIndustry_{i,t} + \beta_7 IndexRet_{i,t-1} + \beta_8 Ret_{i,t} + \beta_9 Ret_{i,t-1} + \beta_{10} LogTNA_{i,t} + \varepsilon_{i,t}$$

where dependent variables are aggregated monthly flows to conventional funds and to ETFs, grouped by index that the funds track. The independent variables include: capital gains, lagged aggregate flows to both types of funds, flow to industry, lagged index return, value weighted current and lagged funds returns, expenses, and log of aggregated by index TNA of conventional funds and ETFs. The regressions include index and year dummies. T-statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at less than the 10-percent levels, 5-percent levels, and 1-percent levels, respectively. SUR reports system weighted R square.

Panel B	*FlowCF*						*FlowETF*					
	OLS		SUR		SUR		OLS		SUR		SUR	
Intercept	-124.3		-122.6		-714.8	***	-448.0		-424.5		-571.0	***
	(-0.17)		(-0.17)		(-4.65)		(-0.70)		(-0.67)		(-2.98)	
FlowETF	-0.129	***	-0.250	***	-0.200	***						
	(-3.44)		(-6.78)		(-5.35)							
FlowCF							-0.202	***	-0.396	***	-0.294	***
							(-3.41)		(-6.75)		(-5.17)	
CapGainsCF	-16.32	***	-16.84	***	-11.90	***	-5.18		-8.31		0.39	
	(-4.51)		(-4.66)		(-3.56)		(-1.02)		(-1.63)		(0.10)	
CapGainsETF	93.84		88.93		54.27		142.58		152.75		131.11	
	(0.40)		(0.38)		(0.24)		(0.42)		(0.45)		(0.45)	
$FlowCF_{t-1}$	0.047		0.041		0.102	**	-0.039		-0.029		0.021	
	(1.00)		(0.87)		(2.19)		(-0.67)		(-0.49)		(0.37)	
$FlowETF_{t-1}$	-0.003		0.012		0.034		0.118	***	0.114	**	0.149	***
	(-0.09)		(0.30)		(0.88)		(2.46)		(2.38)		(3.15)	
FlowIndustry	0.002		0.001		0.001		-0.005	*	-0.005		-0.005	
	(0.68)		(0.38)		(0.20)		(-1.63)		(-1.48)		(-1.50)	
$IndexRet_{t-1}$	336.39		238.75		176.52		-743.63		-657.99		-688.32	
	(0.24)		(0.17)		(0.12)		(-0.41)		(-0.37)		(-0.38)	
Ret	540.69		807.91		752.70		2,121.5	**	2,177.8	**	1,919.4	**
	(0.76)		(1.14)		(1.05)		(2.35)		(2.41)		(2.17)	
Ret_{t-1}	926.45		1,006.3		1,015.4		779.67		946.80		623.76	
	(0.66)		(0.71)		(0.71)		(0.43)		(0.52)		(0.34)	
logTNA	23.55		27.03		99.81	***	80.57		76.93	*	114.63	***
	(0.17)		(0.20)		(5.70)		(0.97)		(0.94)		(4.23)	
N of obs	460		460		460		460		460		460	
R-2	0.18		0.21		0.16		0.13		0.21		0.16	
Adj R-2	0.14						0.09					
Year Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Index Dummies	Yes		Yes		No		Yes		Yes		No	

Table 5: Institutional Clientele

This table presents results from estimating seemingly unrelated regressions of the clientele effect between institutional and retail conventional index funds and ETFs. The sample includes U.S. open-end index mutual funds and ETFs that track the same indexes over the 2000-2004 period. Tests were performed with aggregate figures for the sample of 371 institutional index-months and 418 retail index-months. The estimated coefficients are from the regression specification of the following equations:

$$FlowCF_{i,t} = \alpha_{i,t} + \beta_1 FlowETF_{i,t} + \beta_2 FlowCF_{i,t-1} + \beta_3 FlowETF_{i,t-1} + \beta_4 FlowIndustry_{i,t} + \beta_5 IndexRet_{i,t-1} + \beta_6 Ret_{i,t} + \beta_7 Ret_{i,t-1} + \beta_8 Expenses_{i,t} + \beta_9 LogTNA_{i,t} + \varepsilon_{i,t}$$

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowCF_{i,t} + \beta_2 FlowCF_{i,t-1} + \beta_3 FlowETF_{i,t-1} + \beta_4 FlowIndustry_{i,t} + \beta_5 IndexRet_{i,t-1} + \beta_6 Ret_{i,t} + \beta_7 Ret_{i,t-1} + \beta_8 Expenses_{i,t} + \beta_9 LogTNA_{i,t} + \varepsilon_{i,t}$$

where dependent variables are aggregated monthly flows to institutional and retail index mutual funds and to ETFs, grouped by tracked index. The independent variables include: lagged aggregate flows to the types of funds, flow to industry, lagged index return, value-weighted current and lagged funds returns, expenses, and log of aggregated by index TNA of institutional or retail funds and ETFs. The regressions include index and year dummies. T-statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at less than the 10-percent, 5-percent, and 1-percent levels, respectively. SUR reports system weighted R square. The F-test reports significance of difference in coefficients between groups.

Panel A	*FlowInst* SUR (1)		*FlowETF* SUR (2)		*FlowRetail* SUR (3)		*FlowETF* SUR (4)		F test (1-3)	F test (2-4)
Intercept	61.801		2,663.73		122.571		-167.882			
	(0.20)		(1.23)		(0.41)		(-0.08)			
FlowETF	-0.108	***			-0.090	***				
	(-7.37)				(-7.20)					
FlowCF			-1.354	***			-1.354	***		
			(-7.53)				(-7.13)			
$FlowCF_{t-1}$	0.089	*	0.522	***	0.291	***	-0.351	*	***	***
	(1.67)		(2.82)		(6.54)		(-1.92)			
$FlowETF_{t-1}$	-0.003		0.123	**	0.016		0.080			
	(-0.17)		(2.30)		(1.27)		(1.61)			
FlowIndustry	0.002		-0.004		0.003	***	-0.002			
	(1.42)		(-0.97)		(3.05)		(-0.58)			
$IndexRet_{t-1}$	-497.062		4,384.86		-313.712		-1,027.64			
	(-0.16)		(0.07)		(-0.68)		(-0.56)			
Ret	-95.601		1,777.66		511.594	**	2,759.89	***		
	(-0.30)		(1.59)		(2.02)		(2.75)			
Ret_{t-1}	651.201		-4,542.76		202.952		1,228.33			
	(0.21)		(-0.07)		(0.44)		(0.66)			
Expenses	21.043		-2,262,182		3,396.0		-205,261.0			
	(0.00)		(-1.57)		(0.16)		(-0.18)			
logTNA	24.916		179.692		-37.202		71.666			
	(0.81)		(1.36)		(-0.77)		(0.60)			
N of obs	371		371		418		418			
R-2	0.36		0.36		0.38		0.38			
Year Dummies	Yes		Yes		Yes		Yes			
Index Dummies	Yes		Yes		Yes		Yes			

Table 5: Institutional Clientele, Continued

This table presents results from OLS regressions of clientele effect between institutional and retail conventional index funds and ETFs. The sample includes U.S. open-end index mutual funds and ETFs that track the same indexes over the 2000-2004 period. Tests are performed with aggregate figures for the sample of 371 ETF index-months. The estimated coefficients are from regression specification of the following equation:

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowInst_{i,t} + \beta_2 FlowRetail_{i,t} + \beta_3 FlowInst_{i,t-1} + \beta_4 FlowRetail_{i,t-1} + \beta_5 FlowETF_{i,t-1} + \beta_6 FlowIndustry_{i,t} + \beta_7 IndexRet_{i,t-1} + \beta_8 Ret_{i,t} + \beta_9 Ret_{i,t-1} + \beta_{10} Expenses_{i,t} + \beta_{11} LogTNA_{i,t} + \varepsilon_{i,t}$$

where the dependent variable is aggregated monthly to ETFs, grouped by index that the funds track. The independent variables include: aggregate flows to retail and institutional index funds, lagged aggregate flows to funds, flow to industry, lagged index return, value weighted current and lagged ETFs' return, expenses, and the log of aggregated by index TNA of ETFs. The regressions include index and year dummies. T-statistics are reported in parentheses. The symbols *, ** and *** indicate statistical significance at less than the 10-precent, 5-percent, and 1-percent levels, respectively.

Panel B	*FlowETF*		*FlowETF*	
Intercept	237.903		-48.334	
	(0.11)		(-0.12)	
FlowRetail	-0.607	***	-0.527	***
	(-2.99)		(-2.72)	
FlowInst	-0.576	***	-0.487	***
	(-3.23)		(-2.86)	
$FlowRetail_{t-1}$	-0.662	***	-0.618	***
	(-3.43)		(-3.32)	
$FlowInst_{t-1}$	-0.610	***	0.712	***
	(3.38)		(4.16)	
$FlowETF_{t-1}$	0.098	*	0.113	**
	(1.87)		(2.21)	
IndustryFlow	-0.003		-0.004	
	(-0.85)		(-1.12)	
$IndexRet_{t-1}$	14,468		-30,243	
	(0.24)		(-0.55)	
Ret	2,293.21	**	2,291.91	**
	(2.13)		(2.19)	
Ret_{t-1}	-14,002		30,765	
	(-0.23)		(0.56)	
Expenses	-133,700		-167,185	
	(-0.09)		(-1.34)	
logTNA	66.482		71.151	**
	(0.51)		(2.01)	
N of obs	371		371	
R-2	0.24		0.23	
Adj. R-2	0.19		0.20	
Year Dummies	Yes		Yes	
Index Dummies	Yes		No	