Comparison Analysis of Conventional Index Funds and Exchange-Traded Funds

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Abstract. This research investigates the substitutability and reasons of coexistence of two similar investment vehicles that are conventional index funds and exchange-traded funds (ETFs) in Korean market, establishing fourth key results. Firstly, ETFs and conventional index funds generally track their underlying indexes closely. Mean of tracking errors are not statistically different between fund types. Second, flows to these types of funds do not affect each other, indicating that conventional index funds and ETFs are not substitutes. Third, the coexistence can be explained by tax clientele effect which segregates the two vehicles into different market niches. Fourth, the coexistence can be also explained by the behavior of fund investors who prefer different characteristics of these funds. While the cash flow of ETFs is related with past fund performance, family performance and expense, the cash flow of Index funds is influenced by past fund size, fund age and the existence of big vendors.

Keywords: Index funds, ETFs, Tracking Error, Substitution effect, Clientele effect, Fund Cash Flows, Investor Behavior

1. Introduction

As financial markets faced an increase in volatility and capital outflows in emerging markets because of Euro-zone debt crisis and continuing economic slowdown, investors in the Korea market which largely depends on exports for economic growth are having preferred the continuous stable investment alternative to alleviate their anxiety. Also, these days, South Korea is projected to become a super-aged society in 2026 in the world's fastest pace. To prepare for their old age, investors consider long-term investments such as a retirement pension as important investment targets.

In such market conditions, passive fund such as mutual index fund and ETFs(Exchange-traded funds) have being attracted significant interest from investors

and have become the fastest-growing segment of the fund market because people can minimize their risk of portfolio with low cost in the long-term period, regardless of market conditions. As of May 2014, there are 151 ETFs and ____ Index funds traded in the Korea market with assets totaling approximately KRW 1.72 billion and KRW _____ billion.[2] These vehicles simultaneously increased almost 8-11 times from 2003 to June 2012. Especially, although the growth of total fund market had slowed down from 31.9billion won in 2010 to 28billion won in 2011, including about 13.9% decreasingly, ETFs have become the fastest-growing segment of fund market including an increase of 63.5%. The growth of the Index funds is slowing in comparison with the growth of ETFs but they co-exist at the similar level in fund market.

ETFs and Index funds are a publicly traded mutual fund whose operational goal are to track passively a market benchmark in order to generate daily returns on some a broad-based some index such as KOSPI200. Unlike the general funds that are managed by selecting the type of stocks and researching the information about stocks on their portfolio, ETFs and Index funds have expanse advantage on its simple structure, costs, diversification without large losses. Therefore, as it is hard to take the direction of investment in unstable stock market, passive funds are being evaluated as good investment vehicles for the purpose of long-term investments. However, some argue that ETFs are placed above Index funds in another side. In terms of liquidity, while people invest their money in Index funds by subscribing funds through stock firms, people can trade ETFs as easily as stocks. This means ETFs offer services and investment flexibility that indexed mutual funds generally do not. Also, average fee rate of ETFs which is annually about 0.23%-0.66% is smaller than fee rate of index fund which is annually about 1.24%.

This begs the question: Why do ETFs and Index funds co-exist in the market at similar rate in spite of same operational goal? In Economic theory, if two products are substitutes, an increase in demand for one results in a decrease in that for the other. Intuitively, ETFs look like more efficient vehicle than Index funds, which is rooted in the fact that ETFs has high liquidity and low costs. We may conclude that most people invest their money in ETFs concentrically as passive fund investment and eventually, conventional Index funds would gradually disappear or lose significant market share to ETFs based on economic theory. However, these two vehicles are having co-existed and exponentially growing up together and the extent of this potential competition is not clear.

Using Korean fund market data, this study will compare with the performance of ETFs and Index funds by examining tracking errors and Information ratio of vehicles. Then, after we divide the period into before- and after the end of securities transaction tax law, we will also examine whether these funds are substitutes goods in the domestic market. If these two fund types are good substitutes, they will negatively affect each other's fund flows. With respect to their coexistence in fund market, we suggest that it can be explained by clientele effect and behavior of fund investors.

Firstly, we suggest that the choice of investing through a conventional index funds or ETFs may largely depend on investor-specific circumstances. While ETFs are generally expected to be more tax-efficient, investors with tax-exempt or tax-deferred

[2] KRX ETF Montly May,2014,

retirement accounts may not gain additional tax benefit from ETFs. As such, there may be a tax clientele effect: ETFs might be preferred by investors with higher liquidity and/or higher marginal taxes and Index funds might be preferred by investors with tax exempt or tax-deferred retirement accounts. It is consistent with the argument made by Agapova(2011) that show tax clientele effect segregates the two vehicles into different market niches.

Also, their coexistence can be explained by behavior of investors. There may be different important determinants of ETFs and Index fund flows. For example, when people choose Index funds, they make sure whether there are big vendors which deal in these funds. However, because ETFs are traded as stocks, investors who trade ETFs will ascertain whether this ETF is generally known because of high liquidity or excess return. As such, if there will exist different determinants of these fund flows, we can conclude that investors recognize these two funds as different products and it can be another reason of their coexistence. Therefore, we will examine and compare the determinants of ETFs and Index funds flows.

The remainder of the paper includes a literature review in Section 2 and Methodology in Section 3. We empirically analyze substitutability of two investment vehicles, the clientele effect and the behavior of ETFs and Index fund investors in Section 4 and Section 5 concludes the paper.

2. Literature review

While a lot of studies examine performance, manage method, investment style, structure of mutual funds domestically and internationally, few literatures are available on ETFs because of limited data given their short period of existence. Especially in Korea market, historical period of ETFs and Index fund is very short. So, researches on these subjects are in the initial step.

With respect to performance of ETFs and Index funds, Elton et al. (2002) show that ETFs have lower performance than Index funds. They examine the characteristics and performance of SPDR (Standard and Poors Depository Receipts) and explain that if the price is close to NAV, it is related with the ability of redemption and the treatment of dividends. They argue that ETFs underperform the index by about 10 basis points per year because of the requirement which is hold dividends received from the underlying shares in cash. In contrast, index funds can reinvest dividends as soon as they are received by the fund. Gastineau (2004) also finds that underperformance of ETFs results from non-reinvestment of dividends. He finds that Index funds outperform their benchmarks and similar to ETFs by eschewing the exact replication strategy.

Several studies examine which one is more efficient investment instrument between ETFs and Index funds by comparing the structure of vehicles. Guedj and Huang (2003) argue that ETFs is more efficient investment vehicle by comparing liquidity of ETFs with that of Index funds. They show that investors with higher liquidity prefer to invest via Open-Ended Mutual Funds (OEF) since they benefit more from the liquidity insurance. Interestingly, the concentration of high liquidity need investors in the OEF does not lead to higher flow-induced trading costs since individual liquidity needs cancel out at the fund level. So they conclude that OEFs are not dominated by ETFs in equilibrium. Moreover, when investors have more correlated liquidity shocks, ETFs is more suitable than OEFs. Poterba and Shoven (2002) also regard ETFs as tax-efficient alternatives by illustrating the differences in the before- and after-tax returns on ETF (SPDR) and Index fund (Vanguard 500 index). They suggest that before- and after-tax returns of the two funds were very similar but after-tax investors have several advantages when they invest ETF. Kostovetsky (2003) develops a model that is useful in examining major difference between ETFs and Index funds, based on the management fees, shareholder transaction fees, taxation efficiency, and so on. He shows that although ETFs outperform Index funds in the long-term investment, the result is reversed in short-term investment. He suggests it brings about transaction fees, taxation efficiency and qualitative differences. About substitutability of these funds, Agapova (2011) suggests that conventional Index funds and ETFs are substitutes, but not perfect substitutes. He suggests that the coexistence of both vehicles can be explained by a tax clientele effect and Institutional clientele effect by comparing two aggregate cash flows.

There are several papers about the Korean ETFs and Index funds market. Lee et al. (2011) expect that the passive fund market as long-term investment instruments will

expand owing to the accumulation of retirement savings and the need for investment advisory services. Although the low sales fee of passive fund cause uncooperative distribution channel to promote passive funds, market will favor passive funds when asset management business is engaged in more and they expect that the market for ETFs and the index funds will grow at the similar rate in the long run. Choi et al. (2012) examine the changes in the investment strategy of index funds after the introduction of ETFs in Korean stock market. They note that the sensitivity of index fund returns to the KOSPI200 returns significantly increased after the introduction of ETF. They suggest that the index fund manager adjust her investment strategy to attract investors as the strong competitor (ETFs) appears to the market. Therefore, this study reports that index fund investors should consider not only the apparent factors such as trading fees but also the implicit factors such as the fund manager's ability.

Lee et al. (2004) explore the Korean ETF markets with respect to arbitrage opportunities between ETF and its corresponding net asset value. They also examine the distribution of the degree of mispricing for KODEX200 in an attempt to compare with the case of SPDRs in USA. They conclude about 84% ETF observations were fairly priced and arbitrage opportunities last 1-2 and 3-5 minutes on the average. Compared to SPDRs, KODEX200 tend to be more underpriced and the violation frequency of no-arbitrage pricing conditions also tends to be higher. Overall, they propose that Korean ETF markets have gradually become more efficient, although there still is a tendency of continuous underpricing of ETFs over time.

Chung (2012) analyzes tracking errors of ETFs that track KOSPI200 passively using daily data. He shows that the over-performance of ETFs relative to KOSPI200 is statistically insignificant and economically negligible. Meanwhile, he finds that tracking errors of ETFs relative to KOSPI200 are shown to be statistically significant and economically meaningful. He also observes that ETFs tend to be under-priced relative to NAV, and the under-pricing persists for a long period of time. He argues that these movements of ETF cause extreme discrepancy between ETF and NAV, which is an obstacle in the way of tracking KOSPI200 effectively. Han et al. (2009) investigate the information transmission among the KOSPI200 futures, Index funds, and ETFs. They represent that between the KOSPI200 futures and ETFs show the bi-directional effects to each other according to granger causality test. They find that although the KOSPI200 futures have high endogenous explanatory power, both Index funds and ETFs are explained well by the KOSPI200 futures, showing that they have high exogenous explanatory power. Therefore, they conclude that the KOSPI200 futures lead both ETFs and Index funds.

With respect to the behavior of fund investors, many authors have tried to explain the inflows of mutual funds, which is a critical aspect in investor fund selection. Several fund characteristics have been analyzed as potential determinants of future fund inflows. Firstly, a lot of mutual fund literature has documented statistically positive relation between net fund flows and past fund performance. (Sirri and Tufano,1998, Ippolito, 1992) Also, Ivkovic et al.(2009) studies the relation between individuals' mutual fund flows and fund characteristics They found that Inflows are related only to ''relative'' performance, expense ratio and back-end load. They suggest that the expense ratio (particularly the management fee component) reflects the underlying quality of the fund manager and thus, the positive inflow-expense relation really reflects an underlying positive relation between inflows and past fund

performance/quality. Third, Mutual fund size has been one of the most studied variables in mutual fund literature. Gotzmann et al. (1997) said that if the investors do not understand the characteristics of funds, they put their money in famous mutual funds which have larger TNA. Fourth, fund family size can be determinants of future fund inflows. Chen et al. (2004) find that fund family size has a positive and statistically significant effect on performance and inflows of fund.

Unfortunately in Korea, due to its relatively short history of fund markets and lack of data availability, sufficient studies have not been conducted to fully understand the behavior of fund investors. Ko et al. (2010) find that that fund performance and cash flows are positively related only for the period of 2005-2007, based on which they conclude that the structural changes of the fund market affect the performance-flow relationship. Park (2005) also investigates the relationship between the performance and cash flow of equity fund based on monthly as well as weekly data. He find that fund size, age play significant roles determine the cash flow of equity fund.

Although there are many prior research related to performance, tax effect, liquidity of ETFs and Index funds, no study has tested implication of substitutability and co-existence of these vehicles in the Korean market. Therefore, the present study is different from previous studies as it analyzes the clientele effect and behavior of investors which may explain the coexistence of both investment instruments. Furthermore, the present study contributes to the publish literature by extending passive fund related research in Korean fund market, where the lifetimes and track records of ETFs and Index funds are short.

3. Methodology

3.1. Performance Measures

The risk-adjusted return calculated from the conventional one factor CAPM model or the three-factor model (Fama and French, 1993) is basically conducted to test the fund performance. But, with respect to Index funds and ETFs, Tracking Error is also important performance measure since the purpose of two instruments is to track their benchmark passively. Therefore, this study uses excess return and Tracking Error to measure their performance and compare with their characteristics. The risk-adjusted return shows how a product's performance compares with that of its benchmark over a stated period of time. Another method, Tracking Error indicates the consistency of a benchmark's excess return during that same period of time.

3.1.1. Tracking Error

Tracking Error is defined as the difference between the excess return of fund and can be indicator of performance by measuring how well the fund's NAV reflects the underlying benchmark's return. Tracking Error indicates how much variability exists among the individual data points that make up the fund's average excess return. In

other words, if we minimize positive or negative excess return, we can make ETFs and Index funds track their benchmark nearly. Generally, fund managers use Full Replication Strategy which tracks benchmark of each fund perfectly. However, it is virtually impossible to use this strategy because of taxes, the property of benchmark index, management fee rate. So, these bring about Tracking Error by subtracting NAV (net asset value) in specific period. (Shin and Soydemir, 2010)

To see this, although there exist methods through several literatures, this study uses the measures in Agapova (2011). We calculate Tracking Error by using Equation (1).

$$TE_{i,t} = |Ret_{i,t} - TargetRet_{i,t} + \frac{1}{252} Exp_i \,| . \tag{1}$$

Here, respectively, $Ret_{i,t}$,$TargetRet_{i,t}$ indicate the rate of return of fund i at time t and the rate return of benchmark index of fund i at time t . Exp_i represents the gross expense rate of fund i .

3.1.2. Information ratio

Information ratio is defined as portfolio returns above the returns of a benchmark (Jensen' alpha of portfolio) for the unit of diversified risk. Therefore, the Information ratio is often used to gauge the skill of managers of mutual funds, hedge funds, etc, which measures the excess return of the manager's portfolio divided by the amount of risk that the manager takes relative to the benchmark. However, there are potential problems such as lack of time series data of Information ratio. Therefore, in this paper, the Information ratio is defined as the difference between return of fund and return of the benchmark on fund divided by standard deviation of tracking errors. The higher Information ratio, the higher the excess return of the portfolio. It means that the amount of risk taken and the better the manager.

$$IR(InformationRatio) = \frac{Ret_{i,t} - TargetRet_{i,t}}{\sigma(TE_i)} . \tag{2}$$

Here, respectively, indicate the rate of return of fund i at time t and the rate return of benchmark index of fund i at time t . $\sigma(TE_i)$ represents the standard deviation of Tracking Error. We expect that ETFs and Index funds have different information ratio because of rebalancing period. While ETFs are regularly managed by realigning the rate of assets in portfolio, assets in Index funds are frequently rebalanced. For this reason, most Index funds have about 2-3% of excess returns and reflect fund manager's performance actively. Therefore, we hypothesize that Index funds have higher Information ratio than ETFs.

3.2. Substitution effect

3.2.1. Substitution effect over the study period

In this study, Substitution effect is examined by comparing fund cash flows of Index funds and ETFs (Agapova, 2011). We run a regression wherein the cash flow of Index fund i at time (ETF i at time t) is the dependent variable and the cash flows of ETF i at time t (Index fund i at time t) is the independent variable as shown in equation (3):

$$\begin{aligned} FlowIF(ETF)_{i,t} &= \alpha_{i,t} + \beta_1 FlowETF(IF)_{i,t} + \beta_2 FlowIF_{i,t-1} + \beta_3 FlowETF_{i,t-1} \\ &+ \beta_4 FlowIndustry_{i,t} + \beta_5 TargetRet_{i,t-1} + \beta_6 IF(ETF)Ret_{i,t} + \beta_7 IF(ETF)Ret_{i,t-1} \\ &+ \beta_8 Expenses_{i,t} + \beta_9 LogNAV_{i,t} + \beta_{10} IR_{i,t} + \varepsilon_{i,t}. \end{aligned} \quad (3)$$

$$Flow_{i,t} = \frac{NAV_{i,t} - NAV_{i,t-1} \times (1 + R_{i,t})}{NAV_{i,t-1}}. \quad (4)$$

Equation (4) is used to calculate cash flows using the methodology in Sirri and Tufano (1998) The cash flow of ETF i at time $t-1$ ($FlowIF_{i,t-1}$ and $FlowETF_{i,t-1}$, respectively) is an control variable because of the persistency of cash flows(Cashman et al., 2007) $FlowIndustry_{i,t}$ is cash flows of the total funds, which represent level of investments and investor' confidence in the whole fund market. Since cash flows in individual fund also increase when cash flows in the fund market increase, we use this measure as market control variable. Also, $TargetRet_{i,t-1}$ refers to return of benchmark which shows the attractiveness of benchmark index. $IFRet_{i,t}$ and $ETFRet_{i,t}$ indicate the rate of return of Index fund i and ETFs i at time t. $Expenses_{i,t}$ represents the total expenses of fund i and $LogNAV_{i,t}$ is the logarithm of the total net asset value, which is used for controlling fund' size effect. Also, we add Information ratio ($IR_{i,t}$) as explanatory variable.

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

3.2.2. Substitution effect after the end of securities transaction tax act

After 2010, as securities transaction tax of mutual fund disappears, 0.3% of stock sale amounts was added as taxes in addition to management fee, sales expense, trust fee. Therefore, the expense of mutual fund increases and then naturally affects the return rate of mutual fund. Although there are same performances, the real return rate of funds decreases when managers trade stocks in their funds frequently. For

example, if turnover ratio of fund is 100% over 1 year, after-tax return rate is lower about 0.3% compared to before-tax return rate. The end of securities transaction tax law was expected to strike especially Index fund and Midcap-funds because these fund take arbitrage strategy to obtain excess return or absolute profits.

This study examine whether this increase in the expense of Index fund affect the flow of ETFs and Index funds as follows. Explanatory and dependent variable is same as that of the first substitution effect in the regression equation (3). Also, we employ a dummy variable, which is 1 if it is the cash flows of ETF or Index fund after January 1st, 2010. β_2 is expected to be negative if the substitution effect increases as the expense of Index funds is higher.

$$\begin{aligned} FlowIF(ETF)_{i,t} &= \alpha_{i,t} + \beta_1 FlowETF(IF)_{i,t} + \beta_2 After^* FlowETF(IF)_{i,t} + \\ &\beta_3 FlowIF_{i,t-1} + \beta_4 FlowETF_{i,t-1} + \beta_5 FlowIndustry_{i,t} + \beta_6 TargetRet_{i,t-1} \\ &+ \beta_7 IF(ETF)Ret_{i,t} + \beta_8 IF(ETF)Ret_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogNAV_{i,t} \\ &+ \beta_{11} IR_{i,t} + \varepsilon_{i,t}. \end{aligned} \quad (5)$$

3.3 Clientele effect

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: ETFs might be preferred by investors with higher liquidity and/or higher marginal taxes and Index funds might be preferred by investors with tax exempt or tax-deferred retirement accounts.

This study examines whether the coexistence of Index funds and ETFs can be explained by clientele effect. ETFs are preferred to high-liquidity investors. On the other hand, Index funds are preferred to investors who want to have not only low liquidity but tax-exempt or tax-deferred incentives. Individual Retirement Pension, Long-term House-purchasing Fund, Long-term Equity Fund which is classified as Index funds are used in the present study to analyze the substitutability of these investment vehicles.

3.3.1. Individual Retirement Pension (IRP)

IRP is the system which let employees get it as pension after age 55, when they put their retirement income in IRP and invest it as investment instruments with tax deferred benefits. Especially, Index fund which only IRP members can join have a tax deduction about capital gain and let investors pay their tax when they get retirement pension. The longer the investment period, the greater return on investment which investors can be received since investors can reinvest their money while holding the funds with tax deferred benefits. Therefore, IRP members prefer Index fund to ETFs. This study add Index fund which only IRP members join as variable to show substitution effect of ETFs and Index funds.

Explanatory and dependent variable in the regression equation (6) is same as that in the regression equation (3). Also, we include a variable, $IRPFlow_{i,t}$ which is used as the cash flow of Index fund which only IRP members can join, i at time. If this benefit cause the number of joining IRF-Index fund to increase and the number of joining ETFs to decrease because of substitutability, β_2 is expected to be statistically negative.

$$\begin{aligned} FlowETF_{i,t} &= \alpha_{i,t} + \beta_1 FlowIF_{i,t} + \beta_2 IRPFlow_{i,t} + \beta_3 FlowIF_{i,t-1} \\ &+ \beta_4 FlowETF_{i,t-1} + \beta_5 FlowIndustry_{i,t} + \beta_6 TargetRet_{i,t-1} \\ &+ \beta_7 ETFRet_{i,t} + \beta_8 ETFRet_{i,t-1} + \beta_9 Expenses_{i,t} \\ &+ \beta_{10} LogNAV_{i,t} + \beta_{11} IR_{i,t} + \varepsilon_{i,t}. \end{aligned} \quad (6)$$

3.3.2. Long-term House-purchasing Fund, Long-term Equity Fund of Index funds

Long-term Housing Fund is the fund which gives tax-free benefit about capital gain income for the investors who do not own their house and decide to put their money in this fund at least 3 years. Investors could subscribe to this fund only from July 2008 to December 2009 and received this benefit up to December 31th 2012.

Long-term Equity Fund also gives investors tax-exempt benefit which is generated by fund (Interests for 3 years from the date of subscription, dividends income and so on) and income deduction for three years at the year-end tax adjustment. The amount deducted from income is quarterly up to KRW3million and income deduction rates are 20% at first year, 10% at second year and 6% at third year.

For these reasons, some investors prefer these index funds to ETFs. If there is the substitutability of two these investments, the cash flow of ETFs decreases as the cash flow of Index fund increases. Also, these funds give more tax benefit for the investors who subscribe from July 2008 to December 2009 and after this period, tax benefit is reduced since this policy finished. This study employs a dummy variable, $Home$ which is 1 if it is the cash flows of Index fund from July 2008 to December 2009 to measure the tax clientele effect. If this policy cause the number of join on Index funds which contained these benefit to increase and the number of join on ETFs to decrease because of substitutability, β_2 is expected to be statistically negative.

$$\begin{aligned} FlowETF_{i,t} &= \alpha_{i,t} + \beta_1 FlowIF_{i,t} + \beta_2 Home^{*} FlowIF_{i,t} + \beta_3 FlowIF_{i,t-1} \\ &+ \beta_4 FlowETF_{i,t-1} + \beta_5 FlowIndustry_{i,t} + \beta_6 TargetRet_{i,t-1} + \beta_7 ETFRet_{i,t} \\ &+ \beta_8 EFFRet_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogNAV_{i,t} + \beta_{11} IR_{i,t} + \varepsilon_{i,t}. \end{aligned} \quad (7)$$

3.4. The behavior of ETFs and Index fund investors

Through the study of the clientele effects, we conclude that investors did not regard these types of funds as substitutes because of their fund characteristics. Therefore, by observing the behavior of fund investors, we can explain their coexistence in fund markets. We expect that there may be different important determinants of ETFs and Index fund flows. For this study, we run the regression (8) to examine the relation between the cash flow of ETF and fund characteristics:

$$\begin{aligned} FlowETF_{i,t} = & \alpha_{i,t} + \beta_1 flow_{i,t-1} + \beta_2 fundPerf_{i,t-1} + \beta_3 fundTNA_{i,t-1} \\ & + \beta_4 FamTNA_{i,t-1} + \beta_5 fundage + \beta_6 expense_{i,t-1} \\ & + \beta_7 First + \varepsilon_{i,t}. \end{aligned} \quad (8)$$

The cash flow of ETF i at time $t-1$ $\mathrm{t}-1$ ($flow_{i,t-1}$ $flow_{i,t-1}$) is a control variable because of the persistency of cash flows. (Cashman et al, 2007) This study uses the risk-adjusted return calculated from the three-factor model (Fama and French, 1993) as a measure of fund performance. Equation (9) is used to calculate three-factor risk-adjusted returns:

$$r_{i,t} = \alpha_i + \beta_i r_{m,t} + s_i SMB_t + h_i HML_t + \varepsilon_{i,t}. \quad (9)$$

Here, $r_{i,t}$ and $r_{m,t}$, respectively, indicate the rate of return of fund i and the market return above the risk-free rate at time t. SMB_t represents the size factor and HML_t represents the growth factor. $fundTNA_{i,t-1}$ and $FamTNA_{i,t-1}$ are the logarithm of the lagged total net asset value of the fund and the families which manage the fund. $fundage$ is the number of years since the fund launch date. $\text{expense}_{i,t-1}$ is the lagged total expenses. *First* is dummy variable which is 1 if ETF is the first launched product among the other ETFs which track same benchmark. The first launched ETF present advantage over the others because of the occupation effect. With regard to the flow of Index funds, we run the regression (9):

$$\begin{aligned} FlowIF_{i,t} = & \alpha_{i,t} + \beta_1 flow_{i,t-1} + \beta_2 fundPerf_{i,t-1} + \beta_3 fundTNA_{i,t-1} \\ & + \beta_4 FamTNA_{i,t-1} + \beta_5 fundage + \beta_6 expense_{i,t-1} \\ & + \beta_7 bigvendor + \varepsilon_{i,t}. \end{aligned} \quad (9)$$

In regard to the cash flow of Index funds, we use *bigvendor* variable as the independent variable instead of *First* variable. *bigvendor* represents the dummy variable which is 1 if the fund is sold by the large sales company whose TNA is over 0.8 billion. We expect that Index fund investors want to trade at well-known fund vendors because they think that these vendors sell Index funds which have better excess returns than small size vendors. Also, since the residuals may be correlated across

firms or across time, and OLS standard errors can be biased, we run regressions with clustered standard errors.

4. Empirical Analysis

4.1 Data and Summary Statistics

The dataset for this study encompasses ETFs and Index funds listed in June, 2012 which track same benchmarks. The benchmarks in study are total 6 benchmarks which are KOSPI200, KRX100, MKF Mid Value, MKF Blue chip30, MKF Green Index, Socially Responsible Index. In this paper, there are 16 ETFs containing 8 KOSOPI200 and 399 Index funds containing 371 KOSPI200.(Appendix 1) Generally, 1-2 ETFs are listed grouped by individual benchmark except KOSPI200 Also, Index funds grouped by KOSPI200 accounts for approximately 93% of the number of total Index funds. We exclude derived type ETFs because of different characteristics. Bond, Foreign stocks, commodities, currency ETF are also excluded on account of shortage of data and absence of Index funds which track same benchmark as that of ETFs. The study period spans January 2006 to December 2011. We collect benchmark data from Zeroin and the return, net asset value, expenses from KRX and Zeroin. We also collect information on price, the return, net asset value, expenses from Zeroin.

Table 1. Summary statistics for ETFs and Index funds grouped by Index

The table reports summary statistics for ETFs and Index funds in period January 2006 to December 2011. N is the number of fund in this period and TNA is the total net asset value(NAV) of benchmark(in million won) in 29th December 2011, Exp is the average total expense ratio of funds(%) and Flow is simple cash flow of total asset value in this period(in million won)

	ETF				Index Fund			
Index	N	TNA	Exp	Flow	N	TNA	Exp	Flow
KOSPI200	8	4,191,279	0.25	3,845,193	371	10,423,935	0.89	8,694,279
KRX100	2	45,376	0.23	630,268	16	659,852	0.64	542,841
MKFMidValue	1	12,892	0.46	-10,277	1	786	0.8	13,894
MKFBlueChip30	1	9,412	0.4	-7,780	1	6,365	0.51	-5,830
MKFGreenIndex	2	10,153	0.43	-8,741	5	155,260	0.96	133,684

SRI Socially Responsible Index	2	17,888	0.41	-24,136	5	342	1.36	19,903
Total	16	4,287,000	0.33	4,424,527	399	11,278,197	0.86	9,398,771

Table 1 shows summary statistics for ETFs and Index funds grouped by Index. In case of KOSPI200, TNA (Total Net Asset value) of Index funds(over KRW1.04bn) was almost twice as much as that of ETFs.(over KRW0.4bn) However, in case of MKFMidValue MKFBlueChip30 and SRI Socially Responsible Index, TNA of ETFs was more than that of Index funds. The expenses of ETFs were lower than those of Index funds in every benchmark. As mentioned earlier, the cash flow of ETFs (Index funds) which track KOSPI200 increased by approximately KRW0.38bn (KRW0.86bn) in this period, indicating that the size of funds which track KOSPI200 increased rapidly. However, there are negative cash flows in several benchmark indices such as MKFMidValue, MKFBlueChip30, MKFGreenIndex.

4.2. Tracking Error and Information Ratio

4.2.1 Tracking Error

We examine Tracking Error and Information ratio of ETFs and Index funds to identify whether these instruments track their benchmark very well. Table 2 provides Tracking Error of ETFs and Index funds tested for statistical significance by t-test. The benchmark which had the largest Tracking Error was MKFBlueChip30. (2.12% for Index funds and 2.11% for ETFs) and the benchmark which had the smallest Tracking Error was KOSPI200.(0.30% for ETFs) In funds However, in respect with KRX100, MKFMidValue, SRI Socially Responsible Index, the results were opposite. Overall, average Tracking Error mean was 0.78% ETFs(Index funds) which track KOSPI200 accounts for approximately 97%(92%) of the total net asset value of ETFs(Index funds) and Tracking Errors of these funds are negligible (Index fund 0.43% and for ETF 0.30%).

Although the annual tracking error was significant at 1ess than 1% level, it did not have a big impact on investors.(in KOSPI200, differences between two vehicles were 0.345%) Based on this analysis, Most ETFs and Index funds track their benchmark very closely and have excellent performance.

4.2.2 Information Ratio (IR)

Table 3 shows information ratio of Index funds and ETFs which were both under 0.1 The funds which had the largest IR were ETFs in KOSPI200 (0.01775) and the funds which had the smallest IR were Index funds in MKFGreenIndex(-0.05567) ETFs(0.00177) outperformed Index funds(-0.02700) although this difference are trivial. Therefore, the skill of managers of ETFs is better than that of Index funds but the skill of managers does not affect the performance of these two instruments since the difference are almost same.

Table 2. Tracking Error of Index funds versus ETFs

This table presents Tracking Error of Index funds and ETFs. We calculate Tracking Error by using $TE_{i,t} = |Ret_{i,t} - TargetRet_{i,t} + (1/252)Exp_i|$. $Ret_{i,t}$ indicates the rate of return of fund i at time t and $TargetRet_{i,t}$ indicates the rate of return of benchmark index of fund i at time t. Exp_i represents the gross expense rate of funds. The means and standard deviation of these variables are calculated across the funds that track one of the 6 indices. The difference in means and standard deviation is tested for statistical significance. *** indicate statistical significance at less than 1% levels.

Index		N	Mean	Standard deviation	t-value	
KOSPI200	Index fund	276017	0.00434	0.01044	218.22	***
	ETF	5298	0.00296	0.00666	32.32	***
	Difference		0.00138	0.00378	14.72	***
KRX100	Index fund	16402	0.00331	0.00953	44.45	***
	ETF	2348	0.00477	0.00674	34.32	***
	Difference		-0.00146	0.00279	-9.28	***
MKFGreenIndex	Index fund	1135	0.00516	0.01871	9.30	***
	ETF	454	0.00890	0.00935	20.28	***
	Difference		-0.00374	0.00936	-5.28	***
MKFBlueChip30	Index fund	179	0.02118	0.01573	18.09	***
	ETF	179	0.02106	0.01558	18.08	***
	Difference		0.00012	0.00015	-3.24	***
MKFMidValue	Index fund	361	0.00231	0.00185	23.72	***
	ETF	361	0.00778	0.00828	17.86	***
	Difference		-0.00547	-0.00643	-12.25	***
SRI Socially Responsible Index	Index fund	2460	0.00546	0.00770	35.19	***
	ETF	540	0.00620	0.01151	12.52	***
	Difference		-0.00074	-0.00381	-1.42	
mean			0.007786	0.010174		

4.3. Substitution effect

4.3.1. Substitution effect over the study period

As we said, while they have same operational goal to track passively the market benchmark, there also exits the differences between these funds such as liquidity and tax. So, do investors think that these investment vehicle are substitution each other? The most effective way to test for the substitution effect between Index funds and ETFs is to estimate aggregate flows to ETFs and Index funds. We run the regression a regression wherein the cash flow of Index funds (ETFs) is the dependent variable and the cash flows of ETFs(Index funds) is the independent variable. In this regression, β_1 represents how much cash flows of ETFs and Index funds have substitution relation.

Table 3. Information ratio of Index funds and ETFs

This table shows information ratio of Index funds and ETFs. In this paper, the Information ratio is defined as the difference between return of fund and return of the benchmark on fund divided by standard deviation of tracking errors. The difference in means and standard deviation is tested for statistical significance. The symbols *, ** and *** indicates statistical significance at less than the 10%, 5%, and 1% levels, respectively.

Benchmark		N	Average IR	Standard deviation	t-value	
KOSPI200	Index fund	276016	-0.03108	1.03728	-15.74	***
	ETF	5298	0.01775	1.16753	1.11	
	Difference		-0.04883	-0.13025	-3.02	***
KRX100	Index fund	16402	-0.02525	1.03624	-3.12	***
	ETF	2348	0.01296	1.22066	0.51	
	Difference		-0.03821	-0.18441	-1.44	
MKFGreenIndex	Index fund	1135	-0.06312	0.99956	-2.13	
	ETF	454	-0.05567	1.36247	-0.87	
	Difference		-0.00745	-0.36291	-0.11	
MKFBlueChip30	Index fund	180	0.00429	1.23077	0.05	
	ETF	180	0.01684	1.45100	0.16	
	Difference		-0.01255	-0.22023	-0.09	
MKFMidValue	Index fund	361	-0.00853	1.19988	-0.14	
	ETF	361	0.00828	1.35674	0.12	
	Difference		-0.01680	-0.15686	-0.18	
SRI Socially Responsible Index	Index fund	2460	-0.03830	1.05240	-1.80	*
	ETF	540	0.01045	1.15970	0.21	
	Difference		-0.04875	-0.10730	-0.90	
Means	Index fund		-0.02700	1.09269		
	ETF		0.00177	1.28635		
	Total means		-0.01262	1.18952		

Table 4 reports results for the substitution effect on net flows to funds over the study period. To control for the endogeneity problem, where flows to Index funds and ETFs enter both equations as dependent and explanatory variables, SUR (Seemingly Unrelated Regression) approach is used to test the substitution effect hypothesis. Although coefficients β_1 on Index funds and ETFs were negative in both equations, they were not statistically significant, implying that there was no the substitution effect. It does not consistent with the previous study of Agapova, 2011. Therefore, unlike U.S. market, we conclude Index funds and ETFs are not substitutes in domestic market. We infer this result from organizational structure and characteristics of ETFs and Index funds in the Korean fund market. While ETFs are traded as mid- and long-term investments in U.S. market, it underutilized as method of long-term investment since ETFs are frequently traded as stocks. On the other hand, index funds are disadvantaged within three months redemption of funds. So, investors use Index funds as mid- or long-term investments. Therefore, there is clientele effect which segregates the two vehicles into different market niches. Because of this reason, we conclude that investors do not perceive that they are substitutes each other.

Another reason is limitations on the diversity of products. In this study period from 2006 to 2011, ETFs were rapidly growing on scale. In U.S. market, there were diverse products as ETFs have been growing. But in domestic market, the number of ETFs was very scarce. Later, diverse products were gradually released, starting from Financial Market Integration act in 2009 and KRX promoted ETFs to develop the fund market since they concluded the investors do not understand ETFs very well. In summary, from all of the above, it can be inferred that conventional index funds and ETFs are not substitutes each other because of ETFs growth deficit in Korean market.

Table 4. Substitution effect over the study period

This table examines substitution effect over the study period comparing cash flows of Index funds and ETFs(Agapova, 2011). we run a regression wherein the cash flow of Index fund i at time t (ETF i at time t) is the dependent variable as shown in equation:

$$FlowIF(ETF)_{i,t} = \alpha_{i,t} + \beta_1 FlowETF(IF)_{i,t} + \beta_2 FlowIF_{i,t-1} + \beta_3 FlowETF_{i,t-1} + \beta_4 FlowIndustry_{i,t} + \beta_5 TargetRet_{i,t-1} + \beta_6 IF(ETF)Ret_{i,t} + \beta_7 IF(ETF)Ret_{i,t-1} + \beta_8 Expenses_{i,t} + \beta_9 LogNAV_{i,t} + \beta_{10} IR_{i,t} + \varepsilon_{i,t}.$$

We calculate cash flows using the methodology in Sirri and Tufano(1998) $Flow_{i,t} = (NAV_{i,t} - NAV_{i,t-1} \times (1 + R_{i,t})) / NAV_{i,t-1}$ The cash flow of ETF i at time $t-1$ ($FlowIF_{i,t-1}$ and $FlowETF_{i,t-1}$, respectively) is an control variable(Cashman et al, 2007) $FlowIndustry_{i,t}$ is cash flows of the total funds. $TargetRet_{i,t-1}$ refers to return of benchmark. $IFRET_{i,t}$ and $ETFRet_{i,t}$ indicate the rate of return of Index fund i and ETFs i at time t . $Expenses_{i,t}$ represents the total expenses of fund i and $LogNAV_{i,t}$ is the logarithm of the total net asset value, which is used for controlling fund' size effect. Also, we add Information ratio ($IR_{i,t}$) as explanatory variable. The symbols *, ** and *** indicates statistical significance at less than the 10%, 5%, and 1% levels, respectively.

	FlowIF		*FlowETF*	
	OLS	SUR	OLS	SUR
Intercept	10731 (0.09)	0	-0.01618** (-2.37)	0.002584*** (5.58)
FlowETF	-2123 (0.00)	-11712.2 (-0.03)		
FlowIF			-0.0000000013 (-0.10)	-0.0000 (-0.03)
$FlowETF_{t-1}$	246454 (0.61)	264136 (0.62)	0.01687* (1.65)	0.071723*** (42.25)
$FlowIF_{t-1}$	0.00469 (0.05)	0.004773 (0.05)	-0.00005008 (-1.36)	0.00000001808*** (4.72)
FlowIndustry	-1.77847 (-1.22)	-1.84147 (-1.23)	0.0000000707 (1.02)	0.0000001511*** (25.1)
$TargetRet_{i,t-1}$	291735 (0.09)	253830.3 (0.07)	-0.47976** (-2.07)	-1.04532*** (-76.26)
Ret	-775885 (-0.25)	-767004 (-0.24)	-0.49559** (-2.17)	0.019933 (1.54)
Ret_{t-1}	190752 (0.19)	216501.7 (0.21)	0.92189*** (20.64)	0.814946*** (211.73)
Expense	-4259552 (-0.50)	-4438926 (-0.52)	-0.58146 (-0.26)	-0.01375 (-0.39)
LogNAV	967.18505 (0.17)	1535.523 (0.95)	0.00169*** (3.34)	0.000051 (2.41)
IR	17455	17635.4	0.00033	-0.00046***

	(0.56)	(0.55)	(0.21)	(-3.57)
$Adj.R^2$	-0.00003		0.0919	
$Sys.w.R^2$		0.005823		0.005823

The results of OLS and SUR show that there were positive relations between the cash flow of ETFs and the lagged cash flow of that. This result can be understood in line the previous study of Cashman et al(2007), which find that the previous cash flow affects fund performance in next period. Also, the cash flow of ETFs and that of the total funds had positive relation, indicating that the cash flow of ETFs also increased as the cash flow of funds increased in the whole market. But, the relation between the cash flow of Index funds and ETFs were statistically insignificant.

4.3.2. Substitution effect after the end of securities transaction tax law

After the end of securities transaction tax law, tax which is 0.3% of the sale price was added in the expenses of mutual fund. It affected arbitrage strategy that fund managers have been using frequently. Therefore, this results in increasing of the Index funds expenses and we examine whether this policy have effect on the cash flow of ETFs and Index funds. This study employs a dummy variable, *After* which is 1 if the period is after 1st January, 2010. We use SUR (Seemingly Unrelated Regression) approach to control for the endogeneity problem.

Table 5. Substitution effect after the end of securities transaction tax act

This table examines substitution effect over the study period comparing cash flows of Index funds and ETFs(Agapova, 2011) after the end of securities transaction tax law. we run a regression wherein the cash flow of Index fund i at time t (ETF i at time t) is the dependent variable as shown in equation:

$$FlowIF(ETF)_{i,t} = \alpha_{i,t} + \beta_1 FlowETF(IF)_{i,t} + \beta_2 After^{*} FlowETF(IF)_{i,t} + \beta_3 FlowIF_{i,t-1} + \beta_4 FlowETF_{i,t-1} + \beta_5 FlowIndustry_{i,t} + \beta_6 TargetRet_{i,t-1} + \beta_7 IF(ETF)Ret_{i,t} + \beta_8 IF(ETF)Ret_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogNAV_{i,t} + \beta_{11} IR_{i,t} + \varepsilon_{i,t}.$$

we calculate cash flows using the methodology in Sirri and Tufano(1998) $Flow_{i,t} = (NAV_{i,t} - NAV_{i,t-1} \times (1 + R_{i,t})) / NAV_{i,t-1}$ The cash flow of ETF i at time $t-1$ ($FlowIF_{i,t-1}$ and $FlowETF_{i,t-1}$, respectively) is an control variable(Cashman et al,2007) $FlowIndustry_{i,t}$ is cash flows of the total funds. $TargetRet_{i,t-1}$ refers to return of benchmark. $IFRet_{i,t}$ and $ETFRet_{i,t}$ indicate the rate of return of Index fund i and ETFs i at time t . $Expense_{i,t}$ represents the total expenses of fund i and $LogNAV_{i,t}$ is the logarithm of the total net asset value, which is used for controlling fund' size effect. Also, we add Information ratio ($IR_{i,t}$) as explanatory variable. we employ a dummy variable, *After* which is 1 if it is the cash flows of ETF or Index fund after January 1st, 2010. The symbols *, ** and *** indicates statistical significance at less than the 10%, 5%, and 1% levels, respectively.

	FlowIF		*FlowETF*	
Benchmark	OLS	SUR	OLS	SUR
Intercept	10200 (0.08)	0	-0.01618** (-2.37)	0.002581*** (5.57)
FlowETF	-80032 (-0.17)	-94179.7 (-0.19)		
FlowIF			-0.0000000013 (-0.10)	0.0000 (1.64)
*After*ETF*	383306 (0.43)	407055.8 (0.43)		
*After*IF*			0	-0.0000 (-1.64)
$FlowIF_{t-1}$	0.00457 (0.05)	0.004631 (0.05)	-0.0000500800 (-1.36)	0.0000000383*** (4.72)
$FlowETF_{t-1}$	244601 (0.60)	262746.6 (0.62)	0.01687* (1.65)	0.071728*** (42.26)
FlowIndustry	-1.78319 (-1.23)	-1.84739 (-1.23)	0.0000000707 (1.02)	0.0000006023*** (25.1)
$TargetRet_{t-1}$	334873 (0.10)	299350.4 (0.09)	-0.47976** (-2.07)	-1.04532*** (-76.26)
Ret	-766054 (-0.24)	-755951 (-0.23)	-0.49559** (-2.17)	0.019925 (1.54)
Ret_{t-1}	155414 (0.16)	177540.6 (0.17)	0.92189*** (20.64)	0.814991*** (211.73)
Expense	-4241859 (-0.50)	-4426056 (-0.52)	-0.58146 (-0.26)	-0.01371 (-0.39)
$LogNAV_{i,t}$	975 (0.17)	1518.912 (0.94)	0.00169*** (3.34)	0.000051** (2.41)
IR	17352 (0.55)	17528.5 (0.55)	0.00033 (0.21)	-0.00046*** (-3.57)
$Adj.R^2$	-0.00003		0.26835	
$Sys.w.R^2$		0.154989		0.154989

4.5. Clientele effect

Based on these previous results, ETFs and Index funds track their benchmark very well but, the substitutability of these investment vehicles is statistically insignificant. Then, how can we explain the coexistence of Index funds and ETFs? In this section, we sort fund's investors who have more advantage of Index funds than that of ETFs to explain this coexistence by clientele effect.

4.5.1. Individual Retirement Pension (IRP) Clientele effect

To test the existence of this clientele effect, we run the regression with equation (6), where "cash flow of ETF" is the dependent variable and "the cash flow of Index fund which only IRP members can join" is the principal explanatory variable. The test results are summarized in Table 6. Contrary to what we expected, the coefficients of $flowIRP$ was not significant. This supports the conclusion that the cash flow of IRP Index funds are not related with the cash flow of ETF. We can infer that the result might stem from the fact that investors have regarded ETFs as long-term investment vehicles like accumulated funds. Also, as of December, 2011, individual investors account for 51.19%[3] of the total investors. The other investors are institutions, LP, foreigners. Moreover, most cash of ETFs were inflowed by foreigners and institutions.(Lee. et al, 2011) Therefore, in respect with ETF investment trend, they are not substitutes in the Korean fund market.

4.5.2. Long-term House-purchasing Fund, Long-term Equity Fund of Index funds Clientele effect

We examine their coexistence have resulted from clientele effect about Long-term House purchasing fund and Long-term Equity fund of Index funds which investors are given tax-free benefit about capital gain income. We employ a dummy variable, $Home$ which is 1 if it is the cash flows of Index fund in Long-term House-purchasing Fund subscription period. The period is from July 2008 to December 2009. The coefficients on $Home * IF$ was negative but statistically insignificant. We infer that investors have regarded ETFs as target of arbitrage trading instead of long-term investment. Therefore, the investors have thought these types of funds are not substitutes.

Table 6. Individual Retirement Pension(IRP) Clientele effect

This table examines individual retirement pension(IRP) clientele effect. we run a regression wherein the cash flow of ETF i at time t is the dependent variable and the cash flows of Index fund i at time t ($FlowIF$), the cash flow of Index fund which IRP members only join(IRP)($FlowIRP$) are the independent variables as shown in equation:

[3] KRX ETF Monthly (January, 2012)

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowIF_{i,t} + \beta_2 IRPFlow_{i,t} + \beta_3 FlowIF_{i,t-1} + \beta_4 FlowETF_{i,t-1} + \beta_5 FlowIndustry_{i,t} + \beta_6 TargetRet_{i,t-1} + \beta_7 ETFRet_{i,t} + \beta_8 ETFRet_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogNAV_{i,t} + \beta_{11} IR_{i,t} + \varepsilon_{i,t}.$$

The cash flow of ETF and the cash flow of Index fund i at time $t-1$ $FlowIF_{i,t-1}$ and $FlowETF_{i,t-1}$, respectively) is an control variable (Cashman et al, 2007) $FlowIndustry_{i,t}$ is cash flows of the total funds. $TargetRet_{i,t-1}$ refers to return of benchmark. $Expenses_{i,t}$ represents the total expenses of fund i and $LogNAV_{i,t}$ is the logarithm of the total net asset value, which is used for controlling fund' size effect. $IR_{i,t}$ is information ratio. The symbols *, ** and *** indicates statistical significance at less than the 10%, 5%, and 1% levels, respectively.

	FlowETF	
	coefficients	t-value
Intercept	-0.01646	-1.63
flowIRP	-0.00109	-0.05
FlowIF	-0.0000	-0.08
$FlowIF_{t-1}$	-0.0000	-1.25
$FlowETF_{t-1}$	0.02678	2.23**
FlowIndustry	0.0000	1.20
$TargetRet_{t-1}$	-0.50928	-2.00**
Ret	-0.47213	-1.89*
Ret_{t-1}	0.96462	17.65***
Expense	-0.24318	-0.09
$LogNAV_{i,t}$	0.00165	2.40**
IR	0.000514	0.29
Obs.	305736	
$Adj.R^2$	0.0876	

Table 7. Long-term House Purchasing Fund, Long-term Equity Fund of Index funds Clientele effect

This table examines Long-term Housing Purchasing Fund, Long-term Equity Fund of Index funds Clientele effect. We run a regression wherein the cash flow of ETF i at time t is the dependent variable and the cash flows of Index fund i at time t (*FlowIF*), the cash flows of Index fund from July 2008 to December 2009($Home*IF$)are the independent variables as

$$FlowETF_{i,t} = \alpha_{i,t} + \beta_1 FlowIF_{i,t} + \beta_2 Home^{*} FlowIF_{i,t} + \beta_3 FlowIF_{i,t-1} + \beta_4 FlowETF_{i,t-1} + \beta_5 Flow\ Industry_{i,t} + \beta_6 TargetRet_{i,t-1} + \beta_7 ETFRet_{i,t} + \beta_8 EFFRet_{i,t-1} + \beta_9 Expenses_{i,t} + \beta_{10} LogNAV_{i,t} + \beta_{11}\ IR_{i,t} + \varepsilon_{i,t}.$$

shown in equation: *Home* is a dummy variable, which is 1 if it is the cash flows of Index fund from July 2008 to December 2009 to measure the tax clientele effect.. The cash flow of ETF

and the cash flow of Index fund i at time $t-1$ $FlowIF_{i,t-1}$ and $FlowETF_{i,t-1}$, respectively) is an control variable (Cashman et al., 2007) $FlowIndustry_{i,t}$ is cash flows of the total funds. $TargetRet_{i,t-1}$ refers to return of benchmark. $Expenses_{i,t}$ represents the total expenses of fund i and $LogNAV_{i,t}$ is the logarithm of the total net asset value, which is used for controlling fund' size effect. $IR_{i,t}$ is information ratio. The symbols *, ** and *** indicates statistical significance at less than the 10%, 5%, and 1% levels, respectively.

	FlowETF	
	Coefficients	t-value
Intercept	-0.01648	-1.63
Home IF*	-0.00794	-0.07
FlowIF	-0.0000	-0.08
$FlowIF_{t-1}$	-0.0000	-1.25
$FlowETF_{t-1}$	0.02677	2.23**
FlowIndustry	0.0000	1.19
$TargetRet_{t-1}$	-0.50891	-2.00**
Ret	-0.4722	-1.89*
Ret_{t-1}	0.96478	17.64***
Expense	-0.25186	-0.09
$LogNAV_{i,t}$	0.00165	2.40**
IR	0.000515	0.29
Obs.	305736	
$Adj.R^2$	0.0876	

4.6. The Behavior of ETFs and Index fund Investors

The preceding section reveals the reason why ETFs and Index funds coexist in the fund market by tax clientele effect. It shows that investors are segregated into different niches because Index fund have tax advantage over ETFs. However, since the majority of Index funds are outside of tax policy, this is most likely only reason for the coexistence. In this section, we turn our attention to individual investors' behavior to explain the coexistence of these types of funds.

The results of relating fund-level flows to a range of fund characteristics are presented in Table 8. For the cash flow of ETF on the first of the two columns, the coefficient of $flow_{i,t-1}$ is positive and statistically significant. This indicates that the cash flow of ETFs is influenced by pas flow of that. Also, the coefficients of $fundPerf_{i,t-1}$ is statistically significant at 1% level. This supports the conclusion that the past fund performance of ETFs and the cash flow to the ETFs are positively related. This is in line with the previous studies of Sirri and Tufano(1998) and Ippolito(1992). The coefficient for $FamTNA_{i,t-1}$ is also statistically positive. (Chen et al., 2004) It indicates that the ETFs investors give priority to past fund excess return and family size when they choose ETF. This might be because investors trade ETFs as short-term investments in purpose of their profit. However, the coefficient for $expense_{i,t-1}$ is positive. This result might be due to a characteristic of the Korea fund market, where fund sales and management fees are not very distinct across ETFs. Also, it represents the irrational behavior of investors that pick up ETF which have high excess return in the past although expense of this ETF is high.

Meanwhile, as shown in the second columns, the cash flow of Index funds are positively related with $fundTNA_{i,t-1}$, $fundage$ and $bigvendor$. This result can be understood in line with the previous study of Goetzmann et al.(1997), which find that the cognitive dissonance of mutual fund investors influence the cash flow of mutual fund. In detail, Index funds are traded at the fund vendors. Commonly, fund vendors recommend investors representative index fund which has big size and old age. When the investors are not able to understand the information on the Index fund, they prefer the well-known fund vendors and choose their fund recommended by these vendors. As such, depending on the characteristics of ETFs and Index funds, investors prefer their funds, which is one of reasons for the coexistence of these types of funds.

Table 8. The Behavior of ETFs and Index fund Investors

This table examines the behavior of ETFs and Index fund Investors using the following equations:

$$FlowETF(IF)_{i,t} = \alpha_{i,t} + \beta_1 flow_{i,t-1} + \beta_2 fundPerf_{i,t-1} + \beta_3 fundTNA_{i,t-1} + \beta_4 FamTNA_{i,t-1} + \beta_5 fundage + \beta_6 expense_{i,t-1} + \beta_7 First(bigvendor) + \varepsilon_{i,t}.$$

The cash flow of ETF i at time $t-1$ ($flow_{i,t-1}$) is an control variable because of the persistency of cash flows(Cashman et al, 2007) This study uses the risk-adjusted return calculated from the three-factor model(Fama and French, 1993) as a measure of fund performance. $fundTNA_{i,t-1}$ and $FamTNA_{i,t-1}$ are the logarithm of the lagged total net asset value of the fund and the families which manage the fund. $fundage$ is the number of years since the fund launch date. $expense_{i,t-1}$ is the lagged total expenses. $First$ is dummy variable which is 1 if ETF is the first launched product among the other ETFs which track same benchmark. In case of Index funds, we employ the dummy variable $bigvendor$ which is 1 if the fund is sold by the large sales company whose TNA is over 0.8 billion. We run regressions with clustered standard errors. The symbols *, ** and *** indicates statistical significance at less than the 10%, 5%, and 1% levels, respectively.

	$FlowETF_t$	$FlowIF_t$
Intercept	-0.012831*	367082
	(-1.85)	(0.77)
$flow_{i,t-1}$	0.0669598*	-0.00361
	1.79	(-0.04)
$fundPerf_{i,t-1}$	0.2032584***	1613.12
	4.88	(0.03)
$fundTNA_{i,t-1}$	0.0000266	124024***
	0.17	(8.47)
$FamTNA_{i,t-1}$	0.0008546*	57285.54
	1.80	(1.53)
fundage	-0.0000003	53.54212**
	-0.95	(2.57)
$expense_{i,t-1}$	1.346955*	-4902530
	1.90	(-0.57)
First	-0.0002931	
	-0.62	
bigvendor		79695.47**
		(2.00)
Obs.	9182	292319
$adj.R^2$	0.00436	0.0023

5. Conclusion

This paper analyzes the substitutability and coexistence of two similar investment vehicles that are conventional index funds and exchange-traded funds (ETFs) in Korean market. The two vehicles track same market indexes, but have different organizational structures and characteristics. It could be considered intuitionally ETFs are more efficient for lower cost and liquidity. However the choice of investing depends on investor's characteristic and specific circumstances.

Although previous studies have examined conventional index funds and exchange-traded funds (ETFs), they have focused on tracking errors and price efficiency of ETFs, and the effect of ETF introduction on the index funds in Korean market. This study investigates empirically explanations of the substitutability and coexistence of two investment vehicles. The sample period is from January, 2006 to December, 2011 and 399 index funds and 16 ETFs following 6 benchmark indexes have been

examined in this study. Fund data are generously provided by Korea Exchange, Zeroin and FN Guide, Korean financial data providers.

First, the mean tracking error is 0.007786 on average that indicates ETFs and conventional index funds generally track their underlying indexes closely, and doesn't have a significant impact on investors. Mean of tracking errors are not statistically different between fund types, but ETFs have smaller tracking errors on average.

Second, we found that conventional index funds and ETFs are not substitutes, and flows to both fund types does not affect each other. Flows to ETFs are positively related to lagged flows for conventional index funds and ETFs, lagged fund returns, and the industry flows. Also, flows to ETFs are negatively related to return of underlying indexes and information ratio. The substitutability came from policy, end of stock exchange tax exemption of public offering fund, is also both fund types are not substitutes.

Third, the empirical analysis with the coexistence of both instruments by a clientele effect presents the similar result. Individual retirement pension and long-term home mortgage mutual funds are not related to flows for conventional index funds and ETFs.

We make inferences from the result are due to organizational structures and characteristics of conventional index funds and ETFs in Korean market. ETFs are traded on the stock exchange and underutilized as a method of long-term investment. On the other hand, conventional index funds are disadvantaged within three months redemption of funds. So investment to conventional index funds can be lead to long-term investment. It can be the other reason that is low growth of investment and NAV size of ETFs. The effective growth of ETFs was begun in 2007, and implementation of Korean capital market integration act caused diversity of ETFs in 2009. Therefore analysis have had limit because of relatively short history of the growth of ETFs. Also most of investment funds of ETFs were institution or foreign investors as of December 2011. From all of the above, it can be inferred that conventional index funds and ETFs are not substitutes each other because of ETF’s growth deficit in Korean market.

This paper contributes to the literature by empirically investigating the substitutability and coexistence of conventional index funds and ETFs(analysis of the substitution and clientele effects) in Korean market. Unfortunately in Korea, sufficient studies have not conducted to fully such as long and short-term investors and retail and institutional clientele effect, due to its relatively short history of fund market and lack of data availability. We leave it to future

Appendix:

List of ETFs and Index funds grouped by Index

Benchmark	ETF	Index fund
KOSPI200	KODEX200	Samsung Index Plus Securities Investment Trust 1
	KOSEF200	IBK KOSPI200IndexSecurities Investment Trust
	TIGER200	Mirae Asset KOSPI200 Index Securities Investment Trust
	KINDEX200	Shinhan BNPP BEST Index Plus Alpha Securities Investment Trust 1
	TREX200	Kyobo Axa Power Index Derivatives Investment Trust 1
	KStar200	Tongyang Moadream Index Securities Investment Trust 1
	Arirang200	ING Index Premium Securities Investment Trust 1
	PowerK200	KB star Korea Index Securities Investment Trust and so on.
		Total 371
KRX100	TIGERKRX100	Mirae Asset KRX100IndexSecurities Investment Trust 1
	KOSEFKRX100	WooRiKRX100IndexSecurities Investment Trust 1 and so on.
		Total 16
MKFMidValue	TIGERMidCap	Samsung KODEX Midcap-value
MKFBlueChip30	TIGERBlueChip 30	Mirae Asset Bluechip30IndexSecurities Investment Trust
MKFGreen Index	TIGERGreen	Mirae Asset Green Index Securities Master-feeder Securities Investment Trust and so on.
	GREATGreen	Total 5
SRI Socially Responsible Index	GREATSRI	Yuri Dow Jones Socially Responsible Index Securities Investment Trust and so on.
	PIONEERSRI	Total 5

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