AN ECONOMIC INTERPRETATION OF ETF EVOLUTION: SUGGESTIONS FOR CHINA ETF INNOVATION

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ABSTRACT

Exchange Trade Funds (ETF) perhaps are one of the most significant and successful financial innovation in that past decades. This manuscript provides not only a brief survey of the ETF development but also the economic interpretation of ETF evolution. Specifically, demand for market basket from the theory of mutual fund separation is the fundamental driving force for index instruments. Arbitrage process toward market equilibrium explains the need for continuously tradable index tracking products. The arbitrage theory is also crucial for the explanation of ETF expansion. The paper demonstrates that the ETF expansion should consider the replication of risk-factor borne by investors: in addition to the market risk factor, there are four factors, *value*, *momentum*, *contrarian*, and *liquidity*. Importantly, this article conservatively makes few suggestions for the ETF innovation in China. From the viewpoint of fair-market equilibrium, this research paper recommends the allowance of *conditional short-sale* of ETF products. The *money market ETF* could be an important ETF innovation in China. It attracts non-speculative investors or savers and increases Stock Exchange's activities. The development of ETF derivatives is also necessary to eliminate unnecessary arbitrage opportunity and further promote market efficiency. Finally, this article proposes a simple centralized model using ETF for facilitating China Share Reform.

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I. Introduction

Exchange traded funds (ETFs) – though 'ETF' may still be a buzz-word to many investors – are becoming one of the most popular and important investment products available to both institutional and retail investors, developed in the last ten to fifteen years. Since its humble beginnings in Canada's Toronto Stock Exchange and the American Stock Exchange, exchange traded funds have proven to be innovative, effective, and on the cutting edge of investing. Although countless articles have been written explaining what ETFs are, why investors may benefit from using them in their investment portfolios, and/or how the ETF affects market liquidity and volatility, there is no theoretical explanation about the demand for ETF and its important function toward market efficiency.[2] One of the purposes of this article is to summarize the development of ETFs and provide a rational economic interpretation of ETF evolution.

As reported by Bloomberg, by the end of 2004, the worldwide ETF market included 329 different funds with $313.2 billion in assets under management. Of that market the United States had an astonishing $227.7 billion in 152 portfolios (see Ackermann, M (2005)). ETFs have grown in popularity with both short-term and long-term investors for a number of reasons, including their net asset value pricing model, tax efficiency, low costs, liquidity, and flexibility. ETFs are considered to be a hybrid between traditional mutual funds – particularly those that track indices - and equity stock. ETF shares can be traded like any other share on major stock exchanges, as investors may take long or short positions, buy on margin, and even purchase options contracts on the funds. Unlike mutual funds which are traded only at the end of the day, ETFs are traded throughout the trading day just as common stocks are. Like an indexing mutual fund, each share represents a basket of stocks held by the ETF. The stocks generally track a specified index which could be a well known index such as the Standard & Poor's 500 Index or it could track a specific country, sector, or industry.

ETFs offer many of the same benefits as traditional mutual funds, particularly instant diversification. Most retail investors cannot afford to adequately diversify their portfolios or to successfully track an index. Instead, investors may invest in mutual funds and ETFs as a way to

[2] In addition to newspaper reports and professional magazine articles, there are many academic papers focus on the analysis of ETF. For example, Elton, Gruber, Comer and Li (2002) analyze the performance of ETF. Chu, Hsieh and Tse (1999) and Chu and Hsieh (2002) address the issue of pricing efficiency of ETF. Hasbrouck (2003) investigates price discovery of ETF. Hedge and McDermott (2004) examine the market liquidity of ETFs and their underlying securities.

claim ownership in a huge basket of stocks that they would otherwise not be able to own. Evidence shows that the growing popularity of ETFs comes from investors who have invested in traditionally managed mutual funds. Though mutual funds have become exceedingly popular, most fund managers have not been able to consistently beat the market. As a result, investors naturally tend to hold the market funds, since aggressive fund managers fair to beat it. In addition, long-term, buy-and-hold investors prefer ETFs to open-end index funds because of their tax advantages. ETFs are tax advantageous in comparison to traditional mutual funds in that ETFs rarely have to make capital gains distributions to its holders. This is true for two reasons. First, the funds are not actively managed. That is, the assets of the fund are not actively bought and sold as with traditional mutual funds. The only time that the make up a fund is changed is when the make up of its underlying index changes. Second, the creation/redemption procedure for ETFs is tax efficient. With a traditional mutual fund, when demand for the fund decreases fund managers must sell some of the underlying assets and thus create capital gains for the investors who continue to hold the fund. ETFs conversely are set up so that fund managers may trade with investors in the primary market, shares of the ETF for proportionate baskets of its underlying stocks and vice versa to adequately meet the demand for the ETF. With this method of redemption, low capital gains are realized and thus a lower tax burden to investors.

Investors prefer investment of ETF to that of closed-end funds because that ETFs trade at or very close to the net value of its underlying assets, free of any substantial premium or discount. This is mostly a result of the creation and in-kind redemption structure of ETFs. Because large investors in the primary markets can easily exchange baskets of stocks for ETF shares and vice versa, they may readily harp upon any disparity between the trading price of the ETF and the underlying NAV and thus keep the ETF trading at or very close to its NAV. While the benefits and growing popularity of exchange traded funds is becoming clearer, there is no rational economic explanation of the evolution of ETF. This article attempts to fulfill this gap.

The creation of ETF originates from the demand for market basket products (Rubinstein, 1989). In fact, this demand for index product has been implicitly documented by the theory of mutual fund separation (Ross, 1976). Under the equilibrium, the efficient set of investment alternatives can be fully characterized by a zero-systematic risk asset and fully diversified market portfolios. Investors are able to allocate their efficient investment by a combination of risky-free bond and index funds according to their different degree of risk-aversion. The arbitrage process

eliminates arbitrage profit, discover prices and promote efficiency. Nevertheless, this process requires basket or index instruments have high tracking ability, a continuous market through time, and low creation and trade execution costs. The natural evolution of ETF is to meet this market requirement as the traditional index funds fail to do so.

For well-diversified portfolios of assets, the idiosyncratic risk is eliminated, and the risk can be quantified as the systematic risk or technically as the beta risk. The beta risk is linear in nature. This manuscript demonstrates that the linearity of beta risk creates arbitrage opportunity such that investors are able to combine different market baskets – though they are all efficient in the risk-return trade off – to form arbitrage portfolios. This provides an incentive for the expansion of ETF. I classify the expansion of ETF as the ETF decomposing into two ways: (1) there is a tendency of horizontal expansion. The core market ETF is decomposed into a set of sector ETFs. For instance, Dow Jones U.S. sector ETFs can be viewed as the decomposed ETF of Dow Jones total market index ETF; (2) contrary to horizontal expansion, the vertical expansion naturally occurs by decomposing the core market ETF by different characters such as Dividend ETF, Capital-Gain ETF, Value ETF, and Growth ETF. The decomposing expansion of ETF also indicates that investors seek not only immediate risk diversification but stock selection based on some preferable selection criteria.

The investment preference selection of investors shows that the possible next expansion of ETF could be the transform of passive market index oriented ETF to the aggressive nature of managed ETF. However, different from traditional aggressive mutual funds, many owners of ETF may demand transparency so that they are able to, at any time, look into the baskets. This paper attempts to analyze the possibility of this kind of ETF expansion. The second purpose of the article is to provide suggestions to the Shanghai Stock Exchange for the innovation of ETF in China. It is important to note that allowing short-selling on ETF, particularly for market index ETFs covered by put options writing, could be a smooth approach to release the short-sale restriction in China equity market without any significant instability. This article suggests that forming a ETF trust fund by converting state shares into ETF with a portfolio insurance using ETF put options could significantly promote China stock market stability in the post share reform period. The author of this manuscript strongly recommends that any expansion of ETF products could follow the guideline of vertical and horizontal expansions of market baskets and importantly the parity relationship among different ETF instruments and markets.

The remaining of this paper is organized as follows: Section 2 presents a theoretical interpretation of demand for market baskets. The theories of two-fund separation and arbitrage behaviors explain the development of ETF. Section 3 describes the ETF development from 1980s to 2000s in the U.S. financial markets. Section 4 surveys several important academic literatures about ETF performance, market liquidity of the underlying securities of ETF, price formation process and price discovery of ETF and other issues. In Section 5, I demonstrate the importance of ETF derivatives. The invisible hand toward market equilibrium through arbitrage process across markets is carefully documented in the section. The index arbitrage shows the importance of ETF futures contracts. Section 6 provides suggestions for China ETF innovations. These suggestions can be summarized as (1) the expansion of ETF based on the vertical and horizontal approach, (2) following the market nature of arbitrage process toward equilibrium by allowing short-sale on market ETFs, (3) carefully designing derivatives for serving the purpose of risk-diversification, and (4) fully utilizing ETF and its derivative for market stability of the post China Share Reform. Finally, a conclusion remark is provided in Section 7.

II. DEMAND FOR ETF: A THEORETICAL INTERPRETATION

Although exchange-trade funds (ETF) are the most significant and successful financial innovation in the recent history, the theory of this development has been documented for almost three decades. In fact, the ETF development can be viewed as a natural evolution of financial products to meet the demand of investors' risk behaviors.

II.1 *Two-fund Separation: Demand for Index Funds*

The theoretical of ETF evolution relies on the theory of mutual fund separation. David Cass and Joseph Stiglitz (1970) derive conditions for two-fund separation. The separation means that under certain conditions such that investors' risk preference and utility function is irrelevant to the investment choice of individual securities and/or their combinations (portfolios). All risk-averse investors agree that the optimal investment choice depends on a linear combination of two funds: *a risk-free bond* fund and *a risky index portfolio*. Cass-Stiglitz show that in an incomplete market, the two-fund separation holds for a class of utility functions called as Hyperbolic Absolute Risk Aversion (HARA) utility class. Without a risk-free asset, the separation holds

only for quadratic and constant relative risk aversion (CRRA) utility funds. Although Cass-Stiglitz two-fund separation is usually applied in a static framework without considering portfolio rebalancing, it is also valid for analyzing dynamic strategies. Besnainou, Jordan and Portait (2001) demonstrate that in the dynamic framework, *portfolio rebalancing*, as opposed to a *buy-and-hold strategy*, is necessary to two-fund separation. Specifically, investors need to synthesize a risk-free asset or a zero-beta portfolio as time passes. It is important to note that the portfolio rebalancing requires a continuous trading process among cash, bonds and mutual funds.

Robert Merton (1971, 1973) shows that within an explicit dynamic framework and without restrictions to the way risk-aversion parameters may vary as in the Cass-Stiglitz approach, investors' investment choices depend on two funds in an arbitrage-free market. Again, one fund is a risk-free portfolio, and another fund is the growth-optimal risky portfolio. In the dynamic framework, increasing risk aversion can be reflected by decreasing weight in the growth-optimal portfolio, and consequently increasing weight in cash. This indicates the optimal choice of investment could be continuously moving along a linear tradeoff between the two-fund. This is the market equilibrium that is agreed by all investors regardless their rsik-reference. Stephen Ross (1976) Let the return generating process of asset follows a linear format such that $\tilde{r}_j = \alpha_j + \beta_j \tilde{r}_m + \tilde{\varepsilon}_j$, where $\tilde{r}_j$ is the returns on asset *j*, α_j is a non-dynamic term, $\tilde{r}_m$ is the index return of risky securities, and $E(\tilde{\varepsilon}_j | \tilde{r}_m) = 0$; the conditional mean of noise term on the index return is zero. Stephen Ross (1976) demonstrates that without any restriction on utility functions, the two-fund separation holds. This condition of the linearity of returns ensures the irrelevance of investor risk-preference to the individual asset choice. From the above two-fund separation theory, ETF is superior to the traditional (open-end) index mutual fund in that ETF is continuously tradable in the open market. That is, the traditional index funds are unable to ensure the separation result. In addition, the arbitrage theory is able to explain the existence of ETF.

II.2 *Arbitrage Process toward Pricing Equilibrium*

For a purpose of simplicity, let's consider the following numerical example. There are three well diversified portfolios (with no idiosyncratic risk) have risk and returns as:

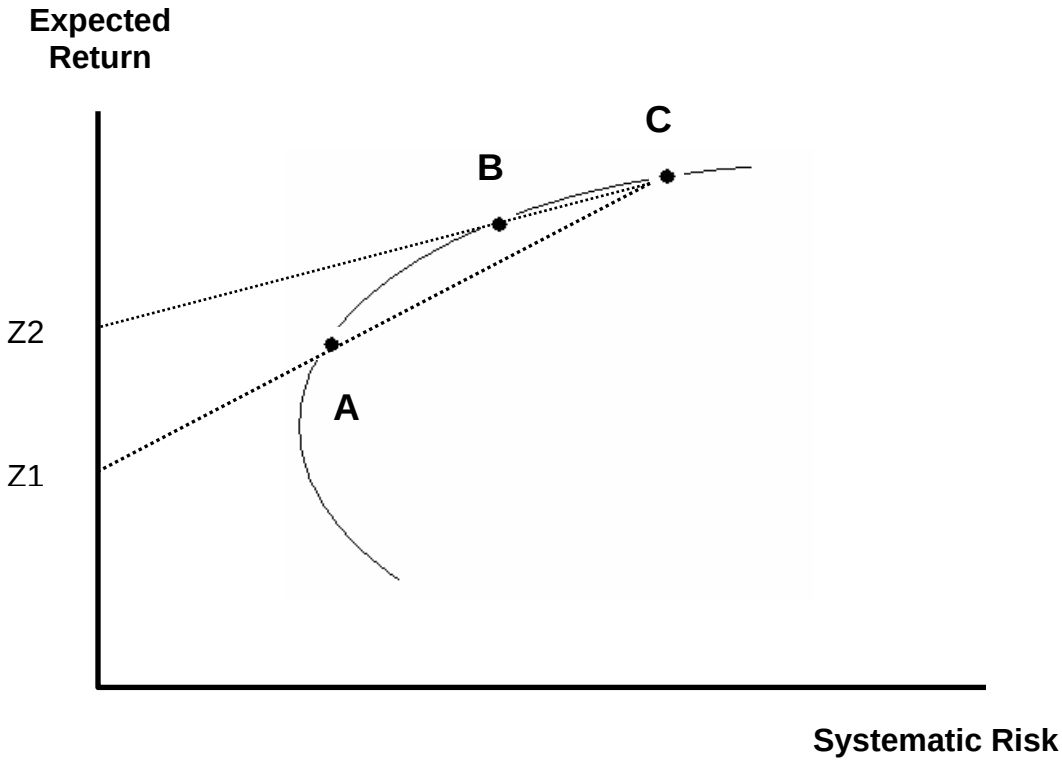
	Portfolio A	Portfolio B	Portfolio C

Expected Return	0.06	0.09	0.11
Systematic Risk	0.5	1.0	1.5

Since the systematic (or ß) risk is linear in nature, one is able to form a zero-beta portfolio using A and C such that $\beta_{z1} = 0 = w_A\beta_A + (1 - w_A)\beta_C$. By substituting the betas of A and C into the equation and solving for w_A, we have w_A = 1.5, and w_C = -0.5. That means that for an investment with net worth of $100, to form a zero-risk portfolio (Z1), one could short A for $50 and simultaneously long $150 of C. The return of Z1 is then equal to 0.035 (1.5x0.06-0.5x0.11). Meanwhile, another zero-beta portfolio can be constructed by combining B and C. That is, $\beta_{z2} = 0 = w_B\beta_B + (1 - w_B)\beta_C = w_B + 1.5(1 - w_B)$, w_B = 3, and w_C = -2. Interestingly, the return of this zero-beta portfolio, Z2, is equal to 0.05, which is higher than that of Z1. Since both Z1 and Z2 are risk-free, one obtains risk-less arbitrage profit by shorting Z2 and purchase Z1. Figure 1 depicts this risk-return relationship among well-diversified risky portfolios A, B and C. Although this relationship is infeasible under the equilibrium, it *necessarily* exists for the market making process toward equilibrium. I discuss this issue as follows:

Figure 1

Infeasible Arbitrage relationship between Expected Return and Risk for Well-Diversified Portfolios



Arbitrage opportunity dependents on three parameters: *Investment*, *Risk* and *Return*. If a project requires no Investment (no out of pocket cash outlay), the project has no risk, and the return is positive, then an arbitrage opportunity exists. Alternatively, if there is a positive investment outlay, the project is risk-free, and the return is higher than the market risk-free rate, then the arbitrage also appears. The above example such that the return of Z2 is higher than that of Z1 clearly indicates the existence of arbitrage. Arbitragers take the arbitrage profit, whenever they found the opportunity. For example, shorting Z2 means that the investor will simultaneously short sell portfolio B and purchase portfolio C. At the same time, the arbitrager long Z1 by buying A and Shorting C. Consequently, through this arbitrage process, the buying pressure will increase A's price, and the selling pressure pushes down the B's price. Consequently, portfolios A, B and C risk-return are priced as a linear relationship. That is, no matter how one form zero-beta portfolios among A, B and C, the result is the same. The return of all zero-beta portfolios is identical and unique, the price is fair to all buyers and sellers, and thus equilibrium exists. Importantly, this indicates that the equilibrium is non-static and is in fact dynamic through a continuous arbitrage process.

There are three important characteristics of Exchange Trade Funds that make them as very useful tools for arbitrage process. First, ETF are continuously tradable during the market opening period; Second, ETF are well-diversified portfolios; and Third, ETF are tracking instruments with very small tracking errors. Following the above example of arbitrage process toward pricing equilibrium, portfolios A, B and C must be well-diversified portfolio, index instruments, and tradable for all investors. Traditional index funds fail to do so. For open-end funds, although they behavior as indexes, these funds are not tradable during the daily trading hour. For closed-end index funds, there is a large tracking error, and thus it is surely unsuitable for arbitrage process. Note that this arbitrage process occurs at the spot markets, and thus index futures contracts are not useful. Consequently, the exchange trade funds or index tracking stocks are financial products from *natural market evolution*. Specifically, the necessary arbitrage process for market equilibrium promotes the creation of ETF. Since there is infinite number of diversified portfolios (or funds) along the efficient frontier, the arbitrage opportunity caused by the dynamic infeasible but existing non-linear relationship among funds is obviously infinitive. In summary, the reason of creating ETF is simply a market evolution of pricing efficiency, and this creation and/or innovation will be continuous and expanding.

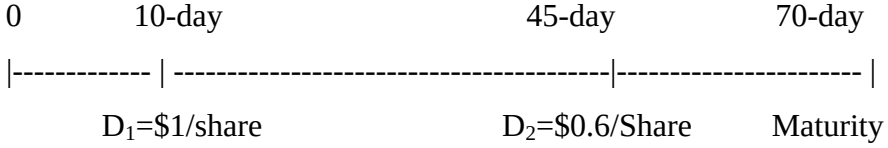
II.3 *Index Arbitrage*: *Motivation for ETF Creation*

The arbitrage process toward price equilibrium not only exists in the cash market but also appears across different markets, for example between Spot and Futures markets. It is well known that in theory, futures prices are determined by force of arbitrage. There is an invisible hand for keeping the price balance between futures and its underlying spot assets. When arbitrage opportunity exists, markets are not in equilibrium, and traders will quickly act to exploit arbitrage profits. The arbitrage process always involves simultaneous execution of long and short activities. An arbitrage profit is risk-less, involving a positive cash inflow at one or more dates, and zero cash flows at all date. That is, arbitrage requires no investment and no cash outlay, and the arbitrageur generates only cash inflows at one or more dates.

To illustrate the arbitrage process between a stock index and its futures contract, I employ a hypothetically numerical example. Consider a value-weighted index of 3-stock.

Stock	Current Price	Share Outstanding	Market Value	Weight
A	60	250,000	15000000	0.3
B	25	600,000	15000000	0.3
C	10	2,000,000	20000000	0.4

Suppose stock A will trade ex-dividend in the amount of $1.0/share 10 days from today. Stock B will trade ex-dividend in the amount of $0.6/share 45 days from today. Stock C pays no dividends. The maturity of an index futures contract is 70 days from now. We may graph these future dividends in a time line as follows:



*If the futures contract is priced at 1199 (with a value of 1199*250 = $99,750/Contract), is there any arbitrage opportunity*? From the theory, the futures value (*F*) is equal to the spot price (*S*) pluses the carrying cost (*CC*) and minuses the carrying returns (*CR*) such that $F = S + CC - CR$. For stock index futures, the carrying is the interest income of holding the index, and the carrying returns are dividend incomes that investors hold until maturity of the futures. Suppose the risk-less rate of interest rate is 5% per year, then the holding period interest rates for dividends and/or current cash until maturity of the futures contracts (70-day) can be calculated as:

Holding Period	Today to 70-day	10-day to 70-day	45-day to 70-day
Interest Rate	0.96%	0.82%	0.34%

Thus, the carrying cost (*CC*) can be calculated easily as

$$CC = 1200 \times 0.96\% = \$11.51.$$

However, to calculate the futures value, particularly for the carrying costs (*CR*), investors must form a portfolio of stocks to replicate the index. First, one needs to determine how many shares of the underlying stocks A, B and C to purchase. Consider that the market value of spot is $300,000 (=1200*250). By using the weights that has been determined in the previous table, the number of shares for replicating the index can be determined in the following table:

Stock	Cash Value of stock in 250 Shares of Index	Number of Share needed to Replicate the index
A	90000	1500
B	90000	3600
C	120000	12000

The *CR* of stock A is then computed as $CR_A = [1500 * \$1 * (1+0.82\%)]/250 = \$6.05$, and that of stock B is $8.67, where $CR_B = [3600 * \$0.6 * (1+0.34\%)]/250$. Consequently, the index futures should be priced at $F = 1200 + 11.51 - 6.05 - 8.67 = 1196.79$.

The current futures price of 1199 is higher than the theoretical value such that $F > S + CC - CR$ or $F-(S + CC - CR) = 2.21 > 0$. There is clearly an opportunity of arbitrage, and the traders and/or market makers will re-act immediately to take the profit. The amount of arbitrage

profit is approximately $550/contract. This is the *Index Arbitrage*. To implement the arbitrage trading, traders will perform the cash-and-carry arbitrage as follows:

Today:	Cash
(1) Buy the component stocks of the index in the appropriate weights, so that the index is replicated: Buy 1500 shares of A, 3600 shares of B and 12000 shares of C	- $300,000
(2) Borrow the foregoing amount for 70-day, at a holding period rate of 0.96%	+ $300,000
(3) Sell one future contract at its current futures price of $1199 (no cash flow results; use a bank letter of credit, or securities, to meet initial margin requirements)	0
Total initial Cash Flow	**0**

10-day:	Cash
(1) Receive dividends from Stock A ($1/share for 1500 shares)	+ $1500
(2) Save or lend dividends for 60 days at a holding period rate of 0.82%.	- $1500
Total Cash Flow	**0**

45-day:	Cash
(1) Receive dividends from Stock B ($0.6/share for 3600 shares)	+ $2160
(2) Save or lend dividends for 25 days at a holding period rate of 0.34%.	- $2160
Total Cash Flow	**0**

On the Delivery Date (70-day):	Cash

(1) Sell 1500 shares of A, 3600 shares of B and 12000 shares of C at the market prices	+ (1500 $S_{A(T)}$ + 3600 $S_{B(T)}$ + 12000 $S_{C(T)}$)
(2) Repay loan and interest	- $300,000 (1+0.96%) = -302,880
(3) Buy (offset) the futures contract at F_T	+F_0 - F_T = 299750 - (1500 $S_{A(T)}$ + 3600 $S_{B(T)}$ + 12000 $S_{C(T)}$)
(3) Receive Payment from lending of $1500 for 60-day	+ $1500 (1+0.82%) = + 1512.30
(3) Receive Payment from lending of 2160 for 25-day	+ $2160 (1+0.34%) = + 2167.34
Total Arbitrage Profit	**$550/Contract**

From the above simple example, it is clear that the index arbitrage promotes the need for stock basket trading. Unfortunately, before the introduction of ETF, the basket trading requires a large amount of capital and a simultaneous execution of trading (i.e., program trading). Therefore, only few capable institutional traders are able to conduct index arbitrage, and thus, it increases market inefficiency and potential market risk of irrational behavior. The US stock market crash of 1987 is a typical case. Under a computerized program trading for executing a set of large number of stocks, it may cause a very significant and irrational market movement. For instance, when futures contracts are priced below their theoretical value, a negative basis, arbitrage profit exists by buying futures and simultaneously shorting or selling the underlying stocks. This arbitrage process is taken in a very short period of time. A wide range of selling pressure appears in the stock market creates panic selling force from individual investors and/or speculators. Consequently, it results a market crash. To prevent this type of market crash, the most effective approach is to naturally eliminate the program trading by allowing all investors to participate index arbitrage process. That is, if the basket trading is available for even a small investors (it is no longer a special privilege to few large institutional traders), then the arbitrage opportunity is almost infeasible, and the market becomes efficient. ETF was created for this purpose.

II.4 *Guidelines for ETF Innovation*

One of the key factors for ETF innovation is to provide perfect instruments for arbitrage process and for all investors. There are eighteen characteristics to have an ideal market basket instrument (the ETF):[3]

(1) it represents an important component of risk borne generally by investors;
(2) it should have low tracking error;
(3) it has a continuous market through time;
(4) it has low creation costs;
(5) it has low trade execution costs;
(6) it has low inventory carrying costs;
(7) it preserves or enhance tax benefits;
(8) it has full collateralization;
(9) it passes through voting rights;
(10) it is offered in small enough unit size to appear to small investors;
(11) it has a predetermined long life before forced liquidation or turnover;
(12) it does not provide incentive to manipulate price illegally;
(13) it is part of related system of securities permitting desirable variations in patterns of returns;
(14) it is not subject to various miscellaneous security regulations;
(15) it possess a number of desirable trading features;
(16) it is simply described to potential investors and readily accessible price quotations;
(17) it is consistent with existing securities regulation; and
(18) it removes all basket-motivated trading away from the individual securities comprising the basket.

These characteristics can be summarized as: First, the creation of ETF is to mimic an important component of risk borne generally by investors. For example, a broad market index ETF quantifies the systematic risk that is un-diversifiable for general investors. A sector ETF tracks the price volatility of a subset of the board market (a specified industry). The volatility of a fixed income ETF represents the interest rate risk. Second, ETF must be a perfect tracking instrument

[3] These characteristics have been proposed by Mark Rubinstein (1989)

such the change of net asset values of fund is equal to price movement of the underlying index. Third, ETF must be accessible for general public investors. Fourth, the protection to investors is ensured. Finally, ETF minimizes market imperfection such as regulative restrictions, taxation, and transaction costs. In addition, the creation of ETF must consider short-sale allowance. With short-sale restriction, the arbitrage process for fail price discovery is incomplete, the price equilibrium is unable to reach, and the market will be inefficient.

III. THE HISTORY OF ETF

Just months after Black Monday, a general manager of the Toronto Futures Exchange (TFE) named Andrew Clademenos was appointed director of derivative markets at the TFE in January 1988. Clademenos approached his new task determined to breathe new life into the incredibly volatile market. The Futures Exchange had not lived up to its earlier expectations, mainly due to fierce competition from the Chicago and New York futures markets, and Clademenos was resolute to inject more vigor into the futures market by introducing new products.

III.1 *Toronto Index Participation Units:*

Whilst Clademenos and the researchers at the TFE worked diligently to create a product that might bring a new life to the exchange, independent futures and options traders grew exceedingly scarce. They grew so scarce, in fact, that the TFE began taking drastic measures to bring in international investors. In the summer of 1988, advertisements sponsored by the exchange appeared in the South China Morning Post offering to help traders interested in futures trading in Toronto to qualify as immigrants through Ottawa's business immigration program. The TFE offered letters of recommendation to immigration officials to Hong Kong traders who could deposit a minimum of $100,000 into a trading account with the futures exchange and provide guarantees that they would remain active and independent traders for some time.

Then, on 13 October 1989 things got even worse. The proposed financing arrangements of a proposed purchase of the parent company of United Airlines Inc., UAL Corp., collapsed. Investors, fearing that other debt financed takeovers would share the same fate, began frantically dumping their stocks. The values of the NYSE and the TSE both fell drastically, the worst market meltdown since Black Monday. At this point in time, many analysts believed that, as in

1987, several adverse financial and economic developments were coalescing to unnerve investors' confidence. Indeed, they were right. The TSE soon plummeted to its fourth-worst trading day in history. Retail investors were simply too nervous to play the volatile market.

This downtime in the market fostered an intense turf war between exchanges over both retail and institutional investors. The TSE was competing with the Montreal Exchange for domestic institutional and retail investors. They were also competing with New York and Chicago exchanges for institutional futures and options traders.

With uncanny timing – just 11 days after the October 13th drop, addressing delegates at the Fifth Canadian International Futures & Options Conference, Andrew Clademenos revealed plans for a new product that he believed would bring back retail investors as well as attract interest from domestic and international institutions. The product was of course the Toronto Index Participation Units or TIPs. Clademenons informed the delegation that TIPS would be a new way to invest in all of the 35 blue ribbon companies in the TSE 35 index. He added that the TSE was seeking "regulatory approval for a derivative product that allows institutions and small investors to buy all 35 equities in one basket." Units in the index fund would resemble mutual funds and trade on the exchange like stocks, offering advantages such as instant diversification, no management fees, RRSP eligibility, dividend income tax credits, and voting rights.

The announcement of TIPs was met with mixed reactions. Many analysts were excited by the idea, maintaining that volatility was a fact of life in the market but the withdrawal of so many retail investors further increased price swings in share prices. These analysts believed that attracting retail investors back to the TSE would help stabilized prices. Others were intrigued by possible hedging strategies. One hundred eighty degrees away from these analysts were TSE members who argued that TIPs would work against investors buying individual stocks and thus hurt the overall market. Others still were against TIPs because they saw it as a vehicle for promoting program trading. Nevertheless, the TSE approved the issue of nearly 12.5 million Toronto Index Participation Units, valued at $248 million on 16 February 1990.

On 9 March 1990, TIPs began trading on the TSE and exceeded the expectations of of TSE officials and market analysts as investors traded 157,765 units. Reacting to the first day accomplishment of his new innovation and sensing that the introduction of TIPs was successful on even the first day of attracting retail investors, Andrew Clademenos proclaimed, "we're

delighted with the first day of trading. It was more than expected and where were lots of small orders, so it's not just the big guy who's trading."

In the ensuing months, TIPs became exceedingly popular. By September of 1990, only 6 months after its introduction, the number of issued TIPs was up to 23.2 million with an average of 230,000 units being traded every day. By January of 1991, there were nearly 33 million outstanding units and by May of 1991, 44.4 million units. In December of 1991, less than two years after its introduction, TIPs surpassed the $2 billion mark in value of TIPs trades. This innovative product had undoubtedly caught on as a legitimate and popular investment vehicle for all types of investors, and the United States exchanges were taking notice.

III.2 *Amex's Equity Index Participations:*

Nearly every report issued by the Security and Exchange Commission following the 1987 market crash encouraged the development of innovative products to more closely link equity and futures markets, specifically an equity index product and a mechanism for trading baskets of stock on exchanges. By July of 1988, the American Stock Exchange filed an application with the SEC to trade equity index participations (EIPs) – a new product that stirred controversy and sparked a turf war between financial markets. The proposed EIPs were designed to allow investors to participate in the overall movement of the market, based on the Standard and Poor's 500 index. Giving individual investors the opportunity to participate in the market appreciation in the stocks of an entire index as if they owned all of the stocks, the product was also designed as an effort to attract retail investors back to the market as officials at Amex hoped that this future-option hybrid that trades like a stock would attract public interest.

In the months approaching the SEC ruling on Amex's application, ambiguity surrounding the product sparked intense debate over jurisdiction and foreshadowed the impending legal battle that ultimately killed index participations in US markets. Futures markets, backed by the Commodity Futures Trading Commission, fervently disputed that the index participations were "badly disguised stock-index futures contracts" and that only the CFTC had the right to approve such a product.[i] The Philadelphia stock exchange, which was the first market to propose a basket product, along with Amex emphasized the characteristics of an option in the EIPs. The trade association for mutual funds even chimed in, claiming that EIPs were really a form of mutual funds. On 14 March 1989 - only minutes after the SEC approved proposals by Amex as

well as the Philadelphia Stock Exchange and the Chicago Board options exchange to trade index participations – the Chicago Mercantile Exchange, the Chicago Board of Trade, and the CFTC filed a suit in US appeals court challenging the SEC's jurisdiction to make such an approval, marking the beginning of an overly litigious and political battle that lasted for years. The basis of the CME's argument was that EIPs were "economically indistinguishable from stock index futures contracts" and should therefore be regulated by the CFTC.

Kenneth Leibler, the president of Amex at that time, rebuked the suit as "harmful to investors and the financial markets", referencing the fact that an equity index product was suggested by many studies following Black Sunday. He added that "approval of Equity Index Participations is truly a major step in the evolution of financial instruments to meet the needs of today's investors" and to "provide investors with an economical and practical means of investing in virtually the entire stock market." The SEC placed a stay on its approval for trading index participations to allow it time to consider the CME's dispute but lifted it after one month. While the CME made plans to file for a motion for a stay, Amex began trading EIPs on 12 May 1989 and reached a first day volume higher than any new derivative securities product introduced in the 20 years prior to its release. Meanwhile, the debate over jurisdiction entered Capitol Hill as a senate subcommittee was created to focus on the issue of index participations.

Though they were gaining great popularity among investors – trading about 1 million certificates per day, EIPs didn't stay listed for long. Despite losing its appeal for a stay, the CME won its jurisdictional appeal in a US Court of Appeals only three months after EIPs began trading on Amex. EIPs were never traded again. The turf war over who should regulate such products continued well into 1992, but soon after, Amex rolled out a product that made EIPs obsolete and no longer necessary to fight for.

III.3 *Nate Most and His Spiders*

Whilst the turf war over index participations ensued, Nate Most, a former professor in physics and head of new product development for Amex in the late 80s and early 90s, had an ace in the hole with a product he called 'Standard and Poor's Depository Receipts' or SPDRs. Because SPDRs so closely resembled EIPs, they were put on the back-burner while Amex pursued listing EIPs, since it didn't make much sense for the exchange to list two products that were so much alike. Most recognized that SPDRs, which were designed more like the Toronto

Stock Exchange's TIPs, were fundamentally designed to be traded as securities. SPDRs were designed to have an underlying trust with a portfolio of stocks underwritten by member firms and had no expiration dates.

As the dispute continued and indexing products were no longer available from exchanges, investors began moving towards index-tracking mutual funds. As Most witnessed the growing popularity of these mutual funds, he recognized opportunity for listing SPDRs. With the help of the Boston based State Street, Most came up with the structure for SPDRs as it exists today. In June of 1992, Amex finally filed with the SEC a proposal to trade SPDRs. To get SPDRs approved, however, Amex needed a laundry list of exemptions from the SEC. It took nearly an entire year for the exemptions to come through and for SPDRs to be approved for trading. But on 29 January 1993, with a giant 9-foot spider hanging over the floor of the exchange from the ceiling and great deal of fanfare, SPDRs began trading on the American Stock Exchange. On its opening day SPDRs was the third most actively traded stock with a total volume of 1,003,200 shares.[ii] After six months of trading SPDRs had already increased its trust by 50% to $280 million and was increasing in popularity, appealing to both the average investor as well as the more sophisticated investor. Officials at Amex took notice of SPDRs' success and began planning spin-off products for other indices even though it was rather early in life of the new product.

SPDRs have since paved the way for the ETF market in the US, and essentially created a market for a brand new category of investment vehicle. In January of 1993 SPDRs took off and never looked back. Today it is the largest and most popular ETF available with $55 billion in assets as of 31 December 2004.

III.4 *World Equity Benchmark Shares and iShares:*

World Equity Benchmark Shares or WEBS were the next major development in ETF products. Borrowing the structure for SPDRs, officials at Morgan Stanley Group, Inc. and Amex joined together to create a family of exchange traded funds intended to each individually track one of 17 different Morgan Stanley Capital International Indices. The funds were created for a niche group of investors who desired vehicles that would allow them to make bets on individual oversees markets. Some indexing mutual funds existed for these indices but often traded at a premium or discount. The ETF structure would allow investors to trade much closer to net asset

value. Additionally, since ETFs are American listed securities, fund managers who wished to hold pieces of international markets but were explicitly banned from doing so now could with WEBS.

On 18 March 1996 17 WEBS began trading on the American Stock Exchange with similar fanfare to the debut of SPDRs. An enormous globe was suspended over the trading floor and the flags of each of the countries represented by the 17 WEBS were hung. Amex chairman Richard F. Syron proclaimed that "for the first time ever, both institutional and individual investors will be able to take advantage of international opportunities through a single equity trade on the American Stock Exchange and in US dollars. Trading internationally has never been easier."[iii] In their first quarter of trading, WEBS received so much attention that plans were made to launch at lest six more and to gradually create 21 more for a total of 38 WEBS.

WEBS are now known as iShares Morgan Stanley Capital International Index Exchange Traded Funds (MSCI) and are part of a larger iShares family of ETFs. Seeking to capitalize on the success of ETFs and to offer products to meet any investor's taste, Barclays Global Investors (BGI) aggressively released over 50 iShares in 2000 – a move that doubled the number of ETF offerings in the U.S. – and expanded from offering ETFs for single international markets. Not only were distinct international markets indexed but ETFs indexing emerging markets, domestic and global sectors, as well as more traditional domestic indices were also released. BGI sliced the market into nearly every conceivable way and indexed it as an ETF. iShares is now the largest family of ETFs available in the US market listing 82 different iShares as of March 2005. Appendix A shows a complete list of iShares products available as of July 2005.

III.5 *Diamonds and Cubes*

Building on the success of SPDRs and WEBS, Amex announced in June of 1997 plans to create a third ETF, this one to be based on what to some is considered the world's best market indicator – the Dow Jones Industrial Average. This new ETF was designed to allow investors to buy and sell all thirty blue chip stocks represented in the DJIA with the trade of a single security, the "Diamonds Trust". The Diamonds Trust began trading 20 January 1998 and after only four days saw nearly 7 million shares traded and it's total assets increase from $39 million to an astounding $193 million.

The real breakthrough for ETFs, though, came in March of 1999 when Amex unveiled its Nadaq-100 Shares, also known as "Cubes". The trust was set up just as its predecessors – Spiders, WEBS, and Diamonds. Its underlying portfolio held the Nasdaq's 100 largest non-financial stocks, including several giant technology companies that were making tremendous gains. Cubes could not have been released at a better time; it was a time when the technology sector was taking off – and so did cubes. The Nasdaq-100 Trust opened to the most successful launch of any new product in the history of the American Stock Exchange (at that time) with 2.6 million shares being traded. The trust grew so quickly that after only a little over one month, it had over $1 billion in assets. By this time, Nate Most's novel idea of index shares now had 30 unique products with over $16 billion in management and traded over 9 million shares per day.

The cubes continued to grow rampantly. By the beginning over November 1999, it reached the $3 billion mark and by the end of the month surpassed the $4 billion mark. One year later it rose past $20 billion, all the while bringing some much needed prestige back to the American Stock Exchange and serving as a catalyst to spark the growth of the ETF industry into what it is today. Today's investors can track much more than traditional indices such as the S & P 500 or the DJIA. Many ETFs have been created to track specific sectors both domestically and abroad while other ETFs have been designed to track certain investment styles, such as those established by Morningstar – small and large growth, small and large value, blend, etc. As of 31 December 2004, 169 ETFs were listed in the United States. One hundred forty four of those were listed on the American Stock Exchange, the premier venue for exchange traded funds.

Another form of ETF that is not in existence but has been discussed are actively managed ETFs. However, an actively managed ETF would defeat many of the fundamental reasons for which investors have come to choose ETFs over actively managed mutual funds. While there have been whispers of such product, it is unlikely that one will ever materialize.

III.6 *Fixed Income ETFs*

On 26 July 2002, Barclays Global Investors became the first to offer fixed income ETFs with the launch of four iShares products that tracked bond indexes based on Lehman Brothers indexes and Goldman Sachs indexes.[iv] In addition to offering many of the same benefits to investors as stock ETFs – low cost, diversification, professional management, buy and sell in any brokerage account, trade throughout the day – bond ETFs also give retail investors access to

fixed income pricing information, as it is difficult for investors to figure out what the price is for a bond.[13] In 2002, Lee Kranefuss, chief executive of BGI's individual investor business said the "with the ETF, a package of bonds trading on the stock exchane, you can look up what price it has traded for today; it's updated every 15 seconds."[13] He later added that "Unlike stocks, for which prices are widely disseminated, secondary bond market offerings are not centrally listed. Investors may have to turn to brokers who might mark up prices by as much as 5%, with investors having no way to verify the fair market value of the bond."[v] It is evident that the major advantages to investing in bond ETFs are getting fair market value on a portfolio of bonds that have similar maturities or qualities and the generation of income. One advantage of stock ETFs that fixed income ETFs are missing is the tax advantage. Though investors do not incur capital gains – bond ETFs share the same creation/redemption structure as stock ETFs – they are taxed at the regular income tax rate on the income generated through the bonds.

As of August 2004, there six fixed income ETFs listed, five tracking government bonds and one tracking corporate bonds. The chart below lists them.

Fixed Income ETFs	Ticker	Category
iShares Lehman 7-10 Year Treasury	IEF	Intermediate Government
iShares Lehman Aggregate Bond	AGG	Intermediate-Term Bond
iShares Lehman 20+ Year Treas Bond	TLT	Long Government
iShares Lehman TIPS Bond	TIP	Long Government
iShares Lehman 1-3 Year Treasury Bond	SHY	Short Government
iShares GS $ InvestTop Corp Bond	LQD	Long-Term Bond

IV. SOME SUGGESTIONS TO CHINA ETF INNOVATION

ETF is relative new financial products in China. Since the purpose of this article is not for introducing Chinese ETF, the focus will be on the nature and characteristics of ETF in China and the suggestion for improving the effectiveness of these newly created products.[4] It is important to note that any arbitrage process requires two-side markets, where long and short positions exist simultaneously. ETF are tracking instruments. To minimize tracking errors, arbitrage process is necessary. In China financial markets, short-selling is not allowed for both institutional and individual investors. Logically, then, one may question the tracking ability and/or effectiveness of China ETF. Nevertheless, the tracking errors of ETF in China equity markets are quite small.

ETF is an innovated product such that direct short-selling is unnecessary for arbitrage process. The creation of ETF involves "in-kind" transfer which avoids selling activities (cash conversion) of the underlying securities in the market. Unlike mutual funds and unit investment trusts, ETF shares are created when an institutional investor deposits a block of securities with the ETF in return for this deposit, the investor receives a fixed number of ETF shares, some or all of which it may then sell on a stock exchange. The institutional investor can get its deposited securities back by redeeming the same number of ETF shares it got from the fund. The arbitrage process is conducted as follows: If the underlying securities price is higher than the ETF, the institutional investors will trade a lower priced ETF shares back to the sponsor in exchange for the higher price securities by selling the securities and buy more ETF shares. Consequently, the ETF shares price increases and securities prices decrease. If the ETF shares price becomes higher than that of the underlying index, the institutional investors will trade the lower priced securities back to the fund in exchange for ETF shares. Then, the index price up and ETF price down until they are equal to each other. Note that this arbitrage mechanism is effective only when there is a large number of institutional investor participations and/or a significant size of capital investment.

IV.1 *Conditional Short-Sale Allowance for Exchange Trade Funds*

[4] For detail introduction of Chinese ETF, please visit www.sse.com.cn.

One of the major differences between ETF and open-end mutual funds is that ETF can be shorted and traded continuously with the markets.[5] In section II, we learn that the theoretical explanation of ETF evaluation is the market demand for the arbitrage process toward equilibrium. This is a natural market behavior, and any artificial restriction and/or blocking will definitely produce market inefficiency. It is extremely crucial to understand that although the in-kind transfer provides an alternative arbitrage process without short-selling, it has two major problems: First, zero-tracking error does not imply equilibrium. ETF could perfectly track the index movement; but this does not mean that there is a correct pricing on the underlying index. Second, the in-kind arbitrage process of index ETF is only for large institutional investors. It is absolutely not available for small investors. Therefore, ETF, from small investors' viewpoint, is just like a stock that tracks an index.

For small investors, if short-sale is not allowed, then the difference between ETF and Index Funds is quite insignificant. Consider a buy-and-hold strategy; an index mutual fund could track the index as good as the ETF. There is no need for frequent trades, and thus ETF will be unattractive. However, if ETF is short-able, then it could be used as a good hedge instrument. To see this, let's assume an investor has a long position of a stock, *j*, and wish to hedge his/her position by shorting *h* shares of ETF. Consider the gain or loss on this portfolio is

$$1(\tilde{S}_1 - S_0) - h(\tilde{E}_1 - E_0),$$

and the risk of this portfolio is

(4.1)
$$Var[1(\tilde{S}_1 - S_0) - h(\tilde{E}_1 - E_0)]$$
$$= Var(\Delta\tilde{S}) + h^2 Var(\Delta\tilde{F}) - 2hCov(\Delta\tilde{S}, \Delta\tilde{E}).$$

To minimize risk, take the first derivative of Equation (4.1) with respect to *h*:

$$\frac{d[risk(h0]}{dh} = 0.$$

The solution to this equation is

(4.2)
$$h^* = \frac{Cov(\Delta\tilde{S}, \Delta\tilde{E})}{Var(\Delta\tilde{E})} = Price\ Beta$$

[5] Although closed-end mutual funds can be traded just like stocks, they usually involve large tracking errors. That is, the share price is quite different from fund's net asset value.

This is the optimal hedge ratio which is interestingly equal to the beta coefficient price change.[6] For example, if a stock beta to a market index is 0.90, then the optimal hedge for this stock position is to short-sell 90 shares of ETF for every 100 shares of stock purchase.

Traditionally, in US, investors employ Index Futures to hedge their equity positions in the cash markets. Unfortunately, the index Futures is not an effective hedging tool for small investors particularly. The contract size of index Futures is large. For instance, it is usually 250 times the index value. Index futures are tied to the underlying cash index only by their contractual term at maturity. Prior to maturity, futures prices can exhibit substantial discount or premium to fair value. Thus, index futures are not tacking instruments. This indicates that ETF is indeed an ideal financial vehicle for small investors to hedge their market risk exposure. Thus, I strongly recommend conditional short-sale allowance for stock hedge purpose.

***Suggestion* 1.** *ETF is a tracking instrument for market risk exposure and is available for small investors. It can thus be used as a convenient hedging tool for market risk. Allow investors to short-sale ETF conditional on simultaneous purchase of stocks based on the hedge ratio calculated by Equation (5.2).*

IV.2 *Creation of New ETF Should Consider What Risk Borne by Investors*?

ETF are tracking stocks of a basket or index of equities. Traditionally, broad market index Exchange Trade Funds are popular for small investors in that index ETF involve no idiosyncratic risk. The information about index ETF focus on macro factors which are relatively easier to obtain than information about individual firms. In section II.4, one of major characteristics of ETF is that it represents an important component of risk borne generally by investors. That is, a broad based market index ETF represents the systematic risk that all investors face. This indicates that as long as we can identify a set of securities (an index) such that its price movement and/or volatility represents a particular risk component that investors concern, we could create an ETF to replicate the risk. For the past decade, financial researchers

[6] Note that the beta coefficient is calculated from the price change of stock and ETF not the returns or log-price changes.

have found in addition to the *market risk*, there are several significant macro risk factors borne by investors

Risk Factors of Value/Size*, *Momentum*, and *Contrarian

In the past decade, one of the most extensively studied areas of financial research concentrates on the predictability of cross-section stock returns based on either a firm's fundamental information or past price history. Fama and French (1992, 1996, 1998) document that stocks with high ratios of book-to-market (B/M), earnings to price (E/P) or cash flow to price (C/P) have higher average returns than low B/M, E/P or C/P stocks. In addition, small size firms seem to perform better than large size firms. This is called the *value/size* effect. Jegadeesh and Titman (1993, 2001), Rouwenhorst (1998), Chan, Jegadeesh and Lakonishok (1996) reveal that short-term past returns or past earnings predict future returns. Average returns of the best prior performing stocks (winners) exceed those of the worst prior performing stocks (losers), so that there is *momentum* in stock prices. On the other hand, DeBondt and Thaler (1985) find a *contrarian* effect such that stocks with low long-term past returns outperform stocks with high long-term past returns. Because these patterns in average returns are not explained by the conventional capital asset pricing model (CAPM) of Sharpe (1964) and Linter (1965), they are typically called anomalies.

If anomalies exist, investors are able to create profitable investment strategies by purchasing dominating assets (e.g., the value stocks or the past winners) at the cost of selling dominated assets (e.g., the growth stocks or the losers). Many empirical studies show that this asset reallocation process generates positive excess returns.[7] However, despite pervasive evidence of excess returns or anomalies, there remains debate on this issue. Many argue that the empirical evidence may be simply a data snooping bias in that the anomalies are sample specific results that are unlikely to be observed out of sample.[8] Excess returns may not be evidence of anomalies in that the premium between dominating and dominated assets is compensation for

[7] Again, for the momentum effect, see Jegadeesh and Titman (1993, 2001), Rouwenhorst (1998), Chan, Jegadeesh and Lakonishok (1996). On the contrary, DeBondt and Thaler (1985, 1987), Chopra, Lakonishok, and Richards (1997) suggest a profitable contraian strategy of buying the losers and selling the winners. Fama and French (1992, 1996, 1998) argue that a positive premium between value and growth stocks indicates that the investment strategy of longing the value and shorting the growth produces positive returns.

[8] See MacKinlay (1995), and Knez and Ready (1997).

risk.[9] It can be thus viewed as a risk factor, in equilibrium, priced in addition to the traditional CAPM type systematic risk.[10] That is,

(4.3) ***Expected Return of Stock j = Risk-Free Return*** + β_j^m **(*Market Premium*)**
+ β_j^v **(*Value Premium*)**
+ β_j^{mm} **(*Momentum Premium*)**
+ β_j^c **(Contrarian *Premium*)**
+ β_j^l **(Liquidity *Premium*)**

It is obvious that the market premium cab be replicated by the *Market Index ETF*. If other risk-premium are insignificant to the return generating process, a risk-free investment can be obtained by holding a stock and short β_j^m *Market Index ETF*. This is consistent with the results shown in the previous Section V.1. However, financial researchers have strongly suggested that the market factor is insufficient to quantify all component risk borne by all investors. There are other types of compensation for systematic risk also needed to be considered. That is, the traditional CAPM-type single-factor market model should be replaced by multi-factor APT models which incorporate the effects of value, size, momentum, contraian, and liquidity

This theoretical and empirical evidence provides a solid foundation for ETF expansions. Instead of blindly creation of new ETF based on subjective imagination of creators, we need to carefully understand and discover the nature pricing behavior of the market. Therefore, I suggest that for the next step of ETF innovation, perhaps, consider the ETF that represent the *value premium*, the *liquidity premium*, the *momentum premium*, and the *contrarian premium*. Note that all these risk premium are calculated from returns of particular set of stock portfolios. For the method of constructing Value Stock Portfolios (Value ETF), Momentum Stock Portfolios

[9] See Brennan, Chordia, and Subrahmanyam (1998), Chan, Chen and Hsieh (1985), Chan, Karceski and Lakonishok (1998), Chen and Zhang (1998), and Dichev (1998).
[10] Fama and French (1993, 1995, 1996, 1998) argue that the value premium is compensation for systematic risk. There is no evidence that average returns vary with firm size and B/M in a way that cannot be explained by risk loading, and there is no evidence that variation in risk loadings is uncompensated when it is unrelated to size and B/M.

(Momentum ETF), and Contrarian Stock Portfolios (Contrarian ETF), see Fama and French (1992, 1996, 1998), Jegadeesh and Titman (1993, 2001), and DeBondt and Thaler (1985).

Suggestion 2. *A good ETF should represent an important component of risk borne generally by investors. The market index ETF represents one of component risk of the Market, where the market premium is a compensation for the systematic risk. Following financial research evidence, there are four different types of ETF could be created for representing other four important systematic risk components:*

(1) ***Value ETF*** *represents Risk Premium from Value Stocks.*

(2) ***Momentum ETF*** *represents Momentum Premium from Short-term Past Winners*

(3) ***Contrarian ETF*** *represents Contrarian Premium from Long-term Past Winners.*

(4) ***Liquidity ETF*** *represents Liquidity Premium from illiquidity stocks.*

IV.3 *There is a need for Money Market ETF in China*

From Equation (5.3), it is clear that not only the risk factors are important to the return generating process, but also the risk-free asset is crucial in the asset pricing system. We note that the formation of ETF is to create a vehicle that represent the risk-factor and carry out transaction in a very effective and convenient manner. Since there is a need for ETF to replicate risk factors, there is also a demand for creating an ETF that replicates the risk-less factor. In the United States and many other western capital markets, the short-term debt market is non-segmented from the equity markets. The borrowing and lending is freely activated between money market and stock market. That is, the bridge between money market and stock market is completely open, and thus the inventive for ETF instrument is low. However, in China, the segmentation between cash market and stock markets appears. A large and very significant amount of capital form individuals saving flows into the banking sector. Unfortunately, due to stock market inefficiency, the capital flow to equity market is less than 10% of the total capital saving. Lacking of transparency and available hedging instruments, the risk-exposure is large, and trading is short-term and speculative. This prohibits individual investors' interest of participation in the stock markets.

To increase the market participation and trading activities, perhaps, a risk-free Money Market ETF is a potential vehicle in China. The Money Market ETF (MM ETF) replicates a portfolio of short-term debts. Employ the "in-kind transfer" approach for institutional investors as creation units (CU) to ensure the equivalency between NAV and share price. All individual investors are able to buy/sell the Money Market ETF shares in the open markets. The share price could be locked in at fixed price, said $1/share. In addition, investors could use MM ETF shares as a margin (collateral) for the conditional short selling of equity ETF as stated in *Suggestion 1*.

Suggestion 3. *There is a need for creating Money Market ETF (MM ETF) in China because*

(1) ***MM ETF*** *replicates Risk-less Component in the Pricing System.*

(2) ***MM ETF*** *breaks the segmentation between the Cash market and Equity Markets.*

(3) ***MM ETF*** *attracts small investors (savers), and it increases* Stock Exchange's activities.

(4) ***MM ETF*** *shares can be used as a margin (or collateral) for the Conditional Short-Sale Allowance of ETF in Suggestion 1.*

IV.4 *ETF Derivatives and Price Equilibrium*

Speculation is a conventional view about derivatives markets. Thus, some call the derivative market as a Speculative Market. In this paper, I am providing a different viewpoint that Derivatives of ETF, particularly, Options on ETF, are necessary instruments for a fair price discovery and an efficient capital market. The tracking ability of ETF for the underlying market indexes makes the ETF to be a very effective and convenient tool to replicate the equity market price movement. That is, the volatility of an index ETF represents the market systematic risk. From the theory of financial economics, the system of equilibrium is continuously and diametrically controlled by an invisible hand such that the risk or volatility of the market could be balanced in a crossing sectional joint relationship among different natures of securities.

Consider a market ETF with a current price of 120 (the underlying index is 1200) has uncertain outcomes 3-month in the future as follows:[11]

	Today's	Random Price 3-Month in the Future

[11] For simplicity, we assume that the underlying stocks pay no dividends during the 3-month period.

	Price					
Long ETF	120	*80*	*100*	*120*	*140*	*160*

To insure the down-side risk exposure such that the future price of the ETF below the current price of 120, an at-the-money Put Option with an exercise price of 1200 can be employed as follows:

	Today's Price	Random Price 3-Month in the Future				
Long ETF	120	*80*	*100*	*120*	*140*	*160*
Long Put (X=120)	1	*40*	*20*	*0*	*0*	*0*
ETF + PUT		*120*	*120*	*120*	*140*	*160*

Now, if we write a Call Options (with a 3-month duration and a strike price of 120) in addition to long a Put Options, then the comes show below:

	Today's Price	Random Price 3-Month in the Future				
Long ETF	120	*80*	*100*	*120*	*140*	*160*
Long Put (X=120)	1	*40*	*20*	*0*	*0*	*0*
Write Call (X=120)	-1.5	*0*	*0*	*0*	*-20*	*-40*
ETF+Put-Call		*120*	*120*	*120*	*120*	*120*

It is important to note that the outcomes of 120 are identical from a portfolio of ETF, Put and Call. That is, the risk-free portfolio is formed by three risky assets.[12] Therefore, there is an invisible hand to control the parity between risky assets and a risky-free portfolio such that

(4.4) **ETF + PUT – CALL = Risk-Free Bond.**

[12] This relationship among equity, call and put is called as Put-Call Parity.

The equality (5.4) is an important equilibrium system for discovering fair price through arbitrage process. Specifically, the appropriate price of ETF can be determined by

(4.5) **ETF = CALL – PUT + Risk-Free Bond**.

If the ETF is price too low such that ETF < CALL – PUT + Bond, then an arbitrage opportunity exists. Traders make a risk-free arbitrage profit by shorting call option, buy put options, and borrowing money to buy ETF. The purchasing forces from arbitrage process will push the ETF price higher until it reaches the equilibrium as shown in Equation (5.4), or the arbitrage opportunity disappears.

Suggestion 4. *Call and put options are useful for price discovery of ETF. Nevertheless, the derivative markets are very speculative. To eliminate unnecessary market volatility, the derivatives trading for ETF (not for individual stocks) may be allowed for market makers, if the market making system is established in China financial markets. That is, the ETF derivatives are used only for arbitrage and hedging purpose.*

IV.5 *Application of ETF to China Share Reform*

The split share structure between tradable public and non-tradable state shares has long been a major inefficiency toward Chinese equity market development. Significantly, the non-tradable shares account for approximately two thirds of total voting share outstanding. That is, only thirty percent of shares are flowing in the open market. Form the fundamental financial theory, the major functional purpose of financial markets is determining the fair valuation of firms' assets. It is well known that the value of assets including both tangible and intangible is determined by the market value of debts and equity. Therefore, well functioning debt and stock markets provide fair value of the firms that allow investors or shareholders to govern firms.

With partial equity flow in the market, it is obviously that the appropriate valuation machine fail to function, and the pricing mechanism is consequently distorted. The secondary equity market naturally becomes an ideal place for speculation and gambling. Investors have no long-term commitment, and the trading behavior is short-term oriented. In such an environment, institutional investors and large capital providers hesitate to participate. Importantly, since a large portion of ownership is not tradable, the market prices are unable to encourage major

shareholders or the management to improve corporate governance. Consequently, the market provides no protection for small investors' interest from malpractice of corporate governance, insider or related-party transactions and manipulation of stock price.

Chinese government realizes that the split-share problem has become a major barrier for China capital market development; a Reform of State Share is thus extremely important and necessary. In addition, a growing number of domestic and foreign institutional investors had also increased pressure for fundamental reform. By May 2005, Chinese stock market regulator lunched a serial of trials for a set of testing companies. Four public listed firms and forty-two large size corporations were selected for the first and second trial, respectively. The initial stage of the reform are followed by three major guidelines: (1) State shareholders are responsible for compensating existing tradable shareholders in terms of cash, stock dividends, and/or warrants, (2) non-tradable shares will be locked-up for 12 months after the individual company's reform scheme takes effect and non-tradable shareholders cannot sell more than 5% of their stakes within another 12 months; and (3) the companies should obtain the approval of reform schemes from at least two thirds of tradable shareholders before implementation.

It is important to note that the State Share Reform is not for privatization of state-owned firms. In fact, there is no intent to sell state ownership to the public. The purpose of the reform is to eliminate trading rights differences between non-tradable and tradable shares, not to float all non-tradable shares on the stock market. Specifically, after the reform on non-tradable shares is completed, state-owned shares can be cashed in only upon the approval of the State-owned Assets Supervision and Administration Commission (SASAC). That is, SASAC allows proportion of state-owned shares in state-controlled companies - in line with national economic restructuring plans - as well as the need to facilitate a sound development of the capitals market. Nevertheless, although the floating of State Shares is controlled by SASAC, it is inevitable that new capital is needed to be floated in the market to assort the new tradable State Shares. Merrill Lynch has estimated that domestic boards will need as much as 216 billion Yuan ($26.7 billion) to absorb new stocks if 10 percent of all state shares hit the market in the next three years, the maximum amount allowable. That amounts is equivalent to 23.5 percent of the current total capitalization of China's freely traded shares.

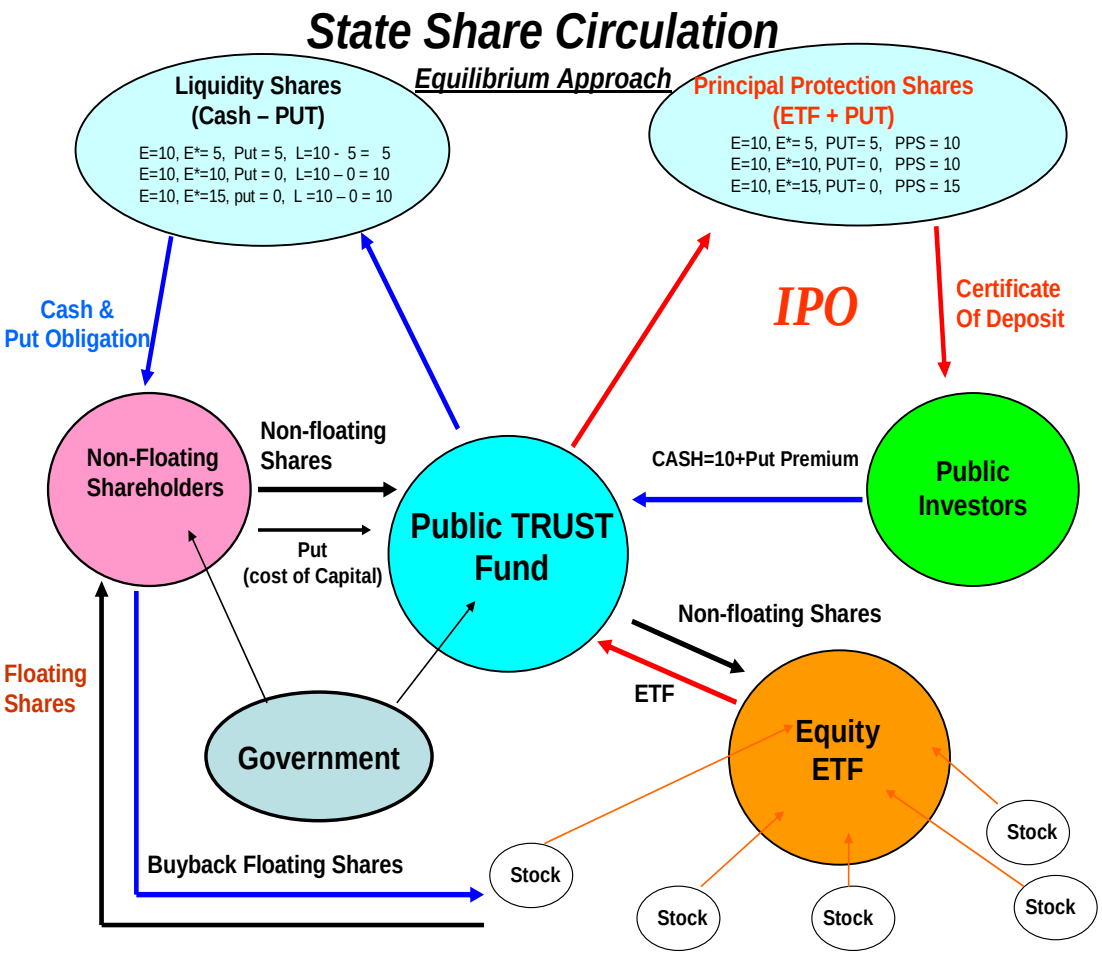
My viewpoint is that the current *decentralized* approach (compensation plans determined by floating and non-floating shareholders negotiation of individual firms) maybe ineffective. First, most of non-floating shares are State Shares. This is a result from the past centralized plan economy. There is **no** natural market mechanism (the invisible hand) to resolve the problem. Second, the compensation plan, particularly, the cash compensation, is just a temporal settlement for the existing shareholders. It provides no incentive for new participants. We must realize that the success of this Share Reform needs ***share circulation***, and the circulation has to have *new capital* and new participants flow into the market. Unfortunately, under current circumstance, there will be no investor (either domestic or international) confidence for putting new capital to the stock markets because of the market unfairness. The market is unfair due to two major reasons: (1) State owned firms have moral hazel. These companies tend to be risk neutral in that they are implicitly insured by the government, and thus firms' behavior is completely out of control by the public investors; (2) There is no hedge or insurance vehicle for public investors to eliminate and/or reduce this risk. I believe that until the above two problems are resolved; the State Share reform is unable to have a long-term success. *The one to resolve the problem is the one who creates the problem.* Consequently, this reform has to be a *Centralized Approach*.

This research article proposes a simple macro financial model for facilitating state share circulation that could avoid the risk of share price crash due to market flooding. The main characteristics of the model are:

- Investment Insurance: establishing confidence of investors and *attracting non-speculators or savers* to participate stock markets.
- Eliminating Moral Hazel: setting a market rewarding and punishment system for firms to maximize public shareholders' wealth not the state shareholder's and/or agent's wealth.

Since no available hedging tool is available for small investors and the short-sale is not allowed, it is necessary for *a centralized unit* to set up a protection mechanism for stimulating investors' enthusiasm of market participation. This centralized unit serves as a "Pass-Through" not-for-profit insurance agent. However, the *mandatory* insurance policy is issued by the non-floating shareholders. There are five key factors of the model: (1) a public trust (served as a

centralized unit), (2) in-kind transfer between state shares and stock portfolios, (3) portfolio insurance, (4) stock repurchase and debt payout, and (5) government support. This model is unique and quite different from any existing system in the world. It is a market-oriented system but is managed by the not-for-profit governmental fund for protecting peoples' interest. To demonstrate this model, a graphical illustration is presented as follows:



(A) Non-Floating Shares ↔ Public Trust Fund:

The public trust fund (PTF) plays the center role of this model. It is a not-for-profit organization organized by the government for controlling capital flow, state assets and investor protection. PTF is the Centralized Unit for managing and controlling capital flow between non-floating shareholders and public investors. The non-floated shares (particularly, the state shares) are sold to the PTF for cash. Nevertheless, for selling every non-floating share, shareholder needs to

write a put option to the PTF. *The put option is closed-end and will not be traded at any secondary market*. The strike price of the put option is at-the-money according to the current market price of the floating shares, and non-floating shareholders receive cash according to the following two conditions:

(1) If the non-floating shareholders issue a plan for Stock-Repurchase Agreement that buying the floating shares back from the open market, PTF will pay the full amount of cash according to the current share price plus Put Premium.
(2) Otherwise, PTF pays 50% of cash value of current price (retaining 50% of cash as collaterals) plus Put Premium.

Importantly, by the nature of market invisible hand (the put-call parity), it is obvious that

(4.6) $$\text{Risk-Free Bond} - \text{PUT} = \text{Stock} - \text{CALL}.$$

That is, non-floating shareholders sell the non-floating shares, obtain Cash (current value of the risk-free bond), and issue Put Options. *It is equivalent to own stocks and covered by call options writing*. Therefore, by theory, if non-floating shareholders use the cash to buyback shares from open markets, then it will naturally becomes a *covered call strategy*.

(B) Public Trust Fund ↔ ETF:

The PTF packages the non-floated shares according to the value weights of ETF (Index Share) and converts to ETF shares. This approach eliminates the idiosyncratic risk of individual stocks, which diversifies risk for public investors. Since the creation/redemption of ETF shares is in-kind transfer, there is no cash transaction involved for PTF.

(C) Public Trust Fund ↔ Public Investors:

PTF initially issues Protection Shares (PS) to the public. The PS is a hybrid of an ETF and a Put Option. The ETF is converted from non-floating shares and the put options are issued by non-floating shareholders. Again, we note the Put Option serves as *Insurance Policy* for a Portfolio (ETF). Therefore, PS has no down-side risk and has up-side systematic pattern as the market

movement. Ideally, this will be a very attracted financial instrument for small and/or conservative investors. Investors pay ETF price plus a Put option premium to the PTF, and PTF uses this fund to finance the purchase of non-floated shares and put options. As a result, PTF serves purely as a PASS-THROUGH function. There is no actual capital investment for the PTF. From Equation (4.5), Protection Shares essentially are

(4.7) $$\text{ETF} + \text{PUT} = \text{CALL} + \text{Risk-Free Bond}.$$

Investors purchase a risk-free bond and buy a call option of ETF for up-side potential of the market.

(D) Non-Floated Shares ↔ Government ↔ Public Trust Fund:

Finally, it is quite important to have supporting and monitoring system from the government for ensuring the capital flows and fulfillment of obligations from all parties.

This model provides a conservative method to ensure smooth capital flows between state-owned firms and public investors. The portfolio insurance provides protection for small investors and attracts new capital and market participants. Although it is centralized and planned by government sponsored unit (PTF), it is not a welfare program but utilizes market insurance approach to stabilize capital market volatility. Importantly, this model focus on the long-term healthy structure of capital facilitation without violating the basic nature of market oriented economic system.

V. SUMMARY AND CONCLUSIONS

Exchange Trade Funds (ETF) are successful innovation in the recent financial history. This paper theoretically demonstrates that ETF in fact can't be claimed as innovation, it is a market natural *evolution* from the demand of market basket. To illustrate the theory of demand for ETF, this manuscript focuses on three aspects: (1) the theory of two-fund separation explains the demand for index instruments, (2) arbitrage process of well-diversified portfolios is the fundamental driving factor for market equilibrium, and (3) index arbitrage between index futures and cash markets is the direct demand for ETF development. From these theoretical interpretations, this article summarizes eighteen characteristics serve as guidelines for ETF innovation.

The history of ETF development in North America is briefly presented in Section III. It shows the ETF revolution from the early stage products such as TFE and AEIP to the recent popular ETF such Spiders, iShares, Diamonds, and Cubs. The main focus of this article is to provide suggestions for China ETF innovation. There are five suggestions summarized as follows: (1) There are two major problems in current China stock markets. One is lacking of transparency of firms' financial activities, and another is no hedging instruments for investors to reduce risk exposure. I suggest the allowance for *conditional short-selling* of ETF. That is, let the ETF be a hedge instrument for stock purchasers. The conditional short-selling means the short-sale of ETF is allowed only when investors are buying the underlying stocks according to the hedge ratio shown in Equation (4.2); (2) Further creation of new ETF should consider the *Risk Factor* borne by general investors. That is, the price movement ETF should replicate a potential risk component that investors face. In addition to the market risk factor, this manuscript suggests that *Value*, *Momentum*, *Contrarian*, and *liquidity* are four important risk factors that ETF could replicate; (3) There is a need for Money Market ETF (MM ETF) in China. This is because MM ETF replicates the risk-free factor in asset pricing system. In China, MM ETF could break the segmentation between cash and stock markets. MM ETF will attract small and non-speculative investors (savers), and it increases Stock Exchange's activities. In addition, MM ETF shares can be used as a margin (or collateral) for the Conditional Short-Sale Allowance of ETF; (4) Call and put options are useful for price discovery of ETF. Nevertheless, the derivative markets are very speculative. To eliminate unnecessary market volatility, the derivatives trading for ETF (not for individual stocks) may be allowed for market makers, if the

market making system is established in China financial markets. That is, the ETF derivatives are used only for arbitrage and hedging purpose; (5) ETF is very useful tool for China Share Reform (CSR). This article argues that the decentralized approach of current CSR may be ineffective. A centralized model is proposed to provide portfolio insurance for investors and ensure smooth capital flow from non-floating shares to general public. The key factors of the success of China stock market reform are twofold: (a) bring back investor confidence by providing investment insurance, and (b) eliminate moral hazel of firms to change firm's risk neutral behavior to be risk-averse. The macro model in this paper targets these factors. It shows that through ETF, by creating principal protection shares and liquidity shares, a public trust fund (serves as a centralized unit) is able to smooth capital flows and importantly, attract new participants to the stock markets.

Appendix A – The iShares Family of ETFs

iShares MSCI South Africa Index	iShares Goldman Sachs Software Index
iShares MSCI South Korea Index	iShares S&P MidCap 400 Index
iShares MSCI Sweden Index	iShares S&P MidCap 400/BARRA Value
iShares MSCI Taiwan Index	iShares Morningstar Large Growth Index
iShares MSCI Australia Index	iShares MSCI EAFE Index Fund
iShares MSCI Brazil (Free) Index	iShares Goldman Sachs Technology Indx
iShares MSCI Spain Index	iShares Morningstar Mid Growth Index
iShares MSCI Singapore (Free) Index	iShares S&P MidCap 400/BARRA Growth
iShares MSCI Pacific ex-Japan	iShares S&P Global Healthcare Sector
iShares MSCI Belgium Index	iShares S&P Global Financials Sector
iShares MSCI Germany Index	iShares Russell 3000 Growth Index
iShares MSCI United Kingdom Index	iShares Russell 1000 Growth Index
iShares MSCI France Index	iShares Dow Jones US Financial Sector
iShares MSCI Switzerland Index	iShares Russell Midcap Value Index
iShares MSCI Italy Index	iShares Russell 3000 Index
iShares MSCI Hong Kong Index	iShares S&P 1500 Index
iShares MSCI Canada Index	iShares Dow Jones US Utilities
iShares MSCI Malaysia (Free) Index	iShares Morningstar Large Core Index
iShares MSCI Mexico (Free) Index	iShares Dow Jones US Consumer Services
iShares MSCI Netherlands Index	iShares Dow Jones US Industrial
iShares MSCI Japan Index	iShares Russell Midcap Growth Index
iShares MSCI Austria Index	iShares Dow Jones US Technology
iShares Morningstar Small Growth Index	iShares Morningstar Large Value Index
iShares S&P Global Technology Sector	iShares Russell Midcap Index
iShares S&P Europe 350 Index	iShares S&P 500/BARRA Growth Index
iShares MSCI EMU Index	iShares Dow Jones US Total Market Ind
iShares S&P Latin America 40 Index	iShares Dow Jones Select Dividend Index
iShares Goldman Sachs Semiconductor	iShares Morningstar Mid Value Index
iShares MSCI Emerg Mkts Index	iShares S&P/TOPIX 150 Index
iShares Morningstar Small Value Index	iShares S&P 500 Index
iShares Dow Jones US Real Estate	iShares Russell 1000 Index
iShares Dow Jones US Basic Materials	iShares Russell 3000 Value Index
iShares Russell 2000 Value Index	iShares Dow Jones US Financial Svcs
iShares S&P SmallCap 600/BARRA	iShares S&P 100 Index

Value	
iShares Russell 2000 Index	iShares S&P Global Energy Sector
iShares S&P SmallCap 600/BARRA Growth	iShares Dow Jones US Healthcare
iShares Russell 2000 Growth Index	iShares Dow Jones US Telecom
iShares Dow Jones Transportation Average	iShares Russell 1000 Value Index
iShares Cohen & Steers Realty Majors	iShares S&P 500/BARRA Value Index
iShares S&P SmallCap 600 Index	iShares Lehman 1-3 Year Treasury Bond
iShares Goldman Sachs Networking	iShares Lehman Aggregate Bond
iShares S&P Global 100 Index	iShares Goldman Sachs Natural Resourc
iShares Morningstar Small Core Index	iShares Dow Jones US Energy
iShares Dow Jones US Cons Goods	iShares Lehman TIPS Bond
iShares S&P Global Telecommunications	iShares Nasdaq Biotechnology
iShares Morningstar Mid Core Index	iShares Lehman 7-10 Year Treasury
iShares FTSE/Xinhua China 25 Index Fund	iShares Lehman 20+ Year Treas Bond
	iShares GS $ InvestTop Corp Bond

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