The Performance and Persistence of Exchange-Traded Funds: Evidence for iShares MSCI country-specific ETFs

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ABSTRACT

The aim of this paper is to investigate the performance and persistence of 20 iShares MSCI country-specific exchange-traded funds (ETFs) in comparison with S&P 500 index over the period July 2001 to June 2006. There are several studies analysing mutual funds performance in past years, but very little is known about ETFs. In our analysis the Sharpe, Treynor and Sortino ratios are used as risk-adjusted performance measures. To evaluate performance persistence and therefore if there is any relationship among past performance and future performance, we apply to the Spearman Rank Correlation Coefficient and the Winner-loser Contingency Table. The main findings are at two levels. First, ETFs can beat the U.S. market index based on risk-adjusted performance measures. Second, there is evidence of ETFs performance persistence based on annual return.

JEL Classification: G11, G15
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November, 27th, 2006
Preliminary draft
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1. Introduction

Could a portfolio of iShares [1] Morgan Stanley Capital International (MSCI) country-specific exchange-traded funds (ETFs) make an international diversified portfolio and beat the U.S. stock market? Or, although the known advantages of ETFs portfolios they cannot beat the US stock market persistently?

We expect that ETFs can beat the U.S. stock market and the U.S. investors can obtain international diversification gains. U.S. market is a single market and country-specific ETFs portfolio covers several markets around the world. Thus, it could increase the performance and reduce risk. We assume that country-specific ETFs portfolio can beat the U.S. stock market. U.S. investors can hold global ETFs portfolios via domestic stock exchanges such as the American Stock Exchange (AMEX). Thus, they do not need to directly invest in foreign stock markets for benefits. The currency risk can be avoided and the barriers of directly investing in foreign stock markets can be eliminated. In addition, ETFs can be traded and sold short like common U.S. stocks and have the advantage of risk diversification, index tracking, all-day trading, strategic trading capability, tax efficiency, lowest fees, and transparent holdings (Carty [2001]). As stated by Cao (2005) "iShares, CECFs and ADRs, provide the U.S. investors the opportunity to obtain international diversification gains without trading abroad". His result is consistent with our view and expectation regarding the advantage of ETFs in terms of achieving international diversification with lower risk. Given ETF is an innovative product and have become popular in recent years, this has attracted our attention, and hence, we address in this paper ETFs rather than mutual funds performance.

[1] iShares is the brand name for one of the world's largest ranges of ETFs, which is marketed and managed by Barclays Global Investors (BGI). iShares funds combine the advantages of stocks with the benefits of index funds: iShares can be bought and sold like any other shares listed on a stock exchange and provide instant exposure to an entire index through a single security. (http://www.ishares.net/about/about_ishares.do)

This study focuses on U.S. investor's perspective only. There are various ETFs listed and traded on AMEX. Over 130 ETFs available in the United States today and over 590 ETFs listed and traded in global stock markets, so far. These ETFs include stock industry sector, international stock, U.S. Treasury, and corporate bond indexes and commodities and, consequently, they are the idyllic vehicle for an investor focused on asset allocation. By September, 30th, 2006, there were 21 iShares MSCI, country-specific ETFs listed on AMEX covering countries in regions such as Asia Pacific, Europe, North and South America. As a result, holding iShares MSCI country-specific ETFs the investor can achieve an international portfolio.

In the past several years, early studies by Cumby and Glen [1990], Eun *et al.* [1991], Shukla and Singh [1997], Redman *et al.* [2000], and Bhargava *et al.* [2001] analyse mutual fund performance. Cumby and Glen [1990] and Eun *et al.* [1991] showed evidence that international mutual funds can beat the U.S. stock market. Cumby and Glen [1990] examine the performance of 15 U.S.-based internationally diversified mutual funds from 1982 to 1988. The findings show that mutual funds outperformed the U.S. Index. Eun et al. [1991] investigate 19 U.S.-based international mutual funds for the period 1977-1986. The results indicate that the majority of internal mutual funds outperformed the U.S. market. However, Shukla and Singh [1997], Redman *et al.* [2000], and Bhargava *et al.* [2001], find the opposite. Shukla and Singh [1997] evaluate the performance of the U.S. based global equity mutual funds during January 1988 to March 1995 period. A total of 28 global and 76 domestic funds observations are included. They show that both global funds and U.S. domestic funds underperformed the S&P 500 Index. Redman et al. [2000] examine the international mutual funds for three time periods: 1985 through 1994, 1985-1989, and 1990-1994 and show that the international portfolio underperformed the benchmark and the U.S. equity portfolio during 1990-1994. Bhargava et al. [2001]

evaluate the performance of 114 international equity funds, 54 mutual funds and 60 managed funds, over the January 1988-December 1997 period. Both international equity managed funds and mutual funds underperformed the S&P 500 Index.

Sharpe [1966], Hendricks *et al.* [1993], Goetzmann and Ibbotson [1994], Bal and Leger [1996], Bers and Madura [2000], and Bauer *et al.* [2006] investigate the persistence of mutual funds performance. On the other hand, there are only a few studies in the literature concerning ETFs performance (Rompotis [2005], Cao [2005], and Harper *et al.* [2006]).

Specifically in this paper, we address two main questions. First, can ETFs outperform the U.S. domestic benchmark? We use three traditional risk-adjusted performance measures to evaluate the performance. The Sharpe ratio, the Treynor ratio, and the Sortino ratio are well known risk-adjusted performance measures and they are easily understood by an individual investor. Thus, investors could evaluate the ETF's performance, based on the Sharpe and the Treynor ratio, by themselves. However, the Sharpe ratio and the Treynor ratio rely on the assumption that returns are normally distributed having these measures difficulty in evaluating the performance with skewed return distributions (e.g. mutual funds). The Sortino ratio constructs a risk-adjusted performance measure by replacing the standard deviation with the downside risk measure. Thus, it can solve the drawback of the Sharpe and the Treynor ratio. Plantinga et al. (2001) and Lien (2002) use the Sortino ratio to evaluate the performance of mutual funds. Second, is ETF's performance persistent? Most investors rely on past mutual fund performance to predict future performance. Does it work on ETFs performance? To evaluate performance persistence and therefore if there is any relationship among past performance and future performance, the Spearman Rank Correlation Coefficient and the Winner-loser Contingency Table are used.. Study by Casarin *et al.* (2005) use the Sharpe, Treynor, and Sortino ratios for

performance measure and non-parametric methods Odds ratio and Chi-squared test for persistence analysis.

The main results can be summarized as follows. First, the 20 iShares MSCI country-specific ETFs, based on excess return measure, outperformed the S&P 500 index, but the results are not statistically significant. Only iShares MSCI-Austria (EWO) provided significantly higher performance than the S&P 500 index over the period from July 2001 to June 2006. Moreover, these ETFs, for both the Sharpe and Treynor ratio measures, outperformed the S&P 500 index. Second, during July 2001 to June 2006 period, according to Spearman's rho and Winner-loser contingency tables approaches, there is no evidence of performance persistence, based on the risk-adjusted performance. But there is evidence of performance persistence based on annual return. Thus, the performance of these 20 ETFs could not predict when we could use past ETFs risk-adjusted performance to predict future performance. Yet, we can use past annual return to predict future annual return. Additionally, for choosing risk-adjusted performance measures the ETFs ranking based on the Sharpe and the Treynor ratio will produce similar results.

The rest of the study is organized as follows. Section 2 provides a brief overview of ETFs and related literature. Section 3 describes data and methodology. Section 4 reports and analysis the empirical results. Conclusions are presented in Section 5.

2. ETFs, Diversified Portfolio, Performance and Persistence

In this section we'll discuss the specificity and main advantages of Exchange-Traded Funds. In addition the notion of diversified portfolio, risk-adjusted performance measures and performance persistence are included in our discussion

2.1. Exchange-Traded Funds

Exchange-Traded Funds (ETFs) are the leading financial innovation of the last decade, (Fuhr [2001]). The first exchange-traded fund was launched in 1989 on the Toronto Stock Exchange. Later, the Standard & Poors Depositary Receipt trust (SPY), tracking the S&P 500 and the first ETFs in U.S., was launched on AMEX in 1993. As Bansal and Somani [2002] point out "ETFs had accumulated approximately $88 billion in assets and had gained the support of some of the largest, most respected firms on Wall Street." Furthermore, at the end of 2005, there were 453 ETFs with 601 listings, and assets of US$416.8 billion, managed by 50 managers on 33 exchanges across the world. As prior mentioned, over 590 ETFs are listed in 2006, and the number has increased 30% during 2006. Fuhr [2001] also points out that "ETFs account for over two-thirds of the daily trading volume on the American Stock Exchange. Most days, two or three ETFs are on the list of the top five most actively traded stocks on the AMEX."

Carty [2001] claims that ETFs "offer significant advantages over individual stocks and traditional equity mutual funds." Indeed, ETFs provide several advantages such as: tax efficiency, lower costs, transparency, buying and selling flexibility, all day tracking and trading, diversification, and wide array of investment strategies. We address some advantages as follows.

First, ETFs are more tax efficient than traditional equity mutual funds. Poterba

and Shoven [2002] compare the pre-tax and after-tax return on the SPDR with the returns on the Vanguard Index 500 fund. “The results suggest that between 1994 and 2000, the before- and after-tax returns on the SPDR trust and this mutual fund were very similar. These finding suggest that ETFs offer taxable investors a method of holding a broad basket of stocks that deliver returns comparable to those of low-cost index funds.” In addition, Zigler [2002] points out that “tax efficiency for the ETF version was 97.15%; the analogous mutual fund cranked at an 81.23% tax-efficiency rate”. On the other hand, Bernstein [2004] did not find evidence of tax evidence when comparing ETFs, open-end mutual funds, and closed-end mutual funds.

Second, Country-specific ETFs are cheaper than closed-end country fund. Chang and Swales [2003] report that the average expense ratio on iShares MSCI country funds is only 0.87%, while the average expense ratio on country closed-end funds is 1.59%. Furthermore, Harper *et al.* [2006] point out that “the expenses associated with portfolio trading and management of exchange-traded funds are very low. For example, the S&P 500 ETF has an expense ratio of 0.11% and the France and Singapore ETFs have an expense ratio of 0.84%. Conversely, the France Growth Fund has an expense ratio of 3.4%, and the Singapore Fund has an expense ratio of 2.12%.” Moreover, in an early study Gastineau [2001] discusses the low expense ratios of ETFs as well. Recent research by Gardner and Welch [2005] indicates that “ETFs boast slightly lower management fees than index mutual funds”. ETF management fees averaged .12 percent compared with .18 and 1.23 percent average for index mutual funds and actively managed mutual funds, respectively.

Third, buying and selling flexibility. ETFs are essentially index funds that are listed and traded on exchanges like stocks. ETFs always bundle together the securities that are in an index; they never track actively managed mutual fund portfolios. Investors can do just about anything with an ETF that they can do with a normal stock,

such as short selling. Because ETFs are listed and traded on stock exchanges like stocks, they can be bought and sold short at any time during the day (unlike most mutual funds). Their price will fluctuate from moment to moment, just like any other stock's price. Thus, individual investors or institutional money managers could easily purchase a basket of ETFs rather than stocks for their portfolios and construct an appropriate asset allocation.

Fourth, several securities are included inside an ETF, as a result, an ETF is already diversified, considering each security's non-systemic risk, so only market risk exists. Holding an ETF is different with holding a single stock that includes non-systemic risk and market risk inside. Moreover, a fund of ETFs could be double diversified. Vassal [2001] points out that a portfolio holding 15~20 securities can diversify non-systemic risk efficiently. Cao [2005] examines the diversification benefits of iShares in comparison to closed-end country funds (CECFs) and American Depository Receipts (ADRs) between April 1996 and December 2004. He confirms that all these securities provide diversification gains, but the results do not support the hypothesis that iShares can excel over CECFs and ADRs.

By last, it is wide array of investment strategies. A Fund of ETFs is a mutual fund which invests in other ETFs. A Fund of ETFs is quite similar to a Fund of Funds. ETFs now cover equity, fixed income and commodity indices. ETFs provide exposure to emerging and developed equity markets via sector, style, country, regional, and global indices. Thus, investors could hold different species of ETFs to fit their invest strategies. Indeed, investors can enter and exit the market quickly.

2.2. Diversified Portfolio

How many ETFs make a diversified portfolio? Early research by Evans and Archer [1968] demonstrate how putting together many randomly selected stocks can

achieve a diversified portfolio. Their assumptions were, the investor is a randomly selected stocks buyer; dividends are not reinvested; and each security has the same weight. The data they used are from 470 of the securities listed in the Standard and Poor's Index for the year 1958. They found using both T-tests and F-tests to test unsystematic risk that risk was reduced as the number of securities in the portfolio increased. The findings show that increasing portfolio sizes beyond approximately 10 stocks could achieve diversification. Fisher and Lorie [1970] also offer support for Evans and Archer's results based on a sample of randomly selected New York Stock Exchange-listed companies. Evaluating the return distributions for the years 1926-1965, they show that holding a portfolio of sixteen stocks instead of one stock decreased diversifiable risk by approximately 90 percent. Elton and Gruber [1977] examine the relationship between the risk of a portfolio and the number of securities in that portfolio. They suppose that an investor randomly selects securities for a portfolio. Their finding shows that a large amount of diversifiable risk can be removed by increasing the number of stocks in a portfolio from 15 to 100. Statman [1987] negates the results of the prior study by Evans and Archer [1968]. He argues the costs and benefits of diversification being the benefits of diversification the risk reduction and the costs, the transaction costs (marginal costs of increasing the number of stock holdings). His findings show that a well-diversified portfolio of randomly chosen stocks must include 30-40 stocks. Late studies examine mutual funds instead of stocks for a diversified portfolio. O'Neal [1997] attempts to determine how many mutual funds constitute a diversified mutual fund portfolio. He uses simulation of growth and growth/income funds and terminal-wealth standard deviation to measure the fund portfolio's variability. Terminal-Wealth Standard Deviation (TWSD) was previous proposed by Radcliffe [1994]. Terminal wealth is the expected portfolio value at the end of the investment horizon. The empirical results indicate that increasing the

number of mutual funds in a portfolio from one to six can reduce the expected terminal wealth standard deviation by 40-70 percent. In addition, Brands and Gallagher [2005] examine the performance and diversification properties of an active Australian equity fund-of funds (FoF). They randomly select equity funds for FoF portfolio construction. The methodology is based on a mean-variance framework. The mean is the monthly return and variance is the TWSD. Moreover, they also examine risk-adjusted performance by the Sharpe Ratio. Empirical results show that the Sharpe Ratio increases as funds are added to the FoF portfolio and if 6 active equity funds are included in the FoF portfolio it could make the portfolio diversified.

The main issue in constructing a portfolio is how to select securities for the portfolio. In prior studies by Evans and Archer [1968], Fisher and Lorie [1970], Elton and Gruber [1977], and Statman [1987], they randomly selected securities for the sample going into a portfolio. This is a way to insure that human interference does not influence the outcome of a project. Their studies examine how many securities are needed to make a diversified portfolio being random selection is a good method for that. It is likely that advanced selection of ETFs or ranking ETFs by measure rather than random selection probably could raise portfolio performance.

2.3. The Traditional Risk-Adjusted Performance

Many papers discussed mutual funds measurement and performance based on data from past years. Cumby and Glen [1990] examine the performance of 15 U.S.-based internationally diversified mutual funds for the period 1982-1988. Both the Jensen measure and the methodology developed by Grinblatt and Titman [1989] were employed to measure portfolio performance. Their findings show that the funds did not outperform the international equity index; however, there was some evidence of the funds outperforming the U.S. index. These findings were also confirmed by

Eun *et al.* [1991], who analysed 19 U.S.-based international mutual funds for the period 1977-1986 being the S&P 500 Index and the MSCI World Index used as benchmarks. The results indicate that the majority of international mutual funds outperformed the U.S. market. However, most international mutual funds underperformed the world index.

Shukla and Singh [1997] evaluate the performance of the U.S. based global equity mutual funds for the period from January 1988 through March 1995 using S&P 500 and the MSCI World Index for and domestic global market benchmark. Their findings show that global funds outperformed the MSCI World Index according to risk-adjusted returns, Sharpe and Treynor ratio. However, both U.S. domestic funds and global funds underperformed the S&P 500 Index A later study by Bhargava *et al.* [2001] evaluates the performance of 114 international equity managers over the January 1988- December 1997 period, comparing the performance of 54 mutual funds (34 foreign, 20 world) and 60 managed funds (39 foreign, 21 world) that invest in international equities, using Sharpe and Jensen performance methodologies. The results indicate that international equity managed funds outperformed the MSCI World Index, but underperformed the S&P 500 Index according to the Sharpe ratio during the period analysed. Redman *et al.* (2000) examine the risk-adjusted returns using the Sharpe Ratio, Treynor Ratio, and Jensen's Alpha for international mutual funds, separating the data into three time periods: 1985 through 1994, 1985-1989, and 1990-1994. With Vanguard Index 500 mutual fund which represents the U.S. market used as a benchmark they found that for 1985 through 1994 the portfolios of international mutual funds outperformed the benchmark and U.S. equity portfolio under the Sharpe and Treynor ratio. During 1985-1989, the international portfolio outperformed both the benchmark and U.S. equity portfolio. However, the international portfolio underperformed the benchmark and the U.S. equity portfolio

during 1990-1994.

There are several studies analysing the performance of mutual funds in past years, but very little is known about ETFs performance. Harper *et al.* [2006] looks at the performance comparison between exchange-traded funds and closed-end country funds. Their sample includes monthly returns based on prices, not NAV, for international ETFs and 22 closed-end country funds over the period from April 1996 to December 2001. The Sharpe ratio and Tracking Error were used as performance measures. The results indicate that ETFs exhibit higher mean returns and higher Sharpe ratios than foreign closed-end funds.. Late studies by Brown *et al*. (2004) also use risk-adjusted performance for methodology.

These studies use risk-adjusted performance for methodology and international mutual funds for their sample. Both the S&P 500 Index and MSCI World Index are widely used as benchmark in these studies. These projects are quite similar to our study, in that iShares MSCI country-specific ETFs and S&P 500 Index benchmark are used. However, the sample and time periods are different. In these studies, some international mutual funds outperformed the S&P 500 Index; some of them underperformed the S&P 500 Index.

2.4. Performance Persistence

The early studies on performance persistence of mutual funds do not find consistent results; *i.e.*, some fund short-term others long-term persistence, and some no persistence at all. Most of the studies mainly focus on the U.K., U.S. and Australia, which are market-based countries. An early study of persistence in the U.K. unit trust performance was done by Fletcher [1997] who investigates a random sample of 101 UK unit trusts from 1981 to 1989. He considers five portfolios based on a ranking of 5-year risk-adjusted performance and 2-year performance and did not find any

evidence of persistence of performance. In a later paper Fletcher [1999] examines 85 UK unit trusts with North American investment objectives between 1985 and 1996. The report shows no evidence of performance persistence as well. Rhodes [2000] analyses U.K. unit trusts over a 19-year period between 1980 and 1998. The results show a weak persistence pre 1987 and no persistence subsequently. Dimson and Minio-Kozerski [2001] examine the closed-end fund and performance persistence in the U.K. covering 244 funds in their sample and from the period 1987-1996, using Sharpe's [1992] returns-based style analysis to measure manager quality after adjusting for factor exposure. They find no evidence of performance persistence amongst British closed-end funds.

However, there is some evidence of performance persistence (Lunde, Timmerman, and Blake [1998], Allen and Tan [1999] and Hendricks *et al.* [1993] Bers and Madura [2000] and Bauer et al. [2006] among others).

Lunde, Timmerman, and Blake (1998) create portfolios of U.K. funds based on risk-adjusted returns over a three-year period using a large data set of 2,300 U.K. unit trusts. They construct performance measures based on bid prices and net income without any adjustment for expenses. Their main conclusion is that "while there is only weak evidence of persistence in the sample comprising funds that survived to the end of the sample, inclusion of non-surviving funds introduces stronger evidence of performance persistence (p.20)".

Allen and Tan (1999) demonstrate some evidence of persistence of performance in a sample of 131 U.K. managed funds for the period 1989-1995. Their study, unlike previous studies which compare mutual fund performance with a benchmark, compares the relative performance of the sample funds themselves. They examine persistence in performance in the short-term and long-tern based on four major empirical tests: contingency tables based on winners and losers, chi-squared

independence testing on those tables, Ordinary Least Squares (OLS) regression analysis of CAPM risk-adjusted returns, and independent Spearman Rank Correlation Coefficient (SRCC) calculations. They provide evidence of persistence performance.

Quigley and Sinquefield (2000) examine the 752 U.K. unit trusts over the period 1978-1997. They construct portfolios based on relative performance in a given year and then compare the performance of each of these portfolios in the next year. Their study covers many more funds than in Fletcher [1997] and indicates persistence in poor performance.

For the US market, Sharpe [1966] used a reward-to-variability ratio to measure the performance of 34 mutual funds. He ranked the mutual funds according to the Sharpe ratio over two periods 1944-1953 and 1954-1963, as well as using the Spearman rank correlation coefficient to test for performance persistence. The findings show no evidence to support the performance persistence.

Carlson [1970] used risk-adjusted performance to measure the performance of equity mutual funds during the period 1948-1967. There is no persistence for ten-year time period, but fractional persistence for five-year time period. Williamson [1972] studied 180 mutual funds over two periods 1961-1965 and 1966-1970 and found no correlation. In addition, early studies by Jensen [1968], McDonald [1974], Shawky [1982], Dunn and Theisen [1983], Chang and Lewellen [1984], Grinblatt and Titman [1989], and Phelps and Detzel [1997] indicated that the performance of funds do not persist. Nevertheless, some studies find evidence for persistence. Hendricks *et al.* [1993] examined 165 mutual funds for performance persistence during the period 1974-1988 and find persistence over the short run. Furthermore, Bers and Madura [2000] compare mutual fund performance persistence to net asset value and market price performance of U.S. closed-end funds. They find evidence of risk-adjusted performance persistence because of the unique characteristics of closed-end funds. A

later study by Bauer et al. [2006], examines 143 New Zealand mutual funds for performance persistence over the period 1990-2003 finding strong evidence for short-term (6-month) persistence in risk-adjusted returns for all funds. Other studies with findings consistent with short-run performance persistence include Brown *et al.* [1992], Goetzmann and Ibbotson [1994], Brown and Goetzmann [1995], Gruber [1996], Wermers ([1997] and [2001]) and Droms and Walker [2001]. Grinblatt and Titman [1992], Elton *et al.* ([1993] and [1996]) document mutual fund return predictability over longer horizons of five to ten years.

Different from prior studies, Bal and Leger [1996] investigate the performance of 92 U.K. Investment Trusts over the period 1975 to 1993. They use Spearman's rank-order correlation coefficient to test correlation between the Sharpe and Treynor ratio ranking. The findings indicate that a comparison of the rankings by these two measures reveals a very high degree of correlation between them. All Spearman's rho suggests a strong positive collection, and correlation is significant at the 0.001 percent level.

Some studies from Australian samples also demonstrate performance persistence of mutual funds. An early study by Bird *et al.* [1983], considers the investment performance of Australian superannuation funds and their managers over the period from 1971 to 1981. They find no evidence that managers perform consistently over time. A recent study by Sawicki and Ong [2000] examines the performance of 97 Australian managed funds using monthly data over the period 1983-1995. Tests using three-year periods point out that there is litter consistency in performance from period to period.

In conclusion, we note that prior studies investigate the performance persistence of mutual funds with different conclusions not only arising from different countries but also from diverse time periods. We include our sample in the short term category,

consisting of 30 months duration.

3. Data and Methodology

3.1. Sample

The sample consists on 20 iShares MSCI country-specific ETFs from the iShares web database.[2] The data include monthly net asset values (NAVs) of 20 exchange-traded funds (ETFs) over the period July 2001 to June 2006, resulting in 60 monthly observations. As said before the reason for choosing iShares MSCI country-specific ETFs is to achieve international diversification. An early study by Olienyk *et al.* [2000] point out that using world equity benchmark shares (WEBS) could achieve international diversification. Moreover, Bergstrom [1975] presented evidence that international portfolio diversification could reduce portfolio variability 20 to 40%.

Table 1 indicates the basic information of these ETFs which includes the region, symbol, name, and inception date. The inception date for most of the ETFs is 12 March 1996, and the latest inception date, 10 July 2000, is for iShares MSCI-Brazil Index Fund (EWZ). Thus, our sample period covers all ETFs historical NAVs with no data missing. All of these ETFs belong to Barclays Global Investors Group, know as iShares. We use 20 iShares Morgan Stanley Capital International (MSCI) country funds as measured by the MSCI individual country index. These include seven iShares from Asian Pacific countries (Australia, Hong Kong, Japan, Malaysia, Singapore, South Korea, and Taiwan), ten iShares from European countries (Austria, Belgium, France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland, and the UK), two iShares from North American countries (Canada and Mexico), and one

[2] iShares web database: http://www.ishares.com

iShares from a South American country (Brazil).

[PLEASE insert Table here]

Table 2 shows each ETF holds a different sector weighting as of 30 June 2006. Fund managers may adjust the portfolio holdings in different periods and different economic situations. Also, we could know the relationship between performance and sector holdings. The sector includes software, industrial materials, energy, utilities, hardware, media, telecommunication, healthcare, consumer services, business services, financial services, and consumer goods. From adjusting proportion view, EWA, EWH, EWS, EWO, EWK, EWI, and EWP, have more than 40% sector weight in Financial Services. Because of this heavy proportion in financial services, investors can increase proportion in these ETFs when financial service is blooming, and vice versa. In another view point, for example, EWT covers 44.93% of sector weight in hardware, we could know that hardware industry is very popular and having higher weighting value in Taiwan.

3.2. Risk Free Rate

In theory, the risk-free rate is the minimum return an investor expects for any investment (since he or she would not want to bear any risk) unless the potential rate of return is greater than the risk-free rate. In practice, however, the risk-free rate does not exist since even the safest investments carry a very small amount of risk. The interest rate on a three-month U.S. Treasury bill is often used as the risk-free rate (Shukla and Singh [1997] and Allen and Tan [1999]). In our study the U.S. three-month Treasury bill for risk-free rate is also used. the U.S. three-month Treasury bill historic is obtained from the Board of Governors of the Federal Reserve data

System web database.[3] The data period is from July 2001 - June 2006 and the monthly average rate of the three-month Treasury bill is calculated to obtain the risk-free rate due to the Treasury bill's rate of rise and fall over time. Since we stand in U.S. investors' view the U.S. domestic Treasure bill can be used to measure the risk-free rate.

Early studies by Sharpe [1966] and Williamson [1972] separate half period of the sample period for testing performance persistence. Thus, in our analysis, we distinguish two periods, period one (July 2001 – December 2003) and period two (January 2004 – June 2006), a total of 60 months for the sample period. Each period contains 30-month or 2.5-year. The period one data can be used for calculating past performance, and then we use period two data for testing future performance. Risk-adjusted performance approach for ranking ETFs is based on the historical NAV data from period one. Period two data was used to test the performance of the 5 ETFs portfolio and compare to the other 15 ETFs portfolio and benchmark.

From Table 3, the risk-free rate is 1.55% and 2.72% for period one and two, respectively.

[Please Insert Table 3 here]

3.3. Benchmark

Benchmark selecting is an issue. Since Standard and Poor's 500 Composite Index (S&P 500) is a well known benchmark and most of fund managers and previous research has used it we find S&P 500 index as an appropriate benchmark. Furthermore, the rate of return of the fifteen ETFs portfolio of our sample will be also used for benchmark.

[3] Board of Governors of the Federal Reserve System: http://www.federalreserve.gov

3.4. Methodology

3.4.1. ETFs' performance

We start by testing whether the returns of 20 iShares MSCI country-specific ETFs are normally distributed. Skewness and Kurtosis are statistics that very often are used to test for normality (Neil and Webb [1993], Amin and Kat [2003], and Cremers *et al.* [2004]). Furthermore, three measures are used to test the ETFs' performance: the Sharpe, the Treynor and the Sortino ratios. In practice, the Sharpe ratio (Sharpe, [1966]) is mainly used to rank alternative portfolios, ex-post, that is based on their historic 'reward-to-variability' ratio:

$$SR_i = \frac{R_i - R_f}{s_i}$$

where, R_i is the historic mean return on ETF-i over the interval considered, s_i is the historic standard deviation of the return on ETF-i over the interval considered and R_f is the average risk-free rate over the interval considered.

The Treynor measure is based on the CAPM and gives the excess return per unit of risk and is computed as:

$$T = \frac{R_P - r_f}{b_p}$$

where, R_P is the portfolio return, b_p is the portfolio systemic risk, and r_f is the risk-free rate.

Finally, the Sortino ratio which it is similar to the Sharpe ratio but uses downside risk instead of total risk. Where returns of a portfolio are not normally distributed, a better measure than standard deviation for measuring an investment's risk is its downside risk. A large Sortino ratio indicates a low risk of large losses occurring. Sortino and Robert [1991] use the lower partial moments (LPM) to measure funds performance replacing the standard deviation with the downside risk measure LPM, where:

$$\mathrm{LPM}(a,t) = \frac{1}{\mathrm{K}} \sum_{t=1}^{k} \mathrm{Max}\left[0, \left(t - \mathrm{r_p}\right)^a\right]$$

and, $\mathrm{r_p}$ is the expected portfolio return, t the target return, a the level of investor risk tolerance, the degree of LPM, and K the number of observations. Consequently, the Sortino ratio is:

$$\mathrm{Sortino}(a,t) = \frac{\mathrm{r_p} - t}{\sqrt[a]{\mathrm{LPM}_a\left(t, \mathrm{r_p}\right)}}$$

The higher the Sortino Ratio, the better the performance. The LPM value α <1 captures risk seeking behavior. Risk neutral behavior is α = 1, while risk averse behavior is α > 1. The higher α value means the higher the risk aversion. We assume the investors are risk averse, so we will choose α equal to 2. and also use the risk-free rate as the target return. As a result, the LPM value will become larger with the increase of the level of investor risk tolerance (α).

3.4.2. Performance persistence

For performance persistence and consistency the Spearman Rank Correlation Coefficient and Winner-Loser Contingency Table Approach are used. Early studies by Sharpe [1996], Carlson [1970], Williamson [1972], and Allen and Tan [1999] use Spearman's rho to evaluate persistence in mutual fund performance. Spearman rank correlation test is a ranking order test. A positive correlation denotes performance persistence. Thus, the Spearman's rho is used to test the ranking of the first period ETFs, and the second period. Spearman rank correlation can be applied to compare two independent random variables, each at several levels (which may be discrete or continuous). Unlike the Pearson product-moment correlation coefficient, Spearman's rank correlation works on ranked (relative) data, rather than directly on the data itself.

A value of the coefficient near one indicates good agreement; a value near zero, poor agreement. Of course, as a distribution-free method, the Spearman rank correlation does not make any assumptions about the distribution of the underlying data. Spearman's method works by assigning a rank to each observation in each group separately. Then calculate the coefficient, r_s, according to the formula:

$$r_s = 1 - \frac{6}{n(n^2 - 1)} \sum_{i=1}^{n} d_i^2$$

where, d is the difference between the ranks of corresponding values of *X* and *Y*, and n is the number of observations. The r_s value always falls between -1 and +1. If r_s is negative, it denotes negative correlation of the two variables. If r_s is positive, it denotes positive correlation of the two variables.

The Winner-Loser contingency table is another approach for evaluating performance persistence. As in Goetzmann and Ibbotson [1994], Malkiel [1995], Brown and Goetzmann [1995] and Khan and Rudd [1995] we also use the contingency tables method to test the performance persistence of iShares MSCI country-specific ETFs in this paper. According to Lee [2003] there are three reasons for using winner-loser contingency tables. "First, contingency tables are more appropriate where there is doubt as to the distributional assumptions of the sample. Second, the application of contingency tables is relatively straightforward and so easier to understand by everyday investors. Third, contingency tables are preferred to the alternative methods when the sample of funds is limited."

The contingency table approach is used to identify the frequency with which funds are defined as winners and losers over serial time periods, (see Figure 1). In this approach each fund is either a winner (W) or a loser (L) where a winner is defined as

a fund with returns above the median and a loser as a fund with returns below the median. A winner (W) in the first period that remains a winner (W) in the future period is defined as a winner-winner (WW). In a similar way, if a loser (L) in the first period is also a loser (L) in the future period, it is defined as a loser-loser (LL). If a fund shifts from a loser (L) to a winner (W) it is a loser-winner (LW) and a fund that moves from being a winner (W) to a loser (L) is a winner-loser (WL).

[Please Insert Table 4 here]

To test for the independence in the results three statistical criteria are used each of which tests for different forms of persistence. The first statistical test is the repeat winner approach of Malkiel [1995]. This test shows the proportion repeat winners (WW) to winner-losers (WL) being calculated as:

$$\text{Percentage repeat winners} = \frac{WW}{(WW + WL)}$$

If p is the probability that a winner continues to be a winner in the next period, p would be 1/2 if there is no persistence. Malkiel [1995] calculates a Z-test for repeat winners as:

$$\text{Z-test repeat winners} = \frac{(WW - 0.5*(WW + WL))}{\sqrt{(WW + WL)*0.5*0.5}}$$

Thus, a percentage of repeat winners above 50% and a Z-test above zero indicate persistence for winners, while a percentage value below 50% and a Z-test above zero indicates a reversal in performance.

The second statistic test is the Odds Ratio (Christensen, [1990]) also referred to as the Cross-Product Ratio (CPR) which was calculated by Goetzmann and Ibbotson [1994] for testing winner-loser contingency tables. The odds ratio test statistic is the ratio of the product of repeat winners (WW) and repeat losers (LL) divided by the product of winner-losers (WL) and loser-winners (LW).

$$\text{Odds ratio} = \frac{(\text{WW} * \text{LL})}{(\text{LW} * \text{WL})}$$

If winner and loser positions occur randomly, the ratio will be 1. Hence, the null hypothesis that performance in the second period is uncorrelated to that the first period corresponds to an odds ratio of one. An odds ratio greater than one indicates persistence, while a value below one, indicates that reversals in performance dominate the sample. The statistical significance of the odds ratio can then be determined by using the standard error of the natural logarithm of the odds ratio given by the square root of the sum of reciprocals of the cell counts.

$$s_{\log(\text{Odds Ratio})} = \sqrt{\frac{1}{\text{WW}} + \frac{1}{\text{LW}} + \frac{1}{\text{WL}} + \frac{1}{\text{LL}}}$$

being the Z-statistic calculated as:

$$\text{Z-statistic} = \frac{(\log(\text{Odds Ratio}))}{s_{\log(\text{Odds Ratio})}}$$

The Z-statistic has a mean of zero, and standard error of 1. An Odds Ratio above one and a positive Z-statistic indicate persistence for winners and losers.

The final statistical test is Chi-square statistic. Kahn and Rudd [1995] calculate the Chi-square statistic and a p-value to test performance persistence via contingency tables.

$$\text{Chi-square} = \frac{(WW - D1)^2}{D1} + \frac{(WL - D2)^2}{D2} + \frac{(LW - D3)^2}{D3} + \frac{(LL - D4)^2}{D4}$$

where,

$D1 = (WW+WL)*(WW+LW)/N,$ $D2 = (WW+WL)*(WL+LL)/N,$

$D3 = (LW+LL)*(WW+LW)/N,$ $D4\ t = (LW+LL)*(WL+LL)/N.$

where, N is the number of ETFs and the Chi-square distribution has one degree of freedom in a two-by-two table.

As a resume, we will use Sharpe ratio, Treynor ratio and annual return for ranking the different periods of ETFs and Spearman's rho and winner/loser contingency table approaches for testing the performance persistence. Moreover, we also examine the Spearman Rank Correlation Coefficient between Sharpe and Treynor Ranking.

4. Empirical Results and Analysis

In this section the statistical analysis of 20 iShares MSCI country-specific ETFs returns are presented. Also the test whether the returns are normally distributed (Skweness and Kurtosis) are shown. Moreover the analysis of performance is done using the Sharpe, Treynor and Sortino ratios as risk-adjusted performance measures. Finally, we apply to the Spearman Rank Correlation Coefficient and the Winner-loser Contingency Table for performance persistency.

4.1. Descriptive Statistics

Table 5 presents the descriptive statistics of 20 iShares MSCI country-specific ETFs between July 2001 and June 2006 (mean monthly returns, standard deviation, minimum, maximum, and range). S&P 500 and iShares MSCI-Austria (EWO) has the lowest and the highest mean return (0.138% and 2.440%, respectively), which indicates that the stock market return of Austria surpassed that of U.S, for the time period of the sample. The average of monthly returns on 20 iShares ETFs is 1.176% with standard deviation of 5.932% being greater than S&P 500 monthly mean return. In addition, standard deviation of S&P 500 is 3.917%, which is the smallest except for the iShares MSCI United Kingdom Index Fund (EWU), 3.798%. Figure 1 plots the annualized standard deviations against the annualized average returns. Obviously, we could see that given the same level of mean for EWO, EWY, and EWZ, but the standard deviation of EWO is the smallest. Thus, EWO has higher Sharpe ratio efficiency.[4]

[Please Insert Table 5 here]

[Please Insert Figure 1 here]

[4] The Sharpe ratio for each ETF will present in Table 4-9.

4.2 The Test of Normality

Table 6 and 7 presents the results of Skewness and Kurtosis and the summary statistics of normality test for the ETFs, respectively. The returns of the ETFs are not normally distributed, as expected. More than 5/6 of the ETFs have negative skewness, which means that the series is skewed to the left. Only three ETFs—EWJ, EWM, and EWY—all from Asian Pacific region have positive skewness. High-risk asset classes typically exhibit negative skewness. In addition, hedge funds usually exhibit negative skewness, as well.

[Please Insert Figure 6 here]

[Please Insert Table 7 here]

4.3. The Performance and Comparison of ETFs

Even though we tested the distribution of the ETFs in the sample, which has proved that ETFs are not normally distributed, early studies by Plantinga *et al.* [2001] and Casarin *et al.* [2005], with many funds in their samples revealing non-normal return's distribution they keep using traditional risk-adjusted performance measures for evaluating mutual fund performance. Firstly, they are easy to understand and accept by most investors. Secondly, they have been widely in previous studies and practical applications to measure mutual funds performance. Finally, it provides a good way to compare the results. Consequently, we also use the traditional risk-adjusted for measuring ETFs performance.

Table 8 reports the performance of the ETFs from July 2001 to December 2003 (Period one). Concretely, the second column of this table presents the effective annual return, which is positive except for EWJ (-1.16%) and EWN (-3.11%). We know that during this period, most of these ETFs had positive returns in all regions. However,

compared with the benchmark in the same period, the S&P 500 index has reverse performance. We calculate that the average return of the 20 ETFs is 9.82% greater than the -2.26% of the S&P 500 index. Thus, 20 ETFs portfolio outperformed benchmark. When the U.S. stock markets enter bear market, U.S. investors could get another choice, moving their money to iShares MSCI country-specific ETFs for holding international portfolio, and profit from outside the United States. Furthermore, standard deviation terms indicate volatility. The S&P 500 index has potentially lower volatility than other ETFs. The standard deviation of the S&P 500 is 17.90% less than that of the 20 ETFs, which is 24.90%. It demonstrates, as expected that high return is associated with high risk. The fourth column shows excess return, fund return minus risk-free rate being the risk-free rate 1.55%. If the fund return is less than the risk-free rate, the excess return will be negative. The last column presents beta a measure of non-diversifiable risk, or in other words the sensitivity of the stock with reference to a broad based market index (in this case the S&P 500, therefore S&P 500 beta is equal to one.). The findings indicate that ETFs with higher beta have higher excess return. For example, EWY has 30.00% excess return with 1.36 beta and EWZ has 18.52% excess return with 2.13 beta. As a resume, during the period July 2001 to December 2003 the 20 iShares MSCI country-specific ETFs, based on excess return, had better performance than the S&P 500 index.

[Please Insert Table 8 here]

Considering the total 20 ETFs returns, the performance is better than S&P 500 index. Thus, the importance of portfolio is appeared. The performance of a portfolio could not only diversified risk but also increasing the level of performance. However, only the EWO pass the statistically test and other ETFs are statistically insignificant

but the total return of ETFs is positive and beat S&P 500 index.

Table 9 shows the results and ranking with different measures to ETFs based on the Sharpe ratio, the Treynor ratio, the Sortino ratio, and Excess return. The calculation period is from July 2001 to December 2003. The first column indicates the Sharpe ratio and the second column shows the ranking by Sharpe ratio. When the Sharpe appears negative, it is meaningless. Thus, we do not consider ETFs that prove negative on the Sharpe ratio: EWU, EWJ, and EWN. There are 17 ETFs out of 20 ETFs that have positive Sharpe ratios, which indicate that 85% of the ETFs have returns higher than the risk free return. We rank ETFs by their Sharpe ratio, and pick the top 5 ETFs for our portfolio. These five are EWO, EWY, EWM, EWA, and EWC. The table shows that EWO has the highest Sharpe ratio, 1.3825, the second one is EWY, 0.8873, the third is EWM, 0.8347, the fourth is EWA, 0.7536, and the fifth is EWC, 0.5352. The rest ETFs make a 15 ETFs portfolio including EWH, EWJ, EWS, EWT, EWK, EWQ, EWG, EWI, EWN, EWP, EWD, EWL, EWU, EWW, and EWZ.

The fourth and fifth columns indicate the Treynor ratio and ranking. The Treynor ratio tests portfolio beta for risk. The same criteria, higher Treynor ratio is better and we do not consider ETFs with negative Treynor ratios. Thus, we take out ETU, EWJ, and EWN which have both negative Treynor and Sharpe ratio. The top 5 Treynor ratio ETFs are EWO, EWM, EWY, EWA, and EWC. These ETFs are the same as the top 5 Sharpe ratio. Therefore, all positive Treynor ratios of ETFs, for Treynor ratio measure, outperformed S&P 500. Finally, we could demonstrate that the S&P 500 index has both negative Sharpe ratio and Treynor ratio during the period from July 2001 to December 2003 as well as S&P 500, for both the Sharpe and Treynor ratio measures, underperformed most ETFs. In current stage, according to risk-adjusted performance approaches, we could infer both 5 ETFs portfolio and 15 ETFs portfolio.

As from Table 7, the returns of ETFs are not normally distributed, 85% of ETFs have negative Skewness and all ETFs of Kurtosis have flat distribution. Thus, we use the Sortino ratio to evaluate ETFs performance. The Sortino ratio constructs a risk-adjusted performance measure by replacing the standard deviation with the downside risk measure. In our study, the lower partial moment (LPM) is used for downside risk measure and take risk-free rate as the target return as well as assume the investors are risk averse ($\alpha = 2$). The seventh and eighth columns indicate the Sortino ratio and ranking.. The top 5 Sortino ratio ETFs are present as follow. The Sortino ratio of EWY is 0.1192 (Ranking #1), EWO is 0.1107 (Ranking #2), EWZ is -0.0017 (Ranking #3), EWM is -0.0418(Ranking #4), and EWP is -0.0812 (Ranking #5). The results of ranking compare to the Sharpe ratio and the Treynor ratio are not significant difference.

The tenth and eleventh columns indicate the Excess return and ranking. Ranking #1 is EWY and excess return is 0.3000, ranking #2 is EWO and excess return is 0.2475, ranking #3 is EWZ and excess return is 0.1852, ranking #4 is EWM and excess return is 0.1641, and ranking #5 is EWA and excess return is 0.1317.

[Please Insert Table 9 here]

Since we already known the results and ranking of these measures for these ETFs in Table 9, we will process the comparison next. As indicated in our design, first, we select 5 ETFs from our sample based on the Sharpe ratio ranking and Treynor ratio ranking during period one (July 2001 – December 2003). Furthermore, we use this portfolio of 5 ETFs to compare its performance with the second portfolio consisting of the remaining ETFs, and also with the S&P 500 benchmark during period two (January 2004 – June 2006).

Table 10 compares the performance of the 5 ETFs portfolio, the 15 ETFs portfolio, and the S&P 500. The 5 ETFs portfolio includes EWA, EWM, EWY, EWO, and EWC. The 15 ETFs portfolio includes the remaining ETFs. For period one, the mean return of the 5 ETFs portfolio is 20.23%; which is greater than the 15 ETFs portfolio at 6.35%, and the S&P 500 index at -2.26%. The standard deviation of the 5 ETFs portfolio is 8.56% higher than the 15 ETFs portfolio at 6.02%. The 5 ETFs portfolio has higher risk than the 15 ETFs portfolio, but we have to consider both return and risk. Study by Simons [1998] gives an example for this. Thus, we use risk-adjusted performance measure, Sharpe ratio, to measure the reward-to-variability. We obtain the results that the 5 ETFs portfolio's Sharpe ratio is 2.1812, the 15 ETFs portfolio's Sharpe ratio is 0.7970, and the S&P 500 index's Sharpe ratio is -0.2128. Obviously, we conclude that the 5 ETFs portfolio has better performance than the 15 ETFs portfolio and the S&P 500 index during period one.

Moreover, during period two (January 2004 – June 2006), the 5, the 15 ETFs portfolio and the S&P 500 index has a mean return of 24.74%, 20.07% and 5.73%, respectively. The 5 ETFs portfolio still gets a higher return than the others. For the risk view, the 5 ETFs portfolio has 12.52% standard deviation, the 15 ETFs portfolio has a 10% standard deviation, and the S&P 500 index has a 7.16% standard deviation. Additionally, the 5 ETFs portfolio's Sharpe ratio is 1.7593, the 15 ETFs portfolio's Sharpe ratio is 1.7363, and the Sharpe ratio of the S&P 500 index is 0.4205. Finally, we infer that the 5 ETFs portfolio is superior to the 15 ETFs portfolio and the S&P 500 index based on the Sharpe ratio performance. We explain that advance selected ETFs portfolio could enhance the performance.

Our findings demonstrate that both the 5 ETFs portfolio and the 15 ETFs portfolio outperformed the S&P 500 Index. The results of this study are similar with the study of Eun *et al.* [1991]. They also point out the majority of international mutual

funds, for Sharpe ratio measure, outperformed the U.S. market. These results also can infer to the previous literature of diversified portfolio (O'Neal [1997] and Brands and Gallagher [2005]). Their findings indicate increasing the number of mutual funds in a portfolio can reduce the risk and make a diversified portfolio. Moreover, our findings are also consistent with the study of Cao [2005], which confirms that iShares provide diversification gains.

[Please Insert Table 10 here]

As above, we demonstrate that advance selected ETFs portfolio could enhance the performance. Moreover, we test whether randomly select ETFs can improve the performance. The results present in Table 4-8. We randomly select 5 ETFs for 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100 panels sets[5] and calculate the mean return, standard deviation and the Sharpe ratio in our sample period one. The 5 ETFs and 15 ETFs portfolios are the same as Table 10. The results shows that the mean return of the randomly selected 5 ETFs of 100 panels set is 9.14%, the standard deviation is 3.44%, and the Sharpe ratio is 2.2043. The mean return of randomly select 5 ETFs of 100 panels set is less than 5 ETFs portfolio but greater than 15 ETFs portfolio and S&P 500 index. Considering risk-adjusted performance measure, randomly select 5 ETFs of 100 panels set Sharpe ratio it the highest compare to 5 ETFs portfolio, 15 ETFs portfolio, an S&P 500 index. For the other panels the Sharpe ratios of 40, 50, 60, 70, 80, and 90 panels sets are superior to 5 ETFs portfolio, 15 ETFs portfolio, and S&P 500 index as well. Thus, we conclude that randomly select 5 ETFs panel set, which greater than 40 panels set, could outperform S&P 500 index and advanced select 5 ETFs portfolio based on Sharpe ratio.

[5] Tables available upon request.

[Please Insert Table 11 here]

4.4 Test of Spearman Rank Correlation Coefficient

Spearman's correlation coefficient is a non-parametric statistic and so it can be used when the data have violated parametric assumptions such as non-normally distributed data. As our prior tests indicate, these ETFs are not normally distributed. Spearman Rank Correlation Coefficient is therefore used to evaluate the relationship between period one and period two. A significantly positive Spearman Rank Correlation Coefficient indicates that the performance persists from period one to period two; a significantly negative coefficient means a reverse performance.

From table 12 to 15 the ETFs are ranked in each period, from 1 to 20, from the ETF with highest to the lowest different performance measures (Sharpe's, Treynor's, Sortino's and Annual Return Ranking Ratios).

[Please Insert Table 12 to 15 here]

Tables 16 to 19 present the results of a performance persistence analysis based on Spearman's rho between the performance measures for the two periods. A matrix is displayed giving the correlation coefficient between the two variables, underneath is the significance value of this coefficient and finally the sample size The coefficients are 0.349, 0.239, 0.522 and 0.502 respectively for the different measures and only statistical significant when the Sortino ratio and Annual Return Ranking are used. Therefore there is evidence to support the performance persistence. As a resume, based on the Sharpe ratio and Treynor ratio rankings, the Spearman's rho indicates weak positive correlation and not statistical significance at confidence level. Thus,

during July 2001 to June 2006 period, the performance of these 20 ETFs could not persist. There is no evidence of performance persistence in our study. This is in line with, Grinblatt and Titman [1989], Phelps and Detzel [1997], Fletcher [1997, 1999], and Dimson and Minio-Kozerski [2001], who did not find evidence of performance persistence. Our finding is based on a ranking of 30-month (2.5-year) risk-adjusted performance. Thus, the first conclusion is that past ETFs risk-adjusted performance does not predict future performance. However, for the annual return ranking based the Spearman's rho has a strong positive correlation and statistical significant for 0.05 confidence level. In addition, according to the Spearman's rho, the ranking of the Sortino ratio has also a positive correlation and significant at 0.01 confidence level. Consequently, using these two approaches we find persistence of performance. Furthermore all the coefficients are positive which induces that previous returns can explain future ones, but we have to take these results cautiously.

[Please Insert Table 16 to 19 here]

4.5. Spearman Rank Correlation Coefficient: All measures Ranking

Prior studies show the Sharpe ratio ranking or Treynor ratio ranking in different periods. Table 20 compares all measures, the Sharpe, Treynor, Sortino ratio and annual return ranking in the same period revealing a very high degree of correlation between them in period one, as measured by Spearman rank correlation coefficient.

[Please Insert Table 20 here]

Table 21 presents the statistical results. The correlation coefficient among the different performance measures fall between 0.877 and 0.962 showing that or

measures are not very different. Moreover, Spearman's rho falls between 0.5 and 1, there is a strong positive correlation. Obviously, the choice of risk-adjusted measure is not so important for ranking purposes.

[Please Insert Table 21 here]

Table 22 indicates the Sharpe ratio, the Treynor ratio, the Sortino ratio, and the annual return ranking in period two and order by Sharpe ratio ranking.

[Please Insert Table 22 here]

A comparison of the rankings by these measures demonstrates a very high degree of correlation between them in period two, as measured by Spearman ranking correlation coefficient but lower than in period one (Table 23). The correlation coefficient among the different performance measures fall between 0.543 and 0.868. That is same way could explain why for the Sharpe and Treynor ratio besides the Spearman Rank Correlation Coefficient is positive is not statistical significant. The different performance measures are more correlated each other for the first rather for the second period.

[Please Insert Table 23 here]

Our results indicate that a comparison of the rankings by these measures, reveals a very high degree of correlation between them. All Spearman rank correlation coefficient suggest a strong positive collection, and correlation is significant at confidence level. Our findings are similar to the findings of Bal and Leger [1996].

They also noted that the Sharpe and Treynor ratio ranking show a strong positive correlation. When a portfolio is well diversified, the non-systemic risk and the systemic risk tend to similar. Thus, the standard deviation and beta of an ETF are not change too much. Finally, whatever using Sharpe ratio ranking or Treynor ranking, we will get the similar result. Our findings also supported the one from by Casarin *et al.* [2005] which indicate a very high correlation between the Sharpe, Treynor, and Sortino ratios.

4.6 Winner-Loser Contingency Table Analysis

Table 24 shows the contingency tables of winners and losers information based on the Sharpe ratio, Treynor ratio, Sortino ratio, and annual return data, respectively. The criteria of the results of contingency table are a percentage of repeat winners above 50%, a Z-test above zero indicate persistence for winners, an Odds Ratio above one and a positive Z-statistic indicate persistence for winners and losers, and a higher Chi-squared test being its p-value used to test for performance persistence. The finding of the 30-Month for Sharpe ratio data showing little evidence of positive performance persistence, with a repeat winner ratio of 60%, Z-Test of 0.63 and an odds ratio of 2.25 with Z-Statistic of 0.89. Although none of the results are statistics significant at the confidence levels of significance (p-value = 0.5287 and 0.3735 respectively) due to the percentage of repeat winners above 50% and the Z-test above zero that indicates persistence of winners. A Chi-squared value of 0.80 (p-value = 0.3711) shows evidence of reversal in performance persistence.

The 30-Month of Treynor ratio and Sortino ratio data showing some evidence of positive performance persistence, with a repeat winner ratio of 70%, Z-Test of 1.26, an odds ratio of 5.44 with Z-Statistic of 1.74 and a Chi-squared value of 3.20, (p-value = 0.2077, 0.0819 and 0.0736 respectively). The repeat winner ratio increases to 70%

the odds ratio also rise to 5.44, and the value of Chi-squared test advances to 3.20.

The 30-Month of annual return data showing strong evidence of positive performance persistence with a repeat winner ratio of 80% (p = 0.0574) with Z-Test of 1.90. The odds ratio of 16.00 and Z-Statistic of 2.48 indicate that this persistence is statistically significant at the 5% level (p-value = 0.0131). The Chi-squared test of 7.20 shows that this persistence is statistically significant at the 1% level (p-value is 0.0073). The p-values are based on two-tail tests. Contingency table of winners and losers based on annual return supports the performance persistence.

[Please Insert Table 24 here]

According to the above results, some evidence shows performance persistence, based on Sharpe ratio, Treynor ratio and Sortino ratio, but statistically insignificant. Strong evidence shows performance persistence, based on annual return, and statistically significant at the confidence level. Past performance of iShares MSCI country-specific ETFs can predict future performance, based on annual return. This finding of winner-loser contingency table method could refer to that of Spearman Rank Correlation Coefficient approach. Investors could use past annual return for selecting iShares MSCI country-specific ETFs to predict future annual return, and winner still can be winner.

Moreover, we want to know that whether time period difference will show the different results. Thus, we test 3-month, 6-month, and 15-month time period for Sharpe ratio, Treynor ratio, and Annual return. Table 25 reports the contingency table of winners and losers based on Treynor ratio for 6-month period. There is one 6-month period (3Q4Q02) which indicates possible persistence of performance, at a 5% level (the p-value is 0.0131 for the Odds Ratio) and at a 1% level (the p-value is 0.0073 for chi-square test). We can also observe a reversal pattern in 4 of the 6-month

periods (3Q4Q01, 1Q2Q02, 3Q4Q03, and 3Q4Q05), although this is not statistically significant. Table 26 shows the contingency table of Treynor ratio for 15-month period. The contingency table supports some persistence in ETFs performance at the overall level, as indicated by the statistically significant Odds Ratio Z-statistic and chi-square statistic, which indicate possible persistence of performance, at a 5% level (the p-values are 0.0414 and 0.0388 for the Odds Ratio and chi-square tests, respectively).

[Please Insert Table 25 here]

[Please Insert Table 26 here]

5. Conclusion

The aim of this paper was to investigate the performance and persistence of 20 iShares MSCI country-specific exchange-traded funds (ETFs) in comparison with S&P 500 index over the period July 2001 to June 2006. Exchange-Traded Funds (ETFs) are the leading financial innovation of the last decade and since it's an innovative product and become popular in recent years, this has attracted our attention. Hence, we addressed in this paper the study of ETFs performance and performance persistence rather than mutual funds because there are several studies analysing the last ones in past years, but very little is known about ETFs

The conclusions can be summarized as follows. First, ETFs can beat the U.S. market index based on risk-adjusted performance measures. Second, past performance of iShares MSCI country-specific ETFs can predict future performance, based on annual return. This finding of winner-loser contingency table method could refer to the one of Spearman Rank Correlation Coefficient approach. Investors could use past annual return for selecting iShares MSCI country-specific ETFs to predict future annual return, and a winner still is a winner.

As a future direction to our research and since our sample is limited to ishares MSCI country-specific, extend the sample and mix ETFs from various sectors such as the industry sector and corporate bond indexes, making an ETFs portfolio for examining the performance in those sectors. Additionally, we have to consider the use of different performance measures, such as benchmark-relative value at risk measurement which is based on a VaR approach to examining the performance of ETFs. Finally, for the testing of persistence of ETFs performance, 2.5 years was used, so different time periods and longer ones could drive to more consistent conclusions.

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Table 1 Sample Data List and Inception Date

This table reports the ETFs region, symbol, ETFs long name, and inception date for iShares. The data of iShares are from iShares website.

ETFs Region	Symbol	ETFs Long Name	Inception Date
Asian Pacific countries	EWA	iShares MSCI-Australia	1996-03-12
	EWH	iShares MSCI Hong Kong Index Fund	1996-03-12
	EWJ	iShares MSCI Japan Index Fund	1996-03-12
	EWM	iShares MSCI Malaysia Index Fund	1996-03-12
	EWS	iShares MSCI Singapore (Free) Index Fund	1996-03-12
	EWY	iShares MSCI-South Korea Index Fund	2000-05-09
	EWT	iShares MSCI Taiwan Index Fund	2000-06-20
European countries	EWO	iShares MSCI-Austria	1996-03-12
	EWK	iShares MSCI Belgium Index Fund	1996-03-12
	EWQ	iShares MSCI France Index Fund	1996-03-12
	EWG	iShares MSCI-Germany	1996-03-12
	EWI	iShares MSCI Italy Index Fund	1996-03-12
	EWN	iShares MSCI Netherlands Index Fund	1996-03-12
	EWP	iShares MSCI Spain Index Fund	1996-03-12
	EWD	iShares MSCI Sweden Index Fund	1996-03-12
	EWL	iShares MSCI Switzerland Index Fund	1996-03-12
	EWU	iShares MSCI United Kingdom Index Fund	1996-03-12
North American countries	EWC	iShares MSCI-Canada	1996-03-12
	EWW	iShares MSCI-Mexico	1996-03-12
South American country	EWZ	iShares MSCI-Brazil Index Fund	2000-07-10

Source: iShares, Inc.

Table 2 Sector Weightings

This table shows the sector weights of the 20 ETFs. The sectors are divided in software, industrial materials, energy, utilities, hardware, media, telecommunication, healthcare, consumer services, business services, financial services, and consumer goods. Data is from Yahoo Finance website. The holdings present as of 30 June 2006.

SECTOR WEIGHTINGS (%)	EWA	EWH	EWJ	EWM	EWS	EWY	EWT	EWO	EWK	EWQ	EWG	EWI	EWN	EWP	EWD	EWL	EWU	EWC	EWW	EWZ
Software	0.43	0.00	0.56	0.00	0.00	0.00	0.46	0.00	0.00	0.51	5.98	0.00	0.00	0.00	0.00	0.00	0.08	0.29	0.00	0.00
Industrial Materials	25.3	11.49	23.67	15.89	11.71	8.4	14.43	12.41	15.01	15.09	16.93	3.54	5.54	4.08	29.96	14.45	12.02	18.23	10.17	28.83
Energy	4.82	0	0.80	1.31	0.37	3.48	0.00	15.76	0.00	13.71	0.00	17.19	0.00	4.8	0.76	0.00	19.38	32.15	0.00	40.74
Utilities	1.34	13.8	4.11	12.3	0.00	3.35	0.00	5.71	0.00	3.85	13.94	9.48	0.00	15.01	0.00	0.00	3.66	0.67	0.00	6.74
Hardware	0.00	0.73	5.65	0.51	3.89	1.44	44.93	0.00	0.00	2.58	10.67	0.00	3.48	0.00	18.47	0.34	0.11	3.23	0.00	0.00
Media	1.17	0.94	0.82	2.76	4.50	0.00	0.00	0.00	0.00	5.03	0.00	3.66	6.81	1.58	1.76	0.00	2.81	2.10	5.91	0.00
Telecommunication	0.97	13.17	2.47	9.30	13.13	6.15	3.95	12.56	7.06	4.61	5.54	10.26	5.19	16.38	5.23	2.22	6.40	2.93	40.23	8.37
Healthcare	2.87	0.00	4.85	0.00	0.90	0.60	0.00	0.00	5.41	9.03	3.09	1.28	0.00	0.28	2.38	32.77	10.16	1.63	0.00	0.77
Consumer Services	6.94	7.41	4.76	7.14	4.96	5.32	0.36	0.00	7.91	5.77	1.63	1.13	4.18	3.37	9.04	0.54	6.89	2.32	10.41	1.63
Business Services	5.79	3.85	6.86	8.6	12.12	9.11	8.61	7.45	0.33	5.02	3.85	2.95	9.18	6.03	5.33	2.67	3.07	4.89	3.42	2.38
Financial Services	46.78	45.19	23.27	26.45	47.82	22.28	19.11	42.27	56.81	21.29	27.11	48.01	39.12	41.55	21.67	28.49	26.24	30.63	19.93	7.57
Consumer Goods	3.58	3.43	22.18	15.74	0.62	39.87	8.16	3.83	7.49	13.51	11.27	2.5	26.49	6.91	5.4	18.52	9.18	0.93	9.92	2.98

Table 3 U.S. Three-Month Treasure Bill Rate

This table reports the U.S. three-moth Treasure bill rate. There are three periods. It is the same as our sample period. The data is from Board of Governors of the Federal Reserve System website.

Period	Average Rate
July 2001 – December 2003 (period 1)	1.55%
January 2004 – June 2006 (period 2)	2.72%
July 2001 - June 2006	2.135%

Table 4: Winner/Loser Contingency Table

Period	T+1	
T	Winner	Loser
Winner	**WW**	**WL**
Loser	**LW**	**LL**

Table 5: Descriptive Statistics of 20 ETFs

This table presents the monthly mean return, standard deviation, minimum return, maximum return and range of 20 iShares MSCI country-specific ETFS during the period July 2001 to June 2006, a total of 60 months for the sample period. Mean return is calculated by net asset values (NAVs). The NAVs data are from iShares website.

Symbol	N	Mean	Std. Deviation	Minimum	Maximum	Range
EWA	60	1.369%	4.589%	-12.987%	9.701%	22.689%
EWC	60	1.331%	4.631%	-11.258%	9.072%	20.331%
EWD	60	1.300%	7.306%	-17.004%	20.829%	37.833%
EWG	60	0.816%	7.345%	-24.192%	23.455%	47.648%
EWH	60	0.645%	5.388%	-13.998%	12.174%	26.172%
EWI	60	0.950%	5.187%	-14.559%	13.709%	28.267%
EWJ	60	0.614%	5.160%	-8.887%	13.202%	22.088%
EWK	60	1.226%	5.281%	-16.203%	17.515%	33.718%
EWL	60	0.859%	4.129%	-12.723%	11.431%	24.155%
EWM	60	0.982%	4.745%	-10.211%	12.903%	23.114%
EWN	60	0.427%	5.815%	-17.359%	14.299%	31.658%
EWO	60	2.440%	4.908%	-11.002%	13.067%	24.069%
EWP	60	1.290%	5.462%	-15.153%	13.671%	28.825%
EWQ	60	0.820%	5.353%	-15.335%	15.725%	31.060%
EWS	60	0.944%	5.115%	-18.539%	11.811%	30.350%
EWT	60	0.721%	7.827%	-21.865%	21.818%	43.683%
EWU	60	0.565%	3.798%	-10.258%	10.117%	20.376%
EWW	60	1.563%	6.520%	-17.785%	15.175%	32.960%
EWY	60	2.276%	8.268%	-16.604%	26.263%	42.866%
EWZ	60	2.379%	11.813%	-30.175%	27.414%	57.589%
Average	60	1.176%	5.932%			
S&P 500	60	0.138%	3.917%	-11.002%	8.645%	19.647%

Figure 1: Risk and average return

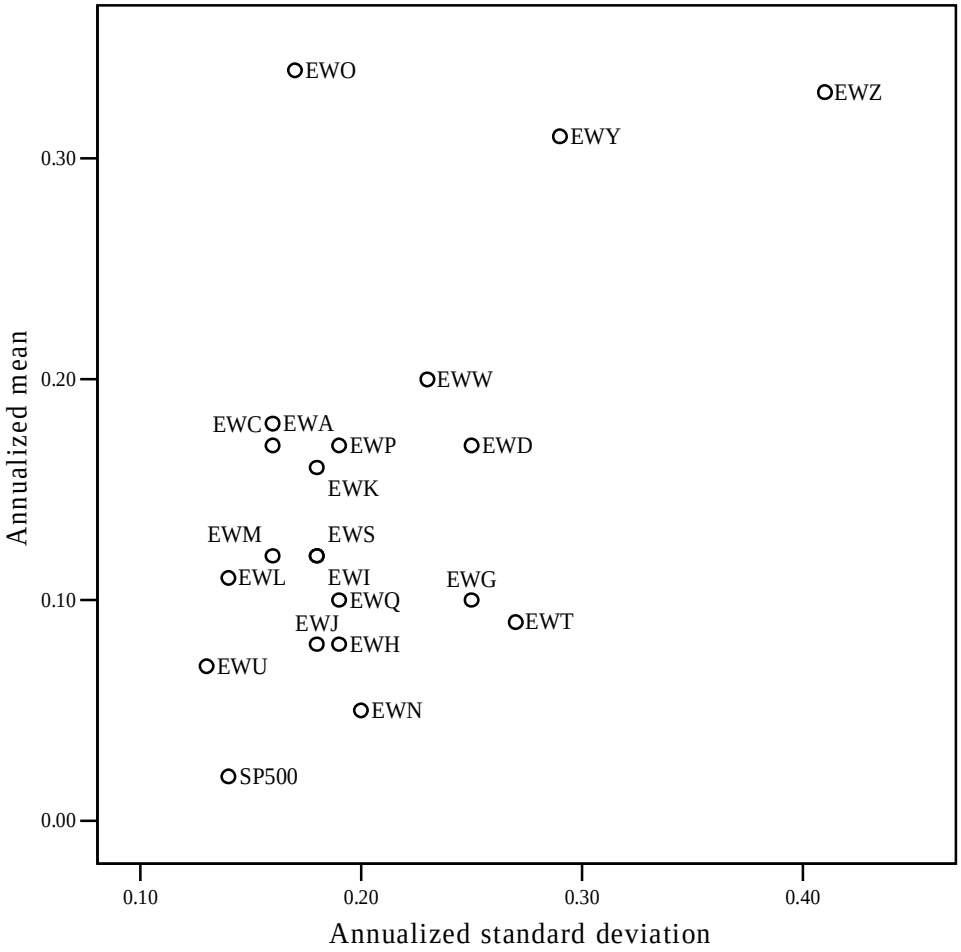

Table 6: The Test of Normality of ETFs

This table presents the coefficient of skewness and kurtosis for each ETF. Each month from July 2001 through June 2006 (60 months), total 20 ETFs are calculated.

ETFs Region	Symbol	ETFs Long Name	Skewness	Kurtosis
Asian Pacific countries	EWA	iShares MSCI-Australia	-0.5340	0.5055
	EWH	iShares MSCI Hong Kong Index Fund	-0.1809	-0.0986
	EWJ	iShares MSCI Japan Index Fund	0.1730	-0.5595
	EWM	iShares MSCI Malaysia Index Fund	0.1424	0.1344
	EWS	iShares MSCI Singapore (Free) Index Fund	-0.8993	2.8551
	EWY	iShares MSCI-South Korea Index Fund	0.0773	0.1079
	EWT	iShares MSCI Taiwan Index Fund	-0.0959	0.5070
European countries	EWO	iShares MSCI-Austria	-0.4682	0.2708
	EWK	iShares MSCI Belgium Index Fund	-0.4981	2.6470
	EWQ	iShares MSCI France Index Fund	-0.4604	2.1489
	EWG	iShares MSCI-Germany	-0.4723	2.9384
	EWI	iShares MSCI Italy Index Fund	-0.5579	1.7705
	EWN	iShares MSCI Netherlands Index Fund	-0.8767	2.1258
	EWP	iShares MSCI Spain Index Fund	-0.5273	1.5002
	EWD	iShares MSCI Sweden Index Fund	-0.1502	1.0662
	EWL	iShares MSCI Switzerland Index Fund	-0.5060	1.2789
	EWU	iShares MSCI United Kingdom Index Fund	-0.2047	0.7417
North American countries	EWC	iShares MSCI-Canada	-0.6946	0.1704
	EWW	iShares MSCI-Mexico	-0.5913	0.3058
South American country	EWZ	iShares MSCI-Brazil Index Fund	-0.5410	0.7522

Table 7 Summary Statistics of Normality Test for ETFs

	No. of ETFs	Total ETFs	Percentage
Skewness < 0	17	20	85%
Skewness = 0	0	20	0%
Skewness > 0	3	20	15%
Kurtosis < 3	20	20	100%
Kurtosis = 3	0	20	0%
Kurtosis > 3	0	20	0%

Table 8: The Performance of ETFs during period one

This table presents the annual return, risk, excess return, and beta of ETFs during July 2001 to December 2003. The risk-free rate is 1.55%. The beta is compare with S&P 500.
The Effective Annual Return = ((1+ monthly mean return)^12)-1
The Annual Std. Dev.= Monthly Std. Dev.*(12^0.5)
The Excess Return = Effective Annual Return – risk-free rate, risk-free rate is 1.55%

Beta = $\frac{\mathrm{Cov}(g_a, g_m)}{\mathrm{Var}(g_m)}$, g_a = the rate of return of the ETF, g_m = the rate of the market

ETFs Region	Symbol (1)	Effective Annual Return (2)	Annual Std. Dev. (3)	Excess Return (4)	Beta (5)
Asian Pacific countries	EWA	14.72%	17.47%	13.17%	0.76
	EWH	2.15%	22.06%	0.59%	0.83
	EWJ	-1.16%	19.45%	-2.72%	0.42
	EWM	17.96%	19.65%	16.41%	0.42
	EWS	6.95%	22.49%	5.39%	0.81
	EWY	31.55%	33.81%	30.00%	1.36
	EWT	10.66%	34.11%	9.10%	1.17
European countries	EWO	26.31%	17.91%	24.75%	0.45
	EWK	9.12%	23.16%	7.57%	0.86
	EWQ	3.70%	23.90%	2.14%	1.16
	EWG	4.73%	33.69%	3.17%	1.72
	EWI	6.89%	22.94%	5.34%	0.98
	EWN	-3.11%	26.08%	-4.67%	1.27
	EWP	14.21%	24.15%	12.66%	1.17
	EWD	10.73%	32.57%	9.18%	1.67
	EWL	5.43%	17.71%	3.87%	0.75
	EWU	0.74%	16.26%	-0.81%	0.79
North American countries	EWC	10.61%	16.92%	9.05%	0.82
	EWW	4.14%	24.62%	2.59%	1.08
South American country	EWZ	20.07%	49.14%	18.52%	2.13
	Average	9.82%	24.90%	8.27%	1.03
	S&P500	-2.26%	17.90%	-3.81%	1.00

Table 9 The Results and Ranking with Different Measure to ETFs

This table presents the results and ranking of Sharpe ratio, Treynor ratio, Sortino ratio, and Excess return for each ETF and S&P 500 benchmark. The calculation period from July 2001 through December 2003 (30 months), total 20 ETFs are calculated.

ETFs	Sharpe Ratio (1)	R (2)	ETFs (3)	Treynor Ratio (4)	R (5)	ETFs (6)	Sortino (2,Rf) (7)	R (8)	ETFs (9)	Excess Return (10)	R (11)
EWO	1.3825	1	EWO	0.5508	1	EWO	0.1107	2	EWO	0.2475	2
EWY	0.8874	2	EWY	0.2209	3	EWY	0.1192	1	EWY	0.3000	1
EWM	0.8348	3	EWM	0.3950	2	EWM	-0.0418	4	EWM	0.1641	4
EWA	0.7537	4	EWA	0.1725	4	EWA	-0.0989	7	EWA	0.1317	5
EWC	0.5352	5	EWC	0.1109	5	EWC	-0.1728	11	EWC	0.0905	9
EWP	0.5242	6	EWP	0.1084	6	EWP	-0.0812	5	EWP	0.1266	6
EWZ	0.3768	7	EWZ	0.0871	8	EWZ	-0.0017	3	EWZ	0.1852	3
EWK	0.3269	8	EWK	0.0880	7	EWK	-0.1546	10	EWK	0.0757	10
EWD	0.2818	9	EWD	0.0549	11	EWD	-0.0999	8	EWD	0.0918	7
EWT	0.2669	10	EWT	0.0778	9	EWT	-0.0960	6	EWT	0.0910	8
EWS	0.2397	11	EWS	0.0668	10	EWS	-0.1862	12	EWS	0.0539	11
EWI	0.2326	12	EWI	0.0543	12	EWI	-0.1863	13	EWI	0.0534	12
EWL	0.2187	13	EWL	0.0519	13	EWL	-0.2520	16	EWL	0.0387	13
EWW	0.1051	14	EWW	0.0239	14	EWW	-0.2054	14	EWW	0.0259	15
EWG	0.0941	15	EWG	0.0184	15	EWG	-0.1523	9	EWG	0.0317	14
EWQ	0.0896	16	EWQ	0.0184	16	EWQ	-0.2211	15	EWQ	0.0214	16
EWH	0.0269	17	EWH	0.0071	17	EWH	-0.2588	17	EWH	0.0059	17
EWU	-0.0499	18	EWU	-0.0102	18	EWU	-0.3567	20	EWU	-0.0081	18
EWJ	-0.1396	19	EWJ	-0.0642	20	EWJ	-0.3353	19	EWJ	-0.0272	19
EWN	-0.1790	20	EWN	-0.0367	19	EWN	-0.2741	18	EWN	-0.0467	20
SP500	-0.2129		SP500	-0.0381		SP500	-0.3677		SP500	-0.0381	

Table 10: Comparison of Performance

This table reports comparison of ETFs performance. Period One is from July 2001 to December 2003 and Period Two is from January 2004 to June 2006. The panel set of 5 ETFs are EWA, EWM, EWY, EWO, and EWC. The panel set of 15 ETFs includes EWH, EWJ, EWS, EWT, EWK, EWQ, EWG, EWI, EWN, EWP, EWD, EWL, EWU, EWW, and EWZ. S&P 500 is U.S. domestic benchmark. The performance measure is based on annual return, standard deviation, and Sharpe ratio.

	5 ETFs	**15 ETFs**	**S&P500**
Period One			
Effective Annual Return	20.23%	6.35%	-2.26%
Annual Std. Dev.	8.56%	6.02%	17.90%
Sharpe ratio	2.1812	0.7970	-0.2128
Period Two			
Effective Annual Return	24.74%	20.07%	5.73%
Annual Std. Dev.	12.52%	10.00%	7.16%
Sharpe ratio	1.7593	1.7363	0.4205

Table 11 The Performance of Randomly Select ETFs

This table reports the performance of randomly select ETFs. We select 100 panels set and calculate the average return, standard deviation, and the Sharpe ratio.
*Sharpe ratio greater than 5 ETFs Sharpe ratio

	Mean Return	St. Dev.	Sharpe ratio
5 ETFs	20.23%	8.56%	2.1812
15 ETFs	6.35%	6.02%	0.7970
S&P500	-2.26%	17.90%	-0.2129
Randomly select ETFs			
Panel Set			
5 panels	9.83%	4.28%	1.9343
10 panels	8.36%	3.27%	2.0833
20 panels	7.86%	3.19%	1.9785
30 panels	8.67%	3.35%	2.1225
40 panels	8.69%	3.22%	2.2159*
50 panels	8.78%	3.18%	2.2762*
60 panels	8.87%	2.99%	2.4455*
70 panels	9.03%	3.19%	2.3483*
80 panels	9.25%	3.26%	2.3633*
90 panels	9.13%	3.45%	2.1966*
100 panels	9.14%	3.44%	2.2054*

Table 12 Ranking by Sharpe Ratio for each ETF in Period One and Period Two

This table reports the ranking based on Sharpe ratio in both Period One and Period Two. The Period One is from July 2001 to December 2003 and the Period Two is from January 2004 to June 2006.

Period One			Period Two		
ETFs	Sharpe Ratio	Ranking by Sharpe Ratio	ETFs	Sharpe Ratio	Ranking by Sharpe Ratio
EWO	1.3825	1	EWO	2.3754	1
EWY	0.8874	2	EWY	1.2090	13
EWM	0.8348	3	EWM	0.3522	19
EWA	0.7537	4	EWA	1.2550	12
EWC	0.5352	5	EWC	1.4072	4
EWP	0.5242	6	EWP	1.3630	7
EWZ	0.3768	7	EWZ	1.3963	5
EWK	0.3269	8	EWK	1.7006	3
EWD	0.2818	9	EWD	1.3230	8
EWT	0.2669	10	EWT	0.2558	20
EWS	0.2397	11	EWS	1.2690	11
EWI	0.2326	12	EWI	1.3009	10
EWL	0.2187	13	EWL	1.3864	6
EWW	0.1051	14	EWW	1.8300	2
EWG	0.0941	15	EWG	0.9988	16
EWQ	0.0896	16	EWQ	1.3200	9
EWH	0.0269	17	EWH	0.7803	18
EWU	-0.0499	18	EWU	1.2047	14
EWJ	-0.1396	19	EWJ	0.8937	17
EWN	-0.1790	20	EWN	0.9998	15

Table 13 Ranking by Treynor Ratio for each ETF in Period One and Period Two

This table reports the ranking based on Treynor ratio in both Period One and Period Two. The Period One is from July 2001 to December 2003 and the Period Two is from January 2004 to June 2006.

Period One			Period Two		
ETFs	Treynor Ratio	Ranking by Treynor Ratio	ETFs	Treynor Ratio	Ranking by Treynor Ratio
EWO	0.5508	1	EWO	0.2412	1
EWM	0.3950	2	EWM	0.0709	19
EWY	0.2209	3	EWY	0.1319	11
EWA	0.1725	4	EWA	0.1566	8
EWC	0.1109	5	EWC	0.1656	6
EWP	0.1084	6	EWP	0.1332	10
EWK	0.0880	7	EWK	0.1685	4
EWZ	0.0871	8	EWZ	0.1891	2
EWT	0.0778	9	EWT	0.0256	20
EWS	0.0668	10	EWS	0.1654	7
EWD	0.0549	11	EWD	0.1224	14
EWI	0.0543	12	EWI	0.1293	12
EWL	0.0519	13	EWL	0.1253	13
EWW	0.0239	14	EWW	0.1703	3
EWG	0.0184	15	EWG	0.0850	18
EWQ	0.0184	16	EWQ	0.1162	15
EWH	0.0071	17	EWH	0.0918	16
EWU	-0.0102	18	EWU	0.1462	9
EWN	-0.0367	19	EWN	0.0892	17
EWJ	-0.0642	20	EWJ	0.1668	5

Table 14 Ranking by Sortino Ratio for each ETF in Period One and Period Two

This table reports the ranking based on Sortino ratio in both Period One and Period Two. The Period One is from July 2001 to December 2003 and the Period Two is from January 2004 to June 2006

	Period One			Period Two	
ETFs	Sortino(2,Rf)	R	ETFs	Sortino(2,Rf)	R
EWA	-0.10	7	EWA	-0.32	7
EWC	-0.17	11	EWC	-0.24	5
EWD	-0.10	8	EWD	-0.27	6
EWG	-0.15	9	EWG	-0.41	12
EWH	-0.26	17	EWH	-0.41	11
EWI	-0.19	13	EWI	-0.44	15
EWJ	-0.34	19	EWJ	-0.36	9
EWK	-0.15	10	EWK	-0.33	8
EWL	-0.25	16	EWL	-0.50	18
EWM	-0.04	4	EWM	-0.55	19
EWN	-0.27	18	EWN	-0.47	17
EWO	0.11	2	EWO	0.06	2
EWP	-0.08	5	EWP	-0.40	10
EWQ	-0.22	15	EWQ	-0.45	16
EWS	-0.19	12	EWS	-0.43	14
EWT	-0.10	6	EWT	-0.42	13
EWU	-0.36	20	EWU	-0.59	20
EWW	-0.21	14	EWW	0.02	3
EWY	0.12	1	EWY	-0.10	4
EWZ	0.00	3	EWZ	0.08	1

Table 15 Ranking by Annual Return for each ETF in Period One and Period Two

This table reports the ranking based on Annual Return in both Period One and Period Two. The Period One is from July 2001 to December 2003 and the Period Two is from January 2004 to June 2006

	Period One			Period Two	
ETFs	Annual Return	Ranking by Annual Return	ETFs	Annual Return	Ranking by Annual Return
EWY	31.55%	1	EWY	30.45%	4
EWO	26.31%	2	EWO	41.15%	2
EWZ	20.07%	3	EWZ	46.29%	1
EWM	17.96%	4	EWM	7.16%	20
EWA	14.72%	5	EWA	20.81%	8
EWP	14.21%	6	EWP	19.09%	9
EWD	10.73%	7	EWD	23.11%	6
EWT	10.66%	8	EWT	7.38%	19
EWC	10.61%	9	EWC	24.13%	5
EWK	9.12%	10	EWK	22.73%	7
EWS	6.95%	11	EWS	17.15%	12
EWI	6.89%	12	EWI	17.37%	10
EWL	5.43%	13	EWL	16.45%	14
EWG	4.73%	14	EWG	16.02%	15
EWW	4.14%	15	EWW	39.07%	3
EWQ	3.70%	16	EWQ	17.27%	11
EWH	2.15%	17	EWH	14.20%	17
EWU	0.74%	18	EWU	13.60%	18
EWJ	-1.16%	19	EWJ	17.10%	13
EWN	-3.11%	20	EWN	14.26%	16

Table 16: Spearman's rho Analysis based on Sharpe Ratio

Correlations Sharpe Ratio Ranking

			Period 1	Period 2
Spearman's rho	Period 1	Correlation Coefficient	1.000	.349
		Sig. (1-tailed)	.	.066
		N	20	20
	Period 2	Correlation Coefficient	.349	1.000
		Sig. (1-tailed)	.066	.
		N	20	20

Table 17: Spearman's rho Analysis based on Treynor Ratio

Correlations Treynor Ratio Ranking

			Period 1	Period 2
Spearman's rho	Period 1	Correlation Coefficient	1.000	.239
		Sig. (1-tailed)	.	.155
		N	20	20
	Period 2	Correlation Coefficient	.239	1.000
		Sig. (1-tailed)	.155	.
		N	20	20

Table 18: Spearman's rho Analysis based on Sortino Ratio

Correlations Sortino Ratio Ranking

			Period 1	Period 2
Spearman's rho	Period 1	Correlation Coefficient	1.000	.522(**)
		Sig. (1-tailed)	.	.009
		N	20	20
	Period 2	Correlation Coefficient	.522(**)	1.000
		Sig. (1-tailed)	.009	.
		N	20	20

** Statistical significant at 0.01 level (1-tailed).

Table 19 Spearman's rho Analysis based on Annual Return

Correlations Annual Return Ranking

			Period 1	Period 2
Spearman's rho	Period 1	Correlation Coefficient	1.000	.502(*)
		Sig. (1-tailed)	.	.012
		N	20	20
	Period 2	Correlation Coefficient	.502(*)	1.000
		Sig. (1-tailed)	.012	.
		N	20	20

* Statistical significant at 0.05 level (1-tailed).

Table 20 Ranking by Sharpe Ratio, Treynor Ratio, Sortino Ratio, and Annual Return for each ETF in Period One

The table presents the Sharpe ratio, Treynor ratio, Sortino ratio, and Annual Return and the ranking for each measures of each ETF during Period One (July 2001 – December 2003).

ETFs	Sharpe	R	Treynor	R	Sortino (2,Rf)	R	Annual Return	R
EWO	1.3825	1	0.5508	1	0.1107	2	0.2631	2
EWY	0.8874	2	0.2209	3	0.1192	1	0.3155	1
EWM	0.8348	3	0.3950	2	-0.0418	4	0.1796	4
EWA	0.7537	4	0.1725	4	-0.0989	7	0.1472	5
EWC	0.5352	5	0.1109	5	-0.1728	11	0.1061	9
EWP	0.5242	6	0.1084	6	-0.0812	5	0.1421	6
EWZ	0.3768	7	0.0871	8	-0.0017	3	0.2007	3
EWK	0.3269	8	0.0880	7	-0.1546	10	0.0912	10
EWD	0.2818	9	0.0549	11	-0.0999	8	0.1073	7
EWT	0.2669	10	0.0778	9	-0.0960	6	0.1066	8
EWS	0.2397	11	0.0668	10	-0.1862	12	0.0695	11
EWI	0.2326	12	0.0543	12	-0.1863	13	0.0689	12
EWL	0.2187	13	0.0519	13	-0.2520	16	0.0543	13
EWW	0.1051	14	0.0239	14	-0.2054	14	0.0414	15
EWG	0.0941	15	0.0184	15	-0.1523	9	0.0473	14
EWQ	0.0896	16	0.0184	16	-0.2211	15	0.0370	16
EWH	0.0269	17	0.0071	17	-0.2588	17	0.0215	17
EWU	-0.0499	18	-0.0102	18	-0.3567	20	0.0074	18
EWJ	-0.1396	19	-0.0642	20	-0.3353	19	-0.0116	19
EWN	-0.1790	20	-0.0367	19	-0.2741	18	-0.0311	20

Table 21 Correlation between the Sharpe, Treynor, Sortino, and Annual Return Ranking during Period One

Correlations Period 1

			R_Sharpe	R_Trynor	R_Sortino	R_Annual Return
Spearman's rho	R_Sharpe	Correlation Coefficient	1.000	.991(**)	.893(**)	.962(**)
		Sig. (2-tailed)	.	.000	.000	.000
		N	20	20	20	20
	R_Trynor	Correlation Coefficient	.991(**)	1.000	.877(**)	.938(**)
		Sig. (2-tailed)	.000	.	.000	.000
		N	20	20	20	20
	R_Sortino	Correlation Coefficient	.893(**)	.877(**)	1.000	.955(**)
		Sig. (2-tailed)	.000	.000	.	.000
		N	20	20	20	20
	R_Annual Return	Correlation Coefficient	.962(**)	.938(**)	.955(**)	1.000
		Sig. (2-tailed)	.000	.000	.000	.
		N	20	20	20	20

** Statistical Significant for 0.01 level (2-tailed).

Table 22 Ranking by Sharpe Ratio, Treynor Ratio, Sortino Ratio, and Annual Return for each ETF in Period Two

The table presents the Sharpe ratio, Treynor ratio, Sortino ratio, and Annual Return and the ranking for each measures of each ETF during Period Two (January 2004 – June 2006).

ETFs	Sharpe	R	Treynor	R	Sortino (2,Rf)	R	Annual Return	R
EWO	2.3754	1	0.2412	1	0.0618	2	0.4115	2
EWW	1.8300	2	0.1703	3	0.0160	3	0.3907	3
EWK	1.7006	3	0.1685	4	-0.3302	8	0.2273	7
EWC	1.4072	4	0.1656	6	-0.2356	5	0.2413	5
EWZ	1.3963	5	0.1891	2	0.0822	1	0.4629	1
EWL	1.3864	6	0.1253	13	-0.5031	18	0.1645	14
EWP	1.3630	7	0.1332	10	-0.3972	10	0.1909	9
EWD	1.3230	8	0.1224	14	-0.2659	6	0.2311	6
EWQ	1.3200	9	0.1162	15	-0.4466	16	0.1727	11
EWI	1.3009	10	0.1293	12	-0.4374	15	0.1737	10
EWS	1.2690	11	0.1654	7	-0.4327	14	0.1715	12
EWA	1.2550	12	0.1566	8	-0.3179	7	0.2081	8
EWY	1.2090	13	0.1319	11	-0.0975	4	0.3045	4
EWU	1.2047	14	0.1462	9	-0.5866	20	0.1360	18
EWN	0.9998	15	0.0892	17	-0.4692	17	0.1426	16
EWG	0.9988	16	0.0850	18	-0.4093	12	0.1602	15
EWJ	0.8937	17	0.1668	5	-0.3590	9	0.1710	13
EWH	0.7803	18	0.0918	16	-0.4078	11	0.1420	17
EWM	0.3522	19	0.0709	19	-0.5492	19	0.0716	20
EWT	0.2558	20	0.0256	20	-0.4233	13	0.0738	19

Table 23 Correlation between the Sharpe, Treynor, Sortino, and Annual Return Ranking during Period Two

Correlations Period 2

			R_Sharpe	R_Trynor	R_Sortino	R_Annual Return
Spearman's rho	R_Sharpe	Correlation Coefficient	1.000	.725(**)	.543(*)	.815(**)
		Sig. (2-tailed)	.	.000	.013	.000
		N	20	20	20	20
	R_Trynor	Correlation Coefficient	.725(**)	1.000	.651(**)	.752(**)
		Sig. (2-tailed)	.000	.	.002	.000
		N	20	20	20	20
	R_Sortino	Correlation Coefficient	.543(*)	.651(**)	1.000	.868(**)
		Sig. (2-tailed)	.013	.002	.	.000
		N	20	20	20	20
	R_Annual Return	Correlation Coefficient	.815(**)	.752(**)	.868(**)	1.000
		Sig. (2-tailed)	.000	.000	.000	.
		N	20	20	20	20

** Statistical significant at 0.01 level (2-tailed).

* Statistical significant at 0.05 level (2-tailed).

Tabel 24 Contingency tables of winners and losers based on Sharpe Ratio, Treynor Ratio, Sortino Ratio, and Annual Return and Statistic Test

This table reports winner-loser contingency tables based on Sharpe ratio, Treynor ratio, Sortino ratio, and annual return and statistic test. WW = funds with Sharpe ratio, Treynor ratio, and annual return > median; LL = funds with Sharpe ratio, Treynor ratio, and annual return > median; LW and WL correspond to funds with relative return reversals. We report performance persistence statistics according to various criteria:

Percentage repeat winners = WW/(WW+WL);

Z-Test repeat winners = (WW-0.5*(WW+WL))/((WW+WL)*0.5*0.5)^0.5;

Odds ratio = (WW*LL)/(LW*WL);

Z-Statistic = (log(Odds ratio))/ σ log(odds ratio);

$s_{\log(\text{Odds Ratio})} = \sqrt{\frac{1}{WW} + \frac{1}{LW} + \frac{1}{WL} + \frac{1}{LL}}$;

Chi-square = $\sum$(WW-N/4)^2 for all WW, LW, WL, LL;

	Sharpe Ratio	Treynor Ratio	Sortino Ratio (2,Rf)	Annual Return
Period of Evaluation	30 Month	30 Month	30 Month	30 Month
Number of WW	6	7	7	8
Number of WL	4	3	3	2
Number of LW	4	3	3	2
Number of LL	6	7	7	8
Total	20	20	20	20
Repeat Winners %	0.60	0.70	0.70	0.80
Z-Test	0.63	1.26	1.26	1.90
p-value	0.5287	0.2077	0.2077	0.0574
Odds ratio	2.25	5.44	5.44	16.00
ln(odds ratio)	0.81	1.69	1.69	2.77
σlog(odds ratio)	0.91	0.98	0.98	1.12
Z-Statistic	0.89	1.74	1.74	2.48*
p-value	0.3735	0.0819	0.0819	0.0131
Chi-Squared test	0.80	3.20	3.20	7.20**
p-value	0.3711	0.0736	0.0736	0.0073

p-values are based on two-tail tests

* Statistically significant at 5% level

** Statistically significant at 1% level

Table 25 Contingency table of Treynor ratio for 6-month period

	WW	WL	LW	LL	Percentage Repeat W	Z-Test W	p-value	Odds Ratio	ln (Odds ratio)	σlog (odds ratio)	Z-Stat	p-value	Chi-Squared test	p-value
Q4Q01	4	6	6	4	0.40	-0.63	0.5287	0.44	-0.81	0.91	-0.89	0.3735	0.80	0.3711
Q2Q02	4	6	6	4	0.40	-0.63	0.5287	0.44	-0.81	0.91	-0.89	0.3735	0.80	0.3711
Q4Q02	8	2	2	8	0.80	1.90	0.0574	16.00	2.77	1.12	2.48	0.0131*	7.20	0.0073*
Q2Q03	5	5	5	5	0.50	0.00	1.0000	1.00	0.00	0.89	0.00	1.0000	0.00	1.0000
Q4Q03	4	6	6	4	0.40	-0.63	0.5287	0.44	-0.81	0.91	-0.89	0.3735	0.80	0.3711
Q2Q04	5	5	5	5	0.50	0.00	1.0000	1.00	0.00	0.89	0.00	1.0000	0.00	1.0000
Q4Q04	6	4	4	6	0.60	0.63	0.5287	2.25	0.81	0.91	0.89	0.3735	0.80	0.3711
Q2Q05	6	4	4	6	0.60	0.63	0.5287	2.25	0.81	0.91	0.89	0.3735	0.80	0.3711
Q4Q05	3	7	7	3	0.30	-1.26	0.2077	0.18	-1.69	0.98	-1.74	0.0819	3.20	0.0736
Total	45	45	45	45	0.50	0.00	1.0000	1.00	0.00	0.30	0.00	1.0000	0.00	1.0000

-values are based on two-tail tests.

Statistically significant at the 5% level

* Statistically significant at the 1% level

Table 26 Contingency table of Treynor ratio for 15-month period

	WW	WL	LW	LL	Percentage Repeat W	Z-Test W	p-value	Odds Ratio	ln (Odds ratio)	σlog (odds ratio)	Z-Stat	p-value	Chi-Squared test	p-value
1-15	6	4	4	6	0.60	0.63	0.5287	2.25	0.81	0.91	0.89	0.3735	0.80	0.3711
16-30	7	3	3	7	0.70	1.26	0.2077	5.44	1.69	0.98	1.74	0.0819	3.20	0.0736
31-45	6	4	4	6	0.60	0.63	0.5287	2.25	0.81	0.91	0.89	0.3735	0.80	0.3711
Total	19	11	11	19	0.63	1.46	0.1443	2.98	1.09	0.54	2.04	0.0414*	4.27	0.0388*

-values are based on two-tail tests.

Statistically significant at the 5% level

* Statistically significant at the 1% level