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How Effective Is Arbitrage of Foreign Stocks? The Case of the Malaysia Exchange-Traded Fund

J. Christopher Hughen, Bowling Green State University

ABSTRACT: Unlike closed-end country funds that usually trade at large premiums to the values of their portfolios, exchange-traded funds facilitate arbitrage to prevent their prices from deviating from their underlying values. However, such arbitrage can involve significant transaction costs, which have caused some to question the ability of this arbitrage to reduce premiums. This study examines the premiums on the iShares Malaysia Fund, which is the only exchange-traded fund that has experienced an extended suspension of arbitrage. The results illustrate the importance of arbitrage in providing the full benefits of international diversification associated with exchange-traded funds that invest in foreign securities.

INTRODUCTION

While exchange-traded funds (ETFs) are popular alternatives to mutual funds and closed-end funds, some investors question whether the share prices of international ETFs observed on domestic exchanges consistently reflect the values of their underlying portfolios in foreign markets. If ETFs trade at premiums, this limits the diversification benefits available to investors.[1] The managers of ETFs facilitate arbitrage to prevent premiums from occurring, and the purpose of this article is to describe this arbitrage process and examine its effectiveness.

INTERNATIONAL INVESTING

Over the past 20 years, individual investors in the U.S. have increasingly used the international equity markets to diversify their portfolios. Numerous studies document how the addition of foreign securities to a portfolio allows investors to achieve a higher expected return for a given level of risk

[1] A fund trades at a premium when its share price is above its net asset value (NAV), which equals the market value of the fund's assets divided by the number of shares outstanding. The premium is calculated as the difference between the price and NAV divided by the NAV. A negative premium is called a discount.

Dr. J. Christopher Hughen, CFA is an assistant professor in the finance department at Bowling Green State University. His research interests include international financial investments and institutions.
Email: chughen@cba.bgsu.edu Web Page: www.hughen.com.

(Solnick, 1974; Jorion, 1989).

The average investor is unwilling to open a brokerage account in another country to trade stocks directly on a foreign exchange. Fortunately, there are several ways to achieve indirect exposure to foreign stocks. The first method is to purchase shares in a mutual fund that invests in other countries. While mutual funds are a convenient vehicle for acquiring an interest in a diversified portfolio, they do have some limitations. You can only invest in mutual funds once a day, but active investors want the opportunity to trade throughout the day. In addition, mutual funds are only required to disclose the composition of their portfolio on a semi-annual basis. Thus, it is usually impossible to determine the securities that a mutual fund owns. Also, few international mutual funds invest exclusively in the securities of a particular foreign country; this prevents using mutual funds to make a targeted bet on a country's performance.

Closed-end country funds, which trade on an exchange like listed stocks, address several of the deficiencies of mutual funds. Country funds can be bought and sold during normal exchange hours, and these funds typically concentrate their investments in a particular country or region. However, the market price of fund shares often differs dramatically from the NAV. For example, the median closed-end country fund on December 31, 2000 traded at a premium of -21.6 percent. The fluctuations in the premiums limit the diversification benefits of country funds. Bailey and Lim (1992), Bodurtha, Kim, and Lee (1995), and Chang, Eun, and Kolodny (1995) conclude that closed-end country funds are sensitive to U.S. returns and provide fewer diversification benefits than direct investments.

PREMIUMS AND ARBITRAGE

Why don't sophisticated investors take advantage of closed-end funds that trade at prices different from their NAVs? De Long, Shleifer, Summers, and Waldmann (1990) develop a theoretical model of noise traders in financial markets that offers an explanation for this puzzle. If the difference between price and value reflects the sentiment of irrational investors, then sophisticated investors may face impediments to profiting from premiums. The risk caused by fluctuations in sentiment is not diversifiable in their theoretical model because sentiment, which is correlated among irrational traders, affects many asset classes.

Restrictions on arbitrage prevent rational investors from eliminating closed-end fund discounts. Pontiff (1996) has conducted the most extensive analysis of the relation between arbitrage costs and closed-end fund discounts.[2] He tests the

[2] The arbitrage of closed-end funds is different from the arbitrage of ETFs. Closed-end fund arbitrage does not involve the fund company and does not change the number of shares outstanding.

following four factors that affect the cost of arbitrage in a closed-end fund: the difficulty of replicating the fund's portfolio, the fund's dividend payout, the cost of transactions in the fund's shares, and the level of interest rates. The first three of the above factors account for approximately 25 percent of the cross-sectional variation in discounts.

INTERNATIONAL ETFs

An ETF is an investment company that manages a portfolio of assets on the behalf of its shareholders. While the fund's portfolio objective is to match the return on a particular market index, the fund's share price is determined through the trading process on a stock exchange. The portfolio of stocks owned by an ETF, unlike a mutual fund or closed-end fund, is well known by investors because of its passive investment strategy. International ETFs target foreign market indexes. Barclays Global Investors manages 21 such funds that are called iShares (formerly known as WEBS). Each member of the international iShares series attempts to match the return on a MSCI Index for a particular country.

The managers of ETFs facilitate arbitrage through the in-kind creation or redemption of shares in large blocks called creation units. If a fund's shares are trading at a premium to the value of the portfolio in the foreign market, institutional investors can implement an arbitrage by creating new fund shares. Before the start of each trading day, the fund company releases a detailed list of the securities that it would need to receive in exchange for a creation unit. This portfolio generally consists of the stocks in the index that the fund tracks. Thus, when the fund's share are trading at a premium, an institutional investor can buy the underlying assets of the fund at a relatively low price in the foreign market, exchange this portfolio for ETF shares, and sell the shares at a relatively high price in the domestic market for a profit.

Institutional investors can also implement an arbitrage to take advantage of ETFs that trade at a discount. This involves purchasing enough ETF shares to form a creation unit and trading them with the fund manager for a portion of the securities that the fund holds in its portfolio. A profit can be realized since the cost of purchasing a creation unit is less than the value at which the fund's assets can be sold.

Various frictions prevent this ETF arbitrage from generating a riskless profit or preventing all fund premiums from developing. First, transaction costs reduce the profitability of arbitrage, and these include brokerage costs, bid-ask spreads, and a fee of several thousand dollars charged by the fund company to facilitate in-kind creations or redemptions of shares. In addition, delays in transferring the securities can impede many investors from taking advantage of premiums. Finally, the underlying assets of international ETFs usually do not trade at the same time as the fund shares in the American market, and this

nonsynchronous trading means that premiums are calculated using stale prices. Therefore, a premium does not necessarily reflect an arbitrage opportunity.

Khorana, Nelling, and Trester (1998) examine the index tracking ability of the WEBS for the first six months of their existence. By regressing the daily WEBS return on the daily MSCI Index return, they found the value of the WEBS followed the index value, with an average R^2 of 90 percent. However, these results do not exclude the possibility of large premiums occurring.

HYPOTHESES

Some investors have expressed doubts about how effective the arbitrage process is for international ETFs. An article in the *Wall Street Journal* discusses the views of the former assistant chief counsel of the SEC on this subject: "the premium/discount risk is greatest in international-stock ETFs and is 'being misrepresented' in materials from ETF sponsors and the American Stock Exchange."[3]

To assess the effectiveness of arbitrage in eliminating premiums, this study examines the only extended suspension of fund-facilitated arbitrage in an ETF. This is accomplished by testing the hypotheses listed at the top of the next column.

(1) The size of ETF premiums is affected by the availability of fund-facilitated arbitrage.
(2) The size of ETF premiums is affected by the transaction costs associated with arbitrage.
(3) Without fund-facilitated arbitrage, the premiums on an ETF fluctuate in a similar manner to a closed-end country fund.

The only ETF that has experienced an extended suspension of arbitrage is the iShares Malaysia Fund, which is an ETF that trades on the American Stock Exchange and tracks the MSCI Malaysia Index. The suspension of arbitrage was a direct result of the capital controls imposed by the Malaysian government during the Asian financial crisis.

CAPITAL CONTROLS IN MALAYSIA

The Asian financial crisis was related to the explosion in foreign investment in Southeast Asia during the early 1990s that financed the region's rapidly growing economies. Capital inflows were an average of 1.4 percent of GDP from 1986 to 1990 but this increased to 6.7 percent of GDP for the years from 1990 to 1996.[4] Due in part to the trend towards liberalizing the financial markets in the area, this capital was able to move quickly between countries. The financial crisis began in July 1997 when the central bank in Thailand ended its policy of pegging the baht against the U.S. dollar. The crisis in Thailand led to fears that other countries would be unable to maintain

[3] See Damato and Lucchetti (2000).
[4] See Radelet and Sachs (1998) page 8.

a strong currency. The financial panic quickly spread as investors lost faith in the currencies of these developing countries.

In Malaysia, this process started on July 14, 1997 when Bank Negara Malaysia, the country's central bank, allowed the ringgit to float by abandoning its policy of pegging its value at approximately 2.52 MYR per US$. This allowed premiums on the iShares Malaysia Fund to grow substantially because the policy change indirectly increased the costs of ETF arbitrage. The Malaysian stock market plummeted as the ringgit lost value relative to the dollar. From July 14, 1997 to September 1, 1998, the NAV of the iShares Malaysia Fund fell by 84 percent.

As a percentage of share price, the bid-ask spread and the transaction fee charged by the fund for arbitrage increased dramatically. Assuming a value of 15 cents, the bid-ask spread on July 11, 1997 was 1.15 percent of the ETF NAV.[5] By September 1, 1998, this transaction cost had gone up to 7.38 percent of the ETF NAV. Furthermore, the cost of hedging foreign exchange risk rose after the ringgit was allowed to float. With higher transaction costs, the ETF share price could fluctuate in a wider range around NAV without arbitrage being profitable. Thus, the premium showed a significant increase in volatility and magnitude even in the presence of arbitrage.

On September 1, 1998 the Malaysian central bank impeded the trading of the ringgit in overseas markets by restricting transactions in the country's external account.[6] The Malaysian officials hoped these capital controls would allow them to lower interest rates and stimulate the economy without setting off a severe devaluation of the currency.

Due to the currency controls, the iShares Malaysia Fund did not trade on the American Stock Exchange on September 2. The next day, the fund announced the suspension of the creation of new shares and expressed doubts about the feasibility of creation unit redemptions. Figure 1 (on the next page) shows the premium fluctuations and share creation/ redemption around the suspension of arbitrage. The dots on the graph show the timing of share creations, which are represented by dots in the positive section of the graph, and share redemptions, which are shown as dots in negative territory.[7]

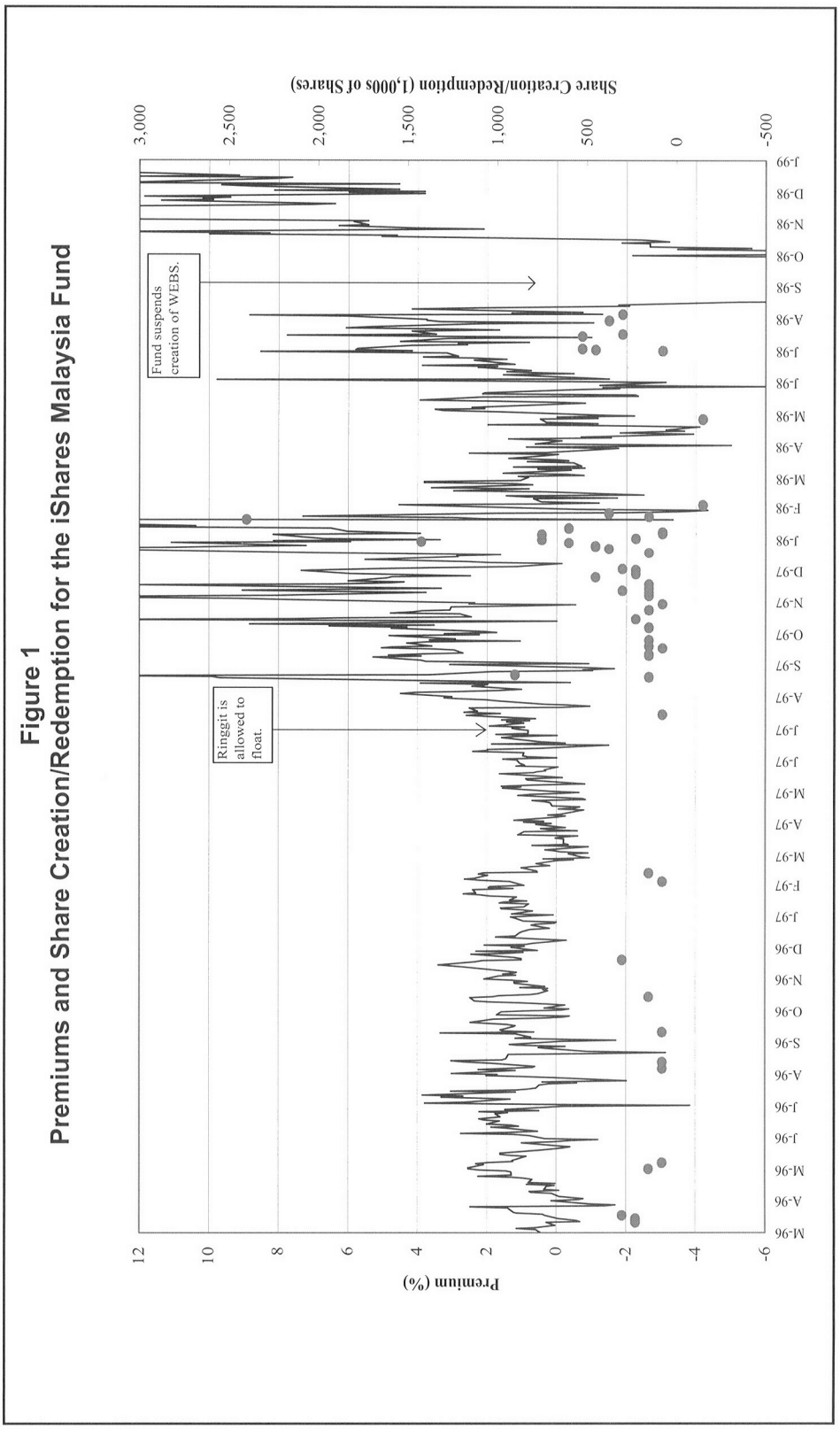
As the Asian financial crisis spread between July 1997 and August

[5] The New York Stock Exchange Trade and Quote Database shows that the average difference between the bid quote and the ask quote for the iShares Malaysia Fund was $0.144.

[6] Funds in an external account can only be used to purchase ringgit assets in Malaysia. Foreigners are only permitted to convert ringgit-denominated securities into foreign currency if the securities were held for more than a year. Purchases of Malaysian securities by nonresidents must be made in foreign currency or ringgits from an external account.

[7] For the iShares Malaysia Fund, a creation unit is equal to 75,000 ETF shares. Before the imposition of capital controls, a creation unit had an approximate value of $650,000. For each creation unit that is purchased or sold in an arbitrage, a transaction fee of $4,600 is assessed by the fund's distributor.

Figure 1
Premiums and Share Creation/Redemption for the iShares Malaysia Fund



1998, the iShares Malaysia Fund traded at prices far from NAVs, and institutional investors created hundreds of thousands of shares over this time to take advantage of the price differentials. After the suspension of share creation in the iShares Malaysia Fund, the fund price quickly moved to a premium below –30 percent and later traded at a premium of 37 percent.

In the absence of arbitrage, international ETF premiums may become as volatile as the premiums on closed-end country funds. Figure 2 (on the next page) supports this assertion with a comparison of the premiums on the iShares Malaysia Fund and the premiums on the Malaysia Fund, the only closed-end fund that invests exclusively in this country. This exhibit reflects weekly NAV data over the period from September 4, 1998 to July 16, 1999. While the premiums on the country fund were larger than the ETF premiums, the premiums often moved in the same direction and followed a similar trend. The data on the iShares Malaysia Fund is consistent with the fund-facilitated arbitrage feature of ETF preventing the extreme premium fluctuations associated with country funds.

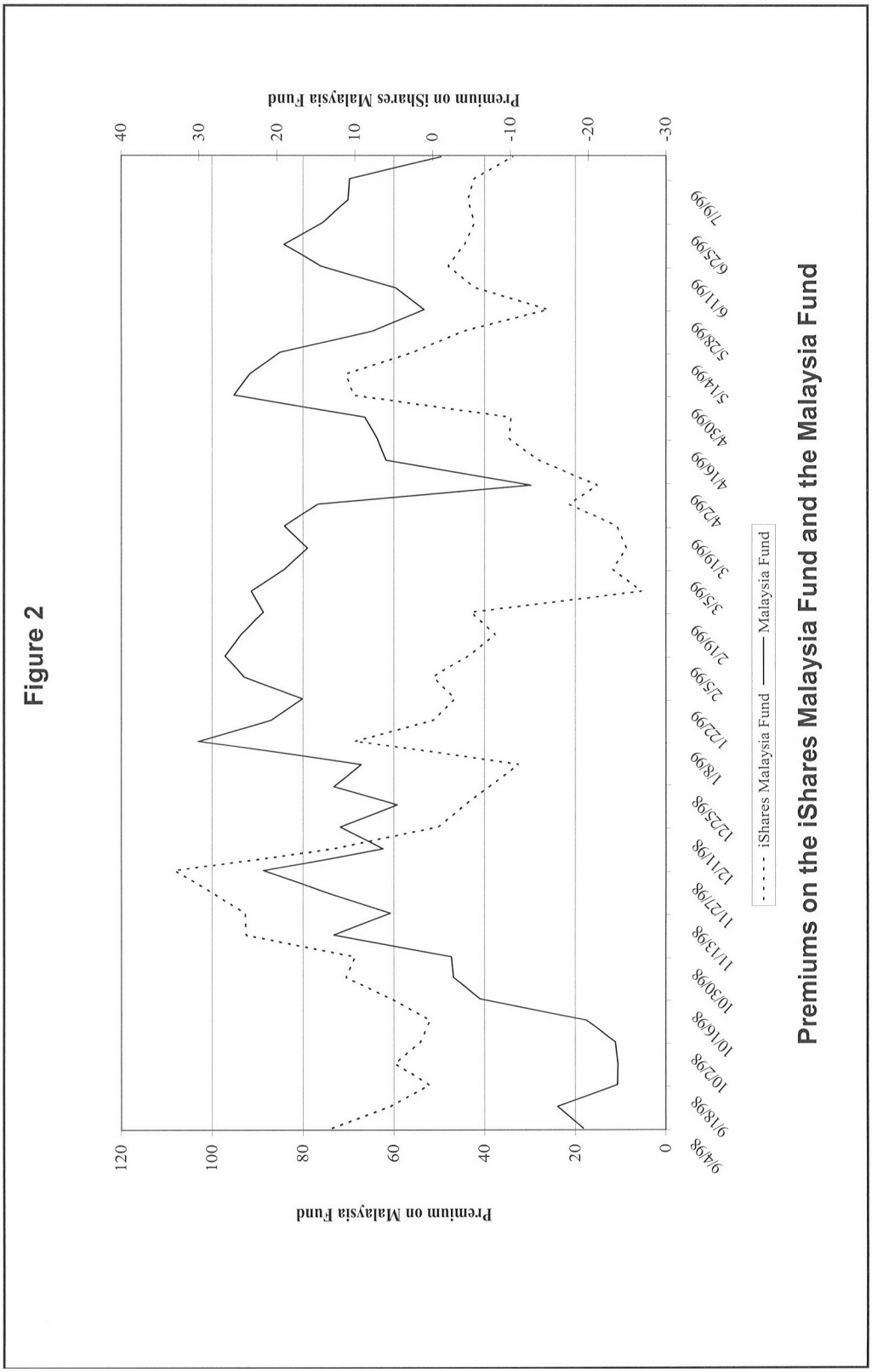
Table 1 (two pages ahead) provides information on the size of daily premiums over three different periods. From the time this fund started trading to the last trading day while the ringgit was fixed, the premiums were small—80 percent of the daily premiums were between -0.37 percent and 2.24 percent. After the ringgit was allowed to float, the absolute value of the premiums was generally larger. However, most of the premiums were ephemeral since the frequent occurrence of arbitrage helped to align prices in the domestic and foreign markets. After share creation and redemption was suspended by the fund company, there were extended periods of large premiums. From 9/3/98 to 1/15/99, over 10 percent of the premiums were less than –20 percent and 10 percent of the premiums were above 18.91 percent. On November 27, 1998, the fund again allowed the redemption of shares but only in ringgits. Eventually, share creations and redemptions were fully restored, and the large premiums on the iShares Malaysia Fund disappeared.

TESTS AND RESULTS

To formally test how the arbitrage suspension affects the ETF premiums, a time series regression model is estimated and shown in Table 2. The dependent variable is the absolute value of the iShares Malaysia Fund premium. An autoregressive error model with two lags is used to correct for serial correlation.

The first independent variable in the regression model is a proxy for the level of transaction costs. In a similar manner as Pontiff (1996), the inverse of the fund share price is used to represent the transaction costs. The second independent variable is a dummy variable that takes on a value of one during the suspension of fund facilitated arbitrage. Both of the variables are positive and significant.

Figure 2



Premiums on the iShares Malaysia Fund and the Malaysia Fund

Table 1: Size of Premiums on the iShares Malaysia Fund

Period Description	Period Length	Percentiles 5th	10th	90th	95th
Ringgit is fixed to the U.S. dollar	3/15/96 - 7/11/97	-0.78%	-0.37%	2.24%	2.51%
Ringgit is allowed to float	7/14/97 - 9/1/98	-2.30%	-1.33%	7.44%	9.86%
Fund arbitrage is suspended	9/3/98 - 1/15/99	-25.56%	-23.84%	18.91%	21.55%

Table 2: Regression Analysis of ETF Premiums

Dependent Variable: Absolute Value of the Daily Premium on the iShares Malaysia Fund

Variable	Estimate	t-value
Intercept	0.7191	2.69 ***
Transaction Costs	11.1953	6.77 ***
Arbitrage Suspension Dummy	8.7767	15.16 ***

The model is estimated using data from March 15, 1996 to January 15, 1999. Transaction costs are represented by the inverse of the share price. An autoregressive error model is used to correct for serial correlation.
**** denotes significance at the 1% level.*

This supports hypotheses (1) and (2), which state that the ETF premiums are influenced by the availability and cost of fund-facilitated arbitrage.

Hypothesis (3) states that, after the suspension of fund-facilitated arbitrage, ETF premiums fluctuate in a similar manner to premiums on a closed-end country fund. This hypothesis is examined by calculating the daily correlation between the iShares Malaysia Fund premium and the Malaysia Fund premium. Before the ringgit was allowed to float, the correlation coefficient was 0.11, which is statistically different from 0 at the five percent level. After arbitrage was suspended, the correlation coefficient was 0.28, which is statistically significant from 0 at the one percent level. Since the correlation coefficient almost tripled after the suspension of arbitrage, the data support hypothesis (3).

CONCLUSIONS

This article tests the efficacy of fund arbitrage by examining the impact of the only extended suspension of arbitrage in an ETF. The capital controls imposed by the Malaysian government caused the managers of the iShares Malaysia Fund to suspend in-kind creations or redemptions of shares. In the period before the Asian financial crisis, the share price closely followed the portfolio value. During this time, 90 percent of the premiums were between -0.37 percent and 2.24 percent. After arbitrage was restricted, the absolute value of the daily premiums increased substantially, and the 10th percentile was -23.84 percent and the 90th percentile was 18.91 percent.

The primary conclusion of this study is that the fund facilitated arbitrage feature is surprisingly successful in minimizing premiums, especially considering the transaction costs involved in an arbitrage. Without this check on the domestically traded share price, the shares in an international ETF could exhibit characteristics of closed-end country funds, which often trade at prices substantially different than their values. This would likely limit the diversification benefits of international ETFs.

This study has important implications for the evolution of exchange-traded funds, the number of which is expected to expand significantly in the next five years. New international ETFs will almost certainly invest in emerging markets since funds already exist for the major developed countries. The SEC has already received filings associated with the offering of international ETFs for several countries in Latin America and Southeast Asia. Investors in such countries are more likely to be impacted by capital controls and currency crises; these events may impede the arbitrage of ETFs and prevent investors from receiving prices in the domestic market that reflect the value in the foreign market. The experience in Malaysia demonstrates that such risks are real and can cause ETF premiums to exceed 30 percent.

This study also has implications

for the domestic ETF market. The SEC recently published a concept release in formulating the rules on actively managed ETFs (SEC, 2001). Currently all U.S. ETFs track an index, but actively managed funds will allow a fund manager to determine the fund's investments. The share arbitrage of an actively managed fund is problematic because actively managed funds traditionally don't have adequate portfolio transparency to permit arbitrage. Regulators should be aware that the popularity of actively managed ETFs may depend on creating a vibrant arbitrage market in the fund shares. This study shows that without an effective in-kind arbitrage process ETFs can trade at significant premiums.

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