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THE EFFECTS OF MARKET SEGMENTATION ON COUNTRY FUNDS:
An Analysis of Short-Term Trading Strategies

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Abstract

Economists disagree about how sensitive country fund prices are to U.S. market returns. We provide additional evidence on this issue through an examination of daily fund discounts. Fund shares provide significant average returns in the three days following large positive and negative discount changes. This finding suggests that large short-term changes in the relation between price and underlying value are not quickly mitigated in the market for country fund shares. Following large negative discount changes, the returns on fund shares and NAVs are of greater magnitude when the S&P 500 Index declines by more than 1%. This is consistent with negative changes in U.S. market sentiment affecting both country fund prices and NAVs in the short-term. Simple trading strategies that take advantage of large discount changes around big changes in the U.S. market appear generally profitable even after adjusting for transaction costs. The limited liquidity in country fund shares suggests that it may be difficult to implement such strategies.

I. Introduction

Country funds are popular vehicles for investing in foreign stock markets. These funds are closed-end investment companies that hold portfolios of securities traded primarily in foreign markets. Investors often use country funds to achieve international diversification and lower their portfolio risk for a given expected return. However, the diversification benefits of such indirect foreign investments are affected by the level of integration of the world's stock markets. With segmented financial markets, returns are sensitive to local risk factors and prices may be different for foreign and domestic investors.

Country funds are potentially vulnerable to market segmentation because the prices of the fund shares on domestic exchanges may differ from their net asset values (NAVs).[1] Prior research offers conflicting evidence on the extent to which country fund prices are affected by market segmentation. Some studies (Bailey and Lim (1992), Hardouvelis, La Porta, and Wizman (1994),

Bodurtha, Kim, and Lee (1995), and Chang, Eun, and Kolodny (1995)) argue that the prices of country funds are sensitive to returns in the U.S. market. More recent research (Anderson, Coleman, Frohlich, and Steagall (2001), Lee and Hong (2002), and Charitou, Makris, and Nishiotis (2003)) suggests that country fund prices are primarily influenced by foreign returns, and these funds offer diversification benefits similar to direct investments in foreign stocks.

This study adds to this debate through an analysis of daily data on country fund prices and NAVs. By examining returns subsequent to large changes in the discount, we provide evidence on efficiency in the market for closed-end funds that invest in foreign equities.[2] In an efficient market, a change in the discount on country funds represents an opportunity for domestic investors to either purchase foreign securities at a relative low price or sell their interest in foreign securities at a relative high price. Prices should quickly adjust to such opportunities in a market with few impediments. We also test if the returns following significant discount changes are of larger magnitude when U.S. market sentiment likely changes. This provides an indication of the level of segmentation between the foreign and domestic markets. To the best of our knowledge, this is the only study of country funds using NAV data of daily frequency.

Our analysis finds that the average return on country fund shares is positive (negative) and statistically significant for the three trading days following discount changes of less than -3% (greater than 3%). The returns on the country fund shares are of a greater magnitude when large negative discount changes occur concurrently with S&P 500 Index declines of more than 1%. This is consistent with negative sentiment in the domestic market affecting the market for foreign equities. Simple short-term trading strategies that buy fund shares after large discount declines and sell fund shares short after large discount increases typically generate average profits. For the strategies that buy fund shares after a large discount change that occurs when the S&P 500 Index declines by more than 1%, the evidence of profitability is especially strong.

This paper contains six sections. Section II discusses the literature on market segmentation and its impact on country funds. It also reviews the research on trading strategies in closed-end funds. Section III presents the hypotheses tested in this study, and Section IV describes the data used in the tests. The next section discusses the results, and the conclusions from our analysis are presented in Section VI.

II. Literature Review

This study extends two lines of research on closed-end funds. First, previous studies investigate the profitability of simple trading rules for closed-end funds that are based on their discounts. As these research papers document abnormal returns from such trading strategies, the results conflict with the idea of market efficiency in the pricing of closed-end funds. Our study also relates to

previous examinations of the diversification benefits of country funds. These studies typically highlight how market segmentation affects the trading in this market.

Thompson (1978) performs one of the earliest evaluations of trading strategies using the discount level. Using yearly discount data on 23 funds, he concludes that funds trading at discounts outperform the market. Richards, Fraser, and Groth (1980) and Anderson (1986) confirm his results and attempt to find trading rules that generate larger profits. These studies support the profitability of strategies that buy or sell funds at specific discount levels and document that funds trading at wider discounts generate higher subsequent returns. Cakici, Tessitore, and Usmen (2000) and Anderson, Coleman, and Born (2001) incorporate transaction costs in the analysis of trading strategies and find that profits can be achieved in excess of these costs. The existence of abnormal profits from simple trading strategies conflicts with the idea of market efficiency in the trading of closed-end funds. However, none of the studies mentioned above examine trading strategies for closed-end funds that invest primarily in foreign stocks.

The second line of research that relates to this study examines the extent to which country funds are sensitive to U.S. market returns. Bailey and Lim (1992) conduct the seminal research in this area and find relatively high correlations between country fund returns and U.S. equity returns. Using a sample of weekly NAVs, Bodurtha, Kim and Lee (1995) find that fund prices (but not NAVs) move with the U.S. market index; these results are consistent with U.S. sentiment driving fund returns and foreign market sentiment influencing NAV returns. Chang, Eun, and Kolodny (1995) estimate a model of fund returns with the following two factors: the U.S. market returns and the residuals from regressing the appropriate foreign market index return on the U.S. market return. By separately running the regression using the NAV return and the return on the fund's shares as the dependent variables, they find that the closed-end country funds generally have higher exposure to the domestic market and lower sensitivity to the foreign market than the underlying assets owned by the funds. Hardouvelis, La Porta, and Wizman (1994) also employ regression analysis on country funds. Their findings support the importance of sentiment, and they conclude discounts have predictive power for fund returns but not NAV returns.

While the early studies of this issue generally conclude that country funds are sensitive to U.S. sentiment, more recent studies generally reach a different conclusion. Anderson, Coleman, Frohlich, and Steagall (2001) use time-series, cross-sectional regressions to show country fund returns are only weakly related to U.S. returns. The authors argue that methodological errors may cause other studies to overestimate the sensitivity of fund shares to the domestic market. Lee and Hong (2002) use VAR and causality analysis to conclude that the returns on the majority of country funds are only weakly associated with U.S market sentiment. Through an examination of country fund

returns from 1993 to 2002, Charitou, Makris, and Nishiotis (2003) find that country fund returns closely track indices in their respective countries. Both Lee and Hong (2002) and Charitou, Makris, and Nishiotis (2003) note that recent events in the international financial markets (deregulation, the Asian financial crisis, and the increase in country fund discounts) may cause their findings to differ from those of earlier studies.

III. Methodology

This study adds to the literature on country funds by examining the short-term reaction of fund shares to large changes in the discount. In an efficient market without extensive segmentation, the price of the fund shares will closely follow the value of the fund's portfolio. Any deviations would provide a potential for profit, which would not persist in an efficient marketplace. This leads us to propose the following hypothesis:

H1: Large short-term changes in country fund discounts are quickly mitigated.

When foreign and domestic markets are closely integrated, changes in NAV will occur contemporaneously with or be quickly followed by changes in the price of fund shares. In a well functioning market, investors will notice when prices diverge from underlying values. As investors seek to exploit the mispricing, their actions will rapidly realign fund prices and their underlying values.

Large discount changes on country funds may be rational responses to new information about foreign investments. Factors that may affect the discount even in an efficient market include capital controls, exchange rates, taxes, and other market frictions. However, large discount changes may reflect the sensitivity of fund prices to domestic market sentiment. To examine this possibility, we propose our second hypothesis.

H2: Large discount changes that are accompanied by large changes in the U.S. stock market are followed by fund share returns of greater magnitude.

We will conclude that country fund prices exhibit short-term sensitivity to U.S. market returns if the reaction to large discount changes is different when the U.S. market has a large change in price.

Our study also extends the literature on closed-end funds by examining trading strategies based on country fund discount changes. This leads to the statement of our third hypothesis.

H3: A simple trading strategy based on short-term discount fluctuations is profitable.

Our profitability analysis includes both trading commissions and the costs associated with the bid-ask spread. The liquidity in the market for country funds is another market friction that may inhibit the implementation of a profitable trading strategy. While personal taxes are additional market friction, we do not explicitly calculate trading strategy returns on an after-tax basis because a strategy that is profitable on a pre-tax basis is profitable on an after-tax basis. Furthermore, these profit opportunities may be exploited by tax-advantaged investors (pension funds, investors with 401k accounts, etc.).

IV. Data

In accordance with SEC rules adopted under the Investment Company Act of 1940, closed-end funds must calculate their NAVs on a weekly basis. In recent years, some funds have started voluntarily releasing this portfolio information on a daily basis in a manner similar to mutual funds. The NAVs are typically distributed through the Nasdaq Mutual Fund Quotation System.

As our study analyzes short-term discount changes in country funds, we gather a list of all the funds that are both classified as world equity funds by *The Wall Street Journal* and release NAVs on a daily basis as of January 31, 2003. Table 1 provides a list of these 23 funds and the symbols used to obtain the price of the fund shares and the NAV. The Templeton China World Fund and the Templeton Russia and East European Fund release NAVs on a daily basis but the data is delayed by one day. For example, these funds release NAVs after the close of trading on every Friday but these NAVs reflect the closing prices on Thursday. This delay is noted in the footnotes of the closed-end fund data tables found in *The Wall Street Journal* and *Barron's*. Since one of the goals of our study is to investigate the reaction of fund prices to short-term changes in the discount, we exclude these two funds from our sample. Funds enter our sample when they start releasing daily NAV data, and this date is shown in the final column of Table 1. Our sample period ends on January 31, 2003.

Table 2 provides descriptive statistics on our sample, which contains 27,732 daily observations. Historical NAVs come from CDA/Wiesenberger and Yahoo! Finance. We use share prices and trading volume from The Center for Research in Securities Prices (CRSP) and Yahoo! Finance. The median closing price and NAV are 11.43 and 13.69, respectively. However, some of the country funds were severely impacted by the Asian Financial Crisis, and this resulted in a minimum price of 2.55. The daily trading volume in country fund shares has considerable variation. While the median daily trading volume is 23,900 shares, the maximum is 6,103,800 and the minimum is 0. As some funds do not trade at all on certain days, we question whether a short-term trading strategy can be effectively implemented using this type of investment.

Over our sample period, the price of fund shares is typically less than the NAV. This is illustrated by the median discount of -16.9%. The discounts

display some surprising short-term fluctuations; the maximum and minimum daily changes are 18.72% and -22.76%. Eight of the ten largest negative discount changes occur during 1997 and 1998. Out of the ten largest positive discount changes, nine are in 1997 and 1998. Five of the ten largest positive and negative discount changes occur on either October 28 or 29 of 1997. The uncertainty created by the Asian Financial Crisis in 1997 and 1998 caused considerable movement in the discounts on some country funds. The 2nd percentile and 98th percentiles for the daily discount change are approximately -3% and 3%, respectively. Therefore, our study uses these cutoffs to classify fund discount changes as large.

V. Results

A. Share Price Returns

In our initial analysis, we examine the daily returns on our sample of closed-end funds during the period immediately following large discount changes. We calculate returns using closing prices. For example, the return for day 1 is the percentage change from the closing price on day 0 to the closing price on day 1. We include dividends in our return calculations. We also calculate the market-adjusted return as the difference between the return on the fund shares and the return on the S&P 500 Index.

Table 3 provides the results following large negative discount changes. There are 618 instances in which a particular fund's discount decreased by more than 3%. The mean and market-adjusted returns on the day following (day 1) a discount decrease of more than 3% are 0.5% and 0.46%, respectively, which are both significant at the 1% level. The mean return and market-adjusted returns are positive on five and four of the next six days, respectively, with both mean and market-adjusted returns being significant on days 2, 3 and 7 at the 9% level or greater. The persistence in returns beyond day 0 suggests that changes in the fund discount are not quickly incorporated into fund prices, thus allowing us to reject hypothesis 1 for negative discount changes.

Although our analysis uses daily NAV numbers provided voluntarily by the funds, publications such as *The Wall Street Journal* and *Barron's* continue to publish only the weekly NAV numbers. Since many investors focus on these publications to provide them with NAV information, the significance of the price returns 7 days after the large decrease in discount may be attributed to investors acting on this "new" information on the issue date of these publications rather than the date on which the fund actually experienced the large discount change.

To examine whether larger discount changes afford investors the opportunity to generate greater returns, we analyze returns following discount decreases of 4%, 5% and 6%. We find that the mean return on day 1 is greater in magnitude for the subset of funds for which we observed discount decreases of at least 4%, 5%

Table 1
Country funds that release daily NAVs

This table lists all closed-end funds that invest primarily in foreign equities and release daily NAVs as of January 31, 2003. To get funds that concentrate their portfolios in foreign stocks, we select only those funds that are classified as world equity funds by *The Wall Street Journal*. The Templeton China World Fund and the Templeton Russia and East European Fund are excluded from our sample because they delay the release of their NAVs.

Closed-End Fund	Fund Symbol	NAV Symbol	Start of Daily NAV Data
Aberdeen Australia Equity	IAF	XIAFX	03/31/00
Asia Pacific Fund	APB	XAPBX	01/14/02
Brazil Fund	BZF	XBZFX	09/08/97
Brazilian Equity Fund	BZL	XBZLX	03/16/98
Central European Equity	CEE	XCEEX	08/02/96
Chile Fund	CH	XXCHX	03/13/98
Emerging Markets Telecommunications Fund	ETF	XETFX	03/13/98
Europe Fund	EF	XEFIX	03/06/98
First Israel Fund	ISL	XISLX	03/13/98
France Growth Fund	FRF	XFRFX	07/02/99
Germany Fund	GER	XGERX	08/02/96
Italy Fund	ITA	XITAX	10/27/95
Korea Fund	KF	XKFDX	07/02/96
Latin America Equity Fund	LAQ	XLAQX	03/13/98
New Germany Fund	GF	XGFNX	08/02/96
Scudder New Asia Fund	SAF	XSAFX	08/14/96
Southern Africa Fund	SOA	XSOAX	10/14/97
Spain Fund	SNF	XSNFX	10/14/97
Swiss Helvetia Fund	SWZ	XSWZX	01/15/98
Templeton China World Fund	TCH	XTCHX	09/16/97
Templeton Dragon Fund	TDF	XTDFX	11/27/96
Templeton Russia and East European Fund	TRF	XTRFX	09/16/97
Templeton Emerging Markets	EMF	XEMFX	11/27/96

Table 2
Descriptive statistics

This table provides descriptive statistics on the trading and prices of the closed-end funds in the sample. The sample contains 27,732 daily observations. Share volume is expressed in units of one share and is rounded to the nearest hundred.

Variable	Maximum	75th Percentile	50th Percentile	25th Percentile	Minimum	Standard Deviation
NAV	43.45	17.52	13.69	9.93	2.73	5.47
Price	34.31	14.50	11.43	8.50	2.55	4.45
Share Volume	6,103,800	52,200	23,900	10,700	0	109,120
Discount	61.08%	-12.47%	-16.90%	-20.20%	-36.44%	8.80%
Daily Discount Change	18.72%	0.75%	0.00%	-0.76%	-22.76%	1.49%
Daily Fund Price Return	20.92%	0.99%	0.00%	-0.98%	-14.93%	1.96%
Daily NAV Return	25.77%	0.79%	0.00%	-0.78%	-16.22%	1.62%

and 6% compared to the mean return of all discount decreases of at least 3%. However, the mean returns for our 5% subset are only significant at the 5% level, and those for the 6% subset are not significant. A comparison of the market-adjusted returns on day 1 provides us with a similar conclusion. For discount decreases of 4% or more, the market-adjusted returns are significant at the 1% level, however, for discount decreases of 5% and 6% and greater, returns are only marginally significant at best. For our subset of observations that had discount decreases of 4% and greater, we find that mean and market-adjusted returns are significant on day 5 and the former is significant
on day 7 as well. For discount decreases of 5% and 6% and greater, mean and market-adjusted returns are significant on day 7.

Table 4 provides the results of our analysis of fund returns following large positive discount changes. We find that when the discount increases by 3% or more, the mean and market-adjusted returns on day 1 are -0.84% and -0.94%, respectively. Both these returns are significant at the 1% level. Compared to our analysis of large negative discount changes, we find returns that are farther from zero, and this is likely due to the greater difficulty in short selling than buying shares. We reject hypothesis 1 for large positive discount changes since negative returns persist over the three days immediately following the event. Both mean and market-adjusted returns are negative and significant at the 10% level or better for days 2, 3 and 5 following a large positive discount change.

For the subset of funds that have discount changes greater than 4%, 5% or 6%, we find that the magnitude of the first day return is greater than that for our overall sample of large positive changes. All of the mean and market-adjusted returns are less than -1% in magnitude. Across all subsets, mean and market-adjusted returns are significant at the 2% level or greater on day 1. We also find negative and significant mean and market-adjusted returns for day 2 for each subset. Additionally, the magnitude of returns for day 2 increases with the cutoff used to classify large discount changes.

Bodurtha, Kim, and Lee (1995) examine the relationship between closed-end country fund share prices, NAVs and market sentiment. They find evidence that mean-reverting sentiment is a significant component of fund prices and that these prices are sensitive to movements in the domestic (U.S.) market. We examine whether large changes in the U.S. market have an impact on fund price returns following large discount changes. Table 5 provides fund price returns after large negative discount changes when the S&P 500 Index drops by more than 1% on the same day. There were 225 instances in which the fund discount dropped by more than 3% on the same day that the S&P 500 Index dropped by more than 1%. We find that the mean price return is 0.98% on the day following the discount and S&P 500 change. This is significant at the 1% level. We also find persistence in the significance of the mean returns through day 4. Market-adjusted returns are 0.80% for day 1, which is significant at the 1% level.

Table 3

Fund returns after large negative discount changes

This table summarizes the price returns on fund shares after large negative changes in the discount. The changes are measured daily, and large changes occur at t = 0. Statistics are provided for discount changes of less than -3%, -4%, -5%, and -6%. The total number of changes in each category (N) is provided in the first column. The mean returns are calculated as close-to-close returns and include dividends. The market-adjusted return is the fund share return minus the return on the S&P 500 Index. The p-values, which are shown below the mean returns, are for a one-sided test that the mean equals zero.

		t = 1	t = 2	t = 3	t = 4	t = 5	t = 6	t = 7
Discount Change < -3%	Mean Return	0.50%	0.29%	0.22%	0.08%	0.09%	-0.04%	0.26%
N = 618		0.00	0.01	0.03	0.26	0.23	0.35	0.01
	Mean Market-Adjusted Return	0.46%	0.17%	0.15%	-0.04%	0.10%	-0.10%	0.18%
		0.00	0.06	0.09	0.35	0.18	0.16	0.04
Discount Change < -4%	Mean Return	0.66%	0.24%	0.10%	0.22%	0.36%	-0.08%	0.34%
N = 241		0.00	0.11	0.33	0.13	0.04	0.33	0.06
	Mean Market-Adjusted Return	0.58%	0.14%	0.10%	0.10%	0.26%	0.02%	0.20%
		0.00	0.21	0.30	0.23	0.09	0.45	0.14
Discount Change < -5%	Mean Return	0.62%	0.15%	-0.17%	0.35%	0.43%	-0.19%	0.67%
N = 121		0.03	0.32	0.32	0.13	0.10	0.26	0.04
	Mean Market-Adjusted Return	0.50%	0.09%	-0.20%	0.32%	0.41%	-0.10%	0.46%
		0.04	0.37	0.27	0.12	0.10	0.36	0.08
Discount Change < -6%	Mean Return	0.53%	0.19%	-0.31%	0.13%	0.26%	-0.16%	0.77%
N = 63		0.16	0.33	0.29	0.39	0.31	0.35	0.09
	Mean Market-Adjusted Return	0.29%	-0.01%	-0.10%	0.19%	0.09%	-0.16%	0.68%
		0.27	0.49	0.42	0.34	0.43	0.33	0.08

Table 4

Fund returns after large positive discount changes

This table summarizes the returns on fund shares after large positive changes in the discount. The changes are measured daily, and large changes occur at t = 0. Statistics are provided for changes greater than 3%, 4%, 5%, and 6%. The total number of changes in each category (N) is provided in the first column. The mean returns are calculated as close-to-close returns and include dividends. The market-adjusted return is the fund share return minus the return on the S&P 500 Index. The p-values, which are shown below the mean returns, are for a one-sided test that the mean equals zero.

		t = 1	t = 2	t = 3	t = 4	t = 5	t = 6	t = 7
Discount Change > 3%	Mean Return	-0.84%	-0.34%	-0.24%	-0.01%	-0.14%	0.12%	-0.05%
N = 635		0.00	0.00	0.02	0.45	0.10	0.14	0.34
	Mean Market-Adjusted Return	-0.94%	-0.33%	-0.19%	-0.09%	-0.16%	0.12%	-0.07%
		0.00	0.00	0.04	0.18	0.05	0.12	0.26
Discount Change > 4%	Mean Return	-1.02%	-0.47%	-0.06%	0.18%	-0.19%	0.34%	-0.02%
N = 280		0.00	0.02	0.38	0.19	0.14	0.04	0.45
	Mean Market-Adjusted Return	-1.19%	-0.41%	0.00%	-0.06%	-0.27%	0.30%	-0.03%
		0.00	0.02	0.45	0.36	0.05	0.05	0.44
Discount Change > 5%	Mean Return	-1.08%	-0.69%	0.00%	0.38%	-0.40%	0.74%	-0.23%
N = 144		0.00	0.02	0.50	0.10	0.07	0.01	0.22
	Mean Market-Adjusted Return	-1.22%	-0.40%	0.02%	0.03%	-0.61%	0.62%	-0.17%
		0.00	0.08	0.47	0.45	0.01	0.01	0.27
Discount Change > 6%	Mean Return	-1.05%	-1.53%	0.43%	0.55%	-0.90%	0.59%	-0.24%
N = 78		0.02	0.00	0.13	0.12	0.01	0.10	0.30
	Mean Market-Adjusted Return	-1.05%	-1.09%	0.42%	-0.06%	-1.08%	0.59%	-0.07%
		0.02	0.01	0.10	0.44	0.00	0.08	0.44

Table 5

Fund returns after large negative discount changes that occur when the S&P 500 Index drops by more than 1%

This table summarizes the returns on fund shares after large negative changes in the discount decreases when the S&P 500 Index drops by more than 1% on the same day. The changes are measured daily, and the large changes occur at t = 0. Statistics are provided for changes of less than -3%, -4%, and -5%. The total number of changes in each category (N) is provided in the first column. The mean returns are calculated as close-to-close returns and include dividends. The market-adjusted return is the fund share return minus the return on the S&P 500 Index. The p-values, which are shown below the mean returns, are for a one-sided test that the mean equals zero.

		t = 1	t = 2	t = 3	t = 4	t = 5	t = 6	t = 7
Discount Change < -3%	Mean Return	0.98%	0.43%	0.58%	0.47%	-0.18%	0.00%	0.22%
N = 225		0.00	0.04	0.01	0.02	0.21	0.49	0.15
	Mean Market-Adjusted Return	0.80%	0.19%	0.31%	0.16%	-0.20%	-0.18%	0.05%
		0.00	0.18	0.05	0.18	0.12	0.13	0.39
Discount Change < -4%	Mean Return	1.34%	0.47%	0.24%	0.93%	0.36%	-0.41%	0.43%
N = 89		0.00	0.10	0.26	0.01	0.17	0.08	0.13
	Mean Market-Adjusted Return	0.93%	0.38%	0.07%	0.67%	-0.13%	-0.45%	0.20%
		0.00	0.13	0.41	0.02	0.34	0.05	0.26
Discount Change < -5%	Mean Return	1.44%	0.21%	-0.21%	1.59%	0.53%	-0.36%	0.75%
N = 43		0.01	0.37	0.36	0.01	0.20	0.21	0.14
	Mean Market-Adjusted Return	0.99%	0.31%	-0.41%	1.37%	0.11%	-0.36%	0.51%
		0.01	0.27	0.19	0.01	0.41	0.18	0.17

We also examine subsets of our sample in which the discount decrease exceeds 4% and 5% on the same day that the S&P 500 Index decreases by 1% or more. We find that day 1 mean returns are 1.34% and 1.44% for the 4% and 5% samples, respectively. These returns suggest that the larger the discount change, the greater the first day returns. Market-adjusted returns are also greater for discount decreases of 5% or more compared to either the 3% sample or the 4% subset. However, the return persistence that is found in the sample of discount changes less than -3% is not found in the -4% and -5% subsets. The mean return on day 2 is only significant at the 10% level for our 4% subset and insignificant for our 5% subset. Both subsets generate insignificant mean returns on day 3.

Table 6 provides the results of our analysis of funds that experience large positive discount changes on the same day that the S&P 500 Index increases by 1% or more. There were 280 instances in which a fund's price increased by 3% on the same day that the S&P 500 Index increased by more than 1%. We find that the mean and market-adjusted returns on the two days following the large discount change are negative and significant at the 3% level or greater. This provides further evidence of a mean reversion in prices following a large discount change and that this reversion persists beyond the first day following the large change. However, for positive discount changes, mean returns are insignificant on days 3 and 4 whereas for negative discount changes we find that the returns are positive and significant through day 4.

For the subset of observations in which the discount change was greater than 4% and 5%, we find that the magnitude of mean and market-adjusted returns on day 1 and day 2 increase as the discount change increases. Mean and market-adjusted returns for these subsets are negative and significant at the 1% level for day 1. For day 2, mean returns are significant at the 5% level for both subsets, but market-adjusted returns are significant at only the 6% level for the 4% subset and insignificant for the 5% subset.

A casual comparison of returns presented in Tables 3 and 5 suggests that the magnitude of first day returns are greater when there is a large move in the S&P 500 Index on the same day. To test hypothesis 2, our sample of large discount changes is partitioned by the magnitude of the index change. Specifically, we examine the difference in mean price returns of funds that have large discount changes (of 3% or more) on days that the S&P index does and does not make a simultaneous large move (1% or more). We also analyze changes in the NAV following large discount changes.

Panel A of Table 7 presents the results of this analysis for discount changes of -3% or less. On three of the four days following a large, negative discount change occurring with a concurrent large drop in the S&P index, the mean fund price return is significantly greater than when there is no concurrent drop in the U.S. market. This suggests that fund prices are affected by U.S. index changes, which is consistent with prior studies (Bodurtha, Kim, and Lee (1995) and Bailey and Kim (1992)) that examine this issue using weekly data. Interestingly, there is also a negative and significant difference in the NAV

Table 6

Fund returns after large positive discount changes that occur when the S&P 500 Index gains more than 1%

This table summarizes the returns on fund shares after large positive changes in the discount when the S&P 500 Index increases by more than 1% on the same day. The changes are measured daily, and the large changes occur at t = 0. Statistics are provided for changes of greater than 3%, 4%, and 5%. The total number of changes in each category (N) is provided in the first column. The mean returns are calculated as close-to-close returns and include dividends. The market-adjusted return is the fund share return minus the return on the S&P 500 Index. The p-values, which are shown below the mean returns, are for a one-sided test that the mean equals zero.

		t = 1	t = 2	t = 3	t = 4	t = 5	t = 6	t = 7
Discount Change > 3%	Mean Return	-0.81%	-0.42%	-0.01%	0.28%	-0.25%	-0.08%	0.06%
N = 280		0.00	0.01	0.47	0.07	0.07	0.32	0.38
	Mean Market-Adjusted Return	-1.12%	-0.31%	0.01%	-0.01%	-0.30%	0.04%	-0.06%
		0.00	0.03	0.47	0.48	0.02	0.40	0.34
Discount Change > 4%	Mean Return	-1.18%	-0.65%	0.19%	0.55%	-0.49%	0.20%	0.06%
N = 143		0.00	0.01	0.20	0.03	0.03	0.29	0.40
	Mean Market-Adjusted Return	-1.52%	-0.40%	0.27%	-0.06%	-0.55%	0.20%	0.01%
		0.00	0.06	0.10	0.39	0.01	0.20	0.49
Discount Change > 5%	Mean Return	-1.53%	-0.77%	0.46%	0.88%	-0.86%	0.35%	-0.11%
N = 78		0.00	0.05	0.07	0.03	0.02	0.19	0.37
	Mean Market-Adjusted Return	-1.66%	-0.31%	0.53%	0.02%	-1.02%	0.34%	-0.08%
		0.00	0.47	0.06	0.96	0.00	0.33	0.80

changes on day 1, where the change is -0.9% when the S&P index decreases by more than 1% and -0.4% when the S&P index does not decrease by more than 1%. This is in contrast with the results of Bodurtha, Kim, and Lee (1995), and Bailey and Lim (1992) who find that fund prices move with the U.S. market but fund NAVs do not. If we look beyond day 1, however, we are able to find a plausible explanation for this difference in results. The previous studies use only weekly NAV values. Therefore, daily changes are aggregated over the week to provide weekly NAV changes. When we look beyond day 1, we find on days 3 and 4 that the difference in NAV changes is positive and significant at the 10% level or greater and this partially offsets the average negative return on day 1. The analysis of large discount changes shows that subsequent fund share returns are generally larger when the U.S. market makes a concurrent move. Thus, we are unable to reject hypothesis 2 for these changes.

Panel B of Table 7 presents the results for discount changes exceeding 3%. Fund price returns on days 1 and 2 are not significantly different when the S&P makes a concurrent large positive move. Therefore, for positive discount changes, we reject hypothesis 2. Why does the day 1 fund price return vary with the change in S&P 500 Index for large negative discount changes but not for large positive discount changes? To correct the fund price increasing relative to NAV, an investor needs to sell shares short, which is a relatively costly strategy typically used by more sophisticated investors. It is possible that these sophisticated investors are less influenced by domestic market sentiment, and they react in a consistent manner to large positive discount changes. While the relatively less sophisticated investors who are only buying shares after large negative discount changes will act differently depending on domestic market sentiment, which is represented by the change in the U.S. market.

B. Profitability Analysis

The results presented in Tables 3 – 7 provide evidence that subsequent to large discount changes abnormal returns exist and that there tends to be a short-term mean reversion in fund prices. However, to determine whether traders can translate these abnormal returns into profitable and attainable trading strategies (hypothesis 3), we consider two additional factors, transaction costs and liquidity.

Since the discount change is not observed by market participants until the close of trading on day 0, in this analysis we calculate day 1 returns as open-to-close returns on that day. This provides us with a more accurate depiction of the return an investor could achieve after having observed the discount change. Return calculations for subsequent days are calculated as close-to-close returns.

We address the transaction costs issue first by evaluating the profits generated by two simple short-term trading strategies. After large negative (positive) discount changes, we assume that a trader takes a long (short) position in the fund with an investment of $10,000. The trader initiates the position at

Table 8
Profitability analysis reflecting transaction costs

This table presents statistics on the profit generated by short-term trading strategies. The first four rows describe the profitability of strategies that buy fund shares after large negative discount changes and sell the shares after five trading days. The next three rows describe the profitability of strategies following large discount changes when there is also a decrease in the S&P 500 Index by more than 1% on day 0. The percentage change in the S&P 500 Index is represented as SPC. The remaining rows describe the profitability of strategies that short the fund shares after large positive discount changes (and large positive S&P 500 Index changes in the last three rows) and cover the short position after five trading days. The first column in the table describes the discount change that initiates the strategy. Transaction costs include the bid-ask spread and a $10 commission charged when a position is initiated and closed. The initial trade has a value of $10,000. The percentage of trades that are profitable is provided under the columns labeled % > 0. The p-value of a two-tailed Student's t-test that the mean is zero is found under the columns labeled P>|t|.

Trading Strategy and Trigger	N	% > 0	75th Percentile	25th Percentile	Median	Mean	P>|t|
Buy after large discount decrease and sell after five trading days							
Δ<-3%	615	48.9%	2.46%	-2.53%	-0.07%	0.03%	87%
Δ<-4%	240	52.1%	3.30%	-2.77%	0.18%	0.22%	55%
Δ<-5%	120	50.8%	3.81%	-3.74%	0.06%	-0.17%	77%
Δ<-6%	62	53.2%	4.20%	-4.07%	0.11%	-0.25%	77%
Buy after large discount decrease and large S&P 500 decrease and sell after five trading days							
Δ<-3% & SPC < -.01	225	59.6%	3.26%	-1.52%	0.76%	1.17%	0%
Δ<-4% & SPC < -.01	89	66.3%	4.66%	-1.72%	1.26%	1.64%	1%
Δ<-5% & SPC < -.01	43	62.8%	5.05%	-1.99%	1.43%	1.16%	27%
Short after large discount increase and cover short after five trading days							
Δ>3%	634	54.6%	2.88%	-2.15%	0.35%	0.28%	15%
Δ>4%	280	56.4%	4.00%	-2.02%	0.65%	0.55%	11%
Δ>5%	144	58.3%	4.27%	-1.97%	0.86%	0.88%	9%
Δ>6%	78	62.8%	4.70%	-0.79%	1.44%	1.44%	5%
Short after large discount increase and large S&P 500 increase and cover short after five trading days							
Δ>3% & SPC > .01	280	51.4%	2.86%	-2.18%	0.06%	0.13%	64%
Δ>4% & SPC > .01	143	55.9%	3.82%	-1.99%	0.43%	0.61%	16%
Δ>5% & SPC > .01	78	60.3%	4.30%	-1.87%	1.15%	1.09%	12%

Table 9

Descriptive statistics on dollar volume (in $1,000s) around large discount changes

This table provides descriptive statistics on dollar volume around large positive and negative discount changes. The dollar volume for each day (shown in thousands of dollars) equals the number of shares traded times the closing price.

	t = -2	t = -1	t = 0	t = 1	t = 2	t = 3	t = 4	t = 5
Discount Change < -3%								
90th Percentile	3,510.0	3,819.2	3,863.5	3,179.8	2,866.1	3,092.3	3,055.2	2,619.8
75th Percentile	1,212.1	1,343.8	1,371.4	1,173.0	1,204.8	1,136.5	1,037.6	1,025.5
Mean	1,175.4	1,334.0	1,318.8	1,143.2	1,062.3	1,100.7	1,040.9	993.0
50th Percentile	365.4	423.1	492.3	389.7	366.5	354.3	350.3	326.9
25th Percentile	131.7	148.2	178.1	137.9	134.6	128.4	130.4	123.5
10th Percentile	56.2	46.1	71.1	54.0	49.6	52.2	50.0	51.6
# of Days when Volume = 0	1	5	2	2	2	4	1	1
Discount Change > 3%								
90th Percentile	2,922.6	3,543.9	4,312.2	3,301.5	3,279.8	2,737.5	2,880.4	2,516.3
75th Percentile	1,222.8	1,229.5	1,580.9	1,194.1	1,039.1	1,170.0	1,027.2	1,012.9
Mean	1,186.1	1,158.0	1,576.2	1,180.6	1,170.7	1,086.2	1,065.4	1,037.6
50th Percentile	426.3	418.9	604.5	464.3	390.5	402.7	393.6	379.7
25th Percentile	149.8	150.8	217.3	151.6	163.5	136.3	126.7	142.0
10th Percentile	50	52.6	83.9	58.8	54.5	53.0	44.7	49.3
# of Days when Volume = 0	3	2	0	0	4	2	3	1

capture profits associated with mean reversion of fund prices should do so only when there is a concurrent change in the U.S. market. These results provide us with some support for hypothesis 3 for large negative discount changes.

We evaluate the short strategy in a similar fashion. We provide descriptive statistics on profits generated from our short strategy when the fund discount increases by more than 3%, 4%, 5% and 6% and for the instances when the discount increase occurs with an increase in the S&P 500 Index of more than 1%. Trades are profitable more than 50% of the time and mean and median returns are positive for all cases. However, mean returns are significantly different from zero only when discount changes are 5% and 6% and greater, and when not accompanied by a large increase in the S&P 500 Index. These instances generate mean returns of 0.88% and 1.44%, respectively. Once again, these results provide weak support for hypothesis 3.

In order for a trader to successfully implement one of these trading strategies, the market for closed-end fund shares needs sufficient liquidity. Table 9 provides descriptive statistics on the dollar volume for days around large discount changes. Dollar volume is calculated as the number of shares traded on that day multiplied by the closing price. We find that median volumes are largest on the day the discount change occurs decreasing by approximately 20% on day 1 with dollar volumes of $389,700 and $464,300 for large negative and positive discount changes, respectively. By day 5, median dollar volumes fall to $326,900 and $379,700 for our samples of large negative and positive discount changes, respectively. Day 1 dollar volumes are less than $60,000 for 10% of our sample suggesting that implementing trades of $10,000 may not be possible without adversely affecting share prices for some funds.

Our results suggest that traders must take care in initiating a trading strategy to take advantage of large discount changes. Even when an appropriate opportunity presents itself, liquidity in the funds may not be sufficient for the trader to carry out the transaction cost-effectively.

VI. Conclusions

Economists have long been interested in why closed-end funds tend to trade at prices that are different than their underlying values. This market anomaly becomes further complicated when the fund shares trade in one country and the fund's portfolio consists of securities that are primarily traded in another country. Our study adds to the rich literature on this subject through an examination of returns subsequent to large discount changes. To the best of our knowledge, this is the only research paper that examines the market reaction to short-term discount fluctuations in country funds.

Our principal finding is that country fund shares experience significant returns in the three days following large changes in the discount. The data

suggest that the market is slow to react to sizeable changes in the relation between price and NAV for these funds. Returns on fund shares are higher following large negative discount changes that occur when the S&P 500 index declines by more than 1%. This finding is consistent with negative sentiment changes in the domestic market exhibiting a negative influence on the prices of country fund shares.

We examine the profitability of simple trading strategies that buy shares following large negative discount changes and sell shares short following large positive discount changes. Even after transaction costs, these strategies typically generate mean profits over our sample period. However, the limited amount of trading in country funds may inhibit the implementation of such trading strategies. Investors who plan to purchase country fund shares and who have some discretion regarding the timing of their trades may find the results of our study valuable. It may be advantageous for them to execute their purchases following large negative discount changes especially if they coincide with negative returns in the U.S. market.

Endnotes

[1] The net asset value (NAV) of a fund equals the value of the fund's portfolio divided by the number of shares issued by the fund. NAVs are calculated after the close of daily trading in the U.S. market (4:00 pm E.S.T). Since foreign markets typically close at different times, the NAVs usually reflect stale prices on foreign securities.

[2] The discount on a closed-end fund equals the price minus the NAV divided by the NAV. Therefore, a negative discount indicates the price of the fund's shares are trading for less than the per share value of its portfolio, and a positive discount, or premium, indicates the fund's shares are trading for more than the per share value of its portfolio. The change in the discount is computed as the current discount minus the discount on the previous trading day. As our sample contains discounts and premiums, we refrain from describing changes as increasing (widening) or decreasing (narrowing). For example, a negative change in the discount can occur when either the discount increases (widens) or the premium decreases (narrows).

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