“Do Turkish Spiders Confuse Bulls And Bears?: The Case of Dow Jones Istanbul 20”

AUTHORS	Mustafa Mesut Kayali

ARTICLE INFO	Mustafa Mesut Kayali (2007). Do Turkish Spiders Confuse Bulls And Bears?: The Case of Dow Jones Istanbul 20. *Investment Management and Financial Innovations*, *4*(3)
RELEASED ON	Tuesday, 28 August 2007
JOURNAL	"Investment Management and Financial Innovations"
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
0	0	0

© The author(s) 2024. This publication is an open access article.

BUSINESS PERSPECTIVES

businessperspectives.org

DO TURKISH SPIDERS CONFUSE BULLS AND BEARS?: THE CASE OF DOW JONES ISTANBUL 20

Mustafa Mesut Kayali*

Abstract

The investor sentiment theory advocates that the prices of securities predominantly held by individual investors may be influenced by their positive or negative sentiment about the market. The closed-end funds and exchange traded funds are such securities held primarily by individual investors and may be subject to investor sentiment. Thus, they may trade at premiums to or discounts from their net asset values in rising or declining markets. This article studies the daily percentage premiums and discounts of the Dow Jones Istanbul 20, Turkey's first exchange traded fund introduced in 2005. It is shown that the mean percentage premium/discount is small but significant. However, an examination of the frequency distribution of the differences between net asset values and prices reveals that only a few deviations are larger enough to allow arbitrage. Also, the Dow Jones Istanbul 20 sells at a discount, on average, in both up and down markets, the discount being significantly higher in rising markets. This result is inconsistent with the investor sentiment hypothesis.

Key words: Investor Sentiment, Dow Jones Istanbul 20, Exchange Traded Funds, Percentage Premiums and Discounts.

JEL classification: G12, G15.

Introduction

It has been folklore in the finance literature that closed-end funds trade at material discounts from their net asset values. This phenomenon has been called the closed-end fund puzzle. The wider discounts of closed-end funds have been attributed to investor sentiment, among other sources, by many researchers (Zweig, 1973; De Long et al., 1990; Lee et al., 1991; Neal and Wheatley, 1998). The investor sentiment hypothesis argues that shares of closed-end funds are more likely to be held by individual investors, as opposed to shares of underlying stocks in CEF portfolios, which are more likely to be held by institutional investors.

Unlike individual investors, institutional investors are rational and can make better assessments of fundamental values of securities. As a result, when individual investors are bearish, or pessimistic about the market conditions, they bid down the prices of closed-end funds. On the other hand, as institutional investors are not so much bearish or pessimistic about the market conditions, they also bid down the prices of underlying stocks in the funds' portfolios, but not as much as the prices of CEFs. This widens the difference between net asset values and prices and causes CEFs to trade at larger discounts. The opposite occurs when individual investors are bullish or optimistic about the market conditions.

Chen et al. (1993) and Elton et al. (1998) challenge the views expressed in Lee et al. (1991) by providing evidence that investor sentiment, as measured by the change in discount on CEFs, is not an important factor in return generating process. In response to Chen et al. (1993), Chopra et al. (1993) provide additional tests to support the investor sentiment theory.

Curcio et al. (2004) show that individual investors are the major long-term holders of Cubes, the Nasdaq-100 Index Tracking Stock. This can be viewed as evidence that exchange traded funds are also more likely to be held by individual investors. Therefore, they may trade at premiums to, or discounts from their NAVs due to investor sentiment. Xu and Liu (2003) argue that it is more likely for ETFs to be traded at premiums when the underlying market is up and at discounts when it is down. They provide empirical evidence consistent with the investor sentiment hypothesis.

* Dumlupinar University, Turkey.

© Mustafa Mesut Kayali, 2007.

This paper examines the daily percentage premiums and discounts of the Dow Jones Istanbul 20, the first ETF in Turkey, to see whether they are significant and behave differently in up and down market conditions. We extend the work of Kayali (2007), who investigates the pricing efficiency of the Dow Jones Istanbul 20 and finds that the daily premiums and discounts in terms of the New Turkish Lira (TRY) are not economically significant, although the mean premium/discount is statistically significant. He also illustrates that the daily premiums and discounts are not persistent over time and disappear within two days.

Different from Kayali (2007), we show that the mean percentage premium/discount is statistically significant. However, when we analyze the distributions of the daily percentage premiums and discounts, we see that larger price deviations from NAV are very rare and never exceed 1 percent. In addition, we provide empirical evidence that the percentage discounts widen in the up market condition, whereas they narrow in the down market condition. This result contradicts with the investor sentiment hypothesis.

This paper is organized as follows. Next section presents a brief review of the literature related to percentage premium/discount of ETFs and their behavior in up and down market conditions. Data and methodology are described in Section 3. Section 4 provides a discussion of empirical findings. Last section concludes the paper.

Literature Review

Ackert and Tian (2000) report an average unadjusted (adjusted) discount of -0.2183 (0.0686) percent for SPDRs and 1.0363 (1.3167) percent for MidCap SPDRs. That is, SPDRs trade at a premium (discount) and MidCap SPDRs trade at a discount, on average. Both of them are significant at the 1% level. The unadjusted (adjusted) discounts of SPDRs range from 0.7937 (0.9147) percent to -1.1121 (-0.5562) percent, while those of MidCap SPDRs range from 3.8933 (3.3623) percent to -1.3713 (-0.5264) percent. The standard deviations of them are 0.2399 (0.1722) percent and 1.2376 (0.7162) percent, respectively.

In addition, Ackert and Tian (2000) test the null hypothesis that average discounts of SPDRs and MidCap SPDRs are equal or not. They conclude that MidCap SPDRs trade at significantly larger discounts. Also, they find average discounts of SPDRs economically insignificant, whereas they consider average discounts of MidCap SPDRs economically significant, after accounting for transaction costs of arbitrage.

Elton et al. (2002) study the premiums and discounts of SPDRs over the years from 1993 to 1998. They define percentage discount as the difference between the net asset value and price of the SPDRs as a proportion of the net asset value. They find an average difference of 0.018% between those prices, meaning that SPDRs trade at a discount, on average. The deviations of price from NAV for SPDRs range from -1.05% to 1.05%.

Cheng and Cheng (2002) examine the daily percentage premium/discount of the four ETFs trading in Hong Kong. They report average premiums ranging from 0.10% to 0.59% for the three of those ETFs and average discount of 0.14% for the other. However, they focus on the Tracker Fund of Hong Kong (TraHK) tracking the performance of Hang Seng Index (HSI) as they have sufficient data available for the analysis done in their paper for only that ETF. Their analysis covers the time period running from November 12, 1999 to March 28, 2002. There are 583 trading days. The average percentage premium/discount over the sample period is 0.59%. In 468 days of the sample period, TraHK trades at a premium and in only 115 days, it trades at a discount. The average percentage premium over 468 days is 0.84%, whereas the average percentage discount over 115 days is 0.40%.

In addition, they divide the sample into two groups. The first group consists of premiums and discounts occurring in an up market and the second group includes premiums and discounts taking place in a down market. If the daily change of Hang Seng Index is greater than zero, that is, if it increases, then the market is defined as an "up" market. On the other hand, if the daily change of HSI is less than zero, or in other words, if it decreases, then the market is called a "down" market. The market is up for 283 days and down for 299 days. As a result, they find an average premium of 0.49% and an average premium of 0.70% for the up and down markets, respectively, over

the sample period. The mean difference between the average premiums of up and down markets is 0.21%, which is statistically and significantly different from zero at the 1% level.

They then partition the overall sample into premium and discount subsamples and find that the TraHK trades at an average premium of 0.77% over the 214 days when the market is up. Also, they find that the Hong Kong ETF trades at an average premium of 0.90% over the 254 days when the market is down. The mean difference between the average premiums of up and down markets is 0.13%, which is also significant at the 1% level. For the discount subsample, the TraHK trades at an average discount of 0.37% over the 69 days in the up market and an average discount of 0.44% over the 45 days in the down market, respectively. The difference between those discounts in both conditions of the market is only 0.07% and not significant at the conventional levels.

They conclude that the TraHK can resist market declines and offers a higher and significant premium even though the market is down. For the discount subsample, however, it can be said that the market cannot distinguish between the up and down markets and results in similar discounts in both conditions.

Xu and Liu (2003) investigate the relationship between ETF premium/discount ratio and return on the underlying index for the three ETFs, namely the Spiders, MidCap Spiders and Diamonds, being traded on the US exchanges. They argue that ETFs are more likely to be traded at premiums than at discounts when the underlying equity index is up, or in other words, has a positive return. They attribute this expectation to the positive investor sentiment. In contrast, they assert that ETF discounts may more likely be associated with a down market than ETF premiums due to negative investor sentiment.

They perform a chi-square test of independence between ETF premium/discount ratio and the underlying index up or down conditions. They report positive chi-square test statistics at the 5% significance level for all three ETFs under consideration. This result confirms their conjecture that ETF premiums are more closely related to up markets whereas ETF discounts are more closely related to down markets.

They further examine the relationship between ETF premium/discount ratio and return on the underlying index by implementing a regression analysis. As a result, they find a significant positive relationship between those two variables at the 1% level even after controlling for the effects of the lagged premium/discount ratio and lagged index return. This finding points out that premiums are associated with positive returns while discounts are associated with negative returns.

Jares and Lavin (2004) analyze the percentage discounts over the sample period from the inception of the Japan and Hong Kong iShares on March 18, 1996 through December 6, 2001. They compute the percentage discount as (NAV minus closing price)/NAV and present empirical evidence that both iShares trade at premiums to their NAVs, on average. The mean percentage discounts of the Japan and Hong Kong iShares are -0.34% and -0.21%, respectively. The percentage discount for the Japan iShares ranges from as high as 6.14% to as low as -7.74%, whereas the percentage discount for the Hong Kong iShares ranges from as high as 13.27% to as low as -32.9%.

They also present empirical evidence on the relationship between the discounts and returns of the respective ETFs. They find a significant positive relation between the contemporaneous returns and lagged discounts. In addition, they find a significant negative relation between the contemporaneous returns and contemporaneous discounts. They conclude that their findings may be an indication of profitable trading opportunities that can be exploited by sophisticated investors.

Cherry (2004) does a very similar analysis to that of Jares and Lavin (2004). He explores the relationship between the returns and lagged discounts of ETFs. As a result, he documents a significant negative relation between those variables. As the negative discount is constructed to mean in Jares and Lavin (2004) that ETF trades at a premium, this result is consistent with that of their study.

Lin and Chou (2006) investigate the determinants of the premium/discount of the TTT, Taiwan's first ETF. They find that arbitrage opportunity, as proxied by the premium/discount of the previous day, and the return of the Taiwanese stock market, are the major determinants of the premium/discount. They interpret this result to imply that a substantial price deviation from the NAV signals an arbitrage opportunity on the next trading day.

They also provide evidence on the reverse relationship between the previous day's premium/discount and today's return. This relationship is significant at the 1% level. The Taiwanese stock market return is another significant determinant of the TTT's return. This result is consistent with that of Jares and Lavin (2004) and Cherry (2004).

Data and Methodology

Data

The daily closing prices and net asset values for the Dow Jones Istanbul 20 are collected from the website of the DJIST. As we detect some inconsistencies in daily closing price data, we correct them according to the daily bulletin of the Istanbul Stock Exchange. There are 241 days of data between January 14, 2005 and December 30, 2005 in the first year of DJIST's trading. If there exists only one of the two price series on a specific day, that day is deleted from the dataset.

The Dow Jones Istanbul 20 is the first exchange traded fund in Turkey listed on the Istanbul Stock Exchange on January 14, 2005. It allows investors to gain direct exposure to top 20 Turkish stocks listed on the ISE and included in the Dow Jones Turkey Titans 20 Index. The total value of assets under management is US$ 41.1 millions as of March 30, 2007. The monthly trading volume and average daily trading volume are US$ 195.6 millions and US$ 8.9 millions, respectively[1].

The DJIST can be traded during regular trading hours as common stocks. It is exempt from tax for individual investors. The management fee is approximately 1/5th of that charged by other A-type investment funds. These characteristics of the DJIST make it an appealing investment alternative for especially individual investors.

Methodology

We compute the daily percentage premium/discount of the DJIST as the difference between closing price and net asset value divided by net asset value and multiplied by 100 using the following formula:

$$\%PD_t = [(P_t - NAV_t) / NAV_t] * 100,$$

where $\%PD_t$ is the percentage premium/discount on day t, P_t is the closing price on day t, and NAV_t is the net asset value on day t. A positive $\%PD_t$ indicates that the DJIST trades at a premium to NAV while a negative $\%PD_t$ implies that it trades at a discount from NAV.

Following Cheng and Cheng (2002) and Xu and Liu (2003), we define up and down markets based on the difference between the value of the Dow Jones Turkey Titans 20 Index on day t and the value of that index on day t-1. If the difference is positive, then the market is defined as an up market. On the contrary, if the difference between the levels of the index on days t and t-1 is negative, then the market is called a down market.

Empirical Results

The summary statistics and the t-test results on the daily percentage premium/discount are presented in Table 1. The average percentage premium/discount over the sample period is -0.1062%. That is, the DJIST trades at a discount from NAV, on average. The percentage premium/discount ranges from -0.9877% to 0.9137%. The standard deviation of the percentage premium/discount is 0.2690%. We test the null hypothesis that the mean premium/discount is zero and obtain a t-value of -6.131. This result indicates that the mean premium/discount is statistically and significantly different from zero at the 1% level. A significant percentage premium/discount may signal an arbitrage opportunity for the traders of the DJIST.

[1] www.djist.com

Table 1

Descriptive statistics and t-test results on the daily percentage premium/discount

	Premium/Discount	Premium	Discount
Sample Size	241	82	159
Range	1.9014	0.9065	0.9805
Minimum	-0.9877	0.0072	-0.9877
Maximum	0.9137	0.9137	-0.0072
Mean	-0.1062**	0.1720**	-0.2497**
Standard Deviation	0.2690	0.1684	0.1855
t-value	-6.131	9.249	-16.972
p-value	0.000	0.000	0.000

Variance from NAV (%)	Number of Days	Percent of Total
-1.0 ~ -0.6	6	2.49
-0.6 ~ -0.2	75	31.12
-0.2 ~ 0.2	134	55.60
0.2 ~ 0.6	24	9.96
0.6 ~ 1.0	2	0.83
Total	241	100.00

** Significant at the 1% level.

We analyze the premiums and discounts separately. The DJIST trades at a premium to NAV for 82 days out of 241 days in the sample period. The average premium is 0.1720% with a standard deviation of 0.1684%. The premiums range from 0.0072% to 0.9137%. On the other hand, the DJIST trades at a discount from NAV for 159 days out of 241 days in the sample period. The average discount is 0.2497% with a standard deviation of 0.1855%. The discounts range from 0.0072% to 0.9877%. Both average percentage premium and discount are significant at the 1% level.

We also examine the frequency distribution of percentage premium/discount over the sample period. The premium/discount lies between -0.2% and 0.2% for 134 days out of 241 days. The proportion of that number is 55.60%. The percentage discounts range from -0.2% to -0.6% for 75 days with a proportion of 31.12% within the total number of days. In addition, the percentage discounts vary between -0.6% and -1.0% for only 6 days and the proportion of those days is 2.49%.

On the other hand, the percentage premiums lie between 0.2% and 0.6% for 24 days with a proportion of 9.96% over 241 days in the sample. Also, the percentage premiums range from 0.6% to 1.0% for only 2 days and the proportion of them within the total number of days in the sample is 0.83%.

The frequency distribution of percentage premiums and discounts tells us that deviations larger than 0.6% are very rare. For only 3.32% of the time the percentage premiums and discounts exceed 0.6%. The majority of the deviations on both sides is smaller than 0.2%. Moreover, 41.08% of the total number of deviations is within the limits of 0.2 and 0.6%. In other words, 96.68% of all deviations lie below 0.6%. Therefore, we conclude that arbitrage opportunities may be very limited after accounting for transaction costs.

We further analyze the daily percentage premiums and discounts of the DJIST to see whether they behave differently in up and down markets. Our empirical analysis closely follows the analysis of Cheng and Cheng (2002), who explored the behaviors of percentage premiums and discounts of TraHK when the market is up and when it is down. For that purpose, we divide the whole sample into two groups as up and down markets depending upon the movements of the underlying index tracked by the Dow Jones Istanbul 20. If the Dow Jones Turkey Titans 20 Index moves up on

day t when compared to its level on day t-1, then we categorize that day under up market condition. In contrast, if the underlying index moves down on day t relative to its level on day t-1, then that day is classified under down market condition. The results are reported in Table 2.

As a result, the market is up for 140 days and it is down for 101 days out of 241 days in the sample. The average daily percentage premium/discount under the up market condition is -0.1638%. The percentage premium/discount in the up market ranges from -0.9877% to 0.9137% with a standard deviation of 0.2687%. The distance between the minimum and maximum values is 1.9014%. The t-value of -7.212 indicates that the mean percentage premium/discount is statistically and significantly different from zero at the 1% level.

Table 2

Summary statistics and t-test results of daily percentage premium/discount for DJIST in up and down markets

	Up Market	Down Market	Mean Difference	t-value	p-value
Premium/Discount (N=241)	-0.1638 (N=140)	-0.0264 (N=101)	-0.1373**	-4.034	0.000
Premium (N=82)	0.1526 (N=38)	0.1888 (N=44)	-0.0362	-0.970	0.335
Discount (N=159)	-0.2816 (N=102)	-0.1926 (N=57)	-0.0890**	-2.973	0.003

** Significant at the 1% level.

On the other hand, the average daily percentage premium/discount under the down market condition is -0.0264%. The percentage premium/discount in the down market ranges from -0.6467% to 0.6133% with a standard deviation of 0.2494%. The distance between the minimum and maximum values is 1.2600%. This result indicates that the percentage premium/discount in the down market is not as volatile as that in the up market. The t-value of -1.065 with a p-value of 0.289 points out that the mean percentage premium/discount is not significant at the conventional levels.

As we can see from Table 2, the DJIST trades at a discount in both market conditions. However, the discount is much higher in the up market condition. The mean difference is -0.1373%, which has a t-value of -4.034 and is significant at the 1 percent level. This result indicates that when the underlying index is up, the percentage difference between the price and NAV is getting larger. In contrast, when the market is down, the price and NAV are getting closer and the percentage difference is decreasing. This result may be attributed to the higher variability of percentage premium/discount in the up market.

This finding is not consistent with that of Cheng and Cheng (2002). They present empirical evidence that the TraHK trades at a premium in up and down markets. Yet, the premium is much higher in the down market condition and the mean difference is significant. They interpret this result to imply that the TraHK is able to resist market declines and offers a higher premium in down markets.

Next, we partition the whole sample into premium and discount subsamples to see how percentage premiums and discounts behave under up and down markets separately. The DJIST trades at a premium to its NAV for 82 days out of 241 days in the sample. In 38 days of those 82 days, the market is up and the DJIST trades at a premium of 0.1526%, on average, which is significant at the 1% level. The standard deviation is 0.1712%. On the other hand, in 44 days of those 82 days, the market is down and the DJIST trades at a premium of 0.1888%, on average, which is slightly higher than that under the up market condition and significant at the 1% level. The standard deviation is 0.1661%. The mean difference between premiums in up and down markets is -0.0362%, which has a t-value of -0.970 and not significant at the conventional levels.

This result shows that premiums in up and down markets are about same although premiums in down market are a little bit higher. This finding is consistent with that of Cheng and Cheng

(2002), who report higher premium for TraHK in down market. However, the difference between up and down markets in their study is significant.

As for the discount subsample, the DJIST trades at a discount for 159 days out of 241 days in the sample. In 102 days of those 159 days, the market is up and the DJIST trades at a discount of -0.2816%, on average, which is significant at the 1% level. The standard deviation is 0.1922%. Alternatively, in 57 days of those 159 days, the market is down and the DJIST trades at a discount of -0.1926%, on average, which is also significant at the 1% level. The standard deviation is 0.1592%. The mean difference between discounts in up and down markets is -0.0890%, which has a t-value of -2.973 and is significant at the 1% level.

This result points out that the DJIST trades at a higher discount in up markets, on average. That is, the whole sample and the discount subsample yield similar results. When the market is up, the discount increases and when the market is down, it decreases. As can be noticed, the standard deviation under the up market condition is higher than that under the down market condition within the discount subsample. Thus, the higher discount under the up market condition may be attributed to the higher variability of discounts when the market is up. This finding is not consistent with that of Cheng and Cheng (2002), who report larger discount under the down market condition. However, the difference between discounts in up and down markets reported in their study is not significant.

Summary and Conclusion

This study analyzes the daily percentage premium/discount of the Dow Jones Istanbul 20, the first exchange traded fund in Turkey, over the 241 days of sample period running from January 14, 2005 to December 30, 2005. The DJIST trades at a smaller premium/discount of -0.1026%, on average. However, the average premium/discount is significant at the 1% level. The negative premium/discount implies that the DJIST sells at a price lower than the net asset value of the underlying portfolio. Although the mean percentage premium/discount is statistically significant, it may not be material after accounting for transaction costs associated with arbitrage opportunities.

We also examine the frequency distribution of the daily percentage premiums and discounts. We observe that the daily percentage premiums and discounts are within the limits of ±1.0% at most on both sides. The majority of the premiums and discounts are between -0.6% and 0.6%. The premiums and discounts exceeding ±0.6% are very rare and may signal limited chance for arbitrage.

In addition, we analyze the role of rising and declining underlying markets in determination of premiums and discounts of the DJIST. The investor sentiment hypothesis suggests that when the individual investors are optimistic about the market, the prices of ETFs rise above their net asset values so that they trade at premiums to their NAVs. On the other hand, when the individual investors are pessimistic about the market, the prices of ETFs drop below their net asset values so that they trade at discounts from their NAVs.

As a result of our empirical analysis, we provide evidence in contrast with the investor sentiment hypothesis. We find that the percentage discounts widen when the underlying market rises and that they narrow when the underlying market drops. This result may be attributed to the higher volatility, as quantified by the standard deviation, of percentage discounts in up markets. The premiums are about same under both market conditions although they are slightly higher when the underlying market is down. This result may indicate that the prices of the DJIST can resist market declines.

References

1. Ackert, L.F. and Y.S. Tian, 2000, "Arbitrage and Valuation in the Market for Standard and Poor's Depositary Receipts", *Financial Management*, 29, 71-87.
2. Chen, N., R. Kan and M.H. Miller, 1993, "Are the discounts on closed-end funds a sentiment index?", *Journal of Finance*, 48 (2), 795-800.
3. Cheng, L.T.W. and K. Cheng, 2002, "Exchange traded funds as an investment/hedging tool", *Educational Article*, 14, 1-4.

4. Cherry, J., 2004, "The Limits of Arbitrage: Evidence from Exchange Traded Funds", *Working Paper*, University of California-Berkeley.
5. Chopra, N., C.M.C. Lee, A. Shleifer and R.H. Thaler, 1993, "Yes, discounts on closed-end funds are a sentiment index", *Journal of Finance*, 48 (2), 801-808.
6. Curcio, R.J., J.M. Lipka and J.H. Thornton, 2004, "Cubes and the individual investor", *Financial Services Review*, 13 (2), 123-138.
7. De Long, J.B., A. Shleifer, L.H. Summers and R.J. Waldman, 1990, "Noise trader risk in financial markets", *Journal of Political Economy*, 98 (4), 703-738.
8. Elton, E.J., M.J. Gruber and J.A. Busse, 1998, "Do investors care about sentiment?", *Journal of Business*, 71 (4), 477-500.
9. Elton, E.J., M.J. Gruber, G. Comer and K. Li, 2002, "Spiders: Where are the Bugs", *Journal of Business*, 75 (3), 453-472.
10. Jares, T.E. and A.M. Lavin, 2004, "Japan and Hong Kong Exchange Traded Funds (ETFs): Discounts, Returns, and Trading Strategies", *Journal of Financial Services Research*, 25 (1), 57-69.
11. Kayali, M.M., 2007, "Pricing Efficiency of Exchange Traded Funds in Turkey: Early Evidence from the Dow Jones Istanbul 20", *International Research Journal of Finance and Economics*, 10, 14-23.
12. Lee, C.M.C., A. Shleifer and R.H. Thaler, 1991, "Investor sentiment and the closed-end fund puzzle", *Journal of Finance*, 46 (1), 75-109.
13. Lin, A. and A. Chou, 2006, "The tracking error and premium/discount of Taiwan's first exchange traded fund", *Web Journal of Chinese Management Review*, 9 (3), 1-21.
14. Neal, R. and S.M. Wheatley, 1998, "Do measures of investor sentiment predict returns?", *Journal of Financial and Quantitative Analysis*, 33 (4), 523-547.
15. Xu, X.E. and J. Liu, 2003, "ETF premium/discount ratio and the index futures basis", *Corporate Finance Review*, 8 (1), 21-27.
16. Zweig, M.E., 1973, "An investor expectations stock price predictive model using closed-end fund premiums", *Journal of Finance*, 28 (1), 67-78.