

Premiums on Exchange-Traded Funds As A Sentiment Indicator: Evidence From Taiwan

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Abstract

Past studies tend to depict closed-end fund (CEF) discounts as a measure of individual investor sentiment. While exchange-traded funds (ETFs) are traded by institutional investors by a much higher proportion than CEFs, this paper examines the proposition that premiums or discounts on ETFs are driven by a combined sentiment of institutional and individual investors and hence can act as a proxy for a broader investor sentiment or a more predictive index of market sentiment. The proposition implies that premiums on various ETFs move together, are correlated with prices of other securities which are affected by the same investor sentiment, and can predict stock returns better. We employ correlation analysis, regression analysis, vector autoregressive analysis, and Granger causality test and evidence ETF premiums not only a more comprehensive sentiment indicator but also a prophetic indicator compared to CEF discounts. ETF premiums as a sentiment indicator can predict future returns on various-cap stock portfolios which cannot be attained by CEF discounts. The levels of ETF premiums Granger cause the levels of CEF premiums whereas changes in CEF premiums Granger cause changes in ETF premiums.

Keywords: Exchange-Traded Fund, Investor Sentiment, Closed-End Fund Puzzle.

Introduction

Recent literature in finance has turned to non-economic factors such as investor sentiment as possible determinants of asset prices. That motivates to study the effects of investor sentiment on asset prices comes from the fact that fundamental based models do not fully explain asset price movement in the short to medium term. Researchers have explored the possible effect of investor sentiment on asset prices. Baek et al. (2005) suggest that shifts in investor sentiment may explain short-term movements in asset prices better than any other set of fundamental factors. Brown and Cliff (2005) find evidence that investor sentiment affects future asset prices in the long run. Verma and Soydemir (2006) provide evidence that U.S. investor sentiment have strong effects not only on U.S. stock market returns but also on international stock market returns. However, whether investor sentiment affects asset prices is still open to debate.

Institutional and individual investors are two major types of investors who compete to obtain limited profitability in financial markets. Research on investor sentiment has focused on individual investors for two main reasons: (1) data on the sentiment of institutional investors are much less available; (2) the “investors” in the theoretical framework for the role of investor sentiment in determining stock prices are referred to a certain group of investors who may not be making investment decisions based on a company’s fundamentals. Such “noise traders,” as they are referred to, are capable of affecting stock prices by way of unpredictable changes in their sentiments and are often supposed to be individual investors.

Following the “noise trader” model of Delong et al. (1990), several empirical studies examine the influence of investor sentiment. Studies use indirect and direct measures of investor sentiment. Indirect measures of investor sentiment include the closed-end fund (CEF) discount, trading activity-based measures, market performance-based measures, IPO related measures, the dividend premium, and derivative-related variables (Verma and Soydemir, 2006). Overall, these studies do not provide a consensus on whether the proxies chosen are appropriate. They also show mixed results as to links between sentiment and stock returns. Direct measures of investor sentiment use sentiment survey data that indicate the expectations of market participants. Fisher and Statman (2000) used data from Merrill Lynch, which compiles the responses of strategists about their recommended portfolios monthly as the measure of the sentiment of the large investors. Fisher and Statman (2000) and Verma and Soydemir (2006) also use survey data from *Investors Intelligence* and the American Association of Individual Investors to stand for investor sentiments. Kling and Gao (2008) use daily survey data on Chinese institutional investors’ forecasts to measure investors’ sentiment.

CEFs have the market price in the market trading and the net asset value (NAV) calculated according to the market value of assets the funds hold at the same time. When the market price is higher than the NAV, it is the premium, while if the reverse happens it is the discount. CEFs in financial markets are generally traded by individual investors and at discounts. The discounts fluctuate violently. The investor sentiment is proposed as a tenable reason for explaining this phenomenon. The CEF discount was therefore treated as a proxy of individual investor sentiment.

However in the market with less CEF issued and listed, using CEF discount to act as a proxy for investor sentiment will be challenged. Such as Taiwan, in 1988 the first CEF was launched. From 1988 to 1998, although 30 CEFs were issued, most of them subsequently turned into open-end. After 1998, no new CEF issuance has ever occurred. As of June 30, 2003, which is the starting date for the data period for this research, only three CEFs remained in the market, and thereafter two of them also transferred to open-end in 2005. Therefore, only one CEF remained to be traded in the present market. Its turnovers were few and whether its discount represented the investor sentiment was doubtful.

Just as CEFs, exchange-traded funds (ETFs) have two values, the market price and NAV, on which premiums and discounts of ETFs can be calculated. In Taiwan, the number and turnovers of ETFs rose yearly and gradually became one of the most important investment instruments since the first ETF was launched in 2003 and listed in the market on June 30, 2003. Therefore, this research is focused on examining the connection between ETF premiums/discounts and the investor sentiment.

ETFs are amongst the most innovative financial products in the last two decades and have fundamentally changed how both institutional and individual investors construct their portfolios. While CEFs are traded mostly by individual investors, ETFs are traded by both institutional and individual investors where institutional investors account for a much higher proportion than the institutional investors of CEFs. Therefore, compared to CEF premiums/discounts, ETF premiums/discounts may proxy for a broader investor sentiment consisting of both individual and institutional estimates.

What CEF premiums/discounts reflect tends to be the sentiment or view of individual investors. These investors usually have less information (less-informed traders) making CEF premiums/discounts exhibit much more the expectation of less-informed traders. Therefore, in the causality between CEF premiums/discounts and stock returns, CEF premiums/discounts are usually effects; they are unable to cause or predict the stock returns, or only able to predict the returns of those stock portfolios that are invested by the same group of investors as CEFs. A lot of past research results support this inference. For example, Elton et al. (1998) found that small investor sentiment is not a significant factor in the return generating process. Canbas and Kandir (2009) employed vector autoregressive (VAR) analysis and Granger causality tests and also found that stock portfolio returns seem to affect CEF discounts but that CEF discounts do not appear to predict future stock returns.

By contrast, ETF premiums/discounts contain a broader sentiment which consists of not only the view of individual investors, but also the views of institutional investors or individual investors with relatively high capital investment. Institutional investors or individual investors with relatively high capital investment usually have much more information (the so-called informed traders), and will make ETF premiums/discounts a broadly proxy for investor sentiment. They make ETF premiums/discounts not only have correlation with the stock returns, but also lead the stock returns to change. In the causality analysis, the proposition predicts that ETF premiums/discounts can cause stock returns, and thus can predict stock returns. Based on the inferences above, the main purpose of this research is to test the following proposition.

ETF premiums/discounts are driven by both individual and institutional investor sentiments. The implications include: (1) premiums/discounts on various ETFs correlate with each other to a certain extent. That extent, we predict, will be lower than that of CEF premiums/discounts since the investor sentiment by which ETF premiums/discounts are driven comes from a broader source of investors. (2) ETF premiums/discounts are correlated with prices of other securities affected by the same investor sentiment. Since ETF premiums/discounts are driven by the sentiment of a broader group of investors, the theory predicts that they are correlated with returns of various-cap stock portfolios, especially small- and larger-cap stock portfolios. (3) Since the investor sentiment driving ETF premiums/discounts incorporates the views of institutional investors who mostly trade on rational information, it implies that ETF premiums/discounts have bidirectional causal relationship with returns of various-cap stock portfolio; that is, ETF premiums/discounts can predict future stock returns and vice versa. We predict that CEF premiums/discounts are also correlated with prices of other securities affected by the same investor sentiment but cannot predict returns of larger-cap stock portfolios since CEF premiums/discounts are mainly driven by individual investor sentiments which are not so informed. (4) ETF premiums/discounts have co-movement relationship with CEF premiums/discounts, and ETF premiums/discounts lead the CEF premiums/discounts to change.

This paper examines the propositions that premiums/discounts of ETFs are driven by a combined sentiment of institutional and individual investors and that ETF premiums/discounts can hence proxy a broader sentiment and predict stock returns better. Correlation analysis, regression analysis, vector autoregressive (VAR) analysis, and Granger causality test are employed to observe whether ETF premiums/discounts relate to a combined sentiment of institutional and individual investors and to investigate the relationship of ETF premiums/discounts as a sentiment indicator with stock returns. The results evidence ETF premiums/discounts not only a more typical sentiment indicator but also a prophetic indicator compared to CEF discounts. ETF premiums/discounts as a sentiment indicator can predict future returns of various-cap stock portfolios which cannot be attained by CEF discounts. The levels of ETF premiums Granger cause the levels of CEF premiums whereas changes in CEF premiums Granger cause changes in ETF premiums.

The remainder of the paper is organized as follows. The next section outlines the literature that is critical to the issues in this study. Section 3 describes the data, the variables, and the methodologies. Section 4 presents the empirical findings, and section 5 concludes the paper.

Literature Review

Investor sentiment theory asserts that some investors, act on individual basis, are irrational. The bases on which they make decisions are noises (irrational factors) such as optimistic or pessimistic expectations and sentiments. When the sentiments become systematic, they are one of the origins of extraneous risk to the security prices. The sentiments, therefore, should be integrated in the valuation of securities. Even if a more rational institutional investor conducted by individual persons with profession, when the policy-making foundation is the information, it still has its own opinions and expectations to form its own sentiment. The sentiment is easier to become systematic because of its trading scale. That is, institutional investor sentiment or opinion can also be related with the security price or the stock return. In sum, if the investor

sentiment theory is tenable, the security return and investor sentiments, including sentiments of individual and institutional investors, should have some correlation.

Some research represents individual investor sentiment by the sole index, commonly used is the CEF discount, e.g. Lee et al. (1991), Leonard and Shull (1996), Elton et al. (1998), Doukas and Milonas (2004), Canbas and Kandir (2006), Güner and Önder (2009). Lemmon and Portniaguina (2006) once use “consumer confidence index” to measure individual investor sentiment. Kling and Gao (2008) use the data¹ of daily survey at four p.m. on the 75 leading institutional investors’ predictions for the Shanghai Stock Exchange Composite Index of the next trading day to measure the sentiment of institutional investors. Some utilize multiple indexes together to represent the investor sentiment. This has been emphasized by Neal and Wheatley (1998), Fisher and Stateman (2000), Brown and Cliff (2004), Baker and Wurgler (2006), Canbas and Kandir (2009).

CEF shares typically sell at prices not equal to the NAV. Although they sometimes sell at premiums to their NAV, discounts have been the norm. Four important pieces to the relationships of market price and NAV together characterize the life cycle of a CEF (Lee et al., 1991). The above attributes just like Lee et al. (1991) described in the opening of their paper published in *The Journal of Finance*: “few problems in finance are as perplexing as the CEF puzzle.” The CEF discount issue was thus topped “CEF puzzle.” Many researches attempted to explain this puzzle and proposed several potential explanations: agency costs or transaction costs, illiquidity of assets, and consideration for capital gain tax liabilities. But Lee et al. (1991) argued that these explanations had been marginally successful in explaining part of the puzzle.

The last and most frequently tested explanation for the CEF discount puzzle is the investor sentiment (Zweig, 1973; Delong et al., 1990). According to the investor sentiment hypothesis, there are two types of investors: rational investors and irrational noise traders. The former are risk averse and have unbiased expectations. The latter, on the other hand, transact based on irrational factors, such as sentiment. The sentiment of noise traders changes over time: sometimes these traders are optimistic, other times they are pessimistic. The variability of noise traders’ sentiment hence creates a new source of risk for rational investors in addition to market risk. As the theory assumes that noise traders are small individual investors who are more likely to trade in CEFs than in the underlying securities held in the fund’s portfolio, prices of CEFs will be affected by the investor sentiment more than the prices of the underlying securities. Therefore, rational investor will buy CEFs only if they are compensated for this new source of risk that affects CEFs more. That is why the CEFs sell at a discount. Hence, changes in the CEF discounts can be explained by changes in the sentiment of investors who invest more in CEFs relative to underlying assets in the portfolio of funds. This is “investor sentiment hypothesis”. For the CEF discount puzzle, this hypothesis not only explain what the above three explanations can explain, but also explain those they can not explain. Simultaneously, this hypothesis may further be tested for confirmation. If it can be demonstrated that the investor sentiment has some correlation with CEF discounts, CEF discount can be taken as a proxy for investor sentiment. The investor sentiment hypothesis implies at least three implications:

- (1) Both levels of and changes in CEF discounts should be highly correlated across CEFs since these funds come under the influence of the same investor sentiment.
- (2) New funds generally start when investors are optimistic about the future, that is, when old funds sell at premiums or at small discounts. Therefore at the beginning of their trading, CEFs tends to trade at premiums.
- (3) Discounts on CEFs should be correlated with the changes in prices of other securities that are mainly invested in by irrational noise traders who are generally significant holders and traders of small stocks. Therefore, the theory predicts that CEF discounts should have higher correlation with the prices and returns on smaller stock portfolios.

¹ These data are provided by the China Central Television since April 20, 2001.

All above predictions are confirmed for the U.S. CEFs in the study by Lee et al. (1991). Their evidence suggests that fluctuations in CEF discounts can be explained by changes in sentiments of individual investors, that discounts on CEFs are indeed a proxy for changes in individual investor sentiment, and that the same sentiment affects returns on smaller capitalization stocks and other stocks held and traded by individual investors. Furthermore, Siegel (1992) reported that shifts in investor sentiment between optimistic and pessimistic predictions are correlated with market returns around the crash in October 1987. Swaminathan (1996) showed that discounts on CEFs could predict excess returns on small firms. Simpson and Ramchander (2002), using Australian and the U.S. consumer survey data, discovered that the divergence of consumer sentiment was useful to explain the time variation of discounts and premiums on the First Australian CEF. In a more recent study, Güner and Önder (2009) provided partial support for the investor sentiment hypothesis.

To test the three implications of the investor sentiment hypothesis, both Lee et al. (1991) and Güner and Önder (2009) employed correlation analysis to observe the co-movements between discounts on different funds, examined if the new funds got started when the market sentiment was more optimistic, i.e. old funds sold at premiums or at smaller discounts, and applied a two-factor time series regression model to observe the relationship between the sentiment indicator, i.e. the discounts on CEFs, and returns on size-decile portfolios. The theory predicts that discounts on CEFs should be correlated much more highly with prices of security portfolios affected by the same investor sentiment.

The regression results of Lee et al. (1991) and Güner and Önder (2009) evidence that CEF discounts have higher correlation with the prices and returns on smaller stock portfolios, i.e. the sentiment affecting CEFs also affects returns on smaller-cap stocks and other stocks held and traded by individual investors. For larger-cap stocks, which have lower individual holding and trading, these correlations diminish. However, since regression analysis only confirms correlation not causality relationship, Canbas and Kandir (2009) employed vector autoregressive (VAR) analysis and Granger causality tests to further investigate the relationship between investor sentiment and stock returns. They discovered that stock portfolio returns seemed to affect CEF discounts but that CEF discounts did not appear to predict future stock returns. In fact, Elton et al. (1998) also documented that CEF discounts, i.e. individual investor sentiment, are not a significant factor in the return generating process.

Data and Variables

The first ETF in Taiwan was launched in 2003 and listed for trading on June 30, 2003. Thus far there are 26 ETFs, investing in domestic or foreign equity markets, traded in the market. Of these 26 ETFs, 14 are included in the sample because they invest in the domestic exchange-listed stocks and their market price and NAV data are available at the same time. In addition, 3 CEFs data were also collected to form another sentiment indicator for comparison purpose. These CEFs are the only 3 CEFs traded in the market for the last decade. For these funds, we collected the daily market value, turnover value, turnover volume, proportion of the three major institutional shareholdings, proportion of the three major institutional turnovers, and premium rate as reported by the Taiwan Economic Journal (TEJ) between June 30, 2003 and December 28, 2012. TEJ started to report proportion of the three major institutional shareholdings and proportion of the three major institutional turnovers since 2008, hence the period for these two data was between January 2, 2008 and December 28, 2012.

We first analyzed the correlations between several fund characteristics. The fund characteristics considered here are the market value, turnover value, turnover volume, proportion of the three major institutional shareholdings, and proportion of the three major institutional turnovers. Table 1 presents the pairwise correlations of these fund characteristics. It seems clear that the market value of these funds correlates positively with turnover value, turnover volume, and proportion of the three major institutional turnovers, but has negative and very low correlation with proportion of the three major institutional shareholdings. The correlation coefficient between proportion of the three major institutional shareholdings and proportion

of the three major institutional turnovers is also very low (0.014294) though significant at 10% level indicating absence of correlation between the two variables and that higher proportion of the three major institutional shareholdings does not necessarily cause higher proportion of the three major institutional turnovers.

Table 1 Correlation of fund characteristics

The daily correlations between fund characteristics. The pairwise Pearson product-moment correlation, *t*-statistic, and *p*-value are shown, as is the number of observations.

	Market value	Turnover value	Turnover volume	Institutional shareholding	Institutional turnover
Market value	1.000000 ----- ----- 15570				
Turnover value	0.767780 149.5163 0.0000 15570	1.000000 ----- ----- 15570			
Turnover volume	0.700107 122.3374 0.0000 15570	0.955617 404.7172 0.0000 15570	1.000000 ----- ----- 15570		
Institutional shareholding	-0.045348 -5.663969 0.0000 15570	-0.074308 -9.297244 0.0000 15570	-0.077625 -9.714697 0.0000 15570	1.000000 ----- ----- 15570	
Institutional turnover	0.132417 16.66869 0.0000 15570	0.112193 14.08749 0.0000 15570	0.120655 15.16515 0.0000 15570	0.014294 1.783646 0.0745 15570	1.000000 ----- ----- 15570

We then plot the average market value and average proportion of the three major institutional turnovers for the three individual CEFs and fourteen individual ETFs in a frame, Figure 1.

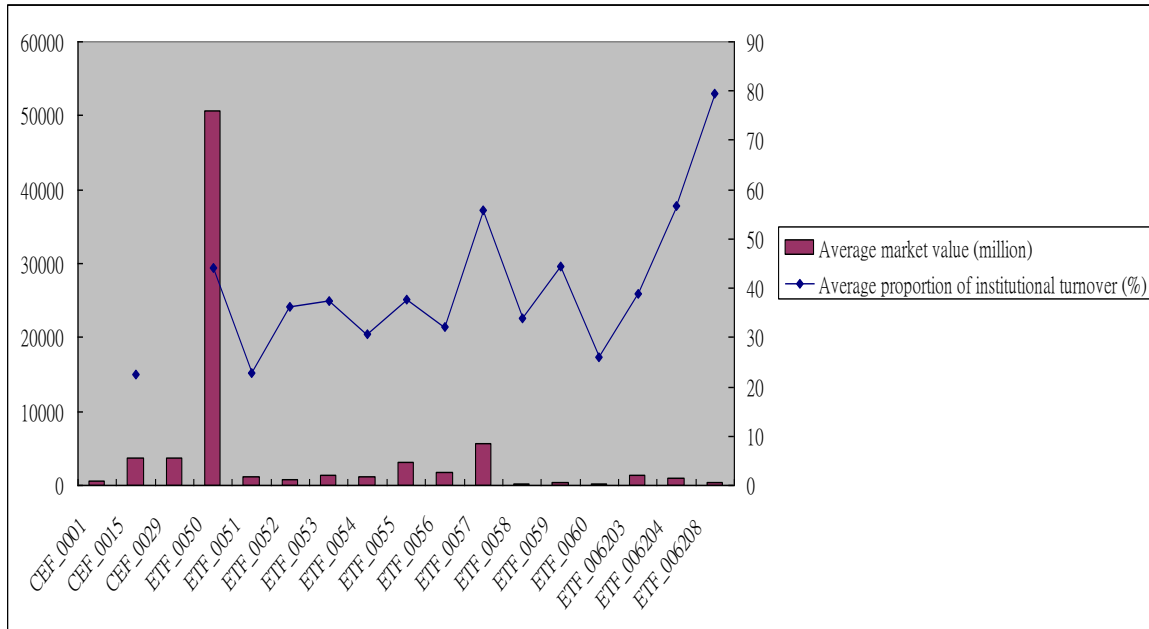


Figure 1 Average market value and average proportion of the three major institutional turnovers for CEFs and ETFs.

Note: The data period for average market value is between June 30, 2003 and December 28, 2012. The period for average proportion of the three major institutional turnovers is between January 2, 2008 and December 28, 2012.

It seems clear that except ETF_0050, ETFs do not necessarily have larger market value than CEFs; however, their average proportions of the three major institutional turnovers all exceed a lot that of CEF_0015, which might be a fundamental cause making premiums/discounts on ETFs another kind of sentiment indicator.

In a fashion similar to that used by Lee et al. (1991), we construct a value-weighted index of premiums (VWP) for both ETFs (VWP ETF) and CEFs (VWP_CEF) at the daily base as follows:

$$VWP_t = \sum_{i=1}^{n_t} W_i PREM_{it}$$

Where

$$W_i = \frac{MV_{it}}{\sum_{i=1}^{n_t} MV_{it}}, \quad MV_{it} = \text{market value of fund } i \text{ at time } t$$

$$PREM_{it} = \frac{SP_{it} - NAV_{it}}{NAV_{it}} \times 100$$

SP_{it} = stock price per share of fund i at time t

NAV_{it} = net asset value per share of fund i at time t

n_t = the number of funds with available NAV_{it} and $PREM_{it}$ data at time t .

Table 2 presents the descriptive statistics of the daily VWP ETF and VWP_CEF over the period between June 30, 2003 and December 28, 2012. Though the average VWPs for both ETFs and CEFs are negative, ETFs are traded at both premiums and discounts while CEFs mostly at discounts as prior studies have reported. The premium index for CEFs (VWP_CEF) is between a larger range (-23.045% to -3.930%) while that for ETFs (VWP ETF) is between a smaller range (-4.410% to 2.481%). Also, CEFs seem to be traded with a larger fluctuation than ETFs as the standard deviation of the former is larger than that of the latter.

The average value-weighted discount of Taiwan CEFs is larger than the discount reported for the U.S. CEFs, yet less than the discount reported for other emerging market like Turkey (Weiss, 1989; Lee at al., 1991; Güner and Önder, 2009). Figure 2 shows the movements of the two premium indices during June 30, 2003 to December 28, 2012. It exhibits that the VWP ETF fluctuates around the zero axis, and the VWP_CEF remains negative and has larger fluctuation. There is a slight indication that the two premium indices might move in an integrated trend.

Table 2 Summary statistics of percentage premiums on ETFs and CEFs:
June 30, 2003 to December 28, 2012

Funds	Mean (%)	Median (%)	Maximum (%)	Minimum (%)	Std. Dev. (%)	Observations
VWP ETF	-0.0557	-0.0658	2.4811	-4.4103	0.3752	2371
VWP_CEF	-12.9961	-12.7708	-3.9295	-23.0449	2.8836	2371

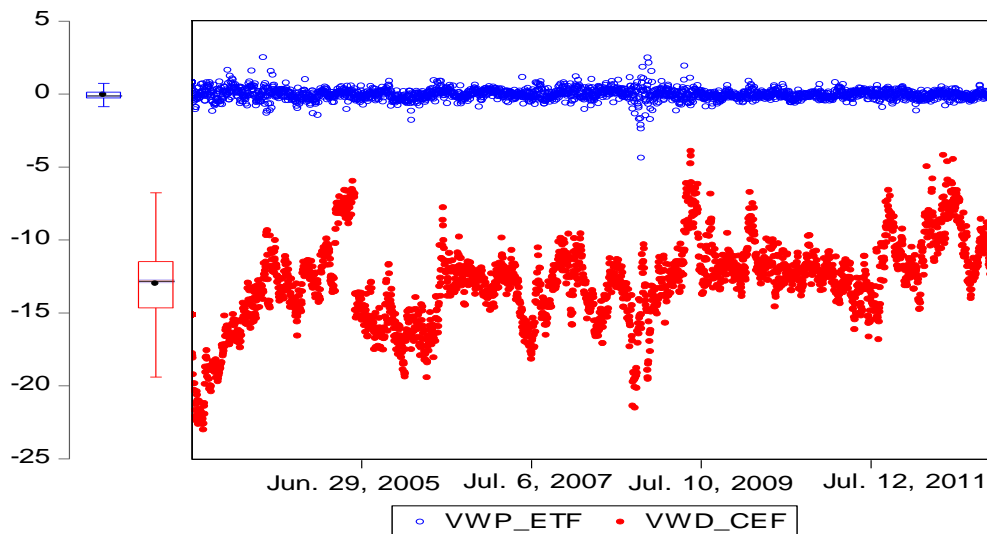


Figure 2 Scatter plot of value-weighted index of premiums (VWP) for both CEFs (VWP_CEF) and ETFs (VWP ETF) between June 30, 2003 and December 28, 2012.

Empirical Evidence

Co-Movements in Premiums of Different Funds

As the investor sentiment model predicts that the discounts on CEFs will be correlated, if the premiums and discounts on ETFs are also indicator for investor sentiment, they should be correlated. Table 3 presents the

correlations of daily premiums of the fourteen individual ETFs considered in this study, and the correlations of these premiums with VWP ETF and the total value of all Taiwan Stock Exchange listed firms (TAIVAL). Table 4 presents the correlations of daily premiums of the three CEFs, and the correlations of these premiums with VWP_CEF, VWP ETF, and TAIVAL for comparison purpose. Most of the pairwise correlation coefficients in Table 3 are significantly positive indicating that premiums of different ETFs tend to move together. The positive correlations are consistent with the hypothesis that premiums and discounts on different funds are driven by the same investor sentiment. Moreover, the highest level of the pairwise correlation between ETFs premiums (0.47) is lower than that of CEF premiums (0.72), as the first implication of the proposition predicts.

Premiums and Returns on Portfolios of Stocks

Table 5 presents the results of time series regressions of small-, mid-, and large-cap portfolio returns on both market returns and VWP for ETFs and CEFs. Table 6 presents the results of time series regressions of returns of small-, mid-, and large-cap portfolios on both market returns and changes in VWP for ETFs and CEFs. The evidence suggests that the level of individual sentiment indicator, VWP_CEF, has correlation with only the small-cap portfolio and the excess return of small firms over large firms. The level of comprehensive sentiment indicator VWP ETF, combining the individual and institutional investor sentiment, has correlations with small and large portfolios, and the correlation with the large-cap portfolio is the highest. The level of comprehensive sentiment indicator also has highly significant correlation with the excess return of small firms over large firms. Both changes in both sentiment indexes have significant correlation with all the three portfolios and the excess return, yet the changes in comprehensive sentiment indicator has more significant correlation with the small- and large-cap portfolios and hence the excess return. These results are in line with the prediction of the second implication of the proposition.

VAR Relationship Between Premiums and Returns on Portfolios of Stocks

The VAR analysis and the following causality test assume that the variables in the system are stationary. As a preliminary step, we employ three methods: the augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979), Phillips-Perron (PP) test (Phillips and Perron, 1988), and the modified Dickey-Fuller generalized least squares (DF-GLS) test (Elliott et al., 1996) for testing a unit root in the variables. The ADF, PP, and DF-GLS test statistics are all significant at the 1% level. Therefore, there is no unit root in the series; all series are stationary².

In VAR models, stock portfolio returns and investor sentiment proxies are used as endogenous variables:

$$R_t = a_0 + \sum_{i=1}^n \alpha_i R_{t-i} + \sum_{i=1}^n \beta_i \text{Sentiment}_{t-i} + \varepsilon_{1t}$$

$$\text{Sentiment}_t = b_0 + \sum_{i=1}^n \phi_i R_{t-i} + \sum_{i=1}^n \delta_i \text{Sentiment}_{t-i} + \varepsilon_{2t}$$

Where R_t is the return on the stock portfolio at time t ; Sentiment_t are investor sentiment proxies VWP ETF, VWP_CEF, or their changes ΔVWP_ETF , ΔVWP_CEF at time t ; n is the appropriate lag length for the VAR system; ε_{1t} and ε_{2t} are disturbance terms. We use Schwarz Bayesian information criterion (SBIC; Schwarz, 1978) to select the appropriate lag structure. The appropriate lag order for the VAR system of various-cap stock returns versus the level of composite sentiment indicator VWP ETF is 3, and that for the VAR system of stock returns versus the level of individual sentiment indicator VWP_CEF is 2. The appropriate lag order for the VAR system of various-cap stock returns versus the changes in composite sentiment indicator ΔVWP_ETF is 6, and that for the VAR system of stock returns versus the

² Due to space limitations, unit root test results are not reported but are available upon request.

changes in individual sentiment indicator ΔVWP_CEF is 1 or 2. As for the VAR system of composite sentiment indicator VWP_ETF versus individual sentiment indicator VWP_CEF , the appropriate lag order for their levels is 2, for their changes is 7.

VAR Results

Table 7-11 present the results of the VAR systems. The results in Table 7 suggest that the level of composite investor sentiment index seem to predict all-cap stock portfolio returns, whereas all-cap stock portfolio returns also seem to predict the investor sentiment proxy. In Table 8, the results suggest that the level of individual investor sentiment proxy seem to predict only the small-cap stock portfolio returns, whereas all-cap stock portfolio returns seem to predict the investor sentiment proxy. Table 9 suggests that the changes in composite investor sentiment proxy seem to predict all-cap stock portfolio returns, especially the large-cap portfolio returns; all-cap stock portfolio returns also seem to predict the investor sentiment proxy.

Table 10 suggests that the changes in individual investor sentiment proxy seem to predict only the small-cap stock portfolio returns; only the mid- and large-cap stock portfolio returns seem to predict the investor sentiment proxy.

Table 11 suggests that the levels of the two sentiment proxy seem to predict each other; only the changes in individual investor sentiment proxy can slightly predict the changes in composite investor sentiment proxy, whereas the reverse relationship is not observed. The changes in the two sentiment proxy exhibit continuation, or momentum, for about 7 trading days and then reverse.

Casual Relationship Between Premiums And Returns On Portfolios Of Stocks Under VAR Systems

Correlation does not necessarily imply causation in any meaningful sense of that word. We therefore employ Granger causality tests to examine the connection between investor sentiment and portfolio returns. The Granger causality test results in Table 12 suggest that the null hypothesis of Granger noncausality from the comprehensive sentiment indicator VWP_ETF to all-cap portfolios returns, including the market portfolio returns, can be rejected at the 5 percent significance level, and vice versa. This implies that there exists two-way causation between the comprehensive sentiment indicator VWP_ETF and stock portfolio returns and that not only stock returns are able to predict investor sentiment but also investor sentiment can predict stock returns.

Regarding the individual investor sentiment indicator VWP_CEF , the results show that all-cap stock returns can Granger cause VWP_CEF , yet VWP_CEF only Granger cause the small-cap stock returns, which coincides with what the proposition predicts. That is, the two-way causation is only observed in the connections between the level of VWP_CEF and the small-cap stock portfolio returns. The changes in individual investor sentiment seem not to Granger cause any-cap stock returns, yet all the three portfolio returns can Granger cause the individual investor sentiment.

We test further the precedence and information content between VWP_ETF and VWP_CEF , we find that the levels of VWP_ETF Granger cause the levels of VWP_CEF but the reverse relationship is not observed; the changes in CEF premiums can Granger cause the changes in ETF premiums but the reverse relationship is not observed.

Such results imply that the composite investor sentiment lead individual investor sentiment in the long run, yet the short-term changes in the individual investor sentiment will affect the composite investor sentiment but the reverse relationship does not exist. The ETF premiums seem to be a more prophetic indicator compared to CEF discounts.

Table 3 Correlation of daily premiums of individual ETFs

Observations	ETF_0050	ETF_0051	ETF_0052	ETF_0053	ETF_0054	ETF_0055	ETF_0056	ETF_0057	ETF_0058	ETF_0059	ETF_0060	ETF_006203	ETF_006204	ETF_006208	VWP ETF
ETF_0050	1.000000														

	2371														
ETF_0051	0.259641	1.000000													
	10.68028	----													
	0.0000	----													
	1580	1580													
ETF_0052	0.157405	0.205073	1.000000												
	6.315643	8.302099	----												
	0.0000	0.0000	----												
	1572	1572	1572												
ETF_0053	0.413344	0.233831	0.246072	1.000000											
	16.76499	8.882163	9.376326	----											
	0.0000	0.0000	0.0000	----											
	1366	1366	1366	1366											
ETF_0054	0.350077	0.181597	0.190098	0.409968	1.000000										
	13.80258	6.820204	7.151185	16.60024	----										
	0.0000	0.0000	0.0000	0.0000	----										
	1366	1366	1366	1366	1366										
ETF_0055	0.470281	0.150900	0.104786	0.277614	0.235019	1.000000									
	19.68074	5.637641	3.891408	10.67246	8.929928	----									
	0.0000	0.0000	0.0001	0.0000	0.0000	----									
	1366	1366	1366	1366	1366	1366									
ETF_0056	0.395321	0.116407	0.248517	0.277906	0.392279	0.282360	1.000000								
	15.21618	4.143782	9.070974	10.22838	15.07770	10.40638	----								
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	----								
	1252	1252	1252	1252	1252	1252	1252								
ETF_0057	0.376099	0.163040	0.156549	0.324161	0.288741	0.281280	0.316202	1.000000							
	14.13093	5.753018	5.518117	11.92946	10.49938	10.20443	11.60357	----							
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	----							
	1214	1214	1214	1214	1214	1214	1214	1214							
ETF_0058	0.168531	-0.033268	0.259183	0.220469	0.265262	0.105947	0.346920	0.311893	1.000000						
	5.952325	-1.158834	9.342378	7.868999	9.577895	3.709291	12.87735	11.42827	----						
	0.0000	0.2468	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	----						
	1214	1214	1214	1214	1214	1214	1214	1214	1214						
ETF_0059	0.176625	0.083420	0.124978	0.231680	0.237174	0.248692	0.287119	0.336934	0.311000	1.000000					
	6.247212	2.914681	4.385329	8.291235	8.499423	8.958753	10.43509	12.45843	11.39203	----					
	0.0000	0.0036	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	----					
	1214	1214	1214	1214	1214	1214	1214	1214	1214	1214					
ETF_0060	0.163225	0.091290	0.156189	0.091997	0.281269	0.126841	0.242806	0.104245	0.173818	0.163174	1.000000				
	5.469605	3.030740	5.227864	3.054428	9.690112	4.227573	8.274923	3.465274	5.835340	5.467919	----				
	0.0000	0.0025	0.0000	0.0023	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	----				
	1095	1095	1095	1095	1095	1095	1095	1095	1095	1095	1095				
ETF_006203	0.308813	0.128452	-0.017907	0.247648	0.232963	0.215477	0.081338	0.373420	0.193335	0.158855	0.184442	1.000000			
	6.590332	2.629079	-0.363536	5.188332	4.862416	4.478915	1.656474	8.170632	3.999730	3.265881	3.809111	----			
	0.0000	0.0089	0.7164	0.0000	0.0000	0.0000	0.0984	0.0000	0.0001	0.0012	0.0002	----			
	414	414	414	414	414	414	414	414	414	414	414	414			

ETF_006204	0.272928	-0.051151	-0.087400	0.186501	0.205430	0.365098	0.139945	0.400672	0.319156	0.187471	0.134811	0.292267	1.000000		
	5.035158	-0.909023	-1.557156	3.369173	3.725486	6.960323	2.508457	7.761461	5.977036	3.387337	2.414704	5.434197	---		
	0.0000	0.3640	0.1204	0.0008	0.0002	0.0000	0.0126	0.0000	0.0000	0.0008	0.0163	0.0000	---		
	317	317	317	317	317	317	317	317	317	317	317	317	317	317	
ETF_006208	0.365984	-0.186102	-0.062545	0.223448	0.013328	0.267696	0.108075	0.385834	0.291923	0.094840	-0.160421	-0.069892	0.276388	1.000000	
	4.235636	-2.040014	-0.674957	2.469032	0.143560	2.992388	1.170866	4.504342	3.287292	1.028078	-1.750454	-0.754602	3.097452	---	
	0.0000	0.0436	0.5010	0.0190	0.8861	0.0034	0.2441	0.0000	0.0013	0.3070	0.0827	0.4520	0.0024	---	
	118	118	118	118	118	118	118	118	118	118	118	118	118	118	
VWP_ETF	0.981290	0.330234	0.247006	0.492543	0.433149	0.511618	0.480267	0.503981	0.243465	0.255141	0.219386	0.353509	0.308144	0.355301	1.000000
	248.0683	13.89791	10.10014	20.90199	17.74859	21.99138	19.35879	20.31398	8.738891	9.186444	7.434143	7.670738	5.748745	4.093821	---
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	---
	2371	1580	1572	1366	1366	1366	1252	1214	1214	1214	1095	414	317	118	2371
TAIVAL	-0.022578	-0.091313	0.051374	0.051670	0.069401	0.089801	0.223872	0.132801	0.190945	0.225388	-0.082032	0.263649	0.141888	0.047903	-0.034528
	-1.099221	-3.642552	2.038313	1.985006	2.569346	3.330004	8.121190	4.664614	6.772130	8.653841	-2.721209	5.547782	2.540007	0.316527	-1.681541
	0.2718	0.0003	0.0417	0.0473	0.0103	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0114	0.6065	0.0928
	2371	1580	1572	1366	1366	1366	1252	1214	1214	1214	1095	414	317	118	2371

Note: Correlations between daily premiums for fourteen individual ETFs, the value-weighted index of premiums (VWP) for ETFs, VWP_ETF, and the total value of all Taiwan Stock Exchange listed firms, TAIVAL. The pairwise Pearson product-moment correlation, *t*-statistic, and *p*-value are shown, as is the number of observations.

Table 4 Correlation of daily premiums of individual CEFs

Observations	CEF_0001	CEF_0015	CEF_0029	VWP_CEF	VWP_ETF	TAIVAL
CEF_0001	1.000000					

	478					
CEF_0015	0.111829	1.000000				
	2.455225	-----				
	0.0144	-----				
	478	2371				
CEF_0029	0.059303	0.720917	1.000000			
	1.296113	22.76702	-----			
	0.1956	0.0000	-----			
	478	481	481			
VWP_CEF	0.104833	0.848300	0.980571	1.000000		
	2.299863	77.97460	109.4032	-----		
	0.0219	0.0000	0.0000	-----		
	478	2371	481	2371		
VWP_ETF	0.016267	0.034394	0.012904	0.059362	1.000000	
	0.354956	1.675038	0.282448	2.894389	-----	
	0.7228	0.0941	0.7777	0.0038	-----	
	478	2371	481	2371	2371	
TAIVAL	0.134566	0.511480	0.620108	0.285452	-0.034528	1.000000
	2.962829	28.97136	17.29950	14.49682	-1.681541	-----
	0.0032	0.0000	0.0000	0.0000	0.0928	-----
	478	2371	481	2371	2371	2371

Note: Correlations between daily premiums for three individual CEFs, the value-weighted index of premiums (VWP) for CEFs, VWP_CEF, and the total value of all Taiwan Stock Exchange listed firms, TAIVAL. The pairwise Pearson product-moment correlation, *t*-statistic, and *p*-value are shown, as is the

number of observations.

Table 5 Time-series relationship between returns on various-cap stock portfolios, the market returns, and the value-weighted premiums for both ETFs and CEFs

The time-series relationship between daily returns on small-, mid-, and large-cap portfolios (DR_SMALL, DR_MID, and DR_LARGE respectively, dependent variables), value-weighted premiums (VWP) for both ETFs and CEFs, and the daily return on a value-weighted portfolio of Taiwan Stock Exchange firms (DR_VWTAI). The dependent variable in the last row is the excess return of small firms over large firms, computed by subtracting large-cap returns from small-cap returns. *t*-statistics are shown in the parentheses and their superscripts *, ** and ***, denote significance at the 10%, 5% and 1% levels, respectively.

Return on the stock portfolio	Intercept	VWP ETF	VWP_CEF	DR_VWTAI	Adjusted R ²	Observations
DR_SMALL	-0.2393	0.0880 (2.4574)**	-0.0201 (-4.3065)***	0.8505 (84.9032)***	0.7558	2371
DR_MID	-0.0468	-0.0131 (-0.4008)	-0.0052 (-1.2134)	0.8968 (98.1938)***	0.8048	2371
DR_LARGE	0.0985	-0.1973 (-5.3275)***	0.0066 (1.3632)	0.7756 (74.8745)***	0.7079	2371
Small – Large	-0.3378	0.2853 (5.6733)***	-0.0266 (-4.0708)***	0.0749 (5.3236)***	0.0290	2371

Table 6 Time-series relationship between returns on various-cap stock portfolios, the market returns, and changes in value-weighted premiums for both ETFs and CEFs

The time-series relationship between daily returns on small-, mid-, and large-cap portfolios (DR_SMALL, DR_MID, and DR_LARGE respectively, dependent variables), changes in value-weighted premiums (Δ VWP) for both ETFs and CEFs, and the daily return on a value-weighted portfolio of Taiwan Stock Exchange firms (DR_VWTAI). The dependent variable in the last row is the excess return of small firms over large firms, computed by subtracting large-cap returns from small-cap returns. *t*-statistics are shown in the parentheses and their superscripts *, ** and ***, denote significance at the 10%, 5% and 1% levels, respectively.

Return on the stock portfolio	Intercept	Δ VWP ETF	Δ VWP_CE F	DR_VWTAI	Adjusted R ²	Observations
DR_SMALL	0.0166	0.2337 (7.4519)***	-0.0397 (-2.5234)**	0.8514 (82.5844)***	0.7593	2370
DR_MID	0.0210	-0.0639 (-2.2227)**	-0.0252 (-1.7510)*	0.8914 (94.3209)***	0.8055	2370
DR_LARGE	0.0239	-0.2541 (-7.8471)***	0.0607 (3.7415)***	0.7826 (73.4969)***	0.7127	2370
Small – Large	-0.0073	0.4878 (11.2030)***	-0.1004 (-4.6002)***	0.0688 (4.8047)***	0.0635	2370

Table 7 VAR results: returns on various-cap stock portfolios vs. the composite sentiment indicator, VWP ETF

t-statistics are shown in the parentheses.

	DR_SMALL	VWP ETF	DR_MID	VWP ETF	DR_LARGE	VWP ETF
Return(-1)	0.1172 (5.7016)	-0.0228 (-4.2035)	0.0360 (1.7447)	-0.0211 (-3.9638)	0.0311 (1.4981)	-0.0150 (-2.5852)
Return(-2)	0.0259 (1.2518)	-0.0109 (-2.0020)	-0.0018 (-0.0894)	-0.0071 (-1.3264)	-0.0288 (-1.3948)	-0.0062 (-1.0651)
Return(-3)	-0.0208 (-1.0099)	-0.0195 (-3.5904)	-0.0120 (-0.5848)	-0.0162 (-3.0535)		
VWP ETF(-1)	-0.1605 (-2.0709)	0.2673 (13.0591)	0.1178 (1.4772)	0.2669 (12.9696)	0.1709 (2.3263)	0.2820 (13.7341)
VWP ETF(-2)	0.2882 (3.6194)	0.1239 (5.8924)	0.2733 (3.3400)	0.1321 (6.2535)	0.0536 (0.7308)	0.1586 (7.7393)
VWP ETF(-3)	-0.2276 (-2.9503)	0.0801 (3.9287)	-0.2204 (-2.7687)	0.0808 (3.9315)		
Constant	0.0285 (1.0419)	-0.0279 (-3.8581)	0.0527 (1.8764)	-0.0275 (-3.7956)	0.0578 (2.2272)	-0.0307 (-4.2313)
Adjusted R ²	0.0204	0.1566	0.0070	0.1522	0.0036	0.1414

Table 8 VAR results: returns on various-cap stock portfolios vs. the individual sentiment indicator, VWP CEF

t-statistics are shown in the parentheses.

	DR_SMALL	VWP_CEF	DR_MID	VWP_CEF	DR_LARGE	VWP_CEF
Return(-1)	0.0988 (4.6393)	-0.0139 (-0.9878)	0.0309 (1.4488)	-0.0353 (-2.5760)	0.0279 (1.3312)	-0.0353 (-2.4264)
Return(-2)	0.0304 (1.4714)	0.0396 (2.8975)	-0.0125 (-0.6058)	0.0374 (2.8235)	-0.0341 (-1.6575)	0.0217 (1.5201)
VWP_CEF(-1)	-0.0782 (-2.4604)	0.7920 (37.7099)	-0.0200 (-0.6123)	0.7849 (37.4136)	0.0147 (0.4938)	0.7893 (38.1874)
VWP_CEF(-2)	0.0747 (2.3565)	0.1698 (8.1112)	0.0233 (0.7155)	0.1763 (8.4234)	-0.0106 (-0.3571)	0.1713 (8.2989)
Constant	-0.0117 (-0.0925)	-0.4922 (-5.9019)	0.0870 (0.6732)	-0.5001 (-6.0208)	0.0987 (0.8250)	-0.5069 (-6.1066)
Adjusted R ²	0.0151	0.9103	-0.0001	0.9105	0.0003	0.9103

Table 9 VAR results: returns on various-cap stock portfolios vs. changes in the composite sentiment indicator, Δ VWP ETF

t-statistics are shown in the parentheses.

	DR_SMALL	Δ VWP ETF	DR_MID	Δ VWP ETF	DR_LARGE	Δ VWP ETF
Return(-1)	0.1138 (5.5247)	-0.0184 (-3.2629)	0.0294 (1.4196)	-0.0181 (-3.2665)	0.0266 (1.2759)	-0.0122 (-2.0322)
Return(-2)	0.0284 (1.3654)	-0.0047 (-0.8228)	-0.0095 (-0.4591)	-0.0035 (-0.6256)	-0.0322 (-1.5474)	-0.0035 (-0.5860)
Return(-3)	-0.0124 (-0.5965)	-0.0141 (-2.4821)	-0.0068 (-0.3277)	-0.0140 (-2.5314)	-0.0094 (-0.4523)	-0.0118 (-1.9624)
Return(-4)	-0.0506 (-2.4334)	-0.0040 (-0.7074)	-0.0479 (-2.3202)	-0.0069 (-1.2563)	-0.0575 (-2.7733)	0.0035 (0.5847)
Return(-5)	-0.0062 (-0.2968)	-0.0026 (-0.4560)	-0.0311 (-1.5047)	-0.0104 (-1.8793)	-0.0216 (-1.0423)	-0.0066 (-1.1053)
Return(-6)	-0.0441 (-2.1507)	0.0110 (1.9562)	-0.0683 (-3.3001)	0.0041 (0.7494)	-0.0666 (-3.2109)	0.0079 (1.3248)
Return(-7)			0.0109 (0.5309)	-0.0047 (-0.8521)	0.0199 (0.9592)	-0.0098 (-1.6313)
Δ VWP ETF(-1)	-0.1004 (-1.3450)	-0.6570 (-32.1484)	0.0991 (1.2842)	-0.6713 (-32.5334)	0.1914 (2.6634)	-0.6668 (-32.1472)
Δ VWP ETF(-2)	0.2475 (2.8076)	-0.4814 (-19.9381)	0.3887 (4.2310)	-0.5005 (-20.3721)	0.3179 (3.7303)	-0.4949 (-20.1152)
Δ VWP ETF(-3)	0.0816 (0.8850)	-0.3613 (-14.3116)	0.1904 (1.9460)	-0.3942 (-15.0647)	0.1132 (1.2506)	-0.3910 (-14.9643)
Δ VWP ETF(-4)	0.0495 (0.5371)	-0.3215 (-12.7378)	0.1593 (1.6134)	-0.3588 (-13.5894)	0.1211 (1.3259)	-0.3508 (-13.3108)
Δ VWP ETF(-5)	0.0080 (0.0906)	-0.2066 (-8.5487)	-0.0614 (-0.6265)	-0.2545 (-9.7073)	-0.0398 (-0.4397)	-0.2526 (-9.6692)
Δ VWP ETF(-6)	0.0599 (0.8010)	-0.1230 (-6.0061)	-0.0382 (-0.4134)	-0.1842 (-7.4611)	-0.0497 (-0.5814)	-0.1824 (-7.3987)
Δ VWP ETF(-7)			-0.2003 (-2.5860)	-0.0919 (-4.4355)	-0.1473 (-2.0498)	-0.0965 (-4.6506)
Constant	0.0366 (1.3636)	0.0012 (0.1591)	0.0469 (1.7095)	0.0020 (0.2762)	0.0480 (1.8843)	0.0011 (0.1555)
Adjusted R ²	0.0230	0.3104	0.0188	0.3148	0.0158	0.3119

Table 10 VAR results: returns on various-cap stock portfolios vs. changes in the individual sentiment indicator, Δ VWP_CEF

t-statistics are shown in the parentheses.

	DR_SMALL	Δ VWP_CEF	DR_MID	Δ VWP_CEF	DR_LARGE	Δ VWP_CEF
Return(-1)	0.1035 (4.9115)	-0.0023 (-0.1661)	0.0301 (1.4150)	-0.0304 (-2.1997)	0.0269 (1.2822)	-0.0328 (-2.2326)
Δ VWP_CEF(-1)	-0.0727 (-2.3240)	-0.1821 (-8.7212)	-0.0221 (-0.6843)	-0.1935 (-9.2479)	0.0127 (0.4309)	-0.1906 (-9.2538)
Constant	0.0353 (1.3144)	0.0046 (0.2570)	0.0435 (1.5767)	0.0059 (0.3317)	0.0441 (1.7240)	0.0060 (0.3373)
Adjusted R ²	0.0149	0.0321	0.0005	0.0341	-0.0001	0.0342

Table 11 VAR results of the two sentiment indicators

t-statistics are shown in the parentheses.

	VWP ETF	VWP_CEF		Δ VWP ETF	Δ VWP_CEF
VWP ETF(-1)	0.2960 (14.4069)	0.0039 (0.0764)	Δ VWP ETF(-1)	-0.6572 (-31.6026)	0.0306 (0.6086)
VWP ETF(-2)	0.1517 (7.4335)	-0.1414 (-2.7908)	Δ VWP ETF(-2)	-0.4898 (-19.8635)	-0.0668 (-1.1186)
VWP_CEF(-1)	-0.0137 (-1.6595)	0.7964 (38.8828)	Δ VWP ETF(-3)	-0.3892 (-14.8752)	-0.0566 (-0.8935)
VWP_CEF(-2)	0.0140 (1.7000)	0.1650 (8.0541)	Δ VWP ETF(-4)	-0.3462 (-13.1221)	-0.0436 (-0.6827)
			Δ VWP ETF(-5)	-0.2467 (-9.4771)	-0.0470 (-0.7441)
			Δ VWP ETF(-6)	-0.1782 (-7.2442)	-0.0014 (-0.0236)
			Δ VWP ETF(-7)	-0.0986 (-4.7744)	0.0659 (1.3182)
			Δ VWP_CEF(-1)	-0.0104 (-1.2089)	-0.2137 (-10.2345)
			Δ VWP_CEF(-2)	0.0152 (1.7318)	-0.1024 (-4.8057)
			Δ VWP_CEF(-3)	0.0104 (1.1807)	-0.0928 (-4.3350)
			Δ VWP_CEF(-4)	-0.0119 (-1.3494)	-0.1225 (-5.7348)
			Δ VWP_CEF(-5)	-0.0100 (-1.1347)	-0.0173 (-0.8059)
			Δ VWP_CEF(-6)	-0.0039 (-0.4432)	-0.0712 (-3.3384)
			Δ VWP_CEF(-7)	0.0201 (2.3391)	-0.0490 (-2.3547)
Constant	-0.0269 (-0.8061)	-0.5049 (-6.0892)		-0.0003 (0.0073)	0.0079 (0.0177)
Adjusted R ²	0.1395	0.9104		0.3131	0.0576

Table 12 Pairwise Granger causality test results

Null hypothesis	lag	F-statistics	p-value
ETF sentiment indicator vs. returns on various-cap stock portfolios			
VWP ETF does not Granger Cause DR_SMALL	3	6.6515	0.0002
DR_SMALL does not Granger Cause VWP ETF	3	13.2117	0.0000
VWP ETF does not Granger Cause DR_MID	3	6.3641	0.0003
DR_MID does not Granger Cause VWP ETF	3	9.0412	0.0000
VWP ETF does not Granger Cause DR_LARGE	2	4.0644	0.0173
DR_LARGE does not Granger Cause VWP ETF	2	3.9850	0.0187
VWP ETF does not Granger Cause DR_VWTAI	3	6.0335	0.0004
DR_VWTAI does not Granger Cause VWP ETF	3	11.8006	0.0000
Δ VWP ETF does not Granger Cause DR_SMALL	6	3.4664	0.0021
DR_SMALL does not Granger Cause Δ VWP ETF	6	4.1635	0.0004
Δ VWP ETF does not Granger Cause DR_MID	7	5.0010	0.0000
DR_MID does not Granger Cause Δ VWP ETF	7	3.2989	0.0017
Δ VWP ETF does not Granger Cause DR_LARGE	7	1.8829	0.0684
DR_LARGE does not Granger Cause Δ VWP ETF	7	4.3352	0.0002
Δ VWP ETF does not Granger Cause DR_VWTAI	6	4.4023	0.0002
DR_VWTAI does not Granger Cause Δ VWP ETF	6	4.7114	0.0001
CEF sentiment indicator vs. returns on various-cap stock portfolios			
VWP_CEF does not Granger Cause DR_SMALL	2	3.0269	0.0487
DR_SMALL does not Granger Cause VWP_CEF	2	4.3962	0.0124
VWP_CEF does not Granger Cause DR_MID	2	0.2852	0.7519
DR_MID does not Granger Cause VWP_CEF	2	7.0664	0.0009
VWP_CEF does not Granger Cause DR_LARGE	2	0.1949	0.8229
DR_LARGE does not Granger Cause VWP_CEF	2	4.0182	0.0181
VWP_CEF does not Granger Cause DR_VWTAI	2	0.5887	0.5551
DR_VWTAI does not Granger Cause VWP_CEF	2	5.6957	0.0034
Δ VWP_CEF does not Granger Cause DR_SMALL	1	5.4008	0.0202
DR_SMALL does not Granger Cause Δ VWP_CEF	1	0.0276	0.8681
Δ VWP_CEF does not Granger Cause DR_MID	1	0.4682	0.4939
DR_MID does not Granger Cause Δ VWP_CEF	1	4.8385	0.0279
Δ VWP_CEF does not Granger Cause DR_LARGE	1	0.1857	0.6666
DR_LARGE does not Granger Cause Δ VWP_CEF	1	4.9844	0.0257
Δ VWP_CEF does not Granger Cause DR_VWTAI	1	0.5725	0.4494
DR_VWTAI does not Granger Cause Δ VWP_CEF	1	0.4300	0.5121
ETF sentiment indicator vs. CEF sentiment indicator			
VWP ETF does not Granger Cause VWP_CEF	2	4.3658	0.0128
VWP_CEF does not Granger Cause VWP ETF	2	1.4531	0.2341
Δ VWP ETF does not Granger Cause Δ VWP_CEF	7	0.9653	0.4549
Δ VWP_CEF does not Granger Cause Δ VWP ETF	7	2.4686	0.0159

Conclusion

Past studies come to the results that CEF discounts are a measure of individual investor sentiment. While ETFs are traded by institutional investors by a much higher proportion than CEFs, this paper examines the proposition that premiums/discounts of ETFs are driven by a combined sentiment of institutional and individual investors and hence ETF premiums/discounts can proxy a broader sentiment that has better prediction ability for stock returns. The sample period extends from June 30, 2003 to December 28, 2012.

This paper employs correlation analysis, regression analysis, vector autoregressive analysis, and Granger causality test and evidences ETF premiums/discounts not only a more typical sentiment indicator but also a prophetic indicator compared to CEF discounts. The results of correlation analysis show that ETF premiums/discounts correlate with each other to a certain extent, yet this extent is lower than the correlation magnitude between CEF premiums/discounts. The results of regression analysis show that ETF premiums/discounts are correlated with returns on various-cap stock portfolio, especially small- and larger-cap stock portfolios. As for the results of vector autoregressive analysis and Granger causality test, ETF premiums/discounts as a sentiment indicator can predict future returns of various-cap stock portfolios which cannot be attained by CEF discounts. The composite investor sentiment, ETF premiums, lead the individual investor sentiment, CEF discounts, in the long run whereas the short-term changes in the individual investor sentiment cause the changes in the composite investor sentiment.

Acknowledgement

The author acknowledges the financial support from Ministry of Science and Technology of Republic of China (Grant No: NSC 101-2410-H-147-008).

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