Offsetting Disagreement and Security Prices[1]

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Abstract

Portfolios often trade at substantial discounts relative to the sum of their components (e.g., closed-end funds, conglomerates). We propose a simple explanation for this phenomenon, drawing from prior research that investor disagreement coupled with short-sale constraints can lead to overpricing. Specifically, we argue that while investors may strongly disagree at the component level, as long as their *relative* views are not perfectly positively correlated across components, disagreement will partially offset at the portfolio level. In other words, investors generally disagree less at the portfolio level than at the individual component level, which, coupled with short-sale constraints, provides an explanation for why portfolios trade below the sum of its parts. Utilizing closed-end funds, exchange-traded funds, conglomerates, and mergers and acquisitions as settings where prices of the underlying components and prices of the aggregate portfolio can be separately evaluated, we present evidence supportive of our argument.

JEL Classification: G11, G12, G14, G20

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1. Introduction

Portfolios often trade at substantial discounts relative to the sum of their components. Examples range from closed-end funds, where the value of the fund generally is below the value of its underlying assets (e.g., Lee, Shleifer, and Thaler, 1991), to conglomerate firms, where the valuation ratio of the multi-segment conglomerate generally is below that of its single-segment counterparts (e.g., Lang and Stulz, 1994). In this paper, we propose a simple and unifying explanation for these seemingly unrelated phenomena.

Specifically, we note that even if investors disagree strongly about the value of the individual components, as long as their *relative* views are not perfectly positively correlated across these components, disagreement will partially offset at the aggregate portfolio level. Put differently, the more investors' relative views about the individual component values "cross"—i.e., the more frequently the investor with the most optimistic view on one component is not also the most optimistic investor on the other components—the greater is the discrepancy between disagreement at the portfolio level and disagreement at the individual component level. Coupled with short-sale constraints, the smaller disagreement at the portfolio level translates to a lower portfolio value relative to the sum of the individual component values.

To illustrate by example, consider the following setting of two investors, *A* and *B*, and two assets, S_X and S_Y. Investors *A* and *B* disagree at the component level: Investor *A* believes that the fair price-per-share for S_X is $10; investor *B* believes it is $5. Moreover, investor *A* believes S_Y should be priced at $5, whereas investor *B* believes it should be priced at $10. Investor *A*'s and investor *B*'s beliefs cross such that there is disagreement at the individual component level ($10 versus $5), yet zero disagreement at the portfolio level ($15). In the presence of binding short-sale constraints, the market price will reflect the valuation of the optimist and shares of S_X and S_Y will both trade at $10. A portfolio containing one share of S_X and one share of S_Y will thus have a net asset value of $20 despite investors' agreement on the overall portfolio value of $15. If the portfolio's underlying assets and the portfolio itself are traded separately, we will observe a discount in the value of the portfolio relative to the value of the portfolio's underlying assets.

This discount should strengthen with the level of disagreement about the value of the underlying assets: If investors *A* and *B* hold similar beliefs about the value of each asset (e.g., S_X=$5.05 versus S_X=$4.95), the fact that investors' beliefs partially offset at the portfolio level is of little practical consequence (*Prediction 1*). The discount should also strengthen with the degree to which investor *A*'s and investor *B*'s beliefs cross: If the same investor holds the most optimistic belief across all assets (e.g., investor A believes that both S_X and S_Y are worth $10, and investor B believes both should be priced at $5), then both the value of each component and the value of the overall portfolio will be determined by the same investor and there will be no discrepancy between the value of the whole and the sum of its parts (*Prediction 2*).

We identify closed-end funds (CEFs) as our first setting to assess the relevance of our proposition. CEFs are corporations holding a portfolio of securities. Both the CEF and the shares held by the CEF are traded on stock exchanges. To the extent that disagreement at the individual security level partially offsets at the portfolio level and to the extent that short-sale constraints affect prices, we expect the fund's market value (= "the portfolio value") to be below the value of the fund's underlying assets (= "the sum of the individual component values"). Moreover, we expect the discount to vary with the level of disagreement about the fund's underlying assets and the degree of belief crossing.

We approximate investor disagreement about the value of a stock and the degree of investors' *relative* belief crossing via analyst earnings forecasts. Consistent with *Predictions 1* and *2*, we provide evidence that high disagreement among the CEF's underlying assets increases the market price of the fund's assets relative to the market price of the fund itself; that is, high disagreement about the CEF's underlying assets increases the CEF discount. More important, we show that the effect of belief dispersion at the individual component level on the CEF discount increases with our measure of *relative* belief crossing. These effects are both statistically and economically meaningful.

Our second setting considers exchange-traded funds (ETFs). Similar to CEFs, ETFs are investment companies holding portfolios of securities, where both the ETF itself and the shares held by the ETF are traded on stock exchanges. As with CEFs, the market price of an ETF can differ from the value of its underlying assets, although the magnitude of this disparity is much smaller for ETFs than for CEFs due to the presence of authorized participants, who can create and redeem large blocks of the ETF's underlying assets. Given the similarity in setup between CEFs and ETFs, a natural question arises as to whether the associations found for CEFs extend to the setting of ETFs. Our tests answer in the affirmative. The ETF discount increases with the level of average disagreement about the fund's underlying assets; more important, the effect of investor disagreement on the ETF discount further increases with the degree of *relative* belief crossing.

We make analogous observations for conglomerate firms. Conglomerates are corporations operating in multiple industry segments. When comparing the valuation ratio of a conglomerate (= "the portfolio value") to the sales-weighted average industry valuation ratios across the segments that the conglomerate firm operates in (= "the sum of the individual component values"), the literature notes that the former generally falls below the latter, a phenomenon referred to as the diversification discount.

Our mechanism provides a partial explanation for this phenomenon.[2] To the extent that disagreement at the individual industry level partially offsets at the conglomerate level, the valuation ratio of the conglomerate should be below the sales-weighted average of the industry valuation ratios of its segments. This diversification discount should thus vary with the level of disagreement about the conglomerate's underlying industry segments.

To test this hypothesis, we (again) approximate investor disagreement via analyst earnings forecast dispersion. We focus on pure players (i.e., single-segment firms) in each industry to compute the average valuation ratio and the average forecast dispersion at the industry segment level. Consistent with *Prediction 1*, we provide evidence that the average disagreement about the conglomerate's underlying segments, indeed, positively relates to the diversification discount.

In a related, perhaps cleaner analysis focusing on merger transactions, we find that disagreement also decreases the combined announcement day return of the acquirer and the target. The combined announcement day return reflects, among others, the difference between the value of the joint firm (= "the portfolio value") and the sum of the value of the acquirer and the target operating separately (= "the sum of the individual component values"). If disagreement at the acquirer/target level partially offsets at the new joint firm level, we expect the value of the aggregate portfolio to be below the sum of the value of the components, i.e., we expect the combined announcement day returns to be negative, in particular, when disagreement among the acquirer and the target is high. Our finding that the combined announcement day return of the acquirer and target decreases in analyst forecast dispersion for the acquirer and target supports this conjecture. More importantly, this pattern is particularly strong when the most optimistic

[2] Mitton and Vorkink (2010) argue that the reduction of idiosyncratic skewness at the portfolio level can also partially explain the conglomerate firm discount.

analyst for the acquirer is not among the most optimistic analysts for the target, i.e., when *relative* beliefs for the acquirer and target cross at the component level, consistent with *Prediction 2*.

In sum, our paper makes the observation that overpricing due to investor disagreement and short-sale constraints at the stock level (individual segment level) need not translate to overpricing at the aggregate portfolio level (conglomerate firm level). We exploit this feature to test the usefulness of disagreement models in explaining frictions that prevent information revelation mechanisms from working properly, thus allowing market prices to sometimes deviate from their corresponding fundamental values. As such, our study adds to the growing literature examining the extent to which behavioral frameworks help explain some of the anomalous patterns observed in financial markets. Our study also adds to the discussions of how the ease and practice of short selling affects capital markets and market efficiency (e.g, Bris, Goetzmann, Zhu, 2007).

The paper is organized as follows: Section 2 lays out the background of our study. Section 3 describes the data. Section 4 shows our baseline findings and Section 5 presents additional analyses. Section 6 concludes.

2. Background

Over the past decades, a large body of empirical work has uncovered patterns in average stock returns that are difficult to explain with traditional asset-pricing models. As a result, "behavioral" models, which depart from the traditional assumptions of perfect investor rationality and frictionless markets, have become an oft proposed alternative (Hirshleifer, 2001; Barberis and Thaler, 2005). While united by their departure from the perfect investor rationality assumption, these behavioral models generally rely on very different economic mechanisms to generate return "anomalies" (Barberis and Thaler, 2005).

One such class of models, referred to as "disagreement models," has received particular attention. At their core, disagreement models presume that investor beliefs are accurate, on average, but that investors agree to disagree (due to overconfidence, for example) and that some investors cannot or will not short-sell the asset (Miller, 1977; Hong and Stein, 2007). An investor, who thinks that a given stock is overvalued, therefore, does not bet against it, but rather sits out of the market. Because, in this setting, market prices are determined by the optimists, prices are upward biased. Moreover, prices go up if the optimists become more optimistic, even if, at the same time, the pessimists become more pessimistic. That is, the upward bias in the stock price increases with the level of investor disagreement. Subsequent work assessing these predictions finds that stocks with higher analyst earnings forecast dispersion and those experiencing reductions in mutual fund ownership breadth earn lower returns subsequently (Diether, Malloy and Scherbina, 2002; Hong and Stein 2002).

While the existing evidence is consistent with models of investor disagreement and short-sale constraints, alternative interpretations remain. For example, investor disagreement may reflect firms' growth opportunities, the exercise of which leads to lower future returns (Johnson, 2004). In addition, one could argue that behavioral biases, in particular over-optimism, also strengthen with valuation uncertainty and investor disagreement (Einhorn 1980; Hirshleifer 2001); over-optimism, in turn, leads to low future returns.[3]

Unlike the disagreement model, these alternative frameworks do not rely on short-sale constraints and imply that any facilitation of short-selling would have little effect on asset prices.

[3] This argument is often viewed as a possible explanation for the Nasdaq bubble. Investors became overly optimistic about internet firms' future prospects partly because these firms had high valuation uncertainty.

Corroborating this view, a growing literature (e.g., Asquith, Pathak and Ritter (2005), Boehmer, Jones and Zhang (2008), Kaplan, Moskowitz and Sensoy (2012)) provides evidence that the practical relevance of short-sale constraints may have been overemphasized and that few stocks are meaningfully short-sale constrained.

In this paper, we distinguish the disagreement model from alternative interpretations by deriving an implication that is unique to the disagreement/short-sale constraint framework. Specifically, our empirical design exploits the simple proposition that the most optimistic investor for stock *X* does not necessarily (also) hold the most optimistic belief for stock *Y*; in other words, investor beliefs sometimes *cross* at the component level. This simple premise, coupled with the fact that, for some securities, the value of a security and the value of its underlying components can be evaluated separately, allows for a relatively clean assessment of the relevance of investor disagreement and short-sale constraints in determining asset prices.

3. Data and Variables

3.1 Closed-End Funds

Our first set of analyses focuses on closed-end funds (CEF). We include in our sample CEFs with data necessary to construct the fund discount and the following control variables: *Disagreement*, *Inverse Price*, *Dividend Yield*, *Liquidity Ratio*, and *Expense Ratio* (all defined below or in Table 1). The sample contains 88 CEFs over the 1999 to 2009 period. Following Chan, Jain, and Xia (2008), we exclude data for the first six months after the fund's initial public offering (IPO) and for the month preceding the announcement of liquidation or open-ending to "*avoid distortions associated with the flotation and winding up of closed-end funds*" (p. 383).

Weekly closed-end fund premia/(discounts) are calculated using closing prices and net asset values (NAV) as reported in *LIPPER*:

$$Premium(Discount)_{i,t} = \frac{Price_{i,t} - NAV_{i,t}}{NAV_{i,t}}. \qquad (1)$$

Any positive association between some variable *X* and eq. (1) could be described either as *X* being positively associated with the closed-end fund premium or as *X* being negatively associated with the closed-end fund discount (vice versa for negative associations). In this study, we describe results in terms of discounts. As reported in Table 1, the average closed-end fund discount in our sample is 6.0%; the standard deviation is 11.5%.[4] The mean and standard deviation of the CEF discount in this study are similar to those reported in prior studies (e.g., Bodurtha, Kim, and Lee, 1995; Klibanoff, Lamont, and Wizman, 1998; Chan, Jain, and Xia, 2008; and Hwang, 2011).

Our main independent variables are the measure of investor disagreement and relative belief crossing for each CEF's underlying holdings, *Disagreement*, and *Crossing* respectively. We postpone the description of two variants of the *Crossing* variable to sections 4 and 5. To compute *Disagreement*, we begin with data on each CEF's portfolio holdings from *MORNINGSTAR*. On average, portfolio holdings are reported every 2.89 months (the median is 3 months). We match portfolio holding data reported at the end of month *t* with weekly closed-end fund discounts over the ensuing month *t*+1. Should portfolio holdings only be reported every other month (or less frequently), we match portfolio holdings dates as of month *t* with weekly closed-end fund discounts over months *t*+1 and t+2, or over months *t*+1 to *t*+3, respectively.

For each stock *j* held by CEF *i* as of *t*, we compute the price-scaled analyst earnings forecast dispersion, $Dispersion_{i,j,t}$:

[4] Unless otherwise noted, the mean and the standard deviation are always calculated on the full pooled sample.

$$Dispersion_{i,j,t} = \frac{StDev\left(Forecast(EPS)_{k,j,t}\right)}{P_{j,t}}, \qquad (2)$$

where $Forecast(EPS)_{k,j,t}$ is analyst *k*'s most recent forecast for quarterly earnings-per-share of firm *j*. We require forecasts to be made in the 90 day period prior to the earnings announcement date, and we require the earnings announcement date to be within 90 days prior to the portfolio holdings date *t*. $P_{j,t}$ is the price-per-share for firm *j* as of the end of the corresponding fiscal quarter.

We compute $Disagreement_{i,t}$ as the portfolio-weighted average price-scaled analyst earnings forecast dispersion of all stocks held by CEF *i* as of *t*.

$$Disagreement_{i,t} = \sum_{j=1} w_{i,j,t} * Dispersion_{i,j,t}. \qquad (3)$$

To ensure that any variation in *Disagreement* does not reflect lack of data on analyst earnings forecasts, we compute weights, $w_{i,j,t}$, with respect to stocks that have *Dispersion* data only. (Our results remain similar if we use portfolio weights as a fraction of total net assets.) We truncate *Disagreement* at the 99th percentile.

3.2 Exchange-Traded Funds

We next turn our attention to exchange-traded funds (ETFs). ETFs are similar to CEFs in that both the fund itself and the fund's underlying holdings are traded separately in stock exchanges. The market price of an ETF sometimes differs from the value of its underlying assets, although the magnitude of this disparity is much smaller for ETFs than for CEFs due to the presence of authorized participants, who can create and redeem large blocks of the ETF's underlying assets.

We identify U.S. domestic *industry* ETFs by their names and we focus on the holdings from the industry where an ETF invests the most. We use these top industry holdings to construct the *Disagreement* and the *Crossing* measure for all industry ETFs in the same way as with CEFs. The sample consists of 112 industry ETFs over the 2003 to 2012 period. On average, portfolio holdings are reported every 1.86 months (the median is 1 month). ETF premia/(discounts) are constructed analogous to CEF premia/(discounts), except that ETF premia/(discounts) are now at a monthly frequency, due to data availability. As reported in Table 1, the average ETF discount in our sample is less than 1bp, with a standard deviation of 3.2bp. While the discount is small in percentage terms, given the size of the ETF industry, the discount is large in dollar terms.

3.3 Conglomerate Firms

We also analyze conglomerate firms, where we focus on conglomerates that possess the data necessary to construct the diversification discount and the following variables: *Disagreement*, *Total Assets*, *Leverage*, *EBIT/SALES*, and *CAPX/SALES* (all defined in Table 4). The sample period is 1978-2012.

The diversification discount is the difference between the conglomerate's market-to-book ratio (*MB*) and its imputed *MB*, divided by the conglomerate's imputed *MB*.

$$Premium(Discount)_{i,t} = \frac{MB_{i,t}\text{-}ImputedMB_{i,t}}{ImputedMB_{i,t}}. \qquad (4)$$

The imputed *MB* is the sales-weighted average two-digit-SIC *MB* across conglomerate *i*'s segments as of *t*. We use single-segment firms only when computing the two-digit-SIC *MBs*. We truncate *Premium* at the 1^{st} and 99^{th} percentile.

As with CEFs, we rely on price-scaled analyst earnings forecast dispersion to approximate investor disagreement. We focus on single-segment firms and compute the average forecast dispersion for each two-digit SIC *j* as of *t*. We compute $Disagreement_{i,t}$ as the sales-weighted average industry forecast dispersion across segments *j* conglomerate *i* operates in as of t.

$$Disagreement_{i,t} = \sum_{j=1} w_{i,j,t} Dispersion_{i,j,t} \qquad (5)$$

Both $Premium_{i,t}$ and $Disagreement_{i,t}$ are measured at an annual/conglomerate-level. We use information in June of calendar year *t* to compute the market value of equity and we use accounting data from the fiscal year ending in the previous calendar year *t*-1 to compute the book value of equity. Earnings forecasts are for annual earnings with fiscal year ending in calendar year *t*-1.

3.4 Mergers and Acquisitions

In our final setting, we turn to mergers and acquisitions. We include in our sample those M&A deals with data necessary to construct the following variables: *Combined Announcement Day Return*, *Disagreement*, *Analyst-Crossing* (*Brokerage-Crossing*), *Acquirer* (*Target*) *Market Capitalization*, *Acquirer* (*Target*) *Market-to-Book Ratio*, and *Acquirer* (*Target*) *ROA* (all defined in Table 5). The sample period is 1980-2008.

The *Combined Announcement Day Return* is the average cumulative abnormal return [-1,+1] across the acquirer and the target, weighted by the acquirer's and target's market capitalization in the month prior to the announcement:

$$CAR(-1,1)_{A,T,t} = w_{A,t} * CAR(-1,1)_{A,t} + w_{T,t} * CAR(-1,1)_{T,t}, \qquad (6)$$

where t=0 is the day (or the ensuing trading day) of the acquisition announcement, *A* indexes acquirers and *T* indexes targets. Following prior literature, we compute abnormal returns as the difference between raw returns minus returns on a value-weighted portfolio of firms with similar size, book-to-market ratio and past returns (Daniel et al., 1997).

As with CEFs, we use price-scaled analyst earnings forecast dispersion to approximate investor disagreement. We compute $Disagreement_{A,T,t}$ as the average analyst earnings forecast dispersion across the acquirer and target, weighted by the acquirer's and target's market capitalization in the month prior to the announcement.

$$Disagreement_{A,T,t} = w_{A,t} Dispersion_{A,t} + w_{T,t} Dispersion_{T,t}. \tag{7}$$

4. Baseline Results

In this section, we present baseline results for closed-end funds and exchange-traded funds. We then replicate our tests for conglomerate firms and mergers and acquisitions.

4.1 Closed-End Funds

We begin our analysis with closed-end funds. The dependent variable is the weekly CEF discount, $Discount_{i,t}$. The independent variable of interest is a measure of investor disagreement for the CEF's underlying assets, $Disagreement_{i,t}$. Other control variables include $Inverse\ Price_{i,t-1}$, $Dividend\ Yield_{i,t-1}$, $Liquidity\ Ratio_{i,t}$, and $Expense\ Ratio_{i,t}$. *T*-statistics are computed using standard errors clustered along two dimensions, the CEF level and the year-week level.

As can been seen from Column 1 in Table 2, after controlling for variables that are known to be related to CEF discounts, the coefficient estimate on *Disagreement* equals -5.855 (*t*-statistic = -2.08). This estimate implies that a one-standard-deviation increase in *Disagreement* leads to a 0.59% increase in the discount. Relative to the average CEF discount of 6%, this increase represents a 9.76% jump.

The effect of belief dispersion on closed-end fund discounts should strengthen with the degree to which investors' beliefs cross. In the extreme case where short-sale constraints are binding and the most optimistic investor for stock *X* (S_X = \$10) also is the most optimistic investor for stock *Y* (S_Y = \$10), no discount should be observed between the price offered for the overall portfolio (\$20) and the value of the portfolio's underlying assets ($S_X + S_Y$ = \$10 + \$10 = \$20). This contrasts with the other extreme where investors' ranking is reversed and the most optimistic investor for stock *X* (S_X = \$10) also is the most pessimistic investor for stock *Y* (S_Y = \$5); here, the dollar discount between the value of the overall portfolio and the value of the portfolio's underlying assets equals \$5 (\$15 versus $S_X + S_Y$ = \$10 + \$10 = \$20). In practice, investors' belief ranking likely lies somewhere between these two extremes.

To explicitly account for this construct, we compute a measure of belief crossing. While the example shown above involves belief crossing at the analyst level, our baseline results are based on crossing at the broker level. This is because an analyst usually only covers stocks from one industry. Should we use analyst-level forecasts to construct our *Crossing* measure, we would only have a limited number of stock pairs across which we could compute the correlation in earnings forecasts. For our closed-end fund tests, we therefore use brokerage-house-level forecasts to construct the *Crossing* measure as brokerages houses usually cover firms from multiple industries.

In particular, we first compute the pairwise "crossing" for each stock pair (*j*,*l*) held by CEF *i* as of t, covered by at least two common brokerage houses:

$$Pairwise\ Crossing(j,l)_{i,t} = Corr\left(Forecast(EPS)_{h,j,t}\ , Forecast(EPS)_{h,l,t}\right), \quad (8)$$

where *Corr* denotes the Spearman Correlation Coefficient, and *h* indexes brokerage houses. Intuitively, when the most optimistic investor of stock X (S_X = \$10) also is the most optimistic investor for stock Y (Sy = \$10), the pairwise crossing measure equals 1. In comparison, when the most optimistic investor of stock X (S_X = \$10) is the most pessimistic investor for stock Y (Sy = \$5), the pairwise crossing measure equals -1.

We compute the *Crossing* measure as the portfolio-weighted average pairwise crossing across all pairs of stocks, multiplied by -1:

$$Crossing_{i,t} = - * \sum_{j,l=1} w_{i,j,t} * w_{i,l,t} * Pairwise\ Crossing(j,l)_{i,t}. \quad (9)$$

As shown in Column 2 of Table 2, the results are consistent with our prediction. To test the effect of belief crossing, we add the following two terms: *Crossing* and *Crossing* interacted with *Disagreement*. The coefficient estimate on the interaction term is -18.868 (*t*-statistic = -2.08). This implies that when *Crossing* is high—i.e., the most optimistic investor for stock X more frequently is not the most optimistic investor for stock Y—an increase in disagreement has a substantially larger negative marginal effect than when *Crossing* is low.

4.2 Exchange-Traded Funds

We conduct similar tests in the setting of exchange-traded funds. Both the *Disagreement* and *Crossing* measures are computed in an analogous way to those of CEFs. As shown in Column 1 of Table 3, after including the same set of control variables as in Table 2, the coefficient estimate on *Disagreement* of -0.003 is statistically insignificant. This may not come as a surprise as the unconditional average of ETF discounts is much smaller than the CEF discount.

In Column 2, we further include an interaction term between *Crossing* and *Disagreement*. To be consistent with the analysis of closed-end funds, our baseline *Crossing* measure for exchange-traded funds is also constructed at the broker level. In Section 5, we report results based on *Crossing* at the analyst level. The coefficient estimate on this interaction term is -0.124 (*t*-statistic = -2.89). This implies that for exchange-traded funds in the top quintile of the

Crossing measure, a one-standard-deviation increase in *Disagreement* is associated with a 2.5bp increase in ETF discounts. Relative to the standard deviation of ETF discounts of 3.2bp, this increase represents a 78.13% jump.

4.3 Conglomerates Firms

We next extend our tests to conglomerate firms. Conglomerates are corporations operating in multiple industry segments. When comparing the valuation ratio of a conglomerate (= "the portfolio value") to the sales-weighted average industry valuation ratios across the segments that the conglomerate firm operates in (= "the sum of the individual component values"), prior literature shows that the former generally falls below the latter, a phenomenon referred to as the diversification discount. Our mechanism provides a partial explanation for this phenomenon.

Following the literature on conglomerates, we estimate both year-fixed-effects and Fama-MacBeth (1973) regression specifications. The dependent variable is the annual conglomerate-level discount, $Discount_{i,t}$. The independent variable of most interest in the context of this study is $Disagreement_{i,t-1}$. Other independent variables are motivated by prior literature and include $log(Total\ Assets)_{i,t-1}$, $log(Total\ Assets)^2_{i,t-1}$, $Leverage_{i,t-1}$, $Profitability_{i,t-1}$ (=*EBIT/SALES*), and $Investment\ Ratio_{i,t-1}$ *(CAPX/SALES). T*-statistics in the year-fixed-effects regression are computed using standard errors clustered along two dimensions (year level and firm level). *T*-statistics in the Fama-MacBeth regression framework are computed using Newey-West (1987) standard errors with one lag.

If investor disagreement (at the industry level) partially offsets at the (across-industries) conglomerate level, in the presence of short-sale constraints, we may observe that the value of the conglomerate falls below the value of the conglomerate's underlying industry components.

As reported in Table 4, this conjecture is borne out by the data. The coefficient estimate on *Disagreement* under the fixed-effects regression specification equals -0.378 (*t*-statistic = -4.57); the coefficient estimate on *Disagreement* under the Fama-MacBeth regression specification equals -0.669 (*t*-statistic = -3.56). Both estimates are economically and statistically significant.

4.4 Mergers and Acquisitions

Since the individual segments of a conglomerate firm are not separately traded and followed by analysts, we cannot compute the *Crossing* measure to directly assess our proposed mechanism. For this reason, we conduct a more direct test of our mechanism in a related setting, drawing on merger and acquisition transactions.

In particular, we ask the question of how the combined announcement day return of the acquirer and target is related to investor disagreement and belief crossing. The combined announcement day return relates to the difference between the value of the joint firm (= "the portfolio value") and the sum of the value of the acquirer and the target operating separately (= "the sum of the individual component values"). If disagreement at the acquirer/target level partially offsets at the new joint firm level, then we may expect the value of the newly merged firm to be below the sum of its component values, i.e., we may expect combined announcement day returns to be negative, in particular, when disagreement among the acquirer and the target is high and when beliefs cross.

As shown in Table 5, after controlling for variables known to relate to synergies, the coefficient on *Disagreement* is -0.447 (*t*-statistic = -3.73). This estimate implies that a one-standard-deviation increase in *Disagreement* is associated with a 1.21% decrease in combined announcement day returns. Relative to the standard deviation of combined announcement day returns of 1.50%, this decrease represents a 21% jump downward.

In further tests, we include an interaction term between *Crossing* and *Disagreement*. Again, for the baseline results, *Crossing* is computed at the broker level. We observe a coefficient estimate on the interaction term of -3.233 (*t*-statistic = -2.56). These results suggest that the degree to which the value of the combined company is below the sum of the acquirer and target value increases with investor disagreement; this relation is particular strong when the most optimistic investor for the acquirer is not among the those most optimistic for the target, i.e., when investors' relative beliefs cross.

5. Additional Analyses

We conduct a number of additional analyses in this section: a) to construct an alternative, embedded measure of belief crossing, b) to directly examine the effect of short-sale constraints, c) to construct belief crossing at the analyst level, and finally d) to examine how belief dispersion and crossing affect capital flows to exchange-traded funds and open-end mutual funds.

5.1 Embedded Belief Crossing

While the *Crossing* variable constructed in the previous section has an intuitive interpretation, it misses an important aspect of belief crossing for portfolios with more than two securities. To illustrate, consider a portfolio with three stocks, X, Y, and Z. Assume X and Y have high belief dispersion, but little relative belief crossing. In contrast, security Z has little belief dispersion, but large relative belief crossing with both securities X and Y. Due to this mismatch, our original constructs of *Disagreement* and *Crossing* would then lead to the erroneous prediction that this portfolio should trade at a substantial discount relative to its underlying assets.

To more precisely capture our mechanism, we construct a measure of *embedded* belief crossing. To implement, we first compute the pairwise "covariance" for each stock pair (*j*, *l*) in portfolio *i* as of *t*, covered by at least two common brokerage houses:

$$Pairwise\ Covariance(j,l)_{i,t} = Corr\big(Forecast(EPS)_{h,j,t}\ , Forecast(EPS)_{h,l,t}\big) * Dispersion_{j,t} * Dispersion_{l,t}, \quad (10)$$

where *Corr* denotes the Spearman Correlation Coefficient, and *h* indexes brokerage houses. We then aggregate *Pairwise Covariance (j,l)* to a *Covariance*-measure, which is the portfolio-weighted average pairwise covariance across all pairs of stocks, multiplied by -1:

$$Covariance_{i,t} = -\sum_{j,l=1} w_{i,j,t} * w_{i,l,t} * Pairwise\ Covariance(j,l)_{i,t}. \quad (11)$$

We repeat our analyses in Section 4, now using *Covariance* in place of *Crossing*. We start by examining the closed-end fund discount. The dependent variable is the weekly difference between the closed-end fund share price and its underlying portfolio value. Our independent variable of interest is the *Covariance* measure constructed as of the prior month end. As shown in Column 1 of Table 6, after controlling for *Disagreement*, *Crossing*, and the same set of other variables as in Table 2, the coefficient estimate on *Covariance* is -6.992 (*t*-statistic = -2.35). This estimate implies that a one-standard-deviation increase in *Covariance* increases the closed-end fund discount by 0.70%. Relative to the average discount of 6%, this increase represents a 11.65% jump.

We observe a similar pattern for exchange-traded funds. As can be seen from Column 2 of the same table, where the dependent variable is the monthly ETF premium, the coefficient estimate on *Covariance* is -0.004 (*t*-statistic = -3.31). Put differently, a one-standard-deviation increase in *Covariance* is associated with a 2.2bp increase in ETF discounts. Relative to the standard deviation of discount of 3.2bp, this increase represents a 7.04% jump.

Finally, we turn our analysis to mergers and acquisitions.[5] We follow the exact same set up as in Table 4, except that now we replace the interaction term between *Crossing* and *Disagreement* with *Covariance*. As shown in Column 3, after controlling for *Disagreement* and *Crossing*, the coefficient estimate on *Covariance* is -1.320 (*t*-statistic = -2.57). That is, a one-standard-deviation increase in *Covariance* leads to 1.32% lower combined announcement day returns.

In sum, our results based on *Covariance* are consistent with, and in many cases stronger than those based on the interaction of *Disagreement* and *Crossing*, lending further support to our mechanism.

5.2 Short Sales Constraints

Returning to our example from the introduction, if we assume that there is an investor A, who believes that the fair price-per-share for S_X is $10 and that the fair price-per-share for S_Y is $5 and if we assume that there is an investor B, who disagrees and believes that stock prices for S_X and S_Y should be $5 and $10, respectively, then, in the presence of short-sale constraints, the market price will solely reflect the valuation of the optimist and shares of S_X and S_Y will both trade at $10. A portfolio containing one share of S_X and one share of S_Y will thus be priced at $20 despite investors' agreement on the overall portfolio value of $15.

As short-sale constraints in the underlying assets *X* and *Y* ease, prices for S_X and S_Y will fall below those offered by the most optimistic investor and the discrepancy between the value of

[5] Again, since the individual segments of a conglomerate firm are not separately traded, we cannot compute the *Covariance* measure in the setting of conglomerate firms.

the underlying assets and the overall portfolio value of $15 will narrow. To explore this idea, we approximate short-sale constraints in the underlying assets using one minus institutional ownership (referred to as *IO* here after). Institutional ownership represents the lendable supply in shares (Asquith, Pathak and Ritter, 2005) and short-sale constraints are most binding when supply is limited.

In particular, for the same reason as described in Section 5.1, we embed institutional ownership directly in our *Covariance* measure. First, for each stock pair (j, l) in portfolio i as of t, covered by at least two common brokerage houses, we define:

$$Pairwise\ Covariance\_IO(j,l)_{i,t} = Corr\big(Forecast(EPS)_{h,j,t}\,, Forecast(EPS)_{h,l,t}\big) * Dispersion_{j,t} * Dispersion_{l,t} * \big(1 - IO_{j,t}\big) * (1 - IO_{l,t}). \quad (12)$$

We then compute *Covariance_IO* as the portfolio-weighted average pairwise crossing across all pairs of stocks:

$$Covariance\_IO_{i,t} = -\sum_{j,l=1} w_{i,j,t} * w_{i,l,t} * Pairwise\ Crossing\_IO(j,l)_{i,t}. \quad (13)$$

We examine the effect of short-sale constraints on our documented pattern in Table 7. The dependent variables in the three columns are, respectively, the closed-end fund premium, exchange-traded fund premium, and combined announced day return of merger transactions. The main independent variable of interest is *Covariance_IO* computed as of the prior month end. After controlling for both *Covariance* and the portfolio-weighted average *IO*, the coefficient estimates on *Covariance_IO* for the CEF, ETF, and M&A samples are -2.058 (insignificant), -0.003 (t-statistic = -2.05), and -1.807 (t-statistic = -4.51), respectively. These results are consistent with our prediction that the effect of belief dispersion and crossing on portfolio discounts is stronger when the short-sale constraints are more binding.

5.3 Analyst-Level Crossing

While our baseline results are based on crossing at the broker level (to maximize the sample size), we are mindful that analyst-level data is potentially cleaner compared to brokerage-house-level data. In this section, we therefore report results for industry ETFs and M&As using *Crossing* and *Covariance* computed at the analyst level.

The empirical setup, as shown in Table 8, is identical to that in Tables 3, 5, and 6, except that now *Crossing* and *Covariance* reflect relative belief crossing at the analyst level. The first two columns include an interaction term between *Disagreement* and *Crossing* (similar to Tables 3 and 5) while the next two columns include the *Covariance* measure (similar to Table 6). The results are very similar to those shown before. For example, the coefficients on *Covariance* for industry ETFs and M&As are -0.005 (*t*-statistic = -3.61), and -2.000 (*t*-statistic = -2.76), respectively, nearly identical to those reported in Table 6.

5.4 Fund Flows

The main reason that exchange-traded funds have a much smaller discount relative to closed-end funds—despite their apparent similarities in structure—is the presence of authorized participants, who can create and redeem large blocks of ETFs' underlying assets for a relatively small transaction cost. If authorized participants indeed create or redeem blocks of shares to arbitrage against price discrepancies between the fund and its underlying holdings, we would expect capital flows to ETFs—i.e., the new shares created or existing shares redeemed—to respond significantly negatively to *changes* in belief dispersion and crossing. To illustrate, say there is an increase in the ETF discount due to an increase in belief dispersion. Arbitrageurs would then buy

ETF shares in the secondary market, redeem these shares, and sell the underlying portfolio to lock in the profits, which amounts to an outflow to the ETF.

To test this prediction of our mechanism, we estimate a simple regression where the dependent variable is the monthly percentage flow to an ETF, and the main independent variable is the change in the *Covariance* measure in the previous period. As shown in Table 9, after including the same set of control variables as in Table 3, the coefficient estimate on *Delta Covariance* (at the broker level) is -0.117 (t-statistic = -2.85). This implies that a one-standard-deviation increase in *Delta Covariance* leads to a 1.12% lower ETF flow in the next month. The results are nearly identical if we use *Delta Covariance* computed at the analyst level.

A natural extension to this prediction is to examine capital flows to open-end mutual funds. Here, we focus solely on sector funds in order to construct our measures of *Crossing* and *Covariance*. We label a mutual fund as concentrating on a particular sector if it invests more than 50% of its total equity portfolio in that sector. The results are shown in Table 10. As with exchange-traded funds, changes in investors' belief dispersion and crossing significantly negatively predict future mutual fund flows: The coefficient estimate on *Delta Covariance* is -0.082 (t-statistic = -2.85).

6. Conclusion

This paper provides a unifying explanation for the phenomenon that, frequently, portfolios trade at substantial discounts relative to the sum of their components. Specifically, we argue that even if investors disagree strongly at the component level, they generally disagree less at the portfolio level if their relative views are not perfectly positively correlated across the components. Utilizing closed-end funds, exchange-traded funds, conglomerates, and mergers and acquisitions as settings where prices of the underlying components and prices of the aggregate portfolio can be separately evaluated, we provide evidence consistent with our argument.

Our evidence also sheds new light on disagreement models by focusing on an implication that is unique to the disagreement/short-sale constraint framework. Specifically, our empirical design exploits a simple fact that the most optimistic investor for stock *X* does not necessarily (also) hold the most optimistic belief for stock *Y*; in other words, investor beliefs sometimes *cross* at the component level. This simple premise, coupled with the fact that, for some securities, the value of a security and the value of its underlying components can be evaluated separately, allows for a relatively clean assessment of the relevance of investor disagreement and short-sale constraints in determining asset prices.

References

Asquith, P., Pathak, P. and Ritter, J., 2005. Short Interest, Institutional Ownership, and Stock Returns. *Journal of Financial Economics* 78:243–276.

Barberis, N., and Thaler, R., 2005, A Survey of Behavioral Finance, in George M. Constantinides, Milton Harris, and Rene Stulz, eds.: Handbook of the Economics of Finance (North Holland, Amsterdam).

Bodurtha, J., Kim, D. S. and Lee, C. M. C. , 1995. Closed-End Country Funds and U.S. Market Sentiment. *Review of Financial Studies* 8: 879–918.

Boehmer, E., Jones, C. M. and Zhang, X., 2008. Which Shorts Are Informed? *Journal of Finance* 63: 491–527.

Bris, A., Goetzmann, W. N. and Zhu, N., 2007. Efficiency and the Bear: Short Sales and Markets around the World. *Journal of Finance* 62:1029–79.

Chan, J., Jain, R. and Xia, Y., 2008. Market Segmentation, Liquidity Spillover, and Closed-End Country Fund Discounts. *Journal of Financial Markets* 11: 377-399.

Diether, K., Malloy, C. and Scherbina, A., 2002. Differences of Opinion and the Cross Section of Stock Returns. *Journal of Finance* 52: 2113-2141.

Einhorn, H. J., 1980. Overconfidence in judgment. *New Directions for Methodology of Social and Behavioral Science* 4: 1–16.

Fama, E. F., and MacBeth, J., 1973. Risk, Return, and Equilibrium: Empirical tests. *Journal of Political Economy* 71: 607–636.

Hirshleifer, D., 2001. Investor Psychology and Asset Pricing. *Journal of Finance* 56: 1533-1597.

Hong, H., and Stein, J. C., 2007. Disagreement and the Stock Market. *Journal of Economic Perspectives* 21: 109-128.

Hwang, B., 2011. Country-Specific Sentiment and Security Prices. *Journal of Financial Economics* 100: 382–401.

Johnson, T., 2004. Forecast Dispersion and the Cross-Section of Expected Returns. *Journal of Finance* 59: 1957–1978.

Klibanoff, P., Lamont, O. and Wizman, T.A., 1998. Investor Reaction to Salient News in Closed-end Country Funds. *Journal of Finance* 53: 673-699.

Lang, L. H. P., and Stulz, R. M., 1994. Tobin's Q, Corporate Diversification, and Firm Performance. *Journal of Political Economy* 102: 1248-1280.

Lee, C. M. C., Shleifer A., and Thaler, R. H., 1991. Investor Sentiment and the Closed-End Fund Puzzle. *Journal of Finance* 46: 75-109.

Miller, E., 1977. Risk, Uncertainty, and Divergence of Opinion. *Journal of Finance* 32: 1151-1168.

Newey, W. K., and West, K. D., 1987. A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. *Econometrica* 55: 703-708.

Mitton, T. and Vorkink K., 2010, Why Do Firms with Diversification Discounts Have Higher Expected Returns? *Journal of Financial and Quantitative Analysis* 45: 1367-1390.

Table 1. Descriptive Statistics

This table reports descriptive statistics for the closed-end funds (CEFs), exchange-traded funds (ETFs), mergers and acquisitions (M&As) and conglomerates used in this study. The sample period is 1998-2009 for CEFs, 1998-2009 for ETFs and 1980-2008 for M&As and conglomerates. Panel A reports descriptive statistics for the pooled sample of weekly CEF-level observations. Our analysis uses domestic equity CEFs. *Closed-End Fund Premium* is the CEF's market price minus its NAV, divided by its NAV. *Disagreement* is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by the CEF. To compute *Brokerage-Crossing*, we consider all stocks that are held by the CEF. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. *Crossing* equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). *Covariance* equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions. *Inverse Price* is the inverse of the CEF's market price. *Dividend Yield* is the sum of the dividends paid by the CEF over the past one year, divided by the CEF's market price. *Liquidity Ratio* is the CEF's one-month turnover, divided by the portfolio-weighted average one-month turnover of the stocks held by the CEF. If the stock is listed on NASDAQ, we divide the number of shares traded by two. *Expense Ratio* is the CEF's expense ratio. Panel B reports descriptive statistics for the pooled sample of monthly ETF-level observations. Our analysis uses domestic equity ETFs with an industry focus. *ETF Premium* is the ETF's market price minus its NAV, divided by its NAV. *Disagreement* is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by the ETF. To compute *Analyst-Crossing (Brokerage-Crossing)*, we consider all stocks that are held by the ETF and that are in the ETF's primary industry. If two stocks are covered by more than two of the same analysts (brokerage houses), we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. *Crossing* equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). *Covariance* equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1)and multiplied by the respective earnings forecast dispersions. *Inverse Price* is the inverse of the ETF's market price. *Dividend Yield* is the sum of the dividends paid by the ETF over the past one year, divided by the ETF's market price. *Turnover Ratio* is the ETF's lagged one-year turnover. *Expense Ratio* is the ETF's expense ratio. Panel C reports descriptive statistics for the pooled sample of annual conglomerate-level observations. *Diversification Premium* is the difference between the conglomerate's market-to-book ratio (*MB*) and its imputed *MB*, divided by the conglomerate's imputed *MB*. The imputed *MB* and *Disagreement* is the sales-weighted average two-digit-SIC-*MB* and the sales-weighted average two-digit-analyst earnings forecast dispersion (scaled by price) across the conglomerate's segments. *Total Assets* is the conglomerate's total assets. *Leverage* is the ratio of long-term debt to total assets. *Profitability* is the ratio of earnings before interest and tax to net revenue. *Investment Ratio* is the ratio of capital expenditure to net revenue. Panel D reports descriptive statistics for the pooled sample of M&As. *Combined Announcement Day Return* is the average cumulative abnormal return [-1,+1] across the acquirer and the target where t=0 is the day (or the ensuing trading day) of the acquisition announcement, weighted by the acquirer's and target's market capitalization in the month prior to the announcement. *Disagreement* is the average analyst earnings forecast dispersion across the acquirer and the target, weighted by the acquirer's and target's market capitalization in the month prior to the announcement. To compute *Analyst-Crossing* (*Brokerage-Crossing*), we focus on analysts (brokerage houses) covering both the acquirer and the target, and we compute (-1)*Spearman correlation coefficient between earnings forecasts issued for the acquirer and those issued for the target. *Covariance* is computed as (-1)*Spearman correlation coefficient between earnings forecasts issued for the acquirer and those issued for the target multiplied by the respective earnings forecast dispersions. *Acquirer (Target) Market Capitalization* is the acquirer's (target's) market capitalization in the month prior to the announcement. *Acquirer (Target) Market-to-Book Ratio* is the acquirer's (target's) market-to-book ratio. *Acquirer (Target) ROA* is the acquirer's (target's) ratio of earnings before interest and tax to total assets.

Table 1. Continued.

	N	Mean	Median	St. Dev.
Panel A: Closed-End Funds				
Closed-End Fund Premium	9,426	-0.060	-0.088	0.115
Disagreement	9,426	0.002	0.001	0.001
Brokerage-Crossing	9,181	-0.022	-0.009	0.070
*Brokerage-Covariance (*1,000)*	9,181	0.000	0.000	0.001
Inverse Price	9,426	0.077	0.059	0.062
Dividend Yield	9,426	0.073	0.076	0.056
Liquidity Ratio	9,426	0.418	0.306	0.514
Expense Ratio	9,426	1.273	1.130	0.793
Panel B: Exchange-Traded Funds				
*Exchange-Traded Fund Premium (*100)*	2,994	-0.010	0.000	0.318
Disagreement	2,994	0.003	0.002	0.004
Analyst-Crossing	2,736	-0.094	-0.076	0.132
Brokerage-Crossing	2,980	-0.048	-0.032	0.104
*Analyst-Covariance (*1,000)*	2,736	-0.004	0.000	0.058
*Brokerage-Covariance (*1,000)*	2,980	-0.004	0.000	0.056
Inverse Price	2,994	0.036	0.031	0.021
Dividend Yield	2,994	0.381	0.203	0.512
Turnover Ratio	2,994	0.333	0.230	0.302
Expense Ratio	2,994	0.005	0.005	0.002
Panel C: Conglomerates				
Diversification Premium	22,331	-0.229	-0.398	0.630
Disagreement	22,331	0.030	0.006	0.080
Total Assets	22,331	4,753	460	26,635
Leverage	22,331	0.196	0.180	0.153
Profitability	22,331	0.061	0.079	0.649
Investment Ratio	22,331	0.079	0.041	0.185
Panel D: Mergers and Acquisitions				
Combined Announcement Day Return	855	0.015	0.009	0.071
Acquirer Announcement Day Return	855	-0.015	-0.011	0.072
Target Announcement Day Return	855	0.206	0.169	0.228
Disagreement	855	0.004	0.001	0.027
Analyst-Crossing	143	-0.111	0.000	0.681
Brokerage-Crossing	193	-0.047	0.000	0.677
*Analyst-Covariance (*1,000)*	143	-0.002	0.000	0.012
*Brokerage-Covariance (*1,000)*	193	-0.001	0.000	0.010
Acquirer Market Capitalization	855	19,243	3,428	44,849
Acquirer Market-to-Book Ratio	855	3.863	2.651	4.388
Acquirer ROA	855	0.098	0.097	0.106
Target Market Capitalization	855	1,883	395	5,932
Target Market-to-Book Ratio	855	3.478	2.096	11.770
Target ROA	855	0.049	0.074	0.174

Table 2. Closed-End Fund Premium

This table reports coefficient estimates from regressions of weekly closed-end fund (CEF) premia on a measure of disagreement about the fund's underlying assets. The sample period is 1998-2009. The dependent variable is the difference between the CEF's market price and the CEF's NAV, divided by the CEF's NAV. $Disagreement_{i,t}$ is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by CEF i as of t. To compute $Crossing_{i,t}$, we consider all stocks that are held by the CEF. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. $Crossing_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). All other independent variables are as described in Table 1. Time-fixed effects are included in all columns. T-statistics are computed using standard errors clustered along two dimensions (year-week level and fund level).

	(1)	(2)
$Disagreement_{i,t}$	-5.855**	-9.891**
	(-2.08)	(-2.24)
$Crossing_{i,t}$ * $Disagreement_{i,t}$		-18.868**
		(-2.08)
$Crossing_{i,t}$		0.005
		(0.38)
$InversePrice_{i,t-1\ [pos]}$	1.094***	1.076***
	(5.96)	(5.87)
$InversePrice_{i,t-1\ [neg]}$	-0.466***	-0.475***
	(-3.65)	(-3.61)
$DividendYield_{i,t-1}$	0.438***	0.442***
	(2.61)	(2.57)
$LiquidityRatio_{i,t}$	0.044*	0.044*
	(1.66)	(1.67)
$ExpenseRatio_{i,t}$	0.003	0.003
	(0.42)	(0.50)
# Obs.	9,426	9,181
Adj. R^2	0.482	0.483

Table 3. Exchange-Traded Fund Premium

This table reports coefficient estimates from regressions of monthly ETF premia on a measure of disagreement about the fund's underlying assets. The sample period is 1998-2009. The dependent variable is the difference between the ETF's market price and the ETF's NAV, divided by the ETF's NAV. $Disagreement_{i,t}$ is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by ETF i as of t. To compute $Crossing_{i,t}$, we consider all stocks that are held by the ETF and that are in the ETF's primary industry. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. $Crossing_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). All other independent variables are as described in Table 1. Time-fixed effects are included in all columns. *T*-statistics are computed using standard errors clustered along two dimensions (year-month level and fund level).

	(1)	(2)
$Disagreement_{i,t}$	-0.003	-0.056***
	(-0.20)	(-4.85)
$Crossing_{i,t}$ * $Disagreement_{i,t}$		-0.124***
		(-2.89)
$Crossing_{i,t}$		-0.000
		(-0.15)
$InversePrice_{i,t-1\ [pos]}$	0.036***	0.036***
	(7.35)	(7.18)
$InversePrice_{i,t-1\ [neg]}$	-0.047***	-0.046***
	(-9.26)	(-9.17)
$DividendYield_{i,t-1}$	0.000	0.000
	(0.34)	(0.25)
$TurnoverRatio_{i,t}$	0.000	0.000
	(0.84)	(0.91)
$ExpenseRatio_{i,t}$	0.015	0.005
	(0.44)	(0.13)
# Obs.	2,994	2,980
Adj. R^2	0.302	0.304

Table 4. Conglomerate Premium

This table reports coefficient estimates from regressions of annual diversification premia on a measure of disagreement about the conglomerate's underlying segments. The sample period is 1978-2008. The dependent variable is the difference between the conglomerate's market-to-book ratio (*MB*) and its imputed *MB*, divided by the conglomerate's imputed *MB*. The imputed *MB* and $Disagreement_{i,t}$ is the sales-weighted average two-digit-SIC-*MB* and the sales-weighted average two-digit-price-scaled analyst earnings forecast dispersion across conglomerate *i*'s segments as of *t*. We use information in June of calendar year *t* to compute the market value of equity and we use accounting data from the fiscal year ending in the previous calendar year *t*-1 to compute the book value of equity (and other control variables to be described). Earnings forecasts are for annual earnings with fiscal year ending in calendar year *t*-1. All other independent variables are as described in Table 1. In Column (1), *t*-statistics are computed using standard errors clustered along two dimensions (year level and firm level). In Column (2), *t*-statistics are computed using Newey-West (1987) standard errors with one lag. The *Adj.* R^2 in Column (2) is the average *Adj.* R^2 across the 31 cross-sectional regressions.

	(1)	(2)
$Disagreement_{i,t}$	-0.378***	-0.669***
	(-4.57)	(-3.56)
$ln(TotalAssets)_{i,t-1}$	-0.258***	-0.288***
	(-9.91)	(-12.09)
$ln(TotalAssets)^2_{i,t-1}$	0.016***	0.018***
	(8.41)	(10.43)
$Leverage_{i,t-1}$	0.372***	0.369***
	(5.99)	(7.07)
$Profitability_{i,t-1}$	0.013***	0.194
	(2.30)	(1.55)
$Investment\ Ratio_{i,t-1}$	0.148***	0.170***
	(2.88)	(3.22)
# Obs.	22,331	31
Adj. R^2	0.064	0.073

Table 5. Combined M&A Announcement Day Returns

This table reports coefficient estimates from regressions of combined M&A announcement day returns on a measure of disagreement about the acquirer and the target. The sample period is 1980-2008. The dependent variable is the average cumulative abnormal return [-1,+1] across the acquirer and the target where t=0 is the day (or the ensuing trading day) of the acquisition announcement, weighted by the acquirer's and target's market capitalization in the month prior to the announcement. $Disagreement_{i,t}$ is the average analyst earnings forecast dispersion across the acquirer and the target, weighted by the acquirer's and target's market capitalization in the month prior to the announcement. To compute $Crossing_{i,t}$, we focus on brokerage houses covering both the acquirer and the target, and we compute (-1)*Spearman correlation coefficient between earnings forecasts issued for the acquirer and those issued for the target. $Tender\ Offer_{i,t}$, $Hostile\ Offer_{i,t}$, and $Competing\ Offers_{i,t}$ represent indicators of whether the offer is a tender offer, whether the offer is hostile and whether there is more than one offer. $Cash\ Only_{i,t}$ and $Stock\ Only_{i,t}$ represent indicators of whether the offer is financed via cash and stock only. All other independent variables are as described in Table 1. Time-fixed effects are included in all columns. *T*-statistics are computed using standard errors clustered at the time (year-month) level.

	(1)	(2)
$Disagreement_{i,t}$	-0.447***	-0.056
	(-3.73)	(-0.05)
$Disagreement_{i,t}$ * $Crossing_{i,t}$		-3.233***
		(-2.57)
$Crossing_{i,t}$		-0.006
		(-0.68)
$ln(AcquirerTotalAssets_{i,t})$	-0.000	-0.000
	(-0.01)	(-0.04)
$AcquirerMB_{i,t}$	-0.002**	0.001
	(-2.32)	(0.81)
$AcquirerROA_{i,t}$	0.034	0.038
	(1.01)	(0.57)
$ln(TargetTotalAssets_{i,t})$	-0.004	-0.002
	(-1.40)	(-0.19)
$TargetMB_{i,t}$	-0.000	0.000
	(-0.07)	(0.11)
$TargetROA_{i,t}$	-0.016	-0.047
	(-0.97)	(-0.62)
$TargetInversePrice_{i,t}$	-0.008	0.016
	(-0.48)	(1.27)

Table 5. Continued.

	(1)	(2)
$RelativeSize_{i,t}$	-0.100***	-0.089
	(-3.50)	(-1.39)
$TenderOffer_{i,t}$	0.019***	0.013
	(2.83)	(0.84)
$HostileOffer_{i,t}$	0.047***	0.048*
	(3.24)	(1.86)
$CompetingOffers_{i,t}$	-0.018*	-0.006
	(-1.79)	(-0.32)
$CashOnly_{i,t}$	0.008	0.017
	(1.33)	(1.31)
$StockOnly_{i,t}$	-0.011*	-0.008
	(-1.76)	(-0.70)
# Obs.	855	193
Adj. R^2	0.151	0.139

Table 6. Embedded Belief Crossing

This table reports coefficient estimates from regressions of weekly closed-end fund premia, monthly ETF premia and combined M&A announcement day returns on a measure of disagreement about the underlying assets. In column 1, $Disagreement_{i,t}$ is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by CEF *i* as of *t*. To compute $Crossing_{i,t}$, we consider all stocks that are held by the CEF. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. $Crossing_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). $Covariance_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions. In column 2, $Disagreement_{i,t}$ is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by ETF *i* as of *t*. To compute $Crossing_{i,t}$, we consider all stocks that are held by the ETF and that are in the ETF's primary industry. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. $Crossing_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). $Covariance_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions. In column 3, $Disagreement_{i,t}$ is the average analyst earnings forecast dispersion across the acquirer and the target, weighted by the acquirer's and target's market capitalization in the month prior to the announcement. To compute $Crossing_{i,t}$, we focus on brokerage houses covering both the acquirer and the target, and we compute (-1)*Spearman correlation coefficient between earnings forecasts issued for the acquirer and those issued for the target. $Covariance_{i,t}$ is computed as (-1)*Spearman correlation coefficient between earnings forecasts issued for the acquirer and those issued for the target multiplied by the respective earnings forecast dispersions. All other independent variables are as described in Table 1. Time-fixed effects are included in all columns. *T*-statistics are computed using standard errors clustered along two dimensions (year-month level and fund level).

	CEF (1)	ETF (2)	M&A (3)
$Disagreement_{i,t}$	-9.547**	-0.540***	-0.001
	(-2.38)	(-6.18)	(0.00)
$Covariance_{i,t}$	-6.992**	-0.004***	-1.320***
	(-2.35)	(-3.31)	(-2.57)
$Crossing_{i,t}$	0.002	-0.001	0.010
	(0.18)	(-0.81)	(1.25)
Other Controls	Yes	Yes	Yes
# Obs.	9,181	2,980	193
Adj. R^2	0.483	0.305	0.139

Table 7. Short-Sale Constraints

This table reports coefficient estimates from regressions of weekly closed-end fund premia, monthly ETF premia and combined M&A announcement day returns on a measure of disagreement about the underlying assets. In column 1, $Disagreement_{i,t}$ is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by CEF *i* as of *t*. To compute $Covariance_{i,t}$, we consider all stocks that are held by the CEF. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. $Covariance_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions. $Covariance\_IO_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions and multiplied by the respective retail ownerships (1- institutional ownership). In column 2, $Disagreement_{i,t}$ is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by ETF *i* as of *t*. To compute $Covariance_{i,t}$, we consider all stocks that are held by the ETF and that are in the ETF's primary industry. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. $Covariance_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions. $Covariance\_IO_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions and multiplied by the respective retail ownerships (1- institutional ownership). In column 3, $Disagreement_{i,t}$ is the average analyst earnings forecast dispersion across the acquirer and the target, weighted by the acquirer's and target's market capitalization in the month prior to the announcement. $Covariance_{i,t}$ is computed as (-1)*Spearman correlation coefficient between earnings forecasts issued for the acquirer and those issued for the target multiplied by the respective earnings forecast dispersions. $Covariance\_IO_{i,t}$ equals $Covariance_{i,t}$ multiplied by the respective retail ownerships (1- institutional ownership). All other independent variables are as described in Table 1. Time-fixed effects are included in all columns. *T*-statistics are computed using standard errors clustered along two dimensions (year-month level and fund level).

	CEF (1)	ETF (2)	M&A (3)
$Covariance_{,t}$	0.004	0.000	-0.011
	(0.39)	(0.57)	(-0.64)
$Covariance\_IO_{i,t}$	-2.058	-0.003^{**}	-1.807^{***}
	(-0.38)	(-2.05)	(-4.57)
$IO_{i,t}$	0.161	-0.001	-0.010
	(0.43)	(-0.29)	(-0.09)
Other Controls	Yes	Yes	Yes
# Obs.	9,181	2,980	193
Adj. R^2	0.477	0.303	0.133

Table 8. Analyst-Level Crossing

This table reports coefficient estimates from regressions of monthly ETF premia and combined M&A announcement day returns on a measure of disagreement about the fund's underlying assets. In column 1 and 3, $Disagreement_{i,t}$ is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by ETF *i* as of *t*. To compute $Crossing_{i,t}$, we consider all stocks that are held by the ETF and that are in the ETF's primary industry. If two stocks are covered by more than two of the same analystswe compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. $Crossing_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). $Covariance_{,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions. In column 2 and 4, the dependent variable is the average cumulative abnormal return [-1,+1] across the acquirer and the target where t=0 is the day (or the ensuing trading day) of the acquisition announcement, weighted by the acquirer's and target's market capitalization in the month prior to the announcement. $Disagreement_{i,t}$ is the average analyst earnings forecast dispersion across the acquirer and the target, weighted by the acquirer's and target's market capitalization in the month prior to the announcement. To compute $Crossing_{i,t}$, we focus on analysts covering both the acquirer and the target, and we compute (-1)*Spearman correlation coefficient between earnings forecasts issued for the acquirer and those issued for the target. $Covariance_{i,t}$ is computed as (-1)*Spearman correlation coefficient between earnings forecasts issued for the acquirer and those issued for the target multiplied by the respective earnings forecast dispersions. All other independent variables are as described in Table 1. Time-fixed effects are included in all columns. *T*-statistics are computed using standard errors clustered along two dimensions (year-month level and fund level).

	ETF (1)	M&A (2)	ETF (3)	M&A (4)
$Disagreement_{i,t}$	-0.072***	-1.659	-0.059***	-1.586
	(-6.12)	(-0.86)	(-5.42)	(-0.85)
$Disagreement_{i,t}$ * $Crossing_{i,t}$	-0.153***	-5.091***		
	(-4.09)	(-2.72)		
$Covariance_{,t}$			-0.005***	-2.000***
			(-3.61)	(-2.76)
$Crossing_{i,t}$	-0.000	-0.003	-0.001	0.010
	(-0.49)	(-0.35)	(-1.58)	(1.04)
Other Controls	Yes	Yes	Yes	Yes
# Obs.	2,736	143	2,736	143
Adj. R^2	0.301	0.125	0.302	0.123

Table 9. Exchange-Traded Fund Flows

This table reports coefficient estimates from regressions of monthly ETF percentage flows on a measure of disagreement about the fund's underlying assets. The sample period is 1998-2009. *Delta Disagreement*$_{i,t-1}$ is change in the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by ETF *i* during the past month. To compute *Crossing*$_{,t}$, we consider all stocks that are held by the ETF and that are in the ETF's primary industry. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. *Crossing*$_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). *Covariance*$_{,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions. *Delta Crossing*$_{i,t-1}$ the change in *Crossing* during the past month. *Delta Covariance*$_{i,t-1}$ the change in *Covariance* during the past month. All other independent variables are as described in Table 1. Time-fixed effects are included in all columns. *T*-statistics are computed using standard errors clustered along two dimensions (year-month level and fund level).

	(1)	Crossing at the Analyst-Level (2)	Crossing at the Broker-Level (3)
Delta Disagreement$_{i,t-1}$	-0.059	-0.091	-0.097
	(-0.96)	(-1.30)	(-1.35)
Delta Covariance$_{,t-1}$		-0.113***	-0.117***
		(-2.87)	(-2.85)
Delta Crossing$_{i,t-1}$		-0.041	-0.051***
		(-1.20)	(-3.00)
InversePrice$_{i,t-1\ [pos]}$	-1.081	-1.078	-1.139
	(-1.08)	(-1.11)	(-1.14)
InversePrice$_{i,t-1\ [neg]}$	-1.532*	-1.593*	-1.592*
	(-1.69)	(-1.76)	(-1.76)
DividendYield$_{i,t-1}$	-0.031	-0.027	-0.031
	(-0.87)	(-0.75)	(-0.85)
TurnoverRatio$_{i,t}$	0.052*	0.060**	0.055*
	(1.83)	(2.23)	(1.92)
ExpenseRatio$_{i,t}$	1.069	0.703	1.797
	(0.13)	(0.08)	(0.21)
# Obs.	1,767	1,634	1,761
Adj. R^2	0.011	0.011	0.012

Table 10. Open-End Mutual Fund Flows

This table reports coefficient estimates from regressions of monthly Mutual Fund percentage flow on a measure of disagreement about the fund's underlying assets. The sample period is 1998-2009. *Delta Disagreement*$_{i,t-1}$ is the portfolio-weighted average price-scaled analyst earnings forecast dispersion of the stocks held by Mutual Fund *i* during the past quarter. To compute *Crossing*$_{i,t}$, we consider all stocks that are held by the Mutual Fund and that are in the Mutual Fund's primary industry. If two stocks are covered by more than two of the same brokerage houses, we compute the Spearman correlation coefficient between the earnings forecasts issued for each of these two stocks. *Crossing*$_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1). *Covariance*$_{i,t}$ equals the portfolio-weighted average Spearman correlation coefficient multiplied by (-1) and multiplied by the respective earnings forecast dispersions. *Delta Crossing*$_{i,t-1}$ the change in *Crossing* during the past month. *Delta Covariance*$_{i,t-1}$ the change in *Covariance* during the past month. All other independent variables are as described in Table 1. Time-fixed effects are included in all columns. *T*-statistics are computed using standard errors clustered along two dimensions (year-month level and fund level).

		Crossing at the Analyst-Level	Crossing at the Broker-Level
	(1)	(2)	(3)
Delta Disagreement$_{i,t}$	-0.028	-0.039	-0.078
	(-0.58)	(-0.98)	(-1.33)
Delta Covariance$_{i,t}$		-0.080***	-0.082***
		(-3.35)	(-2.85)
Delta Crossing$_{i,t}$		0.038	0.005
		(1.43)	(0.51)
FundSize	-0.001	0.000	-0.001
	(-0.14)	(0.00)	(-0.15)
LagFlow	-0.042*	-0.05*	-0.041*
	(-1.87)	(-1.76)	(-1.67)
TurnoverRatio$_{i,t}$	-0.040***	-0.034***	-0.040***
	(-3.33)	(-5.15)	(-3.30)
ExpenseRatio$_{i,t}$	-1.097	0.316	-1.108
	(-0.58)	(0.12)	(-0.57)
# Obs.	5,173	3,753	5,110
Adj. R^2	0.071	0.053	0.069