OFFSETTING DISAGREEMENT AND SECURITY PRICES

Byoung-Hyoun Hwang, Dong Lou, and Chengxi Yin*

This Draft: March 2013

Portfolios often trade at a substantial discount relative to the sum of its 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, 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, 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 that is supportive of our argument.

JEL Classification: G11, G12, G14, G20

Keywords: Disagreement, Short-Sale Constraints, Belief Crossing

^{*} Hwang and Yin are from the Krannert School of Management, Purdue University, 403 W State Street, West Lafayette, IN 47907. Lou is from the Department of Finance, London School of Economics and Political Science, Houghton Street, London WC2A 2AE. Email: <u>bhwang@purdue.edu</u>, <u>d.lou@lse.ac.uk</u> and <u>yinc@purdue.edu</u>. We thank Zhi Da and seminar participants at the 2012 State of Indiana Finance Symposium at Purdue University for helpful comments.

1. Introduction

Portfolios often trade at a substantial discount relative to the sum of its 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 a multi-segment conglomerate generally is below that of its single-segment counterparts (e.g., Lang and Stulz, 1994), to primes and scores, where the total firm value is below the sum of its dividend stream- and capital gain components (e.g., Barber, 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, disagreement partially offsets at the aggregate portfolio level; 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 naturally translates to a lower portfolio value relative to the sum of the individual component values.

To illustrate by example, consider a setting with two investors, A and B, and with 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 much disagreement at the individual component level (\$10 versus \$5), yet zero disagreement at the portfolio, which both investors agree should be valued at \$15. In the presence of 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 be priced at \$20 despite investors' agreement on the overall portfolio value of \$15. If the company's underlying assets and the company 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 in 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, then both the value of each component and the value of the overall portfolio will be determined by exactly the same investor and there will be no discrepancy between the value of the whole and the sum of its parts. This discount should also strengthen in 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.

We identify closed-end funds (CEF) as a natural 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 (and overpricing) 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 value of the whole") to be below the value of the fund's underlying assets (= "the sum of the value of the parts"); 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 measure investor disagreement about the value of a stock via analyst earnings forecast dispersion. We find that high analyst forecast dispersion 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 average analyst forecast dispersion across stocks in the portfolio increases the CEF discount. This pattern is particularly strong when the securities held by the CEF have low institutional ownership and, as such, are more likely to be short-sale constrained.

We make analogous observations for conglomerates, which represent another setting to examine the relevance of our proposition. Conglomerates are corporations operating in multiple industry segments. When comparing the valuation ratio of a conglomerate (= "the value of the whole") to the sales-weighted average industry valuation ratios across the segments that the conglomerate firm operates in (= "the sum of the value of the parts"), the literature has noted that the former generally falls below the latter, a phenomenon referred to as the diversification discount.

To the extent that disagreement (and overpricing) at the individual industry level partially offsets at the conglomerate level and to the extent that short sale constraints affect prices, we expect the valuation ratio of the conglomerate (= "the value of the whole") to be below the sales-weighted average of the industry valuation ratios of its segments (= "the sum of the value of the parts"); moreover, we expect the diversification discount to vary with the level of disagreement about the conglomerate's underlying industry segments.

As before, we approximate investor disagreement via analyst earnings forecast dispersion. We focus on single-segment firms and compute the average valuation ratio and the average forecast dispersion at the industry segment level. We find that high analyst forecast dispersion among the conglomerate's underlying segments is associated with higher valuation ratios across the conglomerate's industry components relative to the valuation ratio of the

3

conglomerate itself; that is, high analyst forecast dispersion increases the diversification discount.

In a related analysis of merger transactions, we find that the combined announcement day return of the acquirer and target decreases in analyst forecast dispersion. The combined announcement day return reflects, among others, the difference between the value of the joint firm (= "the value of the whole") and the sum of the value of the acquirer and the target operating separately (= "the sum of the value of the parts"). If disagreement (and overpricing) 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 combined announcement day returns to be negative, on average, 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. We observe that this pattern is particularly strong when the most optimistic analyst for the acquirer is not among the most optimistic analysts for the target, i.e., when beliefs for the acquirer and target *cross*.

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 and allowing market prices to sometimes deviate from their corresponding fundamental values. As such, our study adds to the growing literature examining to what extent behavioral frameworks explain some of the evidence observed in financial markets. Our study also adds to 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 presents the main findings and Section 5 concludes.

2. Background and Literature Review

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 lack of market frictions, 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 irrational behavior patterns and provide competing explanations for the exact economic mechanisms underlying 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 and that some investors cannot or will not shortsell 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 in the level of investor disagreement. Subsequent work assessing these predictions finds that stocks with higher analyst earnings forecast dispersion and stocks experiencing reductions in mutual fund ownership breadth subsequently earn lower returns (Diether, Malloy and Scherbina, 2002; Hong and Stein 2002).

While the existing evidence is consistent with models of investor disagreement and shortsale 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, grow with valuation uncertainty and investor disagreement (Einhorn 1980; Hirshleifer 2001) and that behavioral biases affect the stock market. 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. 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 constraints framework and taking that prediction to the data. Specifically, our testing ground relies on the simple assumption 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." This basic assumption and the fact that, for some companies, the value of the company and the value of its underlying assets 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 Summary Statistics

3.1 Closed-end Funds

This analysis focuses on closed-end funds (CEF) that possess the data necessary to construct the closed-end fund discount and the following variables: *Disagreement, Inverse Price, Dividend Yield, Liquidity Ratio*, and *Expense Ratio* (all defined below or in Table 1). The sample contains 151 CEFs over the 1998 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*:

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

Any positive (or negative) association between some variable X and eq. (1) could be described either as X being positively (or negatively) associated with the closed-end fund premium or as Xbeing negatively (or positively) associated with the closed-end fund discount. 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 6.4%; the standard deviation is 10.7%.² The mean and standard deviation of the closed-end fund discount in this study are similar to those reported in related studies (e.g., Bodurtha, Kim, and Lee, 1995; Klibanoff, Lamont, and Wizman, 1998; Chan, Jain, and Xia, 2008; and Hwang, 2011).

Our main independent variable is the measure of investor disagreement for the CEF's underlying assets, *Disagreement*. We begin with data on each CEF's portfolio holdings from

² Unless otherwise noted, the mean and the standard deviation are always calculated on the full pooled sample.

MORNINGSTAR. On average, portfolio holdings are reported every 3.139 months (the median is 3 months). We match portfolio holdings dates reported at the end of month t (and the *Disagreement*-measure so constructed) 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).

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

$$Dispersion_{i,j,t} = \frac{StDev(Forecast(EPS)_{k,j,t})}{P_{j,t}},$$
(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 days prior to the earnings announcement date, and we require the earnings announcement date to be 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 the stocks *j* held by CEF *i* as of *t*.

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

To ensure that 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. We truncate *Disagreement* at the 99th percentile.

Other independent variables in our regression specification include: *Inverse Price*_{*i*,*t*-1}, which is the inverse of CEF *i*'s market price as of *t*-1, separated by whether the dependent variable is positive or negative; *Dividend Yield*_{*i*,*t*-1}, which is the sum of dividends paid by CEF *i*

over the past one year, divided by the CEF's market price as of *t*-1; *Liquidity Ratio_{i,t}*, which is CEF *i*'s average past one-month turnover, divided by the portfolio-weighted average turnover (averaged over the past one-month) of the stocks held by CEF *i*. If the stock is listed on NASDAQ, we divide the number of shares traded by two; and *Expense Ratio_{i,t}*, which is CEF *i*'s expense ratio as of *t*.

3.2 Conglomerate Firms

The conglomerate analysis focuses 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 1978-2008.

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*.

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

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

4. Main Results

We first present results for CEFs. We then extend our analysis to conglomerates. We also present evidence on the role of short-sale constraints and belief crossing in moderating the price impact of the here proposed mechanism.

4.1 Closed-end Funds

We estimate the partial effect of disagreement and short-sale constraints on security prices using both – fixed effects and Fama-MacBeth (1973) estimators. Estimates under the fixed effects specification are obtained by adding fund dummies and estimating OLS regressions. The dependent variable is $Discount_{i,t}$ [Eq.(1)]. The independent variable of most interest in the context of this study is the measure of investor disagreement for the CEF's underlying assets, $Disagreement_{i,t-1}$. Other independent variables are *Inverse Price_{i,t-1}*, *Dividend Yield_{i,t-1}*, *Liquidity Ratio_{i,t-1}*, and *Expense Ratio_{i,t-1}*. *T*-statistics are computed using standard errors clustered at the CEF level.

As reported in Table 2, the coefficient estimate on *Disagreement* under the fixed-effects regression specification equals -0.362 (*t*-statistic = -2.99), implying that a one standard deviation increase in *Disagreement* leads to a 0.3% increase in the discount.

The fixed effects estimator solely exploits time series variation in the dependent and independent variables to obtain estimates of the partial effect of disagreement on security prices. To explore the relation in the cross section, we estimate Fama-MacBeth (1973) regressions. Every year/week, we regress *Discount* on *Disagreement* and the same set of control variables as before. We require a minimum of 30 observations for each cross-sectional regression. We then take the time series mean of the coefficient estimates from the cross-sectional regressions. We adjust the standard errors for serial correlation and heteroskedasticity using Newey-West (1987). As reported in Column 2 of Table 2, we find that disagreement and CEF discounts are associated in the cross section: The time series mean estimate (from 369 year/week cross-sectional regressions) is -0.345 and has a *t*-statistic of -2.26.

4.2 Closed-end Funds: Moderating Effects of Short-Sale Constraints and Belief Crossing

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.

Two factors should moderate the price impact of the here proposed mechanism: (1) shortsale constraints and (2) frequency of belief crossing. 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 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 via institutional ownership and compute the portfolio-weighted average institutional holdings for stocks held by CEF i as of t (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.

The spread between the value of the underlying assets and the overall portfolio value also depends on the degree to which investors' beliefs offset. 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 ($S_Y = \$10$) and, as such, values the overall portfolio at \$20, 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 ($S_X = \$10$) is the most pessimistic investor for stock Y ($S_Y = \$10$, stock Y ($S_Y = \10) is the overall portfolio and the value of the portfolio's underlying assets for stock Y ($S_Y = \$10$). 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. Specifically, for each stock *j* held by CEF *i* in quarter *t*, we save the most optimistic and the most pessimistic analyst based on earnings forecasts for quarterly earnings announced in quarter *t*. We then compute the number of times, the most *optimistic* analyst for stock *j* also is the most *pessimistic* analyst for some other stock *j*+1 held by CEF *i* in quarter *t*. We divide this sum by the maximum number of belief crossing one could possibly observe for CEF *i* in quarter *t* based on its holding. Our measure of belief crossing, $BC_{i,t}$, thus ranges from zero to one. The results are consistent with our predictions. In order to examine the effect of shortsale constraints, we re-estimate our main Fama-MacBeth (1973) regression equation, but now include two additional terms: *IO* and *IO* interacted with *Disagreement*. The results suggest that disagreement affects the CEF discount only when short-sale constraints are binding. The average coefficient estimates on *Disagreement* and the interaction term of *Disagreement* and *IO* under the Fama-MacBeth (1973) regression specification are -2.767 (*t*-statistic = -4.31) and 3.101 (*t*statistic = 3.03) respectively. The estimates imply that when *IO* is at the 5th percentile (*IO* = 0.172) and short-sale constraints are more binding, the net marginal effect of an increase in *Disagreement* is -2.767+ 3.101*0.172= -2.233; that is, more disagreement leads to a higher discount. When *IO* is at the 95th percentile (*IO*=0.928) and short-sale constraints are less binding, the net marginal effect of an increase in *Disagreement* becomes substantially weaker: -2.767+3.101*0.928=0.111.

To test the effect of belief crossing, we add the following two terms: *BC* and *BC* interacted with *Disagreement*. Because we require CEF's holdings to be covered by at least two analysts, the results on the moderating role of belief crossing are based on 212 year/week cross-sectional regressions only (previous Fama-MacBeth regressions were estimated based on 369 year/week cross-sectional regressions).

The coefficient estimate on the interaction term of *BC* and *Disagreement* is -12.604 (*t*-statistic = -3.20). This implies that when *BC* is high and 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 *BC* is low and certain investors tend the most optimistic for all stocks.

When examining the role of short-sale constraints and belief crossing with fixed-effects regression specifications, we obtain estimates of the predicted sign, but with no statistical significance on the interaction terms. One reason may be that, in the data, realizations of *IO* and *BC* have very limited time-series variation within a given CEF, which renders the estimation of fixed-effects regression equations difficult.

4.3 Conglomerates and Mergers and Acquisitions

We next consider whether investor disagreement and short-sale constraints can cause an entire industry to become overpriced. We do so by extending our tests to conglomerates. We estimate both fixed effects and Fama-MacBeth (1973) regression specifications. The dependent variable is *Discount*_{*i*,*t*} [Eq.(4)]. The independent variable of most interest in the context of this study is *Disagreement*_{*i*,*t*-1} [Eq.(5)]. Other independent variables are motivated by prior literature and include $log(Total \ Assets)_{i,t-1}$, $log(Total \ Assets)^2_{i,t-1}$, $Leverage_{i,t-1}$, $EBIT/SALES_{i,t-1}$, and *CAPX/SALES*_{*i*,*t*-1}.

If investor disagreement and short-sale constraints cause an entire industry to become overvalued and if investor disagreement partially offsets at the conglomerate level, then we may observe that the value of a conglomerate's underlying industry components exceeds that of the conglomerate itself. Following prior literature, we compute the value of conglomerate i's underlying industry components by multiplying the average two-digit SIC *MB* (constructed using single-segment firms only) with the sales generated by conglomerate i in that segment. This imputed *MB* is then compared to the *MB* of conglomerate i itself. The difference in *MB* should increase in the level of investor disagreement at the industry level. As reported in Table 3, this conjecture is borne out by the data. The coefficient estimate on *Disagreement* under the fixed-effects regression specification equals -0.115 (*t*-statistic = -4.23); the coefficient estimate on Disagreement under the Fama-MacBeth regression specification equals -0.523 (*t*-statistic = -2.64). Both estimates are economically and statistically significant.

Our final set of analyses examines mergers and acquisitions. 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 captures the difference between the value of the joint firm (= "the value of the whole") and the sum of the value of the acquirer and the target operating separately (= "the sum of the value of the parts"). If disagreement (and overpricing) at the acquirer/target level partially offsets at the new joint firm level, we expect the sum of the value of the components to exceed the value of the aggregate portfolio, i.e., we expect combined announcement day returns to be negative, on average, in particular, when disagreement among the acquirer and the target is high.

As shown in Tables 4 and 5, after controlling for variables that are known to be related to synergies, the coefficient on *Disagreement* is -0.447 (*t*-statistic = -3.73). Further, the coefficient on the interaction term between *Disagreement* and our measure of belief crossing is -6.573 (*t*-statistic = -3.70). These results suggest that the degree to which the value of the combined company is below that of the sum of the acquirer value and the target value increases in 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.

5. Conclusion

This paper provides a unified explanation for the phenomenon that, frequently, portfolios trade at a substantial discount relative to the sum of its components. Specifically, we argue that even if investors disagree strongly at the component level, they will disagree less at the portfolio level if their relative views are not perfectly positively correlated across the components. Utilizing closed-end funds, conglomerate firms 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.

References

- Asquith, P., Pathak, P. and Ritter, J., 2005. Short Interest, Institutional Ownership, and Stock Returns. *Journal of Financial Economics* 78:243–276.
- Barber, B. M., 1994. Noise Trading and Prime and Score Premiums. *Journal of Empirical Finance* 1: 251–278.
- 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 Closedend 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.

Table 1. Descriptive Statistics

This table reports descriptive statistics for the closed-end funds (CEF), mergers and acquisitions (M&A) and conglomerates used in this study. The sample period is 1998-2009 for CEFs and 1980-2008 for M&As and conglomerates. Panel A reports descriptive statistics for the pooled sample of weekly CEF-level observations. 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 CEF. Inverse Price is the inverse of the CEF's market price. Dividend Yield is the sum of dividends paid by the CEF over the past one year, divided by the CEF's lagged market price. Liquidity Ratio is the CEF's average one-month turnover, divided by the portfolio-weighted average turnover (averaged over the past one-month) of the stocks held by the respective 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 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. 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. 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 salesweighted 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.

	Ν	Mean	Median	St. Dev.
Panel A: Closed-End Funds				
Closed-End Fund Premium	19,561	-0.064	-0.089	0.107
Disagreement	19,561	0.003	0.001	0.007
Inverse Price	19,561	0.073	0.057	0.064
Dividend Yield	19,561	0.069	0.072	0.048
Liquidity Ratio	19,561	1.085	0.346	4.148
Expense Ratio	19,561	1.417	1.220	0.791

	Ν	Mean	Median	St. Dev.
Panel B: Mergers and Acquisitions				
Combined Announcement Day Return	855	0.015	0.009	0.007
Disagreement	855	0.004	0.001	0.027
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	1,882	395	5,932
Target Market-to-Book Ratio	855	3.478	2.096	11.770
Target ROA	855	0.049	0.074	0.174
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

Table 2. Closed-End Fund Premium and Disagreement about the Underlying Assets

This table reports coefficient estimates from regressions of 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 weekly 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*. *Inverse Price*_{*i*,*t*-1} is the inverse of CEF *i*'s market price as of *t*-1, separated by whether the dependent variable is positive or negative. *Dividend Yield*_{*i*,*t*-1} is the sum of dividends paid by CEF *i* over the past one year, divided by the CEF's market price as of *t*-1. *Liquidity Ratio*_{*i*,*t*} is CEF *i*'s average past one-month turnover, divided by the portfolio-weighted average turnover (averaged over the past one-month) of the stocks held by CEF *i*. If the stock is listed on NASDAQ, we divide the number of shares traded by two. *Expense Ratio*_{*i*,*t*} is CEF *i*'s expense ratio as of *t*. Column (1) reports results from a pooled OLS regression with CEF fixed effects. Column (2) reports the time-series mean of coefficient estimates from weekly cross-sectional regressions. In Column (1), *t*-statistics are computed using standard errors clustered at the CEF level. In Column (2), *t*-statistics are computed using Newey-West (1987) standard errors.

	Expected Sign	Fixed Effects (1)	Fama-MacBeth (2)
<i>Disagreement</i> _{<i>i</i>,<i>t</i>}	-	-0.364 (-2.64)	-3.52
InversePrice _{i,t-1 [pos]}	+	0.737	1.395
InversePrice _{i,t-1 [neg]}	-	-0.457	-0.718
$DividendYield_{i,t-1}$	+	0.425	0.531
$LiquidityRatio_{i,t}$	+	(3.11) 0.001	0.003
$ExpenseRatio_{i,t}$	-	(1.14) 0.002 (0.38)	(2.36) 0.021 (6.22)
# Obs. Adj. R^2		19,561 0.751	292

Table 3. Diversification Discount and Disagreement about the Underlying Segments

This table reports coefficient estimates from regressions of 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*,*i*} 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. $ln(TotalAssets)_{i,t-1}$ and $ln(TotalAssets)^2_{i,t-1}$ is the logarithm of conglomerate *i*'s total assets and its square. *Leverage*_{*i*,*t*-1} 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. In Column (1), *t*-statistics are computed using standard errors clustered at the conglomerate level. In Column (2), *t*-statistics are computed using Newey-West (1987) standard errors.

	Expected Sign	Fixed Effects (1)	Fama-MacBeth (2)
Disagreement _{i,t}	-	-0.216	-0.669
		(-3.69)	(-3.56)
$ln(TotalAssets)_{i,t-1}$	-	-0.485	-0.288
		(-10.15)	(-12.09)
$ln(TotalAssets)^{2}_{i,t-1}$	+	0.026	0.018
		(8.16)	(10.43)
<i>Leverage</i> _{<i>i</i>,<i>t</i>-1}	+	0.601	0.369
		(6.30)	(7.07)
Profitability	-	0.206	0.194
		(3.37)	(1.55)
Investment Ratio	+	0.013	0.170
		(0.27)	(3.22)
# Obs.		22,331	31
Adj. R^2		0.454	

Table 4. Combined M&A Announcement Day Returns and Disagreement about the Underlying Firms

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* 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. *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. *Acquirer (Target) Market Capitalization* is the acquirer's (target's) market capitalization in the month prior to the announcement. *Acquirer (Target) Market Capitalization* is the acquirer's (target's) market capitalization in the month prior to the announcement. *Acquirer (Target) Market Capitalization* is the acquirer's (target's) market capitalization in the month prior to the announcement. *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. *Target Inverse Price* is the inverse of the target's stock price. *Relative Size* is the market capitalization of the acquirer to the sum of the market capitalization of the acquirer and the target. *Tender Offer, Hostile Offer*, and *Competing Offers* 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* and *Stock O*

	Expected Sign	(1)	(2)	(3)
<i>Disagreement</i> _{<i>i</i>,<i>t</i>}	-	-0.435	-0.433	-0.447
~ <i>µ</i>		(-3.46)	(-3.44)	(-3.73)
$ln(AcquirerTotalAssets_{i,t})$	-	0.002	0.001	-0.000
		(0.91)	(0.52)	(-0.01)
AcquirerMB _{i,t}	-	-0.002	-0.002	-0.002
		(-2.72)	(-2.18)	(-2.32)
$AcquirerROA_{i,t}$?	0.068	0.041	0.034
		(1.98)	(1.22)	(1.01)
$ln(TargetTotalAssets_{i,t})$	-	-0.008	-0.006	-0.004
		(-2.73)	(-2.08)	(-1.40)
$TargetMB_{i,t}$	-	-0.000	-0.000	-0.000
		(-0.63)	(-0.83)	(-0.07)
$TargetROA_{i,t}$?	-0.009	-0.010	-0.016
		(-0.52)	(-0.59)	(-0.97)
$TargetInversePrice_{i,t}$	+	-0.013	-0.011	-0.008
		(-0.75)	(-0.59)	(-0.48)
$RelativeSize_{i,t}$	-	-0.118	-0.109	-0.100
		(-4.11)	(-4.06)	(-3.50)
TenderOffer _{i,t}	+		0.019	0.019
			(2.99)	(2.83)
$HostileOffer_{i,t}$	+		0.049	0.047
			(3.32)	(3.24)
$CompetingOffers_{i,t}$	-		-0.015	-0.018
			(-1.59)	(-1.79)
$CashOnly_{i,t}$	+		0.008	0.008
			(1.34)	(1.33)
$StockOnly_{i,t}$	-		-0.008	-0.011
			(-1.47)	(-1.76)
Year Dummies?		No	No	Yes
# Obs.		855	855	855
Adj. R^2		0.101	0.145	0.151

Table 5. Combined M&A Announcement Day Returns and Disagreement about the Underlying Firms: Moderating Effect of Belief Crossing

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 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, 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. 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. Target Inverse Price is the inverse of the target's stock price. Relative Size is the market capitalization of the acquirer to the sum of the market capitalization of the acquirer and the target. Tender Offer, Hostile Offer, and Competing Offers 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 and Stock Only represent indicators of whether the offer is financed via cash and stock only. Tstatistics are computed using White (1981) standard errors.

	Expected Sign	(1)	(2)	(3)
$Disagreement_{i,t}$	-	-4.171	-4.862	-3.771
		(-2.46)	(-2.70)	(-1.94)
$Disagreement_{i,t} * Crossing_{i,t}$	-	-7.127	-7.663	-6.573
		(-4.04)	(-4.22)	(-3.70)
$Crossing_{i,t}$	-	0.002	0.003	-0.002
		(0.28)	(0.34)	(-0.26)
$ln(AcquirerTotalAssets_{i,t})$	-	-0.006	-0.009	-0.009
		(-0.53)	(-0.68)	(-0.68)
$AcquirerMB_{i,t}$	-	-0.000	0.001	0.001
		(-0.07)	(0.82)	(1.10)
$AcquirerROA_{i,t}$?	0.074	0.043	0.059
		(0.93)	(0.51)	(0.65)
$ln(TargetTotalAssets_{i,t})$	-	0.003	0.006	0.008
		(0.23)	(0.53)	(0.52)
$TargetMB_{i,t}$	-	0.000	-0.000	-0.000
		(0.00)	(29)	(-0.20)
$TargetROA_{i,t}$?	-0.083	-0.056	-0.047
		(-0.98)	(-0.64)	(-0.45)
TargetInversePrice _{i,t}	+	0.025	0.032	0.030
		(1.86)	(2.26)	(1.64)
$RelativeSize_{i,t}$	-	-0.050	-0.054	-0.063
		(-0.57)	(-0.60)	(-0.64)

Table 5.	Continued.
----------	------------

	Expected			
	Sign	(1)	(2)	(3)
$TenderOffer_{i,t}$	+		0.031	0.013
HostileOffer: ,	+		(1.66) 0.014	(0.57) 0.026
			(0.55)	(1.00)
$CompetingOffers_{i,t}$	-		0.004	0.018
$CashOnly_{i,t}$	+		0.007	0.020
			(0.49)	(1.23)
<i>StockOnly_{i,t}</i>	-		-0.020 (-1.55)	-0.018 (-1.24)
Year Dummies?		No	No	Yes
# Obs.		146	146	146
Adj. R^2		0.070	0.108	0.161