Who's the Fairest of Them All?
Evidence from Closed-End Funds

Alastair Lawrence
lawrence@haas.berkeley.edu

Jackie (Subprasiri) Siriviriyakul
s_siriviriyakul@haas.berkeley.edu

Richard Sloan
richard_sloan@haas.berkeley.edu

Haas School of Business
University of California at Berkeley
2220 Piedmont Avenue
Berkeley, CA 94720-1900

September 2013

ABSTRACT: Using a setting where market prices and fair values for the same portfolio of assets are observable, we evaluate the quality of fair value measurements under Accounting Standards Codification 820 (pre-codification FAS No. 157). Contrary to prior research, we find only small differences in the value relevance of Level 1, Level 2, and Level 3 fair value measurements. We do however find some evidence suggesting that Level 3 fair value measurements are the least timely, though the difference is small. Finally, we find that the Level 1 and Level 2 fair value measurements are relatively less efficient in reflecting underlying intrinsic values, because they also reflect transitory components in market prices.

KEYWORDS: ASC 820, fair value measurement, Level 1, Level 2, Level 3, value relevance, timeliness, transitory components, closed-end mutual funds.

JEL CLASSIFICATION: M41, G12, and G29.

DATA AVAILABILITY: Data are publicly available from sources identified in the article.

We have received valuable comments from Patricia Dechow, Stephen Penman, Jeffery Pontiff, Jieyin Zeng, and workshop participants at the 2013 AAA Doctoral Consortium, Emory University, and Massachusetts Institute of Technology.

1. Introduction

Accounting Standards Codification (ASC) 820 Fair Value Measurement (pre-codification FAS No. 157 Fair Value Measurements) defines fair value as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date" (FASB 2011). Moreover, it provides guidance for a hierarchy of inputs (Level 1, Level 2, and Level 3 inputs) to be used in fair value measurement, with the highest priority given to directly quoted market prices (Level 1) and the lowest priority given to unobservable model inputs (Level 3). The increasing use of fair value measurements in Generally Accepted Accounting Principles (GAAP) over the past two decades has been far from frictionless. As recent academic discussions highlight (e.g., Ryan 2008; Laux and Leuz 2009 2010), the recognition of fair values in the financial statements goes back to the central debate on the usefulness of information and hence, the relevance and reliability of such information. While value relevance has been used to support the use of fair values and the three-level fair-value hierarchy of inputs, disagreement remains regarding the decision usefulness of this information.

Value relevance studies investigating the fair value measurement hierarchy (Kolev 2008 and Song, Thomas, and Yi, 2010) generally find that Level 1 and Level 2 fair value measurements are more value relevant than Level 3 fair value measurements. In contrast, Altamuro and Zhang (2013), using evidence from the illiquid 'mortgage servicing rights' (MSR) market, find that Level 3 MSR measurements better reflect the persistence of mortgage servicing fees than Level 2 MSR measurements. A complicating factor in all of these studies is that the measures of decision usefulness employed are only indirectly related to the value of the assets that are subject to fair value measurement.

Closed-end funds provide a unique natural setting in which to examine the decision usefulness of fair value information. Managers of closed-end funds face similar earnings management incentives to managers of other companies (e.g., Chandar and Bricker 2002). Closed-end funds hold a portfolio of securities and regularly report the 'net asset value' (NAV), representing the fair value of the investment portfolio divided by the number of shares outstanding in the fund. Unlike their open-ended counterparts, however, shares cannot be purchased from or redeemed with the fund at NAV. Instead, the fund has a fixed number of shares that are listed on a stock exchange and can be bought or sold at market-determined prices. Thus, we can directly observe both the accounting-determined fair value and the market-determined price for the same portfolio of assets. Moreover, we can also compute returns based on both accounting fair values and market prices and examine the efficiency of the resulting returns.

We examine a comprehensive sample of 861 closed-end funds ranging from equity funds reporting predominantly Level 1 fair values, to mortgage bond funds reporting predominantly Level 2 and Level 3 fair values. We first examine the value relevance of fair values across the different levels of the fair value hierarchy. The results indicate that there are only small differences in the value relevance of Level 1, Level 2, and Level 3 fair value measurements. Specifically, we find that Level 1, Level 2, and Level 3 fair values are all priced over 90 cents on the dollar at 94.6 cents, 90.4 cents, and 94.8 cents, respectively—contrary to prior research suggesting that Level 1 and Level 2 assets are priced at approximately 100 cents on the dollar while Level 3 fair values are priced at less than 70 cents on the dollar.

We next examine the timeliness of returns across the different levels of the fair value hierarchy. If returns are timely, then they should not exhibit positive serial correlation and should

not be predictable based on publicly available information. Positive serial correlation and return predictability are suggestive of stale information and are thus undesirable properties of fair values. Using quarterly data, we find evidence of positive serial correlation across all three levels of the fair value hierarchy. The positive serial correlation is strongest for Level 3 measurements (0.156), though it is not significantly greater than that of Level 1 (0.134) and Level 2 (0.113) measurements. Moreover, we find that quarterly returns based on market prices lead quarterly returns based on fair values across all three levels of the fair value hierarchy, though this result is only statistically significant for Level 3 measurements. We also investigate the determinants of differences between funds' market prices and fair values. Previous research concludes that these differences represent market mispricing, documenting that prices systematically revert to fair values (see Pontiff 1995). We find evidence consistent with previous research across all three levels of the fair value hierarchy. Specifically, we find strong evidence of a negative relation between fund premia and stock returns over the next 2 years, but no evidence of a positive relation between fund premia and future NAV returns. We also find that evidence of stock return predictability is strongest using NAVs based on Level 3 fair values. Thus, while Level 3 fair values appear to contain relatively more stale information, they are also most predictive of future stock returns.

Lastly, we examine the efficiency of returns computed using both observed prices and reported fair values, focusing on the extent to which the returns contain transitory components that are unrelated to long-run intrinsic value. Transitory components impact returns in the short run, but subsequently reverse, and thus have no impact on long-run returns. Consequently, they cause negative correlations in short-run returns. We argue that returns containing more transitory components are less efficient, because they are less informative about future cash flows. At the

same time, we recognize that these transitory components could be due to either irrational mispricing or rational predictable time-variation in expected returns. Since much previous research concludes that transitory components in closed-end fund returns represent mispricing, we include them in our analysis for completeness.[1]

Using annual data, we find evidence of significant negative serial correlation for returns based on Level 1 (-0.204) and Level 2 (-0.208) but not Level 3 fair values. This negative serial correlation is also present in the price returns of the funds. Moreover, using long window tests that examine whether fair values and market values reflect underlying innovations in intrinsic value without error, we find strong evidence that market values contain a significant amount of transitory components that are not reflected in fair values, but not vice versa. Since we observe less evidence of transitory components in Level 3 NAV returns, we conclude that Level 3 NAVs are more informative about the underlying security's future cash flows and hence are more useful for determining intrinsic value and forecasting stock returns.

Our findings have a number of significant implications. First, our findings not only provide new evidence on the usefulness of fair value estimates, but also reconcile the conflicting evidence from previous research. We show that there are only small differences in the value relevance across Level 1, Level 2, and Level 3 fair values, and that Level 3 fair values are more informative about future cash flows. The findings highlight that previous relevance studies (Kolev 2008 and Song et al. 2010) appear to suffer from an omitted variables problem, and are in line with prior studies that use realized future cash flows to evaluate fair values and conclude that Level 3 fair values are more value relevant (Altamuro and Zhang 2013).

[1] See Cherkes (2012) for a recent review of the literature on closed-end fund mispricing.

Our results also highlight a potential concern with the FASB's definition of fair value. The FASB clearly adopts a market-based approach, defining fair value as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date". To the extent that market prices contain systematic transitory components, they contain noise from the perspective of long run intrinsic valuation. Under such circumstances, Level 3 fair values appear to provide information that better aids investors and creditors in assessing future cash flows and intrinsic value. Thus, our evidence suggests that the FASB's fair value hierarchy may compromise a key objective of financial reporting, namely the provision of information that is useful in assessing future cash flows.

The remainder of this paper is organized as follows. Section 2 summarizes background information and prior literature, while Section 3 describes closed-end mutual funds, and the research design. Section 4 describes the data, Section 5 reports the results of our main analyses, and Section 6 concludes.

2. Background and prior literature

Over the past 20 years, U.S. GAAP has moved towards disclosing and recording more assets and liabilities in financial statements at fair value rather than at historical cost.[2] The movement to fair value has spurred much debate about the relevance and reliability of fair value estimates, making it a popular topic in academic research. Many studies have found that fair values of both financial and non-financial assets are value relevant, and that investors perceive

[2] Examples of FASB's past fair value initiatives include: FAS No. 107 Disclosures about Fair Value of Financial Instruments (FASB 1991); FAS No. 115 Accounting for Certain Investments in Debt and Equity Securities (FASB 1993); FAS No. 133 Accounting for Derivative Instruments and Hedging Activities (FASB 1998); and FAS No. 159 The Fair Value Option for Financial Assets and Financial Liabilities—Including Amendment of FASB Statement No. 115 (FASB 2007).

fair value estimates as more value relevant than historical cost estimates.[3] However, the value relevance of fair value measurement has been shown to vary with the reliability of the inputs used (e.g., Petroni and Wahlen 1995; Nelson 1996; Cotter and Richardson 2002) and fair value measurements have been shown to be susceptible to managerial opportunism (e.g., Bernard, Merton, and Palepu 1995; Dietrich, Harris, and Muller 2000; Chandar and Bricker 2002; Dechow, Myers, and Shakespeare 2010).

Prior to the release of FAS No. 157 Fair Value Measurements in 2006 (post-codification ASC 820—Fair Value Measurement), there were different definitions of fair value within U.S. GAAP and limited guidance for applying those definitions. ASC 820 supports a single definition of fair value and establishes a framework for measuring fair value in GAAP. In particular, ASC 820 outlines a hierarchy of inputs (Level 1, Level 2, and Level 3 inputs) used in fair value measurement, from most to least verifiable and representationally faithful. Level 1 inputs under ASC 820 are defined as "quoted prices (unadjusted) in active markets for identical assets or liabilities that the reporting entity has ability to access at the measurement date." Level 2 inputs are "inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly" and Level 3 inputs are defined as "unobservable inputs for the asset or liability."

Level 1 inputs are viewed as "the rough equivalent of accounting nirvana" (Ryan 2008) and are generally considered to be of maximum faithful representation in liquid markets. Level 2 inputs include: (1) quoted market prices in active markets for similar assets and liabilities, or

[3] Examples of such research include: Easton, Eddey, and Harris (1993); Barth (1994); Ahmed and Takeda (1995); Petroni and Wahlen (1995); Barth, Beaver, and Landsman (1996); Eccher, Ramesh, and Thiagarajan (1996); Nelson (1996); Venkatachalam (1996); Barth and Clinch (1998); Carroll, Linsmeier, and Petroni. (2003). For a more detailed review of early evidence of the value relevance of fair values see Barth, Beaver, and Landsman (2001).

quoted market prices in inactive markets for identical assets and liabilities; and (2) mark-to-model measurements that are disciplined by observable market prices (e.g., exchange rates and interest rates). Level 3 inputs, viewed as the lowest in the hierarchy in terms of verifiability, are mark-to-model measurements that are undisciplined by observable market prices but rather reflect firm-made assumptions that should reflect what market participants would use in pricing assets and liabilities. Hence, the verifiability of fair values is most difficult for Level 3 measurements, and so they are more susceptible to measurement error and managerial opportunism. However, when transactions are no longer considered to be orderly, concerns are also raised about the faithful representation of Level 1 and Level 2 inputs due to the poor quality observable market inputs.[4] Moreover, the faithful representation of market-based inputs is also compromised when they reflect speculative bubbles and other transitory components (e.g., Penman 2007; Ryan 2008).

ASC 820 became effective on November 15, 2007, and since then research has investigated the decision usefulness of the fair value measurement hierarchy. Using initial data under the fair value hierarchy, Kolev (2008) finds that Level 1 fair values are more value relevant than Level 3 fair values, and Goh et al. (2009) find that Level 2 and Level 3 fair values are valued similarly by the market and are less value relevant than Level 1 fair values. However, Song et al. (2010) with more recent evidence and a larger sample, find that the value relevance of Level 1 and Level 2 fair values are similar and are greater than that of Level 3 fair values. Specifically, they document that Level 1 and Level 2 fair values are priced at approximately 100 cents on the dollar, while Level 3 fair values are priced at less than 70 cents on the dollar.

[4] ASC 820 highlights that when estimating fair values the most weight should be placed on transactions that are orderly and the least weight on those that are not orderly.

Moreover, Riedl and Serafeim (2011) find that firms with a greater proportion of Level 3 financial assets have higher betas, and in turn higher costs of capital than firms with a greater proportion of Level 1 financial assets. While ASC 820 generally encourages the use of Level 2 inputs over Level 3 inputs when available, ASC 820 does not require firms to use Level 2 inputs over Level 3 inputs. When markets are illiquid and transactions are no longer orderly, firms can use Level 3 inputs if there is concern that Level 1 or Level 2 inputs are of sufficiently low quality.[5] In line with this rationale, Altamuro and Zhang (2013), using evidence from the illiquid mortgage servicing rights (MSR) market, find that Level 3 MSR measurements better reflect the persistence of future servicing fees, default risk, and prepayment risk than Level 2 MSR measurements. Hence, existing research concerning the decision usefulness of the fair value measurement hierarchy under ASC 820 is inconclusive. Moreover, the assessment of decision usefulness is complicated by the fact that all of these studies rely on measures of decision usefulness that are only indirectly related to the fair value of the underlying asset. For example, in the value relevance studies, the assets being fair valued average only 15% of the total assets of the company. Thus, these studies are unable to directly observe the accounting-determined fair values and market-determined prices of the same portfolio of assets.

3. Closed-end mutual funds and research design

3.1 Closed-End Funds

Closed-end funds are one of three types of investment companies regulated by the Investment Company Act of 1940; the other two are open-end mutual funds and investment trusts. These investment companies issue shares and invest in a portfolio of securities. Closed-

[5] Consistent with the guidance of ASC 820, Botosan, Carrizosa, and Huffman (2011) find that banks use Level 3 inputs over Level 2 inputs when market liquidity is lower.

end funds are unique in that they do not continuously sell or redeem shares with investors. Instead, they engage in an initial public offering, after which their shares trade on a stock exchange at the prevailing market price. Fund boards are required by the Investment Company Act to determine the fair values of their underlying investments and to use these fair values to compute the fund's net asset value per share (NAV). Thus, a closed-end fund has both a market-determined share price and an accounting-determined NAV that is based on the estimated fair value of its security holdings. The premium (discount) of the fund is the resulting difference between the share price and the NAV. It has long been established in the finance literature that closed-end funds frequently trade at premiums or discounts, a phenomenon named as the "closed-end fund puzzle" by Lee, Shleifer, and Thaler (1991). Closed-end fund research generally attributes the premiums and discounts to reasons such as management fees, illiquid assets, managerial ability, dividend yield, tax liabilities, investor sentiment, open-ending attempts, and private benefits of block ownership (e.g., Boudreaux 1973; Ingersoll 1976; Malkiel 1977; Lee et al. 1991; Barclay, Holderness, and Pontiff 1993; Chay and Trzcinka 1999; Berk and Stanton 2007; Bradley, Brav, and Goldstein 2010; Day, Li, and Xu 2011).[6] Cullinan and Zheng (2013) find some evidence suggesting that discounts are more pronounced for Level 2 and Level 3 measurements than for Level 1 measurements. Yet discounts and premiums are generally not fully explained by such explanations and tend to reverse, resulting in a negative and significant relation between the premiums and future stock returns (e.g., Lee et al. 1991; Pontiff 1995, 1996; Swaminathan 1996). These results suggest that fund prices contain transitory noise that reflects mispricing and is unrelated to the value of the underlying holdings.

[6] See Cherkes (2012) for a more detailed review of this literature.

Closed-end funds must file a Certified Shareholder Report (N-CSR and N-CSRS) semi-annually with the Securities and Exchange Commission, providing a performance summary and set of financial statements for the fund. They must also file a Quarterly Schedule of Portfolio Holdings of Management Investment Companies (N-Q) on a quarterly basis, providing the quarterly fund holdings and NAV. In 1969 and 1970, the SEC released Accounting Series Releases (ASR) describing how closed-end funds must value investments. ASR 113 indicates that it is improper to carry investments at cost, if cost no longer represents fair value. ASR 118 defines fair value as the amount which the owner would reasonably expect to receive for the securities upon their current sale. Since November 15, 2007, when ASC 820 became effective, closed-end funds must also disclose the separate fair values of Level 1, Level 2, and Level 3 investments in their financial statements. The majority of closed-end funds with liquid securities linked to market prices, generally report either daily or weekly NAVs, while those with securities without direct market prices typically report either monthly or quarterly NAVs. Hence, given that all closed-end funds are required to report their NAVs at least quarterly, we perform our analyses on a quarterly and annual basis.

3.2. Evaluating Fair Values Using Closed-End Funds

Closed-end funds provide a natural setting for evaluating accounting fair values, because we can observe prices and returns for the same portfolio of assets based on both the market-determined share price and the accounting-determined fair value. Closed-end funds are also an ideal investment vehicle for investing in illiquid securities, because they are not subject to large and unexpected redemptions. Consequently, closed-end funds invest in a variety of securities,

ranging from liquid Level 1 securities to illiquid Level 3 securities. This allows us to evaluate fair values across all three levels of the FASB's fair value hierarchy.

We evaluate fair values by first identifying the desirable properties of fair values and then conducting empirical tests to see whether the estimated fair values for our sample of closed-end funds display these properties. The FASB defines a fair value as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date" (FASB 2011). Similarly, the SEC defines fair value as "the amount which the owner might reasonably expect to receive upon the current sale" (SEC 1970). With respect to securities for which timely market quotations are readily available, these definitions imply that the fair value is simply the quoted market price. Yet the existing closed-end fund research demonstrates that quoted market prices often fail to reflect the fundamental value of the underlying assets (Cherkes 2012). Moreover, a large body of literature in finance finds that stock prices tend to initially underreact to new information, but then overreact to a series of corroborating information. For example, Cutler, Poterba, and Summers (1991) find positive serial correlation in stock returns over periods from 1-12 months and negative serial correlation in stock returns over periods from 3-5 years.[7] We therefore conduct additional tests to evaluate the extent to which both quoted market prices and estimated fair values efficiently incorporate information about future cash flows. Each of our tests falls into one of the following three categories:

[7] See Barberis, Shleifer, and Vishny (1998) for a review of the empirical research on underreaction and overreaction in stock returns.

Property 1: Value Relevance

Our first category of tests examines the market pricing of fair value measurements using regressions of stock prices on accounting-determined fair values. To the extent that one adopts the FASB and SEC perspective that observed market quotations represent fair values, the value relevance tests allow us to evaluate the extent to which the reported NAVs reflect fair values. Previous research by Kolev (2008) and Song et al. (2010) regresses stock prices on accounting-determined book values that comprise of a combination of fair values and historical costs. Moreover, the financial assets being fair valued correspond to just a small fraction of the underlying firms' overall assets, potentially leading to model misspecification (Boone 2002). The closed-end fund setting offers a distinct advantage over previous research in that we can directly observe both the market prices and the fair values for the same underlying portfolio of assets.

Property 2: Timeliness

Our second category of tests examines the extent to which estimates of fair value reflect new information on a timely basis. Fair values should reflect all publicly available information about future cash flows and a hallmark of efficient stock returns is that they should not be predictable based on publicly available information. We examine the timeliness of fair value estimates using three sources of information. First, we test for evidence of positive serial correlation in returns computed using the fair value estimates. To the extent that estimated fair values are slow to adjust to new information, we should observe positive serial correlation in fair value returns. Second, we use the stock returns of the underlying fund. If information is made publicly available and reflected in stock prices on a timely basis, but is not reflected in NAVs on

a timely basis, then we should observe a positive relation between NAV returns and prior period stock returns. Note that this test is subtly different from the preceding autocorrelation test, because the former picks up situations where new information is diffused gradually, while the latter picks up situations where new information is released with a discrete delay. Third, we use information in the difference between a fund's price and its NAV (i.e., the discount or premium on the fund). The preceding returns analyses should detect timeliness issues relating to adjacent periods. However, it is possible that lack of timeliness could extend beyond adjacent periods. Under such circumstances, the difference between price and NAV should reflect the cumulative effect of all stale information. We test for a positive relation between fund premia and future NAV returns. To the extent that the premium on a fund reflects information that has not yet been incorporated in NAV, we should observe a positive relation between fund premia and subsequent NAV returns.

Property 3: Efficiency

Our third category of tests investigates the extent to which fair value estimates contain transitory components that are unrelated to underlying intrinsic value. Our tests exploit two features of value irrelevant components. First, such transitory components should lead to negative serial correlation in returns. In the long run, the returns on a security are determined by the distributions made on the security. Thus, any transitory components in short-run returns must reverse in a subsequent period. Recall that previous research provides evidence of negative serial correlation in stock returns over periods of 3-5 years. The most popular explanation for this phenomenon is that stock prices overreact to certain types of information, resulting in transitory components in stock returns that subsequently reverse. We test for evidence of transitory components in NAVs in a similar manner. If NAV returns contain transitory components, they

should exhibit negative serial correlation. A potential limitation of tests using serial correlation is that the transitory components may take several periods to reverse, in which case they will not be revealed in adjacent-period serial correlations. An alternative test that overcomes this limitation is to examine the extent to which innovations in NAV returns translate into innovations in stock returns. To the extent that NAV returns contain transitory components that are not reflected in stock returns, the related innovations in NAV returns will not be reflected in stock returns. We therefore evaluate the extent to which NAV returns contain transitory components by examining the responsiveness of long-window stock returns to contemporaneous NAV returns. If NAV returns reflect underlying innovations in intrinsic value without error, then stock returns should exhibit a long-run response coefficient of 1 to NAV returns.

Since previous research argues that stock returns contain transitory components (e.g., Black, 1986; Cutler et al., 1991), we also subject stock returns to a similar test. If stock returns contain value irrelevant components that are not reflected in NAV returns, then we should see that the long-run response coefficient to stock returns is less than 1. Note, however, that these tests can only isolate transitory components that are exclusive to one of the return metrics. To the extent that both stock returns and NAV returns contain common transitory components, the regression coefficients will not be biased downward from 1.

4. Data

4.1 Sample Selection

Our empirical tests employ data from three sources. We obtain closed-end fund data from the Morningstar Traded Fund Centre Database, stock-return data from the CRSP daily stock returns database, and the fair value classification data from the Form N-CSR footnotes obtained

from The SEC's EDGAR site. We perform our analyses using both quarterly and annual data. Our sample period covers all observations with available data on Morningstar and CRSP from 1980 to 2012 and hand-collected EDGAR data from 2009 to 2012.

Table 1 presents the sample selection criteria for the value relevance analysis. Panel A reports the number of funds and fund-years for the hand-collected sample that meet our selection criteria. For each fund in our sample, we hand-collect the fair values for Level 1, Level 2, and Level 3 investments from the Form N-CSR at the end of each fiscal year from 2009 to 2012. We require our sample to have non-missing fair value hierarchy information. In addition, to ensure that NAV data are actually reported by the fund rather than being estimated by Morningstar, we require our sample to have actual, not estimated Morningstar NAVs. To ensure that NAV and fair value hierarchy information are collected from the same time period, the sample is also required to have actual NAVs within the last 10 days of the fiscal year. Finally, we require the sample to have non-missing data on stock price and number of common shares outstanding at year-end. Our final hand-collected sample for the value relevance analysis is composed of 2,041 fund-year observations representing 645 unique funds.

Table 1, Panel B presents the sample selection for the quarterly-data sample. Morningstar does not always have actual NAV data on a daily basis (e.g., weekends and holidays), and hence, our fund-quarters may not always exactly correspond to each fund's actual fiscal quarter-end.[8] Specifically, our fund-quarters end on the date with the last actual NAV for each fiscal-quarter.[9] To keep the number of days in each fund-quarter fairly consistent, we require fund-quarter

[8] Morningstar provides estimated NAVs if actual NAVs are not reported by the fund.

[9] For example, suppose the fiscal-quarter ends on March 31. If the NAV on March 30 and March 31 are both estimated, given that these two days fall on a weekend, while the NAV on March 29 is the actual NAV reported by the fund, the fund-quarter in our analysis will actually end on March 29.

observations to have actual NAV data in the last 10 days of the fiscal quarter to be included in the sample. Moreover, we require fund-quarter observations to have non-missing fair-value returns, premium, and market return data.

For those funds with Level 1 to Level 3 data in fiscal year 2009 to 2012, we classify our funds into three categories based on the amount of Level 1, Level 2, and Level 3 investments as a percentage of the total portfolio value. Specifically, if the total portfolio is comprised of at least 95% of Level 1 investments, the fund is classified as a "Level 1 fund". If the total portfolio is comprised of at least 5% of Level 3 investments, the fund is classified as a "Level 3 fund". The funds with all other combinations of Level 1 to Level 3 investments are classified as a "Level 2 fund". Given the relative proportion of Level 1, Level 2, and Level 3 investments is fairly stable across Morningstar-defined fund sectors from 2009 to 2012, for those quarterly observations from 1980 to 2008 and those without Level 1 to Level 3 data in fiscal year 2009 to 2012, we apply the same rule using the sector average percentage of Level 1 to Level 3 investment data.[10]

Our classification criteria is designed to clearly separate funds with different degrees of Level 1, Level 2, and Level 3 investments while attempting to balance the observations across the three fair value classifications. After imposing the aforementioned data restrictions, we obtain 35,868 fund-quarter observations (861 funds). Our final sample is composed of 3,584 fund-quarter observations (115 funds) in Level 1 funds, 29,152 fund-quarter observations (735 funds) in Level 2 funds, and 3,132 fund-quarter observations (101 funds) in Level 3 funds, respectively.

The same set of selection criteria are applied to our annual data. Panel C reports the

[10] We exclude observations from the sample if they are missing 2009 to 2012 fair value classification data and their sector is missing 2009 to 2012 fair value classification data.

number of funds and fund-year observations that meet the selection criteria. After imposing all the same restrictions on the annual data, we obtain 8,548 fund-year observations (851 funds). Our final annual sample is composed of 869 fund-year observations (113 funds) in Level 1 funds, 6,956 fund-year observations (721 funds) in Level 2 funds, and 723 fund-year observations (91 funds) in Level 3 funds, respectively.

5. Results

5.1 Descriptive Statistics

Table 2 presents the descriptive statistics for the hand-collected sample. The first key variable is the stock price per share (*PRICE*), which is obtained three months after fiscal year-end. The mean (median) daily stock price is $13.44 per share ($13.43 per share). The next three variables are the amount of Level 1 to Level 3 investments per common share outstanding. The mean Level 1, Level 2, and Level 3 investments are $4.41, $13.49, and $0.34 per share, respectively, highlighting that on average the funds in the sample invest primarily in Level 2 investments, followed by Level 1 and Level 3 investments, respectively. The final variable, *OTHER_SHARE*, is measured by taking the difference between NAVs and total investments, divided by the number of shares outstanding. The mean value of *OTHER_SHARE* is -$4.62 per share and generally reflects fund leverage, such as preferred shares.

Table 3, Panel A presents the descriptive statistics for the key variables in the quarterly-data sample. The first two key variables are funds' fair-value returns (*NAV_RET*) and market returns (*RET*). Fair-value returns (*NAV_RET*) are derived using daily stock returns excluding distributions, daily stock returns including distributions, and fund premiums. See Appendix A for the specific definition. The mean (median) quarterly fair-value return is 1.88 percent (2.12

percent), while the mean (median) market return is 2.07 percent (2.51 percent), highlighting that on average fair-value returns are slightly lower than market returns. The higher market returns reflect the fact that fund premiums have increased over the sample period. The standard deviations of fair-value returns and market returns are 8.46 and 10.43, respectively, indicating that the volatility of market returns is greater than the volatility of fair-value returns.

The next key variable is *PREMIUM* measured as of the quarter-end. The mean (median) value is -4.10 percent (-4.94 percent), which is consistent with prior research documenting that closed-end funds on average trade at a discount. The largest discount during our quarterly-sample period is a fund trading at more than 49 percent below its fair value and the largest premium during our sample was a fund trading at more than 104 percent above its fair value. We also report the absolute value of premium as of the quarter-end (*ABS_PREM*). The mean (median) *ABS_PREM* value is 7.97 (6.76), indicating that on average there is approximately an 800 basis point spread between fair values and market prices. Lastly, we report the descriptive statistics of funds market values (*MV*). The mean (median) fund market value is $289 ($167) million, with the fund market value ranging from a minimum of $1 million to a maximum of $6 billion.

Panels B to D of Table 3 separately report the descriptive statistics for Level 1, Level 2, and Level 3 funds, respectively. Panels B to D highlight that fund return performance is highest for Level 1 funds, followed by Level 2 funds, and then by Level 3 funds. For example, the mean quarterly fair-value return and market return are 2.06 percent and 2.18 percent, respectively, for Level 1 funds, whereas the mean quarterly fair-value return and market return are 1.73 percent and 1.96 percent, respectively, for Level 3 funds. This yield difference is not surprising, as Level 1 funds are predominately equity funds and Level 3 funds are predominately fixed income funds.

Panels B to D also show that across Level 1, Level 2, and Level 3 funds, the standard deviation of stock returns is greater than the standard deviation of fair-value returns with the largest volatility spread between the two returns observed for Level 3 funds. Specifically, the standard deviation of fair-value returns and market returns for Level 1 (Level 2) funds are 12.14 and 14.43 (7.75 and 9.57), respectively, and the standard deviation of fair-value returns and market returns for Level 3 funds are 9.58 and 12.47, respectively. The volatility spreads between fair-value returns and market returns suggest that fair value returns contain less transitory components than do stock returns. The mean *PREMIUM* value is lowest for Level 1 funds. Level 1 funds are generally the largest funds, followed by Level 2, and then by Level 3 funds. Specifically, the mean quarter-end market values for Level 1, Level 2, and Level 3 funds are $351 million, $287 million, and $242 million, respectively.

Table 4 presents similar descriptive statistics as in Table 3 but for the annual-data sample. Panel A presents the results for the total sample and Panels B to D report the descriptive statistics for Level 1, Level 2, and Level 3 funds, respectively. The mean (median) annual fair-value return is 8.12 percent (7.60 percent) and the mean (median) market return is 9.09 percent (8.79 percent), consistent with the quarterly-data that on average fair-value returns are slightly lower than stock returns. The standard deviations of annual fair-value returns and stock returns are 18.55 and 23.28, respectively, again highlighting that the volatility of stock returns is greater than the volatility of fair-value returns. The mean values and distributions of *PREMIUM*, *ABS_PREM*, and *MV* are similar to those presented in the quarterly sample. Moreover, the cross-sectional variation across Level 1, Level 2, and Level 3 funds inferred from the annual data in Table 4, Panels B to D is similar to that inferred from the quarterly data in Table 3, Panels B to D.

Appendix B reports the sector breakdowns for the three samples and reports the percentage of funds within each sector that are classified as Level 1, Level 2, or Level 3 funds. Panel A presents the sector breakdown for the hand-collected sample, and Panels B and Panel C present the sector breakdown for total quarterly and annual samples, respectively, where the fair value hierarchy classification rule has been applied retrospectively using 2009 values. The sector classifications are from Morningstar. Overall, Appendix B highlights that Level 1 funds invest predominately in equities, Level 2 funds invest predominately in relatively liquid bond markets and Level 3 funds invest predominately in relatively illiquid bond markets and life sciences companies.

5.2 Value Relevance Results

Table 5 investigates the value relevance of Level 1, Level 2, and Level 3 fair value measurements for 2,041 fund-years (645 funds) using 2009 to 2012 fair value data. Following prior literature (e.g., Song et al. 2010), we regress, without an intercept, the fund's price per share (*PRICE*) on the per share values of Level 1 (*LEVEL1_SHARE*), Level 2 (*LEVEL2_SHARE*), Level 3 (*LEVEL3_SHARE*) investments, and other net assets (*OTHER_SHARE)*. The results highlight that the value relevance of fair value measurements is fairly similar across the fair value hierarchy. Specifically, the coefficients on *LEVEL1_SHARE*, *LEVEL2_SHARE*, *LEVEL3_SHARE* are 0.946, 0.904, and 0.948, respectively, which are all fairly close to one, indicating that the market assigns just under a dollar-for-dollar valuation to Level 1, Level 2, and Level 3 fair value measurements. The tests of significance at the bottom of the table indicate that there is an insignificant difference between the value relevance of Level 1 and Level 3 fair values, and between Level 2 and Level 3 fair values. There is a statistical difference, however, between the value relevance of Level 1 and Level 2 fair values, although

this difference is small. The coefficient on *OTHER_SHARE* is 0.711 and significantly lower than one. We see two possible explanations for this result. First, the estimated fair values for *OTHER_SHARE* may be measured with error. For example, many funds used auction-rate securities as a form of leverage, and the market for auction rate securities collapsed in the financial crisis, causing extreme price volatility.[11] Second, *OTHER_SHARE* primarily reflects leverage taken on by the fund, and to the extent that the fund can source leverage more cheaply than investors, investors may be willing to pay a premium for such leverage. We calculate *PRICE* using the fund's stock price three months after the fund's fiscal year-end because the fair value level breakdowns will not be known until the Certified Shareholder Reports are disclosed, which is typically up to 3 months following the year-end. We find our results are qualitatively similar when we calculate price using the fund's year-end stock price or when we run the regression at the aggregate-firm level rather than at the per-share level. Our findings are contrary to prior research suggesting that Level 3 fair values are priced at less than 70 cents on the dollar and appear to suggest that model misspecification may explain the relatively lower value relevance of Level 3 measurements suggested by previous studies.

5.3 Timeliness Results

To investigate the timeliness of the fair values across the different levels of the fair value hierarchy, we examine the associations between stock returns, fair value returns, and premiums. Following Pontiff (1995), we plot the lead, lag, and contemporaneous correlations between premiums, stock returns, and fair value returns. The contemporaneous variable is on the vertical axis and the time *t* variable is on the horizontal axis. Figures 1 and 2 report the analysis using quarterly and annual data respectively. Figure 1, Panel A and Figure 2, Panel A present the

[11] See http://www.finra.org/Investors/ProtectYourself/InvestorAlerts/Bonds/P038207 .

correlograms for the total sample. The first plot in each figure shows the serial correlation in premia, highlighting that the premia are fairly persistent. More specifically, the first order autocorrelation is around .80 (.60) for the quarterly (annual) data. Moving to the right in each figure, the next plots show that there is a strong evidence of a negative relation between fund premia and future stock returns, and Figure 2, Panel A highlights that this relation extends for up to two years. The correlation between contemporaneous premia and one-quarter-ahead stock returns is –0.13 (Figure 1, Panel A) and the correlation between contemporaneous premia and one-year-ahead stock returns is -0.21 (Figure 2, Panel A). At the same time, neither Figure 1, Panel A nor Figure 2, Panel A shows any evidence of a positive relation between fund premia and future fair value returns ("NAV return"). These findings are consistent with previous research concluding that differences between funds' market prices and fair values represent market mispricing rather than stale NAVs (e.g., Pontiff 1995). Panels B through D of Figures 1 and 2 show that this finding holds across Level 1, Level 2, and Level 3 funds, confirming that premiums reflect security mispricing rather than stale NAVs. In regards to stock mispricing, Panels B through D of Figure 1 and Figure 2 highlight that stock return predictability occurs across all three levels of the fair value hierarchy and is most pronounced for Level 3 funds. Specifically, the correlation between contemporaneous premia and one-quarter-ahead (one-year-ahead) stock return is -0.09 (-0.18) for Level 1 funds, -0.13 (-0.21) for Level 2 funds, and -0.16 (-0.21) for Level 3 funds. One interpretation of these results is that because Level 3 fair values are not based on market prices, they are less subject to market mispricing, and hence, provide better information about the underlying security's future cash flows.

The second and third rows of the correlograms show the serial correlation of market and fair value returns, and the associations between the two returns. As mentioned previously, timely

and efficient returns should not exhibit serial correlation—evidence of positive serial correlation is suggestive of stale information while evidence of negative serial correlation is suggestive of transitory components. Figure 1, Panel A highlights at the quarterly level that market and fair value returns exhibit some evidence of positive first order serial correlations (0.06 and 0.12 respectively), with the positive serial correlation more pronounced for fair value returns, suggesting that fair value measurements are somewhat stale relative to market value measurements. In Panels B through D, we find that the positive serial correlation is strongest for Level 3 funds, though differences are quite small. Figure 2, Panel A however, highlights that over longer annual periods, stock returns and fair value returns actually exhibit evidence of first and second order negative serial correlation. For instance, the first and second order autocorrelations of stock returns are -0.16 and -0.19, respectively, while the first and second order autocorrelations of fair value returns are -0.14 and -0.15, respectively. Figure 2, Panels B through D highlight substantial negative serial correlations in fair value returns and stock returns for Level 1 (-0.14 and -0.22) and Level 2 funds (-0.17 and -0.16) but not for Level 3 funds. Taken together, these relations appear to reflect transitory components in market prices, and since we observe less transitory components in Level 3 funds, it appears that Level 3 fair values provide better measures of intrinsic value because they are less reliant on market prices.

The last plot in the correlograms illustrates the lead, lag, and contemporaneous associations between fair value returns and stock returns. Figure 1 indicates that the contemporaneous association between quarterly stock returns and quarterly fair value returns is highest for Level 1 funds (0.87) and lowest for Level 3 funds (0.81). Figure 2 shows that the contemporaneous associations converge to around 90% across all three levels using the longer annual return measurement window. These inferences are consistent with those from the earlier

value relevance analysis and are once again quite different from the prior research concluding that Level 1 and Level 2 fair values are priced at approximately 100 cents on the dollar while Level 3 fair values are priced at less than 70 cents on the dollar.

Another property of timely returns discussed earlier is that they should not be predictable based on publicly available information. Figure 1 presents evidence that quarterly stock returns predict fair value returns as the correlations between contemporaneous stock returns and one-quarter-ahead fair value returns for Level 1, Level 2, and Level 3 funds are 0.15, 0.14, and 0.19, respectively. The predictability of fair value returns is greatest for Level 3 funds, where it extends for up to two quarters in the future. There is also some weak evidence that fair value returns predict stock returns, as the correlations between contemporaneous stock returns and one-quarter-lagged fair value returns for Level 1, Level 2, and Level 3 funds are 0.10, 0.07, and 0.15, respectively. Figure 2 highlights that there is no evidence of such predictability of returns at the annual level. Overall, the evidence suggests that Level 3 NAVs contain the stalest information, though the differences are small.

To support the inferences from the correlograms, we also examine the serial correlations of stock returns and fair value returns using regression analyses that are presented in Tables 6 and 7. Panel A of Table 6 reports serial correlation regression coefficients for quarterly stock returns (*RET*). Focusing on the full model in Column (2), the coefficient on RET_{t-1} for the total sample is 0.060 and significant ($p < 0.01$), confirming that there is weak evidence of positive first order serial correlation in stock returns. However, the coefficient on RET_{t-2} in the same column is negative and significant ($p < 0.01$), which is indicative of return reversals due to transitory components in stock returns. When the analysis is performed separately for each level, the coefficients on RET_{t-1} are positive and significant across all three levels of the fair value

hierarchy, and the coefficients on RET_{t-2} are only negative and significant for Level 1 and Level 2 funds. Panel B reports serial correlation coefficients for the fair value returns (*NAV_RET*). Like Panel A, the first order autocorrelation of NAV returns is positive and significant. Specifically, in Column (2) the coefficient on NAV_RET_{t-1} for the total sample is 0.123. When partitioned by the three levels of the fair value hierarchy, the coefficients on NAV_RET_{t-1} are highest for Level 3 funds (0.162 and 0.156) suggesting that Level 3 fair values are relatively less timely, though they are not significantly greater than the sample-wide coefficients.

Table 7 reports the serial correlation of stock returns and NAV returns using the annual sample. In contrast to the positive serial correlation in the quarterly sample, but consistent with the annual correlograms, Panel A of Table 7 reports evidence of significant negative serial correlation in stock returns for the annual sample as the coefficients in Column (2) on RET_{t-1} and RET_{t-2} are -0.201 and -0.209, and significant ($p < 0.01$). When the analysis is performed separately for each level, the coefficients on RET_{t-2} are negative and significant ($p < 0.01$) across all three levels of the fair value hierarchy, and the coefficients on RET_{t-1} are only negative and significant for Level 1 and Level 2 funds. These findings are once again suggestive of transitory components in market prices. In Panel B of Table 7, we find that the significant negative serial correlation is also present for Level 1 (-0.135) and Level 2 (-0.162) but not Level 3 fair value returns. These results suggest that Level 3 fair value returns are less prone to reflecting the transitory components in market prices; however, the tests of statistical significance presented at the bottom of the table highlight that these differences are statistically insignificant.

5.4 Efficiency Results

The foregoing evidence of negative serial correlations provides evidence of significant transitory components in market returns and NAV returns. We investigate this issue further by examining the long-term responsiveness of stock returns to NAV returns and vice-versa. Recall that if NAV returns reflect underlying innovations in intrinsic value without error, then stock returns should exhibit a long-run response coefficient of 1 to NAV returns. Conversely, if stock returns reflect underlying innovations in intrinsic value without error, then NAV returns should exhibit a long-run response coefficient of 1 to stock returns. Figure 3 presents the NAV response coefficients, plotting the actual and predicted relations between cumulative stock returns to a quarterly NAV return. The actual relation, which is also plotted with the 95 percent confidence interval, is obtained from the regression coefficient (β) on fair value returns from the following regression:

$$\boldsymbol{CR_q = \alpha + \beta NAV\_RET_t + \varepsilon_t}$$

where CR_q is the cumulative stock returns from the beginning of quarter *t-4* to the end of quarter *q*, where *q* ranges from *t-4* to *t+8*. The predicted relation is based on the assumption that the market return fully reflects all of the information contained in fair value returns on a contemporaneous basis. Specifically, if NAV returns perfectly reflect underlying intrinsic value contemporaneously with stock prices, there should be a zero response in lagged stock returns to current fair value returns. As we move to the end of quarter *t*, the response coefficient should equal one because the fair value return is fully reflected in the market return. After quarter *t*, the response coefficient should stay at one, because all of the information in the current fair value return has already been reflected in the stock return for quarter *t*. Based on the predicted relation,

we evaluate the efficiency of fair value returns using the following guidelines. First, if the actual response coefficient function is above the predicted line in quarter *t-1*, then fair value returns are stale, as lagged stock returns anticipate some information in fair value returns. Second, if the actual function continues to increase in quarter *t+1*, then there is a delayed market response to the information in fair value returns, because the information in current fair value returns is reflected in future stock returns. Moreover, if the final cumulative fair value response coefficient is less than 1, fair value returns must contain transitory components that are not reflected in stock returns.

Panel A of Figure 3 presents the relations for the total sample, while Panels B through D present the relations for Level 1, Level 2, and Level 3 funds, respectively. Panel A highlights that across all funds the actual NAV response coefficient is quite close to the predicted relation; however, there are some significant deviations highlighted by the 95 percent confidence interval of the NAV response coefficient. First, there is some evidence from *t-2* to *t-1* that stock returns anticipate fair values returns as there is a positive jump in the NAV return coefficient. Second, there is also some evidence of a delayed market response to fair values as the NAV return coefficient continues to increase in quarters *t+1* and *t+2*. Moreover, the NAV return coefficient is significantly above the predicted relation in quarters *t+1* to *t+5*, suggesting the stock returns initially overreact to NAV returns. Panel A indicates that it takes approximately six quarters for the overreaction in stock returns to reverse. Across the three levels of the fair value hierarchy, Level 1 and Level 2 funds track closest to the predicted relation. Figure 3 confirms earlier evidence that Level 3 fair values are stale as the 95 percent confidence intervals highlight that the NAV response coefficient is significantly above the predicted response coefficient in quarter *t-1* for Level 3 funds. However, Level 3 funds also appear to have the most pronounced delayed

market response to fair values, as the increase in NAV response coefficient in *t+1* and *t+2* is greatest for Level 3 funds. Furthermore, we find the greatest market return overreaction for Level 3 funds, as the actual regression coefficient for Level 3 funds from quarter *t* to *t+8* is greater than 1.2—highlighting that it appears to take at least two years for the overreaction in stock returns to reverse for Level 3 funds.

In Figure 4, we perform the reverse of Figure 3 by running a regression of cumulative fair value returns on quarterly stock return. Here, the interpretation of the results is the converse of that for Figure 3. That is, first, if the actual regression coefficient line is above the predicted line in quarter *t-1*, then there is a delayed market response to fair value returns, because the information contained in lagged fair value returns is related to current stock returns; second, if the actual line increases in quarter *t+1*, then fair value returns are stale, because the future fair value returns contain current market return information. Moreover, if the total market return coefficient over the period does not approach one, stock returns must contain significant transitory components that are never reflected in fair value returns. The 95 percent confidence interval in Figure 4, Panel A highlights that the stock return response coefficient is significantly lower than one for all quarters from *t+1* to *t+8*, confirming the fact that stock returns reflect transitory components that are never reflected in NAV returns. Specifically, in Panel A, the response coefficient levels out at about 0.65. Level 3 funds have the highest coefficient leveling out at approximately 0.75, while Level 1 and Level 2 funds level out at approximately 0.65 and 0.60, respectively. Figure 4 also highlights that stock returns predict fair value returns, particularly for Level 3 funds, as the stock return response coefficient continues to increase in quarters *t+1* and *t+2*. Together, the foregoing analyses of the response coefficients confirm that stock returns reflect significant transitory components that are not reflected in fair value returns,

and that these findings are most pronounced for Level 1 and Level 2 fair value measurements. Furthermore, the response coefficients confirm that while Level 3 fair values appear somewhat stale, they are most predictive of future stock returns.

6. Conclusion

In this study, we evaluate fair value measurements using the closed-end mutual fund setting, where both market prices and fair values for the same portfolio of underlying financial assets are observable. We provide new evidence suggesting that there are only small differences in value relevance of Level 1, Level 2, and Level 3 measurements. We also find that Level 3 fair values reflect new information with the greatest lag but such differences are generally small. Our most interesting finding, however, is that market prices contain more transitory components than estimated fair values. One implication of this result is that estimated fair values can be used to identify transitory components in stock prices and hence predict future stock returns. We find that the resulting stock return predictability is greatest for funds that are the least reliant on market quotations in estimating fair values. This result is consistent with Level 3 fair values containing the least transitory components because they are the least reliant on market prices.

Our results help to reconcile seemingly conflicting results from existing research. Value relevance studies using market prices to evaluate fair values conclude that Level 1 and Level 2 fair values are more value relevant (e.g., Kolev 2008 and Song et al. 2010), while studies using realized future cash flows to evaluate fair values conclude that Level 3 fair values are more value relevant (e.g., Altamuro and Zhang, 2013). Our findings suggest that these results can be explained by a combination of model misspecification and transitory components in stock returns.

Finally, our findings have important implications for accounting standard setters. The existing accounting rules typically define fair values to be synonymous with market values in orderly markets. Yet our results from the closed-end fund setting suggest that market values are often inefficient in that they take large predictable swings from underlying intrinsic values and that fair values based on managerial inputs are effective in identifying such inefficiencies. Consequently, naïve reliance on market values in financial reporting may not provide the most useful information for assessing future cash flows and could exacerbate mispricing.

REFERENCES

Ahmed, A. and Takeda. 1995. Stock market valuation of gains and losses on commercial banks' investment securities: An empirical analysis. *Journal of Accounting & Economics* 20 (2): 207-225.

Altamuro, J., and H. Zhang. 2013. The financial reporting of fair value based on managerial inputs versus market inputs: Evidence from Mortgage Servicing Rights. *Review of Accounting Studies* 18 (3): 833-858.

Barclay, M., C. Holderness, and J. Pontiff. 1993. Private benefits from block ownership and discounts on closed-end funds. *Journal of Financial Economics* 33 (3): 263-291.

Barberis, N., A. Shleifer and R. Vishny. 1998. A Model of Investor Sentiment. *Journal of Financial Economics* 49 (3): 307-343.

Barth, M. 1994. Fair value accounting: Evidence from investment securities and the market valuation of banks. *The Accounting Review* 69 (1): 1-25.

———, W. Beaver, and W. Landsman. 1996. Value-relevance of banks' fair value disclosures under SFAS No. 107. *The Accounting Review* 71 (4): 513-537.

———,———, and ———. 2001. The relevance of the value relevance literature for accounting standard-setting: Another view. *Journal of Accounting & Economics* 71 (4): 513-537.

———, and G. Clinch. 1998. Revalued financial, tangible, and intangible assets: Associations with share prices and non-market-based value estimates. *Journal of Accounting Research* 36 (Supplement): 199-233.

Berk, J., and R. Stanton. 2007. Managerial ability, compensation, and the closed-end fund discount. *Journal of Finance* 62 (2): 529-556.

Bernard, V., R. Merton, and K. Palepu. 1995. Mark-to-market accounting for U.S. banks and thrifts: Lessons from the Danish experience. *Journal of Accounting Research* 33 (1): 1-32.

Black, F. 1986. Noise. *Journal of Finance* 41 (3): 529-543.

Boone, J. 2002. Revisiting the reportedly weak value relevance of oil and gas asset present values: The roles of measurement error, model misspecification, and time-period idiosyncrasy. *The Accounting Review* 77 (1): 73-106.

Botosan, C., R. Carrizosa, and A. Huffman. 2011. Factors influencing banks' use of Level 3 valuation inputs during the financial crisis. Working paper, University of Utah.

Boudreaux. K. 1973. Discounts and premiums on closed-end mutual funds: A study in valuation. *Journal of Finance* 28 (2): 515-522.

Bradley, M., A. Brav, and I. Goldstein. 2010. Activist arbitrage: A study of open-ending attempts of closed-end funds. *Journal of Financial Economics* 95 (1): 1-19.

Carroll, T., R. Linsmeier, and K. Petroni. 2003. The reliability of fair value versus historical cost information: Evidence from closed-end mutual funds. *Journal of Accounting, Auditing & Finance* 18 (1): 1-23.

Chandar, N., and R. Bricker. 2002. Incentives, discretion, and asset valuation in closed-end mutual funds. *Journal of Accounting Research* 40 (4): 1037-1070.

Chay, J. and C. Trzcinka. 1999. Managerial performance and the cross-sectional pricing of close-end funds. *Journal of Financial Economics* 52 (3): 379-408.

Cherkes, M. 2012. Closed-end funds: A survey. *Annual Review of Financial Economics* 4: 431-435.

Cotter, J., and S. Richardson. 2002. Reliability of asset revaluations: The impact of appraiser independence. *Review of Accounting Studies* 7 (4): 435-457.

Cullinan, C., and X. Zheng. 2013. Valuation uncertainty and closed-end fund discounts: Evidence from fair value disclosures. *Accounting & Finance* forthcoming.

Cutler, D., J. Poterba and L. Summers. 1991. Speculative dynamics. *Review of Economic Studies* 58: 529-546.

Day, T., G. Li., and Y. Xu. 2011. Dividend distributions and closed-end fund discounts. *Journal of Financial Economics* 100 (3): 579-593.

Dechow, P., L. Myers, and C. Shakespeare. 2010. Fair value accounting and gains from asset securitizations: A convenient earnings management tool with compensation side-benefits. *Journal of Accounting & Economics* 49 (1-2): 2-25.

Dietrich, J., M. Harris, and K. Muller, III. 2000. The reliability of investment property fair value estimates. *Journal of Accounting and Economics* 30 (2): 125-158.

Easton, P., P. Eddey, and T. Harris. 1993. An investigation of revaluations of tangible long-lived assets. *Journal of Accounting Research* 31 (Supplement): 1-38.

Eccher, E., K. Ramesh, and S. Thiagarajan. 1996. Fair value disclosures by bank holding companies. *Journal of Accounting and Economics* 22 (1-3): 79-117.

Financial Accounting Standards Board (FASB). 1991. *Disclosures about Fair Value of Financial Instruments*. Statement of Financial Accounting Standards No. 107. Norwalk, CT: FASB.

———. 1993. *Accounting for Certain Investments in Debt and Equity Securities*. Statement of Financial Accounting Standards No. 115. Norwalk, CT: FASB.

———. 1998. *Accounting for Derivative Instruments and Hedging Activities*. Statement of Financial Accounting Standards No. 133. Norwalk, CT: FASB.

———. 2007. *The Fair Value Option for Financial Assets and Financial Liabilities—Including an Amendment of FASB Statement No. 115*. Statement of Financial Accounting Standards No. 159. Norwalk, CT: FASB.

———. 2011. *Fair Value Measurement.* Accounting Standards Codification 820. Norwalk, CT: FASB.

Goh, B.W., J. Ng, and K. Yong. 2009. Market pricing of banks' fair value assets reported under SFAS 17 during the 2008 economic crisis. Working paper, Singapore Management University.

Ingersoll, J. 1976. A theoretical and empirical investigation of the dual-purpose funds. *Journal of Financial Economics* 3 (1-2): 83-123.

Kolev, K. 2008. Do investors perceive marking-to-model as marking-to-myth? Early evidence from FAS 157 disclosure. Working paper, Yale University.

Laux, C., and C. Leuz. 2009. The crisis of fair-value accounting: Making sense of the recent debate. *Accounting, Organizations and Society 34* (6-7): 826-834.

———, and ———. 2010. Did fair value accounting contribute to the financial crisis? *Journal of Economic Perspectives* 24 (1): 93-118.

Lee, C., A. Shleifer, and R. Thaler. 1991. Investor sentiment and the closed-end fund puzzle. *Journal of Finance* 46 (1): 75-109.

Malkiel, B. 1977. The valuation of closed-end investment company shares. *Journal of Finance* 32 (3): 847-859.

Nelson, K. 1996. Fair value accounting for commercial banks: An empirical analysis of SFAS No. 107. *The Accounting Review* 71 (2): 161-182.

Penman, S. 2007. Financial reporting quality: Is fair value a plus or a minus? *Accounting and Business Research* (Special Issue: International Accounting Policy): 33-44.

Petroni, K., and J. Wahlen. 1995. Fair values of equity and debt securities and share prices of property-liability insurers. *The Journal of Risk and Insurance* 62 (4): 719-737.

Pontiff, J. 1995. Closed-end fund premia and returns: Implications for financial market equilibrium. *Journal of Financial Economics* 37 (3): 341-370.

———. 1996. Costly arbitrage: Evidence from closed-end funds. *The Quarterly Journal of Economics* 111 (4): 1135-1151.

Riedl, E., and G. Serafeim. 2011. Information risk and fair values: an examination of equity betas. *Journal of Accounting Research* 49 (4): 1083-1122.

Ryan, S. 2008. Accounting in and for the subprime crisis. *The Accounting Review* 83 (6): 1605-1638.

Song, C. J., W. Thomas, and H. Yi. 2010. Value relevance of FAS No. 157 fair value hierarchy information and the impact of corporate governance mechanisms. *The Accounting Review* 85 (4): 1375-1410.

Swaminathan, B. 1996. Time-varying expected small firm returns and closed-end fund discounts. *Review of Financial Studies* 9 (3): 845-887.

Venkatachalam, M. 1996. Value-relevance of banks' derivatives disclosures. *Journal of Accounting and Economics* 38 (2): 387-418.

APPENDIX A

Variable Definitions

ABS_PREM (%)	=	Absolute value of *PREMIUM;*
LEVEL1	=	An indicator variable equal to one if *PRCT_LVL1* is at least 95% or if the fund's sector has an average *PRCT_LVL1* at least 95% when the fund's *PRCT_LVL1* is unavailable, and zero otherwise;
LEVEL1_SHARE	=	Fair value of Level 1 investments per common share;
LEVEL2	=	An indicator variable equal to one if the fund is not classified as either *LEVEL1* or *LEVEL3*, and zero otherwise;
LEVEL2_SHARE	=	Fair value of Level 2 investments per common share;
LEVEL3	=	An indicator variable equal to one if *PRCT_LVL3* is at least 5% or if the fund's sector has an average *PRCT_LVL3* at least 5% when the fund's *PRCT_LVL3* is unavailable, and zero otherwise;
LEVEL3_SHARE	=	Fair value of Level 3 investments per common share;
MV	=	Market capitalization of the fund in millions as of the end of quarter *t*;
NAV_RET (%)	=	NAV returns derived from the compounded daily stock return excluding distributions (*RETX*), daily stock return including distributions (*RET*), and *PREMIUM* using the following formula: $NAV\_RET = [(1 + RETX)\left(\frac{1+\left(PREM_{t-1}/100\right)}{1+\left(PREM_t/100\right)}\right) - 1 + (\frac{1+RET}{1+RETX} - 1)(1 + (PREM_t/100))]$*100;
OTHER_SHARE	=	(Total net asset value – total investments)/number of common shares outstanding;
PRCT_LVL1	=	Level 1 investments scaled by total investments;
PRCT_LVL2	=	Level 2 investments scaled by total investments;
PRCT_LVL3	=	Level 3 investments scaled by total investments;
PREMIUM (%)	=	Premium data taken from Morningstar, calculated as price at quarter *t* scaled by NAV at the end of quarter *t* multiplied by 100, minus 100;
PRICE	=	Fund stock price per share 3 months after fiscal year-end; and,
RET (%)	=	Compounded daily stock return including distributions for quarter *t*.

APPENDIX B

Sector Analysis of Funds with Level 1-3 Assets

Panel A: Observations with Level 1-3 Assets data in Fiscal Year 2009-2012 (653 Funds)

Sector	Sector Name	Fund	Avg. Level 1 Investment ($)	Avg. Level 2 Investment ($)	Avg. Level 3 Investment ($)	Avg. *PRCT_ LVL1* (%)	Avg. *PRCT_ LVL2* (%)	Avg. *PRCT_ LVL3* (%)	Percentage of Funds with Level 1 Classification (%)	Percentage of Funds with Level 2 Classification (%)	Percentage of Funds with Level 3 Classification (%)
CMD	Commodities	2	0	175,626,953	0	0.0	**100.0**	0.0	0.0	100.0	0.0
DCN	Convertible Securities	20	82,664,688	398,737,080	33,690,082	13.3	**83.5**	3.2	0.0	95.0	5.0
DEM	Emerging Market Debt	31	17,291,096	588,583,419	27,299,378	2.3	**95.3**	2.3	0.0	87.1	12.9
DGL	Global Income	61	16,756,504	713,748,871	7,502,496	2.2	**97.0**	0.9	0.0	95.1	4.9
DGV	Government Bond	15	9,975	345,540,078	574	0.0	**100.0**	0.0	0.0	100.0	0.0
DHY	High Yield	136	8,060,418	295,382,153	18,297,846	3.1	87.6	**9.3**	0.0	64.0	36.0
DIG	Investment Grade	54	14,598,294	326,339,863	5,747,218	2.2	**96.5**	1.3	0.0	96.3	3.7
DLP	Loan Participation	74	38,915,804	505,424,071	25,753,173	3.1	88.9	**7.9**	0.0	63.5	36.5
DMH	Municipal High Yield	23	2,048,179	331,454,040	1,059,994	0.6	**99.0**	0.3	0.0	100.0	0.0
DMO	Mortgage Bond	46	10,352,041	150,708,829	65,156,608	8.2	58.6	**33.1**	0.0	34.8	65.2
DMS	Multisector Bonds	72	22,979,170	560,250,031	10,948,084	7.6	**90.1**	2.4	0.0	84.7	15.3
DNM	National Municipal	337	1,992,388	529,266,118	133,631	0.5	**99.5**	0.0	0.0	100.0	0.0
DPF	Preferred Securities	44	401,271,091	218,178,025	4,030,924	57.8	**37.5**	4.7	0.0	93.2	6.8
DSM	Single State Municipal	504	1,041,805	196,236,397	71,079	0.5	**99.4**	0.1	0.0	100.0	0.0
DTM	Taxable Municipal Leveraged Non-Insured	9	2,447,927	707,071,239	9,667	0.4	**99.6**	0.0	0.0	100.0	0.0
FIN	Financial	8	143,442,077	7,020,913	444,525	**97.1**	2.8	0.1	75.0	25.0	0.0
GEN	General Equity	310	340,413,044	68,426,463	3,458,248	81.5	**17.6**	0.9	53.9	41.6	4.5
HYB	Hybrid Equity/Debt	69	200,299,713	140,865,319	672,484	51.0	**48.1**	0.9	11.6	82.6	5.8
INF	Infrastructure	2	149,587,188	48,834,612	0	75.4	**24.6**	0.0	0.0	100.0	0.0
INH	High Income Equity	61	456,269,870	261,356,347	44,636	71.6	**28.4**	0.0	34.4	65.6	0.0
LIF	Life Sciences	14	181,704,223	14,589,397	22,304,552	86.0	6.5	**7.5**	0.0	42.9	57.1
PRS	Property Shares	29	563,971,946	81,728,425	3,375,467	82.1	**17.4**	0.5	31.0	69.0	0.0
RES	Resources	69	803,101,083	56,340,993	4,766,407	89.8	**9.8**	0.4	52.2	46.4	1.4

SMC	Smaller Companies	18	301,025,561	66,012,793	590,291	85.0	**13.1**	1.9	33.3	50.0	16.7
TMT	Telecom Media and Technology	4	66,945,169	60,618,949	3,360,134	59.4	**38.4**	2.1	25.0	75.0	0.0
UTL	Utilities	21	594,400,462	95,140,602	1,585,186	84.2	**15.7**	0.1	47.6	52.4	0.0

Panel B: Quarterly Data Sample (861 Funds)

Sector	Sector Name	Fund	Quarter	Percentage of Level 1 Funds (%)	Percentage of Level 2 Funds (%)	Percentage of Level 3 Funds (%)
CMD	Commodities	6	125	0.0	100.0	0.0
DCN	Convertible Securities	9	361	0.0	92.5	7.5
DEM	Emerging Market Debt	12	609	0.0	89.0	11.0
DGL	Global Income	29	1,384	0.0	95.2	4.8
DGV	Government Bond	17	442	0.0	100.0	0.0
DHY	High Yield	57	2,522	0.0	48.2	51.8
DIG	Investment Grade	20	951	0.0	93.4	6.6
DLP	Loan Participation	26	770	0.0	69.9	30.1
DMH	Municipal High Yield	8	385	0.0	100.0	0.0
DMO	Mortgage Bond	26	875	0.0	22.5	77.5
DMS	Multisector Bonds	40	1,419	0.0	93.7	6.3
DNM	National Municipal	127	6,665	0.0	100.0	0.0
DPF	Preferred Securities	17	669	0.0	96.1	3.9
DSM	Single State Municipal	182	8,755	0.0	100.0	0.0
DTM	Taxable Municipal Leveraged Non-Insured	4	31	0.0	100.0	0.0
FIN	Financial	3	153	62.1	37.9	0.0
GEN	General Equity	141	5,574	44.9	51.2	4.0
HYB	Hybrid Equity/Debt	30	1,037	3.4	86.0	10.6
INF	Infrastructure	1	5	0.0	100.0	0.0
INH	High Income Equity	29	807	30.4	69.6	0.0
LIF	Life Sciences	5	231	0.0	21.6	78.4
PRS	Property Shares	25	656	15.1	84.9	0.0
RES	Resources	27	614	52.6	46.7	0.7
SMC	Smaller Companies	9	445	30.1	56.2	13.7
TMT	Telecom Media and Technology	4	159	24.5	75.5	0.0
UTL	Utilities	7	224	50.9	49.1	0.0

Panel C: Annual Data Sample (851 Funds)

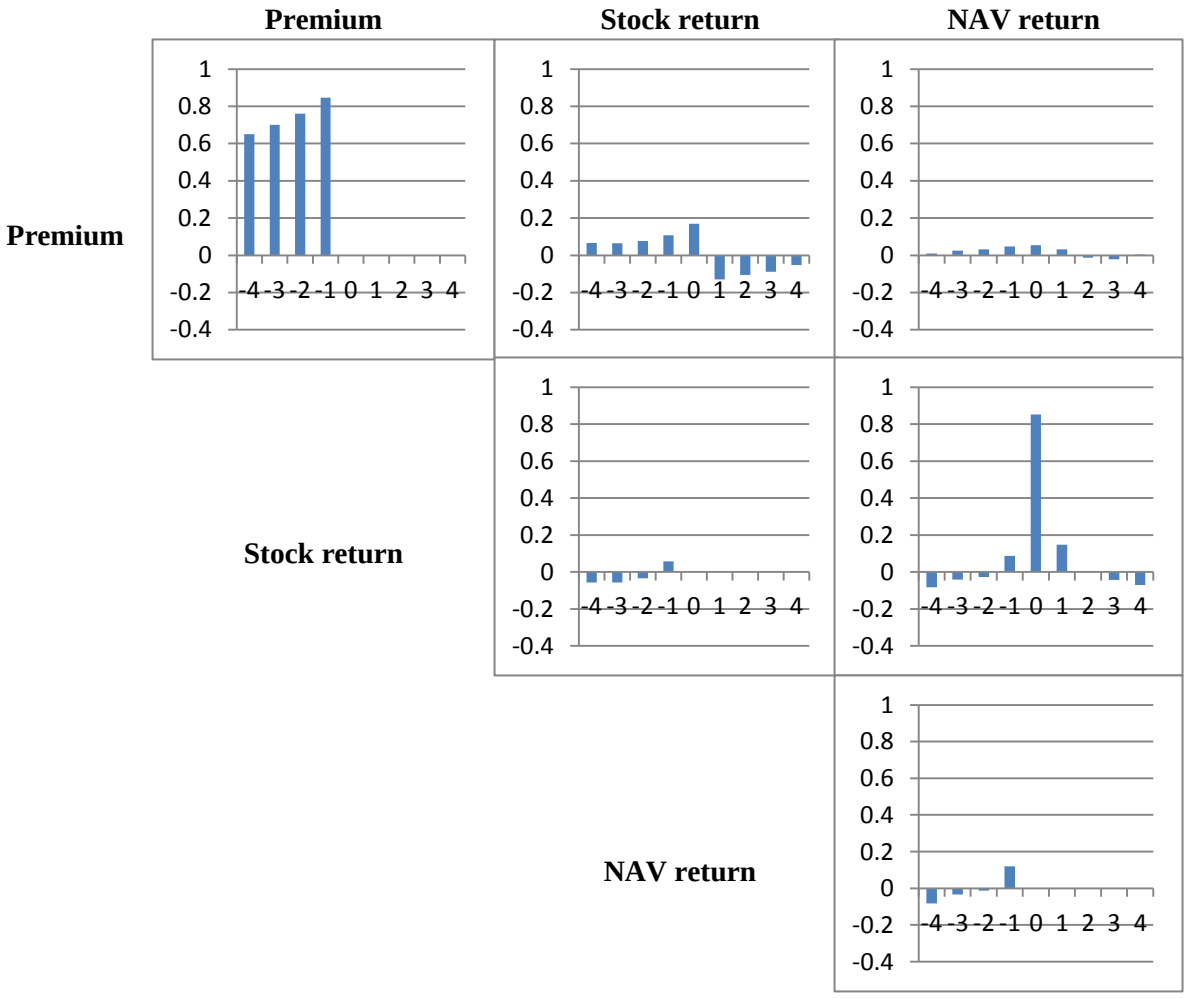
Sector	Sector Name	Fund	Year	Percentage of Level 1 Funds (%)	Percentage of Level 2 Funds (%)	Percentage of Level 3 Funds (%)
CMD	Commodities	6	29	0.0	100.0	0.0
DCN	Convertible Securities	9	81	0.0	92.6	7.4
DEM	Emerging Market Debt	12	145	0.0	89.0	11.0
DGL	Global Income	27	335	0.0	95.2	4.8
DGV	Government Bond	17	100	0.0	100.0	0.0
DHY	High Yield	57	596	0.0	48.3	51.7
DIG	Investment Grade	20	233	0.0	93.1	6.9
DLP	Loan Participation	26	172	0.0	71.5	28.5
DMH	Municipal High Yield	8	92	0.0	100.0	0.0
DMO	Mortgage Bond	23	196	0.0	27.6	72.4
DMS	Multisector Bonds	40	326	0.0	93.6	6.4
DNM	National Municipal	127	1619	0.0	100.0	0.0
DPF	Preferred Securities	17	152	0.0	96.7	3.3
DSM	Single State Municipal	180	2110	0.0	100.0	0.0
DTM	Taxable Municipal Leveraged Non-Insured	3	6	0.0	100.0	0.0
FIN	Financial	3	38	63.2	36.8	0.0
GEN	General Equity	141	1350	45.6	50.2	4.1
HYB	Hybrid Equity/Debt	30	244	2.5	86.5	11.1
INH	High Income Equity	1	1	0.0	100.0	0.0
LIF	Life Sciences	29	177	32.8	67.2	0.0
PRS	Property Shares	5	57	0.0	21.1	78.9
RES	Resources	25	150	16.7	83.3	0.0
SMC	Smaller Companies	26	141	51.8	47.5	0.7
TMT	Telecom Media and Technology	9	106	29.2	56.6	14.2
UTL	Utilities	3	39	23.1	76.9	0.0

This appendix presents the sector breakdown for our three samples. Panel A reports the sector breakdown for the hand-collected sample. The bolded values reflect the sector classification type. Panels B and C report the sector breakdown for the quarterly and annual data samples, respectively. Using the hand-collected sample data as reported in Panel A (before financial and market variable restrictions are imposed), we retrospectively classify funds to the yearly and quarterly samples using the 2009-2012 classifications. When a fund's Level 1-3 investment data are not available in 2009-2012, we apply the fund's sector classification type to that particular fund.

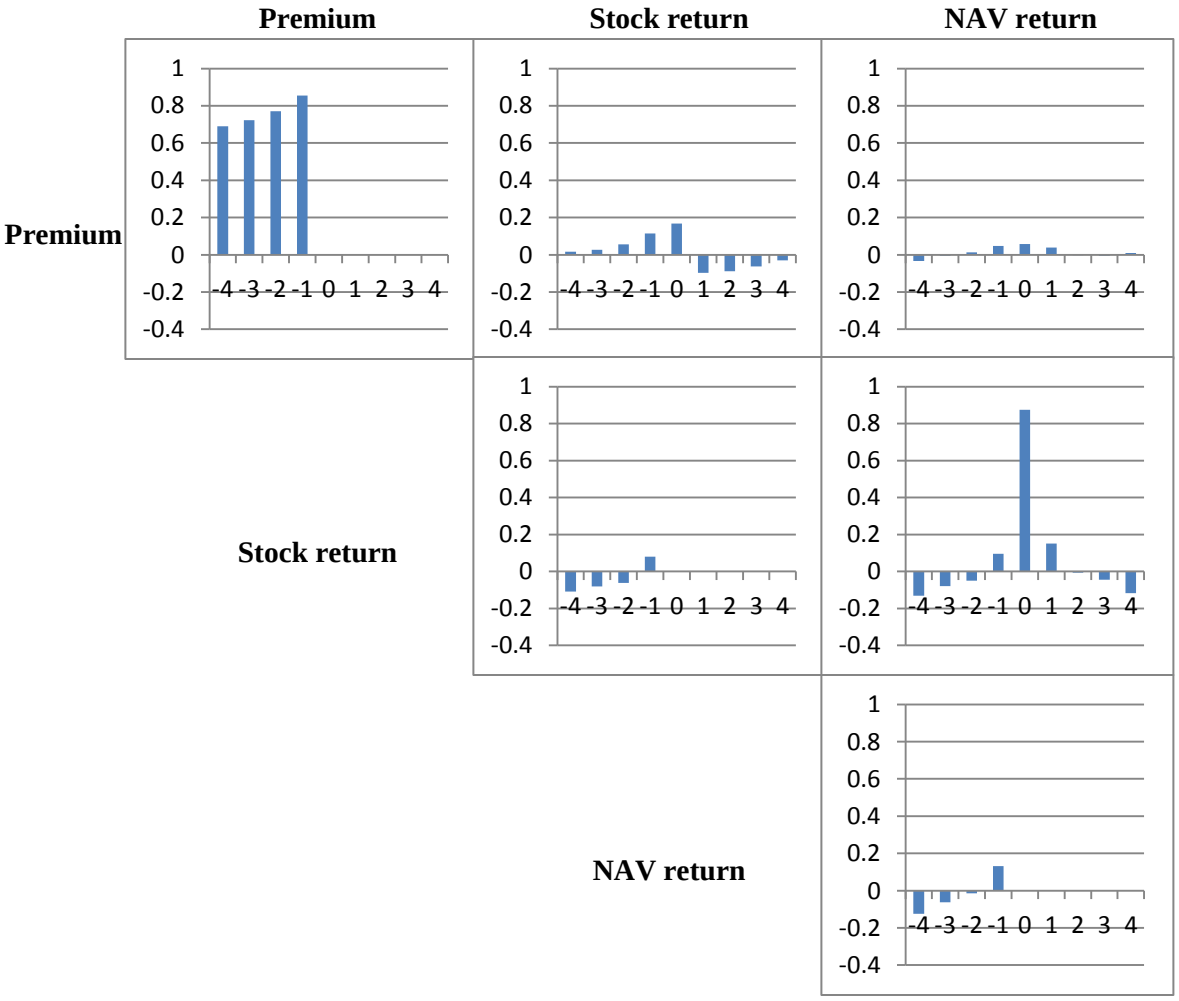
FIGURE 1

Correlogram of Premia and Returns-Quarterly Data

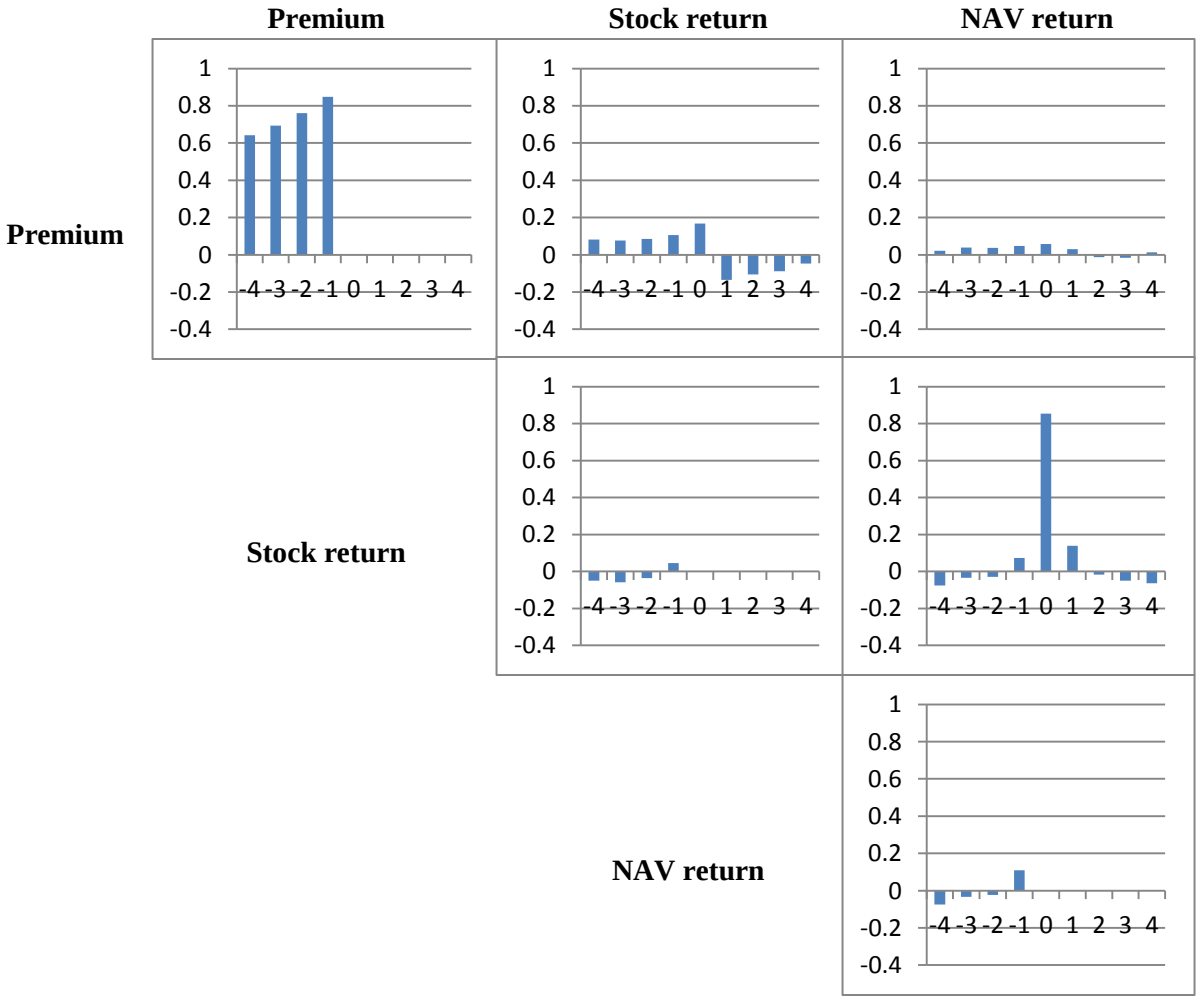
Panel A: Total Sample (35,868 fund-quarters)



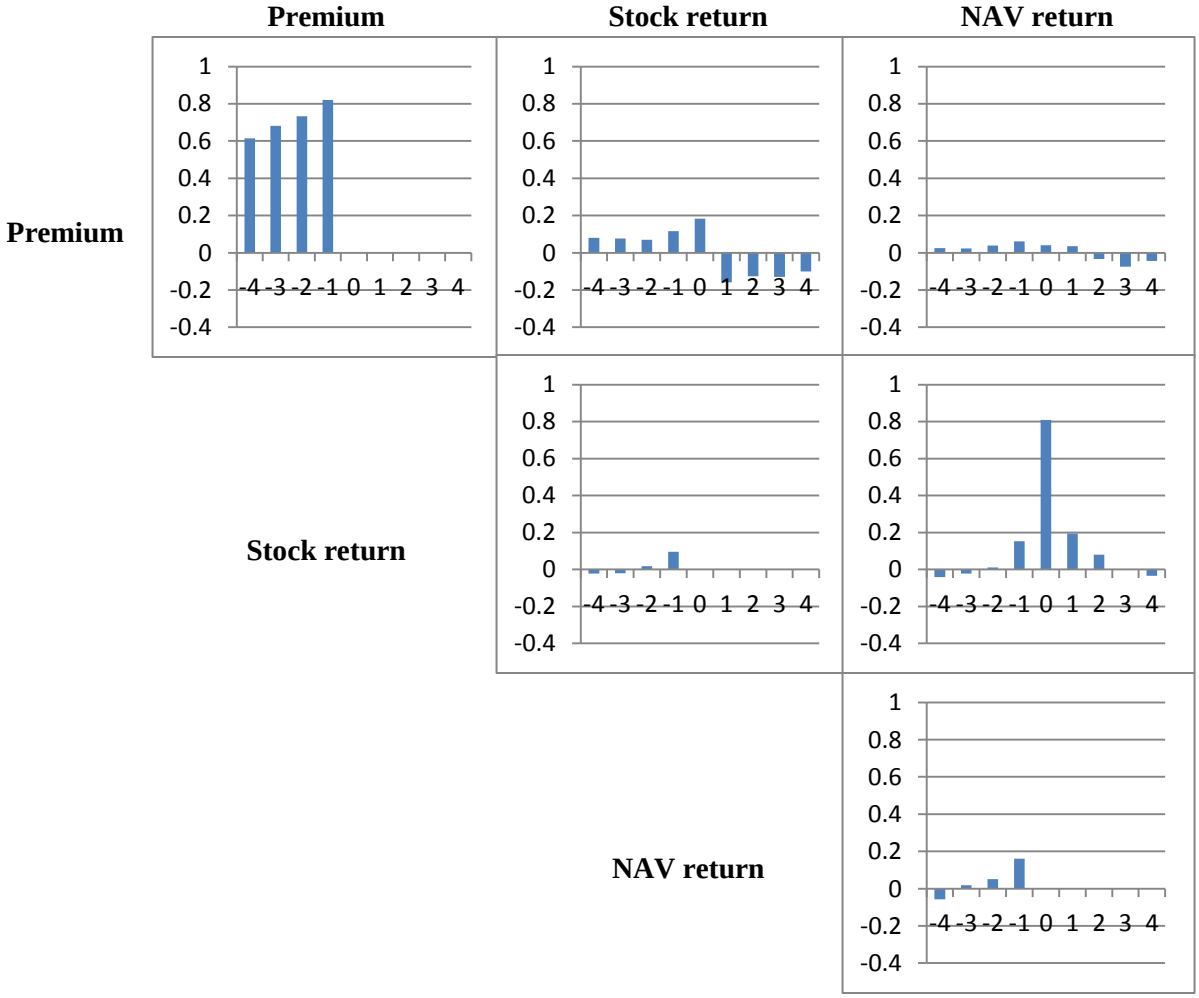
Panel B: Level 1 Funds (3,584 fund-quarters)



Panel C: Level 2 Funds (29,152 fund-quarters)



Panel D: Level 3 Funds (3,132 fund-quarters)

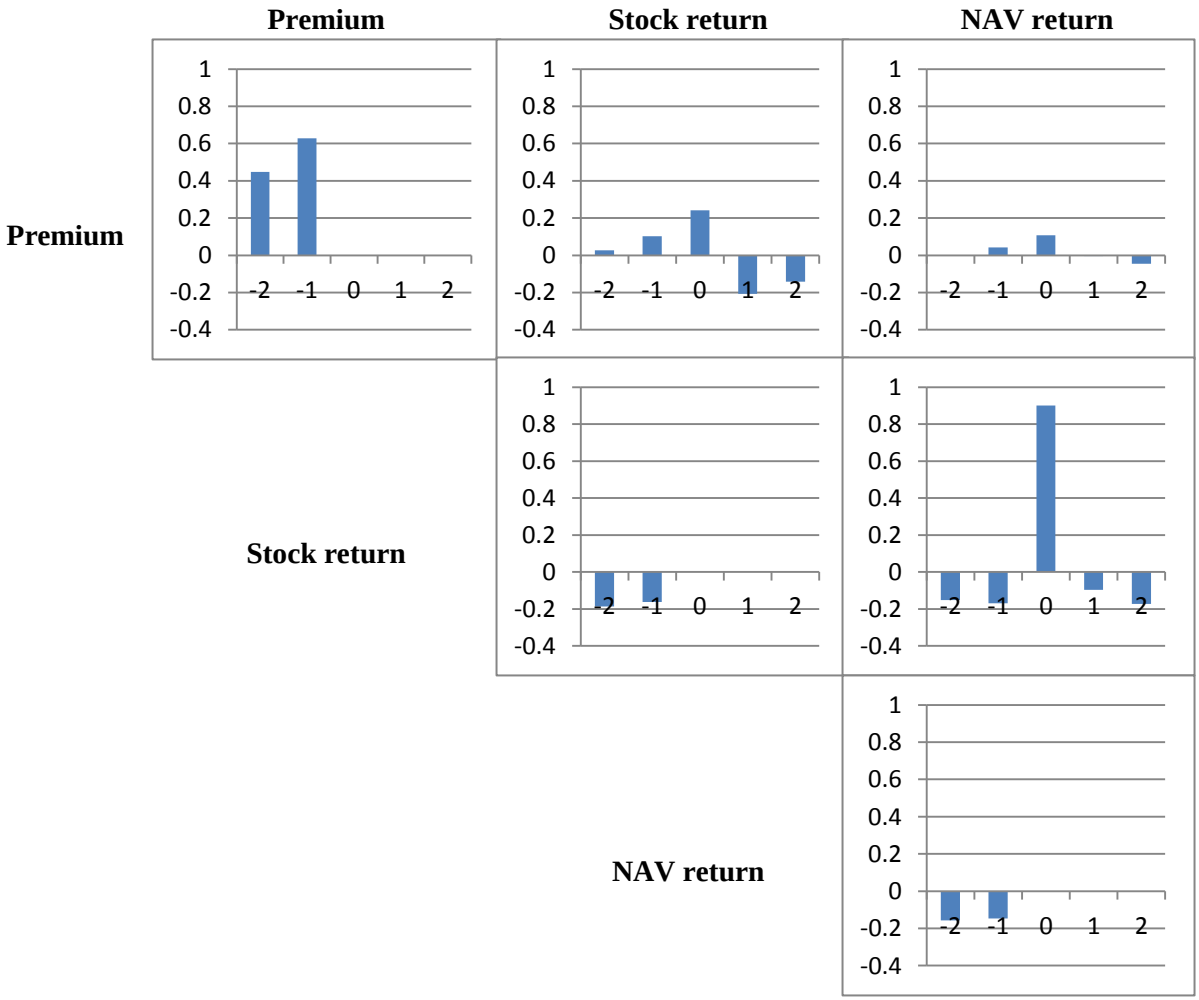


This figure presents four panels that plot the pooled correlations of the contemporaneous variable on the vertical axis with the time *t* variable on the horizontal axis using quarterly data. Panel A presents the correlations for the total sample, and Panels B through D present the correlations for Level 1, Level 2, and Level 3 funds, respectively. *t* varies from -4 to +4 quarters. Premium corresponds to "*PREMIUM*"; stock return corresponds to "*RET*"; and NAV return corresponds to "*NAV_RET"*. See Appendix A for variable definitions.

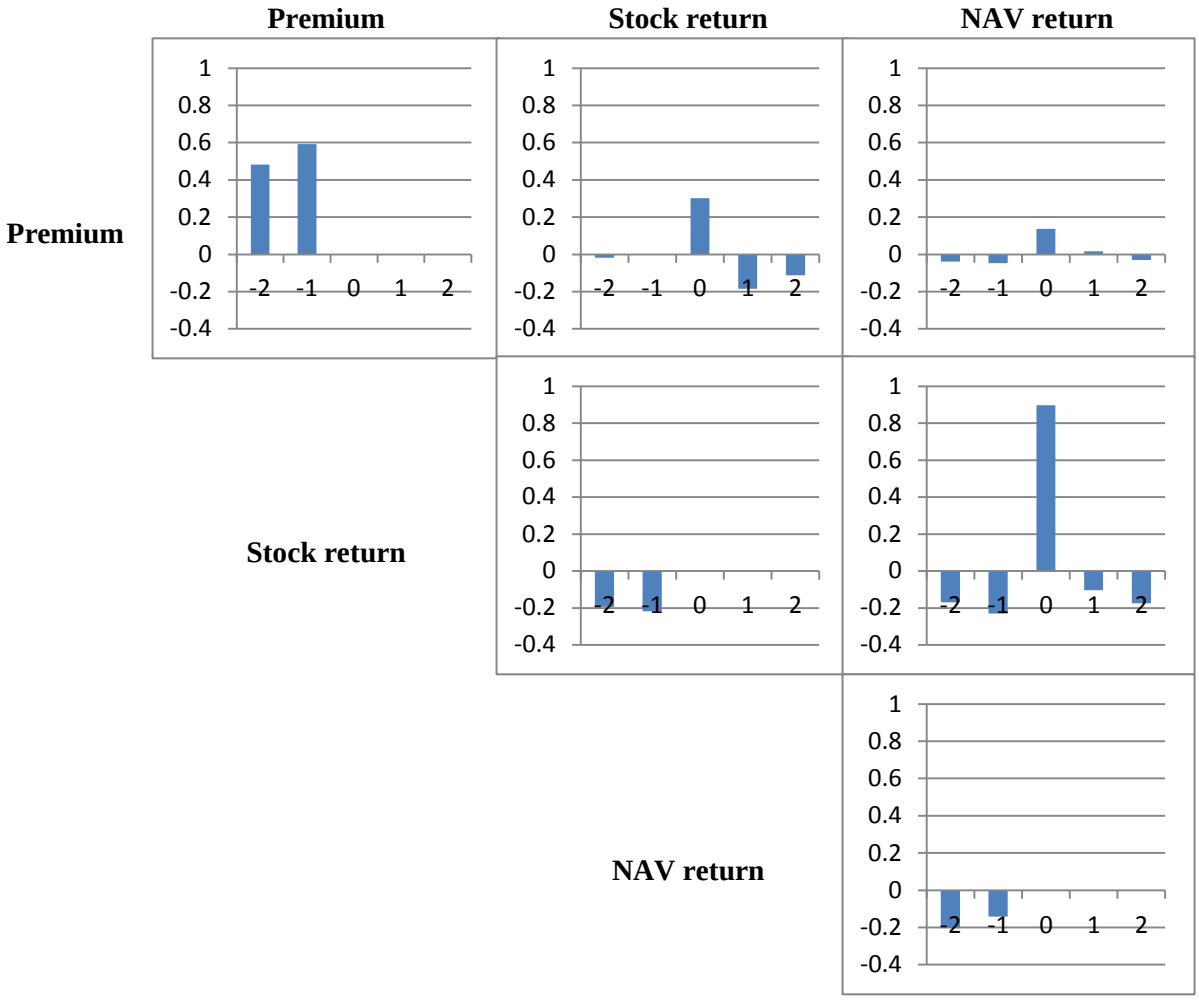
FIGURE 2

Correlogram of Premia and Returns-Annual Data

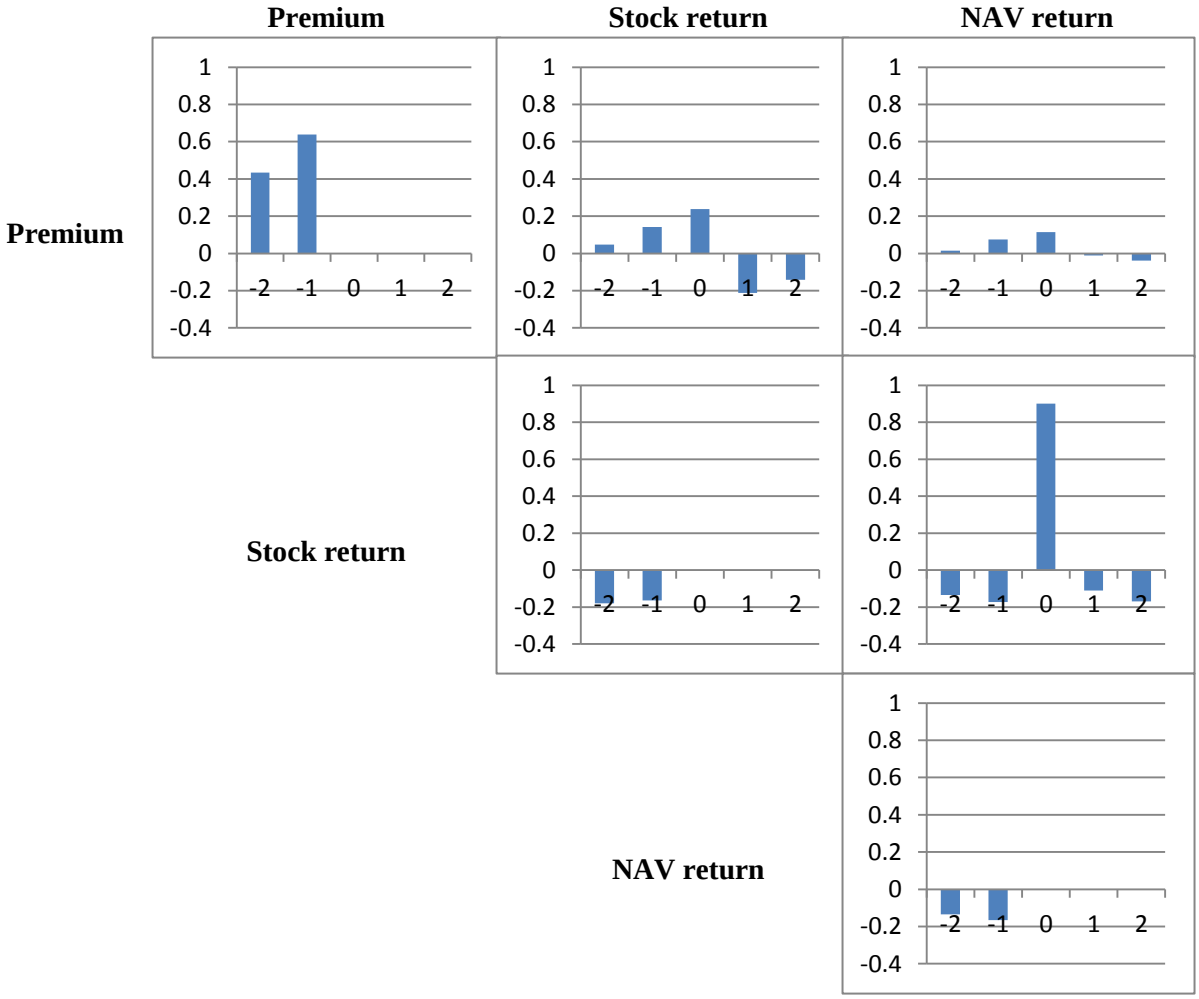
Panel A: Total Sample (8,548 fund-years)



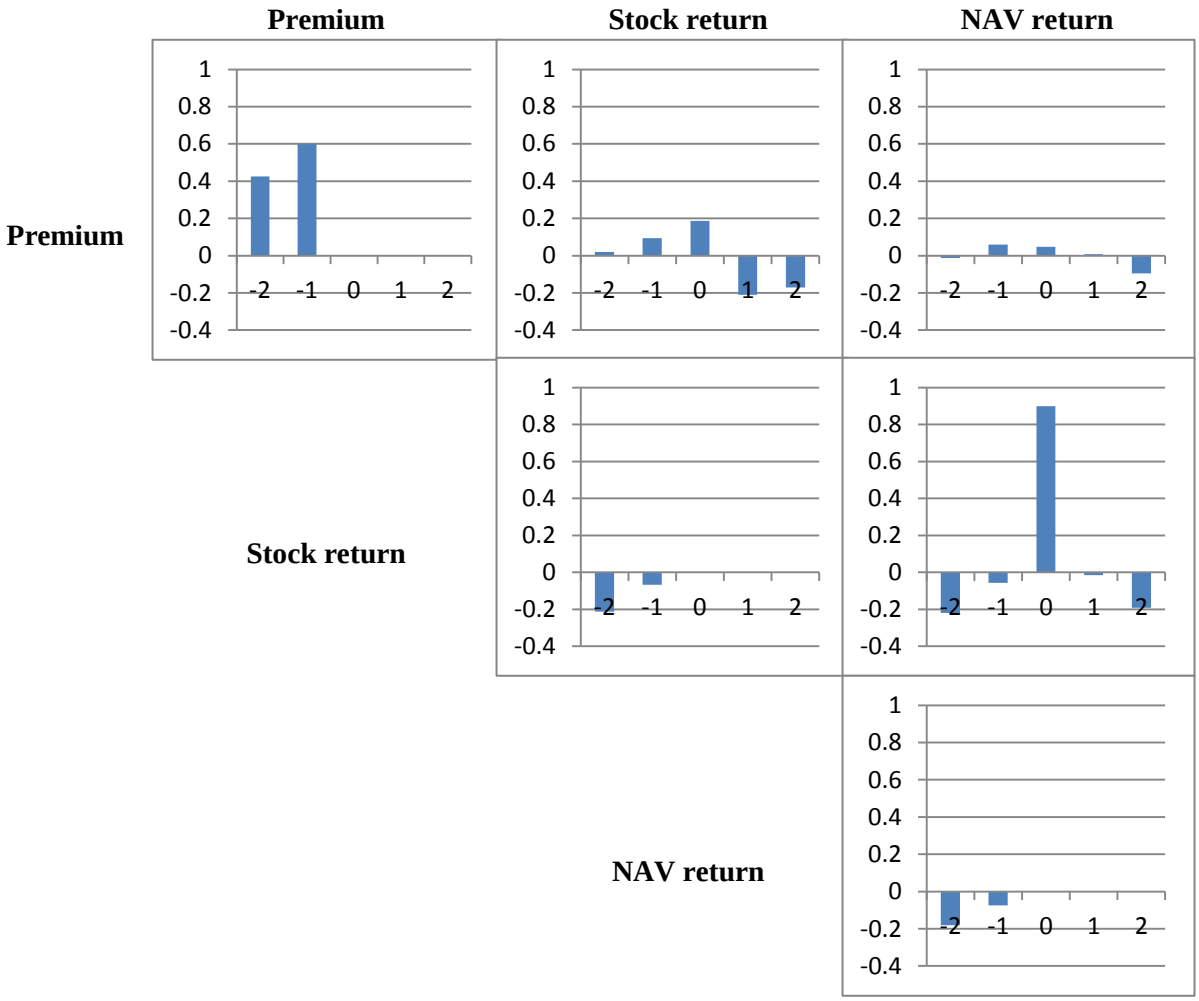
Panel B: Level 1 Funds (869 fund-years)



Panel C: Level 2 Funds (6,956 fund-years)



Panel D: Level 3 Funds (723 fund-years)

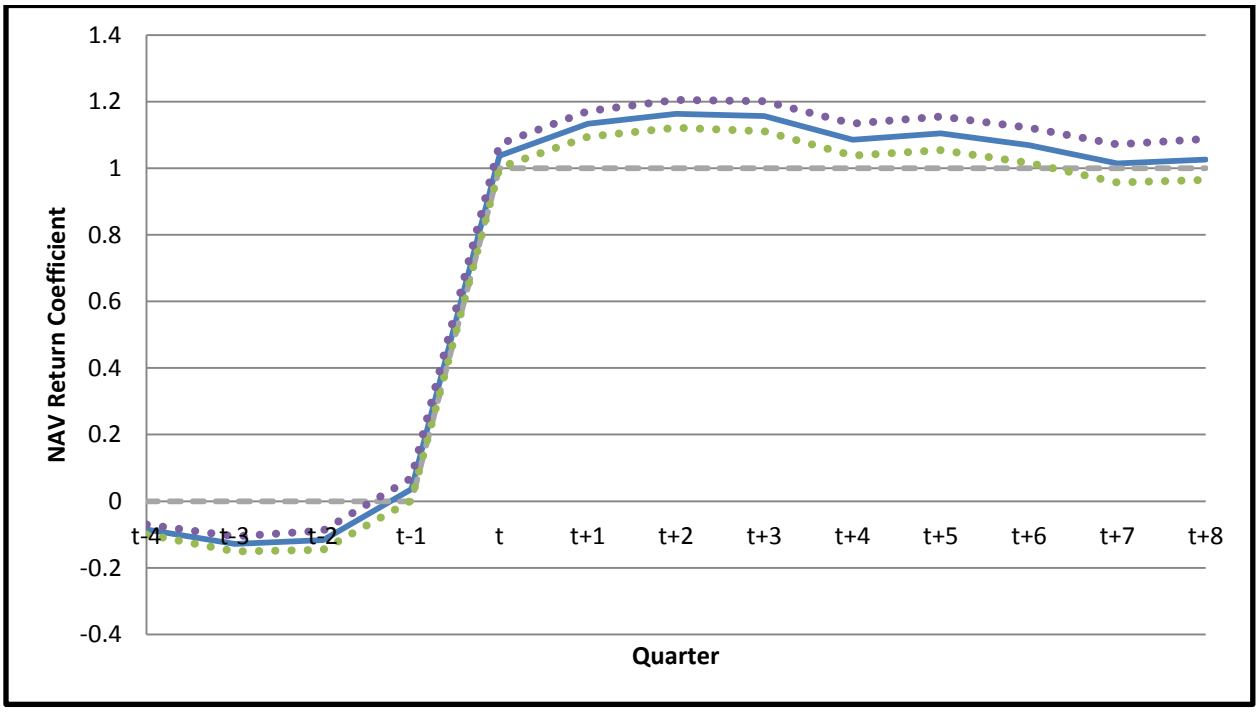


This figure presents four panels that plot the pooled correlations of the contemporaneous variable on the vertical axis with the time *t* variable on the horizontal axis using annual data. Panel A presents the correlations for the total sample, and Panels B through D present the correlations for Level 1, Level 2, and Level 3 funds, respectively. *t* varies from -2 to +2 years. Premium corresponds to "*PREMIUM*"; stock return corresponds to "*RET*"; and NAV return corresponds to "*NAV_RET"*. See Appendix A for variable definitions.

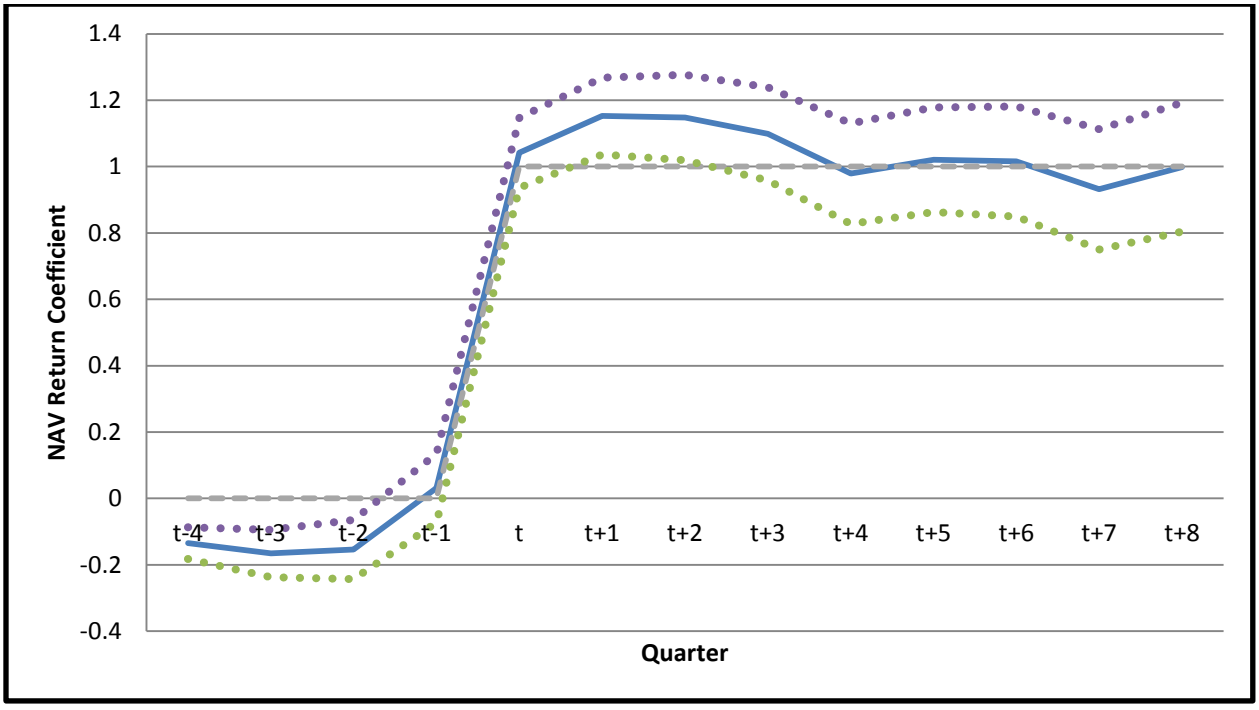
FIGURE 3

NAV Response Analysis: Cumulative Stock Returns Regressed on Contemporaneous NAV Returns

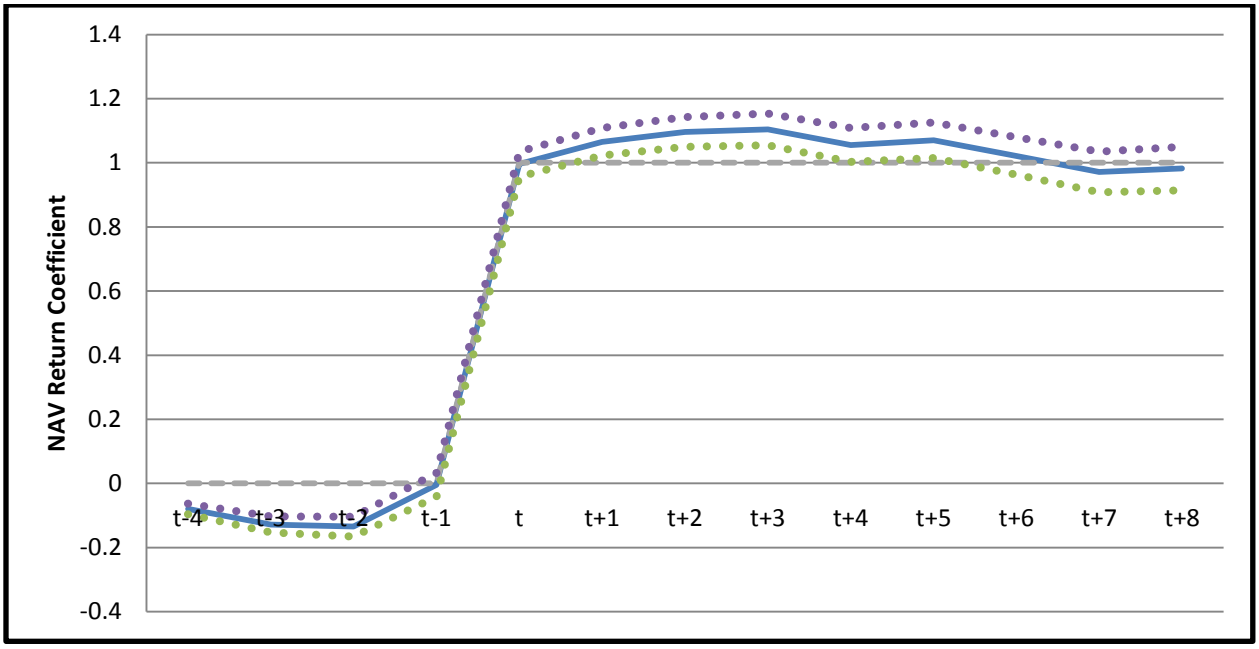
Panel A: Total Sample (35,868 fund-quarters)



Panel B: Level 1 Funds (3,584 fund-quarters)



Panel C: Level 2 Funds (29,152 fund-quarters)



Panel D: Level 3 Funds (3,132 fund-quarters)

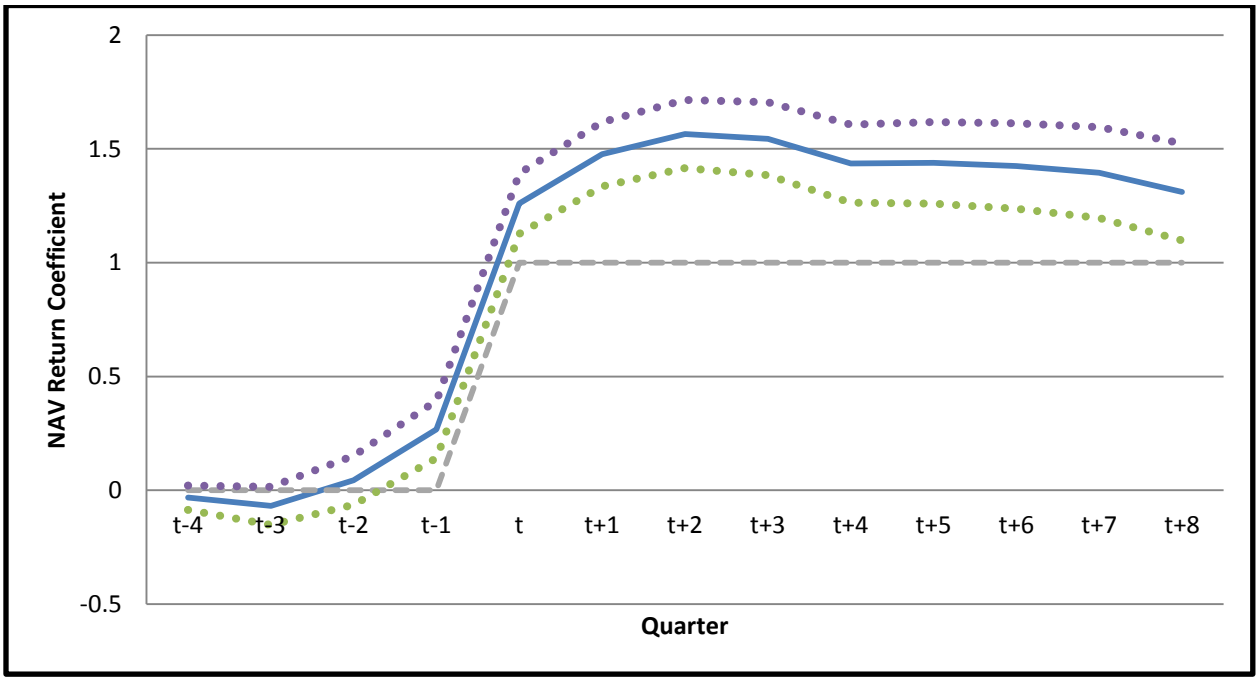
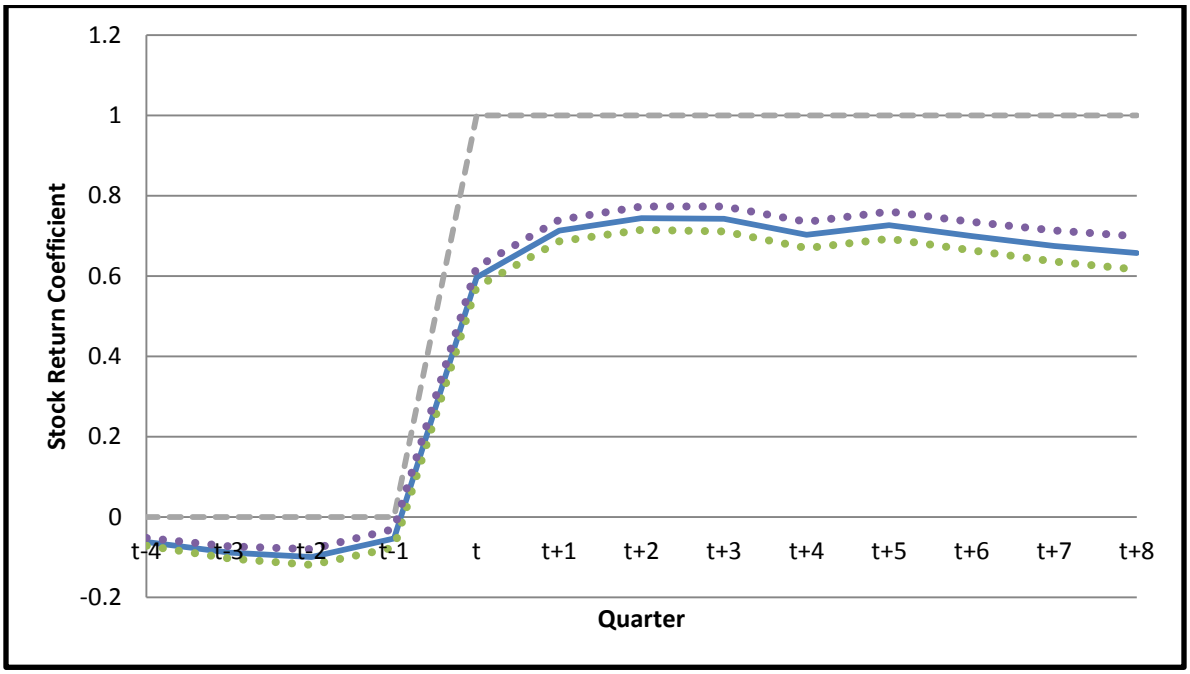


Figure 3 presents the actual (solid line), predicted (broken line), and the 95% confidence interval (dotted lines) of the relations between cumulative stock returns and contemporaneous NAV returns. For each panel, the actual relation is obtained from the regression coefficient (β) on NAV returns from the following regression: $CR_q = \alpha + \beta NAV\_RET_t + \varepsilon_t$, where CR_q is the cumulative stock returns from the beginning of quarter *t-4* to the end of the quarter q, and where q ranges from *t-4* to *t+8*. Panel A presents the relations for the total sample, and Panels B through D present the relations for Level 1, Level 2, and Level 3 funds, respectively.

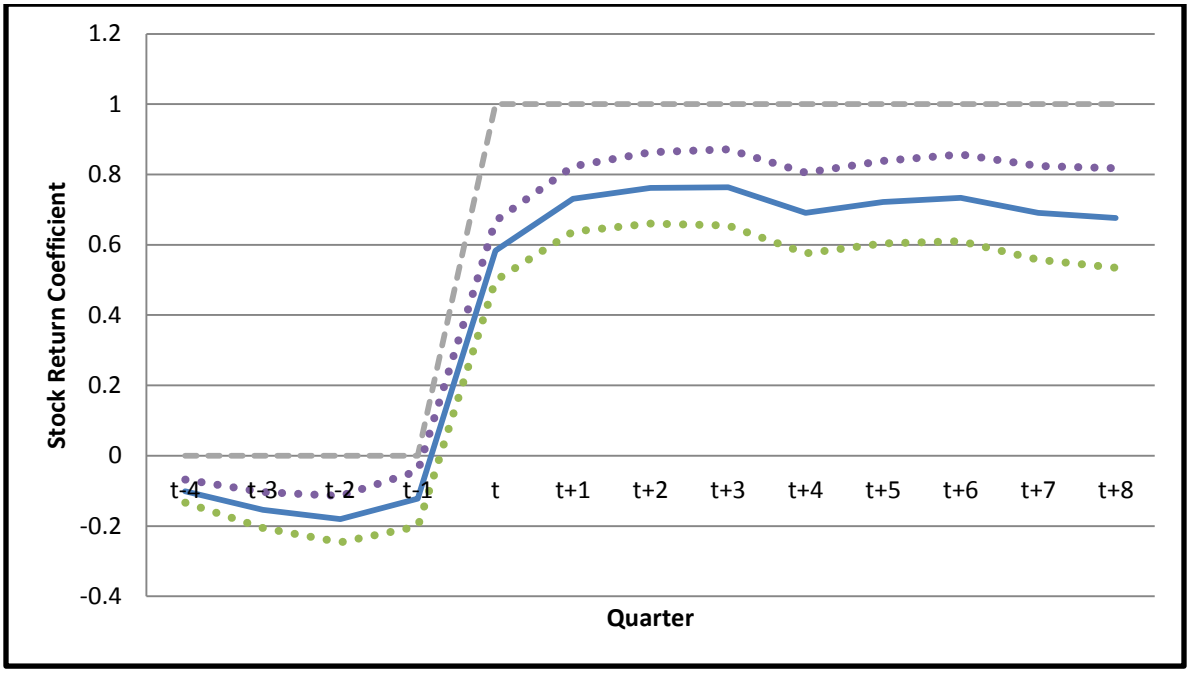
FIGURE 4

Return Response Analysis: Cumulative NAV Returns Regressed on Contemporaneous Stock Returns

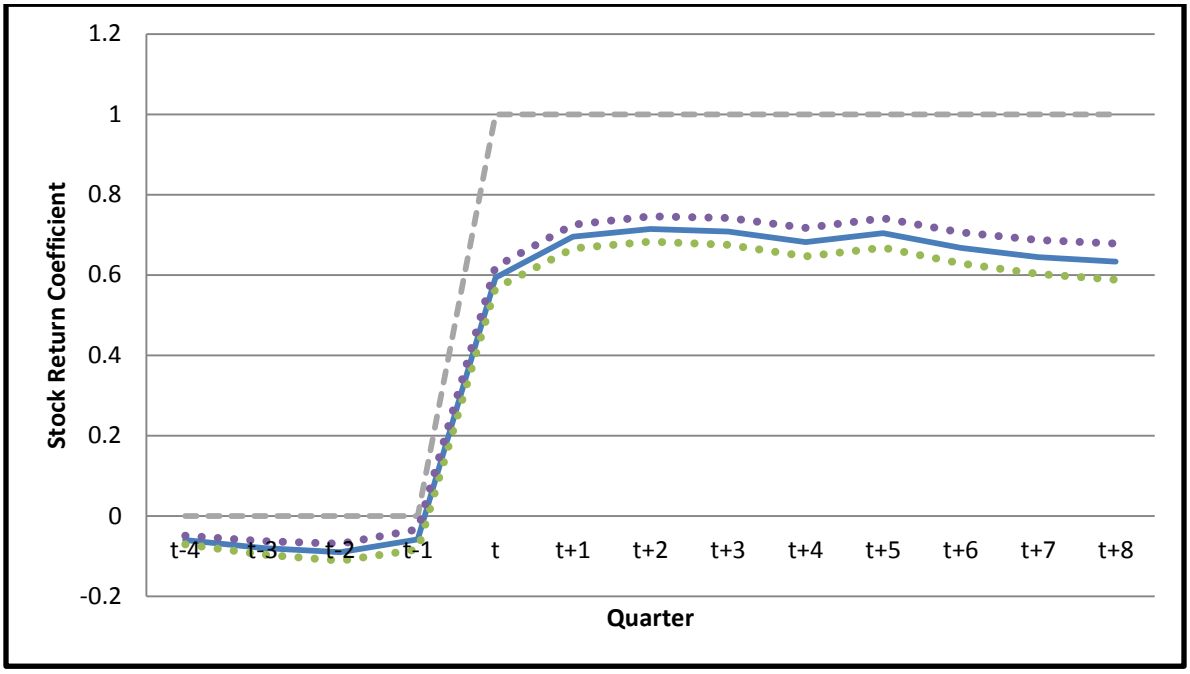
Panel A: Total Sample (35,868 fund-quarters)



Panel B: Level 1 Funds (3,584 fund-quarters)



Panel C: Level 2 Funds (29,152 fund-quarters)



Panel D: Level 3 Funds (3,132 fund-quarters)

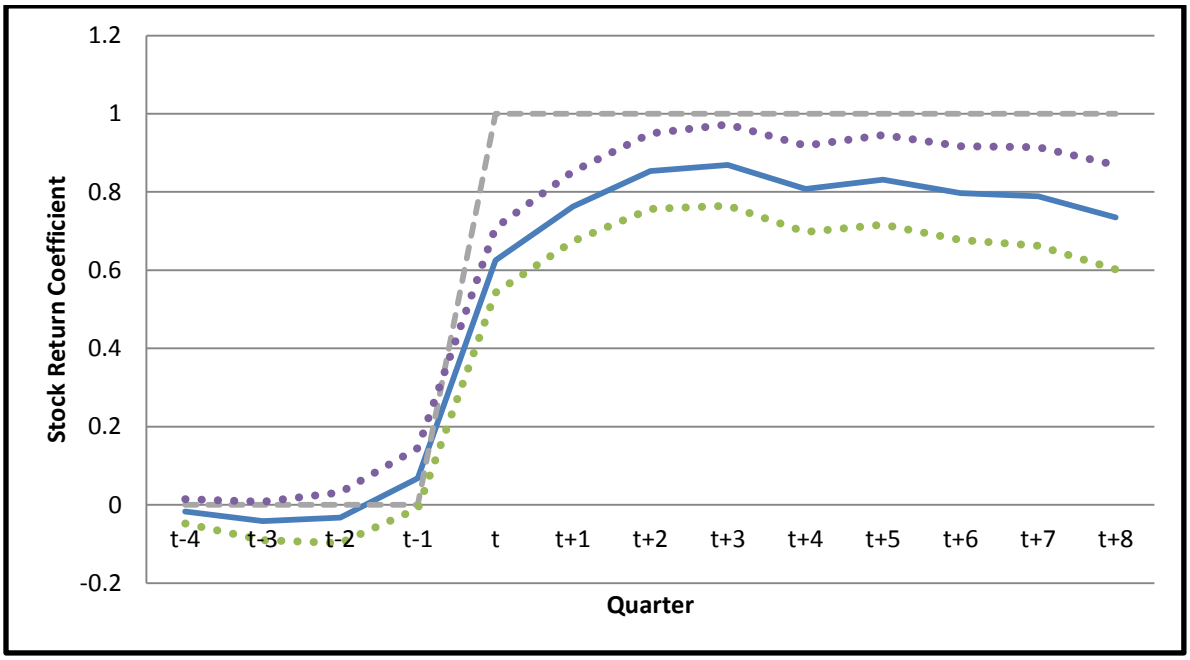


Figure 4 presents the actual (solid line), predicted (broken line), and the 95% confidence interval (dotted lines) of the relations between cumulative NAV returns and contemporaneous stock returns. For each panel, the actual relation is obtained from the regression coefficient (β) on stock returns from the following regression: $CR_q = \alpha + \beta RET_t + \varepsilon_t$, where $CR_q$is the cumulative NAV returns from the beginning of quarter *t-4* to quarter q, and where q ranges from *t-4* to t+8. Panel A presents the relations for the total sample, and Panels B through D present the relations for Level 1, Level 2, and Level 3 funds, respectively.

TABLE 1

Sample Selection

Panel A: Hand-Collected Data

	Observations	
Sample Selection Criteria	Fund	Year
Available in Morningstar and CRSP from 2009-2012	715	2,556
Less: observations without Level 1-3 data	(41)	(141)
	674	2,415
Less: observations without required NAV data	(0)	(1)
	674	2,414
Less: observations without actual NAV in the last 10 days of the year	(21)	(39)
	653	2,375
Less: observations with missing financial and market variables in the analysis	(8)	(334)
Final sample	645	2,041

Panel B: Quarterly Data

	Observations	
Sample Selection Criteria	Fund	Quarter
Available in Morningstar and CRSP from 1980-2012	867	45,069
Less: observations without required NAV data	(3)	(3,094)
	864	41,975
Less: observations without actual NAV in the last 10 days of the quarter	(1)	(967)
	863	41,008
Less: observations with missing financial and market variables in the analysis	(1)	(5,119)
	862	35,889
Less: observations without Level 1-3 data	(1)	(21)
Final sample	861	35,868
Composition of final sample:		
Level 1 funds	115	3,584
Level 2 funds	735	29,152
Level 3 funds	101	3,132

Panel C: Annual Data

	Observations	
Sample Selection Criteria	Fund	Year
Available in Morningstar and CRSP from 1980-2012	867	11,888
Less: observations without required NAV data	(4)	(1,308)
	863	10,580
Less: observations without actual NAV in the last 10 days of the year	(10)	(932)
	853	9,648
Less: observations with missing financial and market variables in the analysis	(1)	(1,095)
	852	8,553
Less: observations without Level 1-3 data	(1)	(5)
Final sample	851	8,548
Composition of final sample:		
Level 1 funds	113	869
Level 2 funds	721	6,956
Level 3 funds	91	723

This table presents the sample selection criteria. Panel A reports number of funds and annual observations available at each step of the sample selection for the hand-collected data; Panel B reports number of funds and quarterly observations available at each step of the sample selection for the quarterly data; while Panel C reports number of funds and annual observations for the annual data. A fund is classified as a Level 1 fund (*LEVEL1*) when the percentage of Level 1 investments to total investments (*PRCT_LVL1*) is at least 95%. A fund is classified as a Level 3 fund (*LEVEL3*) when *PRCT_LVL3* is at least 5%. Finally, a fund is classified as Level 2 fund (*LEVEL2*) when it is not classified as either *LEVEL1* or *LEVEL3*.

TABLE 2

Descriptive Statistics-Hand Collected Data

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
PRICE	2,041	13.44	1.31	5.86	10.56	13.43	15.36	21.93	71.82	5.38
LEV1_SHARE	2,041	4.41	0.00	0.00	0.00	0.23	5.97	21.85	61.42	8.25
LEV2_SHARE	2,041	13.49	0.00	0.00	4.63	14.82	21.65	24.72	60.10	9.14
LEV3_SHARE	2,041	0.34	0.00	0.00	0.00	0.00	0.02	1.51	26.28	1.57
OTHER_SHARE	2,041	-4.62	-59.00	-10.00	-7.82	-4.68	-0.48	0.31	12.40	4.38

This table presents the descriptive statistics of the main variables in the analysis for the hand-collected data. See Appendix A for variable definitions.

TABLE 3

Descriptive Statistics-Quarterly Data

Panel A: Total Sample (35,868 fund-quarters)

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
NAV_RET (%)	35,868	1.88	-90.34	-10.92	-0.68	2.12	4.85	13.16	139.99	8.46
RET (%)	35,868	2.07	-91.90	-13.80	-2.25	2.51	6.62	16.26	200.81	10.43
PREMIUM (%)	35,868	-4.10	-49.48	-17.21	-9.86	-4.94	0.52	11.04	104.63	9.55
ABS_PREM (%)	35,868	7.97	0.00	0.61	3.25	6.76	11.01	19.11	104.63	6.66
MV ($ Mil.)	35,868	289.93	1.34	32.14	82.77	167.01	348.46	938.72	6,065.67	364.40

Panel B: Level 1 Funds (3,584 fund-quarters)

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
NAV_RET (%)	3,584	2.06	-90.34	-18.63	-3.71	2.67	8.72	20.21	70.12	12.14
RET (%)	3,584	2.18	-91.90	-21.23	-5.15	2.43	9.87	24.49	117.09	14.43
PREMIUM (%)	3,584	-6.04	-34.64	-21.21	-13.58	-8.95	-1.58	18.17	98.51	13.63
ABS_PREM (%)	3,584	11.67	0.00	1.24	5.93	10.29	15.00	25.66	98.51	9.27
MV ($ Mil.)	3,584	351.65	2.95	30.02	100.55	210.77	468.08	1,148.74	3,650.24	375.00

Panel C: Level 2 Funds (29,152 fund-quarters)

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
NAV_RET (%)	29,152	1.87	-73.80	-8.99	-0.48	2.09	4.57	11.49	139.99	7.75
RET (%)	29,152	2.07	-79.71	-12.08	-1.92	2.49	6.29	14.81	126.39	9.57
PREMIUM (%)	29,152	-3.98	-49.48	-16.03	-9.31	-4.63	0.50	10.04	104.63	8.60
ABS_PREM (%)	29,152	7.40	0.00	0.58	3.06	6.33	10.34	17.61	104.63	5.93
MV ($ Mil.)	29,152	287.47	1.34	32.25	80.82	163.55	341.11	925.01	6,065.67	372.91

Panel D: Level 3 Funds (3,132 fund-quarters)

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
NAV_RET (%)	3,132	1.73	-52.26	-13.62	-0.83	2.22	5.22	15.22	78.92	9.58
RET (%)	3,132	1.96	-72.77	-17.18	-3.19	2.71	7.39	18.96	200.81	12.47
PREMIUM (%)	3,132	-2.94	-43.87	-18.93	-10.13	-4.13	2.58	16.67	74.91	11.68
ABS_PREM (%)	3,132	9.10	0.00	0.63	3.52	7.36	12.56	22.95	74.91	7.89
MV ($ Mil.)	3,132	242.21	2.64	32.38	83.49	162.61	319.58	703.76	1,834.50	242.39

This table presents the descriptive statistics of the main variables in the analysis for the quarterly data. See Appendix A for variable definitions.

TABLE 4

Descriptive Statistics-Annual Data

Panel A: Total Sample (8,548 fund-years)

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
NAV_RET (%)	8,548	8.12	-82.86	-21.94	2.22	7.60	13.88	35.68	218.75	18.55
RET (%)	8,548	9.09	-93.52	-25.85	-1.44	8.79	18.59	45.51	201.75	23.28
PREMIUM (%)	8,548	-4.46	-47.20	-17.55	-10.33	-5.25	0.28	10.92	93.49	9.45
ABS_PREM (%)	8,548	8.18	0.00	0.64	3.44	7.02	11.40	19.38	93.49	6.50
MV ($ Mil.)	8,548	286.82	2.08	31.66	82.04	165.89	346.29	924.89	5,745.09	360.58

Panel B: Level 1 Funds (869 fund-years)

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
NAV_RET (%)	869	9.35	-82.86	-37.41	-3.27	10.70	22.57	52.47	184.79	27.15
RET (%)	869	10.58	-93.52	-43.16	-8.52	9.71	28.25	67.20	178.15	33.23
PREMIUM (%)	869	-6.76	-32.89	-22.04	-13.62	-9.30	-2.37	16.32	93.49	12.59
ABS_PREM (%)	869	11.71	0.00	1.44	6.45	10.57	15.26	26.08	93.49	8.18
MV ($ Mil.)	869	343.81	5.34	29.10	99.56	200.36	467.93	1,141.18	2,752.87	364.64

Panel C: Level 2 Funds (6,956 fund-years)

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
NAV_RET (%)	6,956	7.92	-76.68	-17.09	2.57	7.40	12.89	31.58	218.75	16.64
RET (%)	6,956	8.90	-88.47	-22.47	-0.54	8.60	17.53	40.45	201.75	20.95
PREMIUM (%)	6,956	-4.31	-47.20	-16.67	-9.79	-4.97	0.26	10.13	66.28	8.62
ABS_PREM (%)	6,956	7.62	0.00	0.60	3.20	6.56	10.74	18.05	66.28	5.90
MV ($ Mil.)	6,956	284.74	2.08	32.02	80.59	162.43	340.67	915.71	5,745.09	369.53

Panel D: Level 3 Funds (723 fund-years)

Variable	N	Mean	Min	P5	Q1	Median	Q3	P95	Max	Std
NAV_RET (%)	723	8.52	-71.70	-31.20	0.22	8.24	15.61	41.39	174.93	22.69
RET (%)	723	9.18	-73.66	-36.77	-4.98	9.85	20.46	54.08	179.79	29.22
PREMIUM (%)	723	-3.17	-43.87	-19.36	-10.82	-4.13	2.27	16.83	63.15	11.94
ABS_PREM (%)	723	9.35	0.00	0.59	3.46	7.74	13.00	22.13	63.15	8.07
MV ($ Mil.)	723	238.30	3.89	32.38	79.37	160.27	318.31	708.38	1,834.50	240.03

This table presents the descriptive statistics of the main variables in the analysis for the annual data. See Appendix A for variable definitions.

TABLE 5

An Analysis of the Relation between Fund Prices and Fair Values-Sample from 2009-2012

$$\boldsymbol{PRICE_{i,t} = \alpha_1 LEVEL1\_SHARE_{i,t} + \alpha_2 LEVEL2\_SHARE_{i,t} + \alpha_3 LEVEL3\_SHARE_{i,t} + \alpha_4 OTHER\_SHARE_{i,t} + \varepsilon_{i,t}} \quad \textbf{(1)}$$

LEVEL1_SHARE$_t$	0.946***
	(215.01)
LEVEL2_SHARE$_t$	0.904***
	(206.15)
LEVEL3_SHARE$_t$	0.948***
	(41.27)
OTHER_SHARE$_t$	0.711***
	(59.37)
Adj. R^2	0.9874
N	2,041

Tests of statistical difference in Equation (1):

	T-Stat or F-Stat	P-Value
H0: α1 = α3	-0.11	0.9102
H0: α2 = α3	-1.91	0.0560
H0: α1 = α2	8.40	0.0000
H0: α1 = α2 = α3	36.45	0.0000

This table presents an analysis of the relation between the fund stock price per share (*PRICE*$_t$) and the fair value of Level 1 (*LEVEL1_SHARE*$_t$), Level 2 (*LEVEL2_SHARE*$_t$), Level 3 (*LEVEL3_SHARE*$_t$) assets per share, and the fair value of other assets and liabilities (*OTHER_SHARE*$_t$) using 2009-2012 fair value data. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. T-statistics and p-values are calculated using clustered standard errors by fund and quarter. See Appendix A for variable definitions.

TABLE 6

Serial Correlation of Stock Returns and NAV Returns-Quarterly Data

Panel A: Stock Returns

$$\boldsymbol{RET_{i,t} = \alpha_0 + \alpha_1 RET_{i,t-1} + \varepsilon_{i,t}} \quad \textbf{(2)}$$

$$\boldsymbol{RET_{i,t} = \alpha_0 + \alpha_1 RET_{i,t-1} + \alpha_2 RET_{i,t-2} + \varepsilon_{i,t}} \quad \textbf{(3)}$$

	Total Sample		Level 1		Level 2		Level 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)
Intercept	1.991***	2.060***	2.055***	2.239***	2.012***	2.082***	1.834***	1.783***
	(31.27)	(29.02)	(8.05)	(8.25)	(29.82)	(27.04)	(7.53)	(6.83)
RET_{t-1}	0.058***	0.060***	0.079***	0.084***	0.046***	0.047***	0.096**	0.098**
	(5.60)	(5.73)	(3.68)	(3.83)	(3.72)	(3.78)	(2.41)	(2.40)
RET_{t-2}		-0.038***		-0.068***		-0.039***		0.009
		(-3.50)		(-3.15)		(-3.06)		(0.23)
Adj R^2	0.0034	0.0048	0.0063	0.0108	0.0021	0.0035	0.0090	0.0098
N	34,892	33,925	3,492	3,400	28,376	27,608	3,024	2,917

Test of statistical difference in Equation (3):

	Level 3 vs. Levels 1&2		Level 3 vs. Level 1		Level 3 vs. Level 2	
	T-Stat	P-Value	T-Stat	P-Value	T-Stat	P-Value
RET_{t-1}	1.03	0.3034	0.31	0.7583	1.21	0.2278
RET_{t-2}	1.32	0.1863	1.72	0.0854	1.15	0.2492

Panel B: NAV Returns

$$NAV\_RET_{i,t} = \alpha_0 + \alpha_1 NAV\_RET_{i,t-1} + \varepsilon_{i,t} \quad \textbf{(4)}$$

$$NAV\_RET_{i,t} = \alpha_0 + \alpha_1 NAV\_RET_{i,t-1} + \alpha_2 NAV\_RET_{i,t-2} + \varepsilon_{i,t} \quad \textbf{(5)}$$

	Overall		Level 1		Level 2		Level 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)
Intercept	1.642***	1.668***	1.796***	1.850***	1.654***	1.695***	1.434***	1.341***
	(30.27)	(27.36)	(8.15)	(7.84)	(28.34)	(25.22)	(7.50)	(6.50)
NAV_RET_{t-1}	0.120***	0.123***	0.131***	0.134***	0.110***	0.113***	0.162***	0.156***
	(10.29)	(10.34)	(5.82)	(5.87)	(7.54)	(7.67)	(4.53)	(4.17)
NAV_RET_{t-2}		-0.027**		-0.032		-0.035**		0.026
		(-2.08)		(-1.28)		(-2.13)		(0.71)
Adj R^2	0.0145	0.015	0.0172	0.0178	0.0121	0.0132	0.0261	0.0264
N	34,892	33,925	3,492	3,400	28,376	27,608	3,024	2,917

Test of statistical difference in Equation (5):

	Level 3 vs. Levels 1&2		Level 3 vs. Level 1		Level 3 vs. Level 2	
	T-Stat	P-Value	T-Stat	P-Value	T-Stat	P-Value
NAV_RET_{t-1}	0.96	0.3373	0.51	0.6110	1.06	0.2887
NAV_RET_{t-2}	1.52	0.1277	1.30	0.1923	1.51	0.1319

This table presents an analysis of the serial correlation of stock returns (RET_t) in Panel A and NAV returns (NAV_RET_t) in Panel B using quarterly data. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. T-statistics and p-values are calculated using clustered standard errors by fund and quarter. See Appendix A for variable definitions.

TABLE 7

Serial Correlation of Stock Returns and NAV Returns-Annual Data

Panel A: Stock Returns

$$\boldsymbol{RET_{i,t} = \alpha_0 + \alpha_1 RET_{i,t-1} + \varepsilon_{i,t}} \quad \textbf{(2)}$$

$$\boldsymbol{RET_{i,t} = \alpha_0 + \alpha_1 RET_{i,t-1} + \alpha_2 RET_{i,t-2} + \varepsilon_{i,t}} \quad \textbf{(3)}$$

	Total Sample		Level 1		Level 2		Level 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)
Intercept	10.452***	12.611***	13.757***	17.161***	10.149***	12.101***	9.512***	12.365***
	(30.75)	(32.46)	(10.30)	(11.44)	(28.56)	(29.46)	(6.60)	(7.58)
RET_{t-1}	-0.161***	-0.201***	-0.210***	-0.265***	-0.164***	-0.204***	-0.069	-0.097
	(-8.95)	(-10.98)	(-5.84)	(-7.08)	(-7.49)	(-9.19)	(-1.16)	(-1.60)
RET_{t-2}		-0.209***		-0.244***		-0.203***		-0.213***
		(-12.41)		(-7.34)		(-9.30)		(-4.94)
Adj R^2	0.0264	0.0736	0.0476	0.1080	0.0271	0.0723	0.0046	0.0516
N	7,616	6,738	777	691	6,212	5,508	627	539

Test of statistical difference in Equation (3):

	Level 3 vs. Levels 1&2		Level 3 vs. Level 1		Level 3 vs. Level 2	
	T-Stat	P-Value	T-Stat	P-Value	T-Stat	P-Value
RET_{t-1}	1.87	0.0615	2.35	0.0187	1.66	0.0973
RET_{t-2}	-0.05	0.9597	0.57	0.5658	-0.21	0.8336

Panel B: NAV Returns

$$NAV\_RET_{i,t} = \alpha_0 + \alpha_1 NAV\_RET_{i,t-1} + \varepsilon_{i,t} \quad \textbf{(4)}$$

$$NAV\_RET_{i,t} = \alpha_0 + \alpha_1 NAV\_RET_{i,t-1} + \alpha_2 NAV\_RET_{i,t-2} + \varepsilon_{i,t} \quad \textbf{(5)}$$

	Overall		Level 1		Level 2		Level 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	coef.	coef.	coef.	coef.	coef.	coef.	coef.	coef.
	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)
Intercept	9.084***	10.789***	11.329***	14.358***	8.892***	10.313***	8.904***	11.233***
	(31.75)	(31.95)	(10.43)	(11.83)	(28.64)	(27.25)	(7.60)	(8.38)
NAV_RET_{t-1}	-0.144***	-0.191***	-0.135***	-0.204***	-0.162***	-0.208***	-0.079	-0.112
	(-6.74)	(-8.50)	(-3.33)	(-4.88)	(-6.08)	(-7.29)	(-1.06)	(-1.47)
NAV_RET_{t-2}		-0.175***		-0.230***		-0.157***		-0.181***
		(-9.38)		(-6.45)		(-6.64)		(-3.41)
Adj R^2	0.0215	0.0591	0.0200	0.0822	0.0273	0.0594	0.0055	0.0419
N	7,616	6,738	777	691	6,212	5,508	627	539

Test of statistical difference in Equation (5):

	Level 3 vs. Levels 1&2		Level 3 vs. Level 1		Level 3 vs. Level 2	
	T-Stat	P-Value	T-Stat	P-Value	T-Stat	P-Value
NAV_RET_{t-1}	1.12	0.2629	1.05	0.2921	1.18	0.2383
NAV_RET_{t-2}	-0.09	0.9244	0.77	0.4391	-0.41	0.6811

This table presents an analysis of the serial correlation of stock returns (RET_t) in Panel A and NAV returns (NAV_RET_t) in Panel B using annual data. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. T-statistics and p-values are calculated using clustered standard errors by fund and year. See Appendix A for variable definitions.