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The Short-Term Impact of Director Trading in UK Closed-End Funds

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August 2013

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Abstract

Most closed-end funds are transparent entities that hold securities that are actively traded in liquid markets. In such a setting, the argument that director transactions mitigate information asymmetry has very limited applicability. Our results provide support for the theory of Barber and Odean (2008): retail investor decision-making is influenced by attention-grabbing events. Director purchases are one such attention-grabbing event and are associated with significant positive price returns - the magnitudes of which are linked to the size of the purchase, the size of the fund, and the investment mandate. Trading volumes increase at the time of the purchase but most of the initial price responses and trading volumes dissipate over the following 15 days.

1. Introduction

Most of the empirical literature on the impact of director transactions has, to date, focussed on the price response to announcements of director purchases of conventional companies. In most cases, that response is positive and is usually attributed to the role of the director purchase in mitigating information asymmetry. Directors and managers know more about the future prospects of the firm than outside shareholders and therefore a director purchase signals to the outside, less-well-informed shareholders that the firm is undervalued.

This paper examines the price response to director purchases of closed-end funds that they oversee. Closed-end funds are transparent entities - the securities held by the fund are known as are their market values - and therefore there is much less information asymmetry between outside shareholders, the fund managers who manage the fund, and the board of directors. Given this transparency and the limited instances of information asymmetry, a director transaction should trigger little or no price reaction.

The theory of Barber and Odean (2008) provides the framework for this paper. Buying decisions of retail investors, faced with an array of investment opportunities, tend to focus on those securities that are the subject of attention-grabbing news. The empirical results suggest that director purchases are one such attention-grabbing event. The announcements of director purchases of closed-end funds are accompanied by significant positive abnormal price returns while there is an insignificant price response to the announcement of director sells. In line with previous literature, larger abnormal returns are associated with larger purchases. Larger returns are also associated with purchases in those funds that have smaller market capitalisations and in those funds that hold assets whose values are uncertain (those investing in private equity, venture capital, and hedge funds).

The notion of a hierarchy of information also has limited applicability in the case of closed-end funds because directors, executive and non-executive, are privy to the same information at board meetings. The results bear this out: the price response on the day of purchase is similar across executive and non-executives. However, purchases made by a fund's chairman and executive directors appear to be regarded as more 'valuable' by attention-driven investors in the weeks immediately after the purchase.

The liquidity effects are also in line with attention-grabbing investor behaviour. Trading volumes peak around the day of the purchase but revert quickly to pre-purchase levels. As expected, an increase in this uninformed trading does not have any impact on bid-ask spreads.

The paper is structured as follows: aspects of the UK closed-end-fund industry are described in Section 2. Section 3 reviews the literature relating to director transactions and sets out the hypotheses. The sample and the methodology are described in Section 4. The empirical results are described in Section 5 and Section 6 concludes.

2. The UK Closed-End-Fund Industry

Closed-end funds are publicly quoted companies that typically invest in the equity of other companies; these other companies are normally also quoted. The market value of the closed-end-fund's assets (the Net Asset Value, NAV) is, in the UK, publically available on a daily basis. In most cases, the asset management function is delegated to a fund management firm. The fund board comprises a majority of independent members and may include a representative of the fund management firm. The board determines the investment mandate and receives and reviews reports on the performance of the fund from the manager on a regular basis. Details of the mandate and the individual investments held by a fund are normally detailed in the annual financial statements while an abbreviated list is usually provided in the half-year statement.

Liquidity in the UK closed-end-fund sector has long been an issue. A report commissioned by the Association of Investment Companies in 2002 identified the causes for the decline in liquidity including a reduction in the level of institutional investor activity, a reluctance of market makers to commit capital (funds were at the time quoted on the SEAQ system), and private-client fund managers having minimum liquidity thresholds (defined by market capitalisation) which led them to exclude some small trusts from their buy lists. Poor liquidity was identified as particularly critical for those funds with small market capitalisations.

The UK Model Code sets out the provisions relating to the disclosure of directors' trades. Directors must inform their company of the transaction as soon as possible and no later than the fifth business day after a transaction and the company must inform the London Stock Exchange of the transaction no later than the end of the business day following the receipt of

the information by the company. The London Stock Exchange disseminates the information via its Regulatory News Services. Directors of UK companies are prohibited from trading during the two month prior to preliminary, interim, and final earnings announcements but, even outside these periods, directors must seek approval to trade from the chairman of the board.

3. Literature Review and Hypotheses

3.1 Price reaction

A number of studies investigate the short-term impact of director purchases of conventional UK companies (Hillier and Marshall, 2002; Friederich, Gregory, Matatko, and Tonks, 2002; and Fidrmuc, Goergen, and Renneboog, 2006). The common finding is that director purchases are met with positive price returns: Fidrmuc et al.(2006) report abnormal returns at day +4 of 1.7% while Dardas and Güttler (2011) report abnormal price returns of 2.5% at day +4 and 3.9% at day +20. These positive responses to director purchases are not limited to the UK market. Results of similar magnitude are reported by Dardas and Güttler for over 30,000 director purchases from eight European markets: an average abnormal return of 1.1% at day +1 and 2.1% at day +20. Similar price patterns are recorded by Dymke and Walter (2008) and Betzer and Theissen (2009).

The existing literature also reports that the larger the director purchase, the more positive the price returns. For the UK, Fidrmuc et al. (2006) report abnormal returns of 4.6% for day +4 for large trades (defined as > 0.1% of the market capitalisation) and 1.1% for small trades. These results are of a similar magnitude to those for markets outside the UK (Betzer and Theissen, 2009; Dardas and Güttler, 2011).

There are three aspects of information asymmetry that have a relevance to this study: the asymmetry between directors and external shareholders, the asymmetry between the fund and the capital market, and the asymmetry between various insiders (executive vs non-executive directors). Each of these aspects is discussed below.

With respect to the asymmetry between insiders and external shareholders, Aboody and Lev (2000) argue that asymmetry is higher in R&D-intensive firms (and in those firms with

uncertain asset values and future prospects) and find that insider purchases in these firms are followed by larger price gains. In a similar vein, Dardas and Güttler (2011) find that the price effects of purchases are higher in those companies in more R&D-intensive sectors (healthcare, energy, and IT). In the closed-end sector, this type of asymmetry is not likely to affect the majority of UK closed-end funds – as noted above, most funds have well defined mandates and invest in known and actively-traded securities. However, there are also closed-end funds with more specialised mandates. Differences in mandate are therefore likely to be the source of this type of asymmetry. At one end of the spectrum are funds that hold liquid UK-traded quoted securities (a mandate to invest, say, in 'UK Growth' or 'UK Smaller'). These funds are unlikely to be characterised as having information asymmetries. At the other end of the spectrum lie funds investing in private equity, venture capital, and unquoted companies where informational asymmetries are likely to exist. In the middle ground lie those funds with mandates to invest overseas and hold securities that, although perhaps being traded on liquid markets, might be unfamiliar to UK investors.

Regarding the asymmetry between the firm and the capital markets, it is argued that large capitalisation firms are followed by more analysts and are subject to more scrutiny with the result that informational asymmetry is expected to be smaller. Conversely, smaller firms are likely to have higher levels of information asymmetry. A number of studies find supporting evidence: announcements of insider purchases in small market-capitalisation firms are associated with higher price returns (Lakonishok and Lee, 2001; Aussenegg and Ranzi, 2008; and Betzer and Theissen, 2009, 2010).

Regarding the informational asymmetries across members of firm boards, the theory of an information hierarchy theory asserts that purchases made by senior members, who are assumed to have access to superior information, will be associated with higher price returns (Seyhun, 1986). However, the empirical results are mixed: Dardas and Güttler (2011) find some evidence to support this information hierarchy hypothesis while Fidrmuc et al. (2006) and Betzer and Theissen (2009, 2010) report inconsistent results. For reasons noted above, this type of asymmetry is unlikely to be an issue in the closed-end-fund market.

In a literature unrelated directly to director purchases, research has focussed on the choice of securities that investors consider when making an investment decision. Odean (1999) suggests that investors limit their choice of stocks in which to invest by focussing only on

those stocks that have caught their attention while Barber and Odean (2008) investigate whether attention impacts on the buy-decision of retail, rather than institutional, investors. They argue that retail investors face an overwhelming choice in making a 'buy' decision and use 'attention' as a screening device to select stocks. 'Attention' is, however, not thought to affect sell decisions of retail investors as these investors focus their attention only on those securities that they already hold. Measures of 'attention' include companies publicised in the press, companies whose shares have recorded high recent returns/hit a limit price, and companies that have experienced high trading volumes (Seasholes and Wu, 2007). Further evidence of retail investors investing in those stocks that have caught their attention is provided by Grullon, Kanatas, and Weston (2004). Firms subject to attention-grabbing events have large buy-sell imbalances and record abnormal price returns that persist, on average, for the following two trading weeks (Barber and Odean, 2008; Barber, Odean, and Zhu, 2009). Barber and Odean (2008) argue that attention-grabbing events affect only the investing behaviour of retail investors; because institutional investors are not typically faced with a lack of resources to scan for stocks, their investing behaviour is not affected by attention.

The applicability of the Barber and Odean (2008) theory to the UK closed-end fund market rests on whether retail investors set the prices of UK closed-end funds. Although institutional-investor involvement tends to wax and wane with the average level of the closed-end-fund discount, the evidence indicates that prices of UK closed-end funds are set by retail investors (Gemmill and Thomas 2002, 2012). In the US, where closed-end funds are owned almost exclusively by retail investors, Klibanoff, Lamont, and Wizman (1998) provide supporting evidence for attention-driven trading. They find that in the week following the publication in The New York Times of a salient article relating to a specific fund, that fund's price reacts much faster to changes in the underlying net asset value. The impact of the price response, however, lasts only for two weeks following publication.

3.2 Trading volume and liquidity

The impact of informed trading on market liquidity is not clear. Even in markets where there are information asymmetries, the results are mixed. Cheng, Firth, Leung, and Rui (2006) report that insider trading leads to wider bid-ask spreads and less depth while Cao, Field, and Hanka (2004), in a study at the time of expiry of IPO lock-ups, report an increase in insider trading activity but no change in bid-ask spreads.

Klibanoff et al. (1997) provide the only evidence on the impact of attention-grabbing events on trading volumes. In weeks when fund-specific salient news is published, trading volumes of the individual US closed-end funds are 40% higher than average. They interpret this as "consistent with the presence of unsophisticated investors whose willingness to trade increases with news." (p. 686).

The literature review suggests the following hypotheses:

Hypothesis 1: the announcement of a director purchase will attract the attention of retail investors and will be met with positive abnormal price returns. Announcements of a director sell will be met with an insignificant price reaction.

Hypothesis 2: the price returns will be positively related to the size of the purchase.

Hypothesis 3: the price returns, after allowing for the size of the purchase, will be larger for purchases in small capitalisation funds.

Hypothesis 4: the price response to director purchases in funds that hold assets with uncertain values will be higher than the price response to purchases in funds that hold liquid and actively-traded assets.

Hypothesis 5: the price response will not depend upon the status of the board member making the purchase. Whether attention-grabbing retail investors regard purchases by, say, the board chairman, as a more valuable signal is an empirical issue.

Hypothesis 6: purchases will attract a significant increase in trading volumes in the post-purchase period. Given the mixed results in the existing literature, the impact of the purchases on liquidity is an empirical issue. Regardless of director purchases, smaller capitalisation funds are expected to have wider bid-ask spreads and to have larger Amihud illiquidity values (Association of Investment Companies Report, 2002); whether bid-ask spreads change for larger/smaller director purchases in larger/smaller funds is an empirical issue.

4. Sample and Methodology

The initial sample comprises 1,979 director purchases and 104 director sells made between January 1999 and January 2008. These transactions are made by directors serving on the boards of 178 individual funds. Data on the director transactions are obtained from Directors Deals while prices, NAVs, bid-ask spreads, and market capitalisations are retrieved from Datastream. Data on fund mandates are obtained from the Association of Investment Companies website and from Cazenove & Co's Investment Trust Monthly publication. The sample excludes instances where a director opts to receive shares in lieu of fees or subscribes a regular amount to a share-savings plan. Table I, Panel A reconciles the initial 1,979 purchases with the 847 purchases used in the sample; Panel B classifies the purchases and sells by month and year.

Table I about here

Following Pontiff (1995) and Gemmill and Thomas (2011), abnormal price changes are identified by initially running a regression of price returns (dependent variable) against NAV returns over a 200 day estimation period (day -250 to -51, where day 0 is the day of the transaction).[1] Price returns (R_P) are computed as $\ln(P_1/P_0)$ where P_1 and P_0 is the price of the fund at day 1 and day 0 respectively. R_{NAV} is the return on the fund's net-asset value. Given that fund-management expenses are typically a fixed percentage of the NAV, the regression is run without a constant.[2] A shorter estimation period of 100 days is also used but the results are unchanged. In order to allow for the negative price returns when newly-launched funds move to trade from a premium to the long-term average level of discount, any purchase that takes place in the first 700 days post-IPO is excluded.[3]

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[1] This approach is also similar to that used by Klibanoff et al. (1997) who use the NAV as the measure of "fundamental value".

[2] The regressions are re-run with a constant and the results are qualitatively unchanged.

[3] New closed-end funds are launched at a premium. A premium is defined as (price – NAV)/NAV. A discount is a negative premium. Given a fund price at issue of 100p and launch expenses of (say) 3p, the net assets will be 97p and the fund sells at a premium of 3.09% at launch. One of the characteristics of the closed-end fund market is that, in the aftermarket, funds typically trade at a discount to the NAV. It takes, on average, around 700 trading days post-IPO for a fund to sell at a level of discount comparable to that of a seasoned fund. During this period the price returns of the newly-launched fund will be less than the NAV returns if it is to trade at a similar level of discount as seasoned funds (Gemmill and Thomas, 2012).

The estimated beta coefficient from the regression is then used to compute the abnormal price returns over the period day -50 to +50 (the event period). Abnormal price returns are defined as:

$$R_P - (b\ R_{NAV}) \tag{i}$$

and cumulated over various intervals in the event period. The robustness of our results is tested by running a regression using the Fama-French three factor model over the same estimation period as above:

$$R_P = a + \beta_1\ R_M + \beta_2\ HML + \beta_3\ SMB + \varepsilon \tag{ii}$$

where R_M is the return on the FTSE All Share Index, SMB_t is the difference in returns of portfolios comprising large and small firms and HML_t is the difference in the returns of portfolios comprising high and low book-to-market firms. For estimating SMB_t, the FTSE 100 index is used as a proxy for the large-firm portfolio and FTSE Small Cap index for the small-firm portfolio. For estimating HML_t, the FTSE 350 Value index is used as a proxy for the low market-to-book firm portfolio and FTSE 350 Growth index for the high market-to-book firm portfolio. As before, the estimated coefficients from the regression over estimation period are used to isolate the abnormal price returns in the event window. Some purchases in individual funds are clustered leading to a potential bias in the results. When there are two purchases of the same fund within a 100 day period, the later purchase is excluded (Betzer and Theissen, 2010)

Three measures are used to assess the impact of the purchases on trading volume and liquidity: first, following Brav and Gompers (2003), abnormal volume activity is estimated as the trading volume around the date of the purchase relative to the fund's pre-announcement trading volume:

$$\text{Abnormal Volume } \overline{\omega}_{i,T} = \frac{V_{i,T}}{\frac{1}{200}\sum_{t=-51}^{-250} V_{i,t}} - 1 \tag{iii}$$

where $V_{i,T}$ is the trading volume for fund i on day T. Normal volume is defined as the mean daily volume over day -250 to -51 relative to the transaction day. Second, Amihud's (2002) illiquidity measure is estimated as follows:

$$\text{Illiquidity}_{iy} = \frac{1}{D_{iy}} \sum_{t=1}^{Diy} \frac{|R_{iyt}|}{\text{Volume}_{iyt}} \qquad\qquad (iv)$$

where R_t is the price return on day t and Volume_t, is the trading volume on day t. The average is estimated over all positive-volume days. Third, the bid-ask spread, defined as the difference between the bid and ask price divided by the average of the bid and ask price.

5. Results

5.1 Price effects

The abnormal returns for periods surrounding the date of the transactions using (i) above are shown in Table II, Panel A. For the 847 purchases, the pre-transaction period (day -50 to -2) is characterized by insignificant returns; over this period the cumulative abnormal returns (CARs) total an insignificant 0.56%. The returns are cumulated over various post-transaction periods and start at day -1 to allow for the possibility that the details of the purchase were known on the day before the published date of the transaction. On day 0, the average return of 0.25% is significant (t = 5.06) and continues to accumulate over the following 50 days. Over the period day -1 to +50, the price returns total 1.55% (0.38% + 1.17%). Considering all purchases, there is no evidence that this price effect dissipates over time but this issue is revisited when the results are categorized by size of purchase.

Table II about here

In contrast to the purchases, the 104 sell trades are preceded by a significant price run-up of around 3.48% in the period day -50 to -2. The sale transaction itself does not generate any price reaction; the abnormal return over day -1 to +1 averages an insignificant 0.32%. This finding provides support for the theory of Barber and Odean (2008). Only the publication of director purchases appears to attract attention-driven trading. A plot of the average daily price returns and abnormal returns for purchases cumulated over a 50 day period preceding and following the date of the transaction is shown in Figure 1.

The returns using (ii) above are shown in Table II, Panel B. The returns, for both the purchases and sells, are similar. For example, the returns for purchases when cumulated over day +2 to +50, the difference amounts to only to 0.08% (1.25% - 1.17%). Given the fact that the number of sells is relatively small and that the results of the purchases are much stronger

than those for the sells, the rest of the analysis focusses only on purchases using (i) above to isolate the abnormal returns.[4]

It could, of course, be that the abnormal returns are driven by factors such as reversion of the discount. Cheng, Copeland, and O'Hanlon (1994), for example, find that portfolios comprising funds selling at larger discounts record higher subsequent abnormal returns than those comprising funds selling at narrower discounts while Copeland (2007) finds that discount reversion is faster when a fund trades at the arbitrage bounds. In order to confirm that the abnormal returns are attributable to the impact of director purchases rather than discount reversion, the purchases are split equally between those made when the individual fund discount on the day of purchase is high/low relative to that fund's average discount over the 250 days prior to day -50. The results are shown in Table II, Panel C. In all cases the CARs for the narrow relative discount group are larger than those for the wider relative discount group and thus give no support for the notion that the CARs following director purchases might be driven by discount reversion.

Two further tests are carried out to establish that the CARs are attributable to the impact of the director purchases. The first test matches the director purchases with notional purchases by level of discount. Thus, if a director purchase in a particular fund is made when the level of discount is, say, 14%, a national purchase is made in the same fund when the fund again trades at a discount of 14% (but outside the estimation and event period for the director purchase). The second test matches director purchases with notional purchases by the magnitude of the purchase. Although it is not possible to match precisely the trading volumes on director-purchase days with those on no-director-purchase days, it is possible to identify those days where the sole transaction in a particular fund is a non-director purchase of between £20,000 and £50,000 (the average size of a director purchase is around £20,000). Having established the dates of the notional purchases, abnormal returns are computed as described above. For both tests, the CARs for these notional purchases over days -1 to +15 are negative and insignificant (-0.06% for the first test and -0.02% for the second test). Although it is not possible to associate the abnormal returns unambiguously with the director purchases, the empirical evidence does point to the CARs in Table II, Panel A being driven by such purchases.

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[4] In the tables that follow, abnormal returns have been computed using regression (i). The results using regression (ii) are similar but are not reported here.

The question then arises of whether these abnormal returns are exploitable. Although average CARs over day -1 to +50 total 1.55%, a strategy of buying the fund and selling the NAV benchmark (and subsequently closing out both positions) would incur two sets of round-trip transactions costs totalling around 2.4% (including 0.5% stamp duty and estimated commission of 0.1%) - and that assumes that the NAV can be cheaply and efficiently replicated. It is therefore unlikely that these short-term abnormal returns could be profitably exploited.[5]

Following the conventional insider-trader literature, the CARs are classified below by magnitude of purchase, fund size, investment mandate, and identity of purchaser. The results for the purchases categorized by size of the purchase are shown in Table III, Panel A. For the 151 smallest purchases (<£5,000), none of the post-transaction returns are significant while the only significant return (of 0.17%) is recorded on day 0 for the 173 purchases between £5,000 and £10,000. For purchases above £10,000 the results are in line with the literature using conventional companies. Larger purchases are broadly accompanied by larger post-transaction returns. For the other four groupings (reflecting progressively larger average purchases) the returns cumulated over day -1 to +50 are 1.96% (0.57% + 1.39%), 1.34%, 2.50%, and 3.56% respectively.

Table III about here

However, for three of these four groupings, the price impact dissipates over the 15 days following the transaction. This is similar to the findings reported by Barber et al. (2009). Apart from the 77 largest purchases (> £100,000) none of the returns in the £10,000 to £100,000 bands are significant when cumulated over day +16 to +50.

Table III, Panel B shows the returns categorised by the purchases each weighted by the market-values of the funds in which the purchases were made. The pattern of the returns is not as clearly defined as in Panel A. Only the group of 298 purchases (with a value of purchase/market value falling in the range 0.01% to 0.05%) has a similar pattern to the un-

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[5] In Table V, CARs of over 6% at day +50 are recorded following large purchases in funds holding illiquid assets (such as venture capital and private equity). It is, however, very unlikely that short positions in the NAV for such funds could be constructed.

weighted purchases - significantly positive and increasing returns up to day +15 but then reducing and insignificant over day +16 to +50. One explanation for these results for the market-capitalisation-weighted purchases is that the Regulatory News Service and other data providers typically disclose the absolute amount of the transaction and do not relate the size of the purchase to the market value of the fund. The pattern of the returns and their relation to the categorisations suggest that attention-driven investors are influenced more by the absolute size of the transaction than by the weighted data.

Table IV, Panel B shows the impact of the purchases classified by the market capitalisation of the fund. Simply analyzing the purchases by the market capitalisation might be misleading if larger purchases were made in larger-capitalisation funds. The funds are therefore first categorised into 6 market-capitalisation groups, ranging from £50m to those with a market capitalisation of more than £1bn. Only in the case of the 30 purchases in funds that have a market capitalisation of between £700m and £1bn is the average value of the purchases (£52,650) significantly different from the average value of purchases in the other groupings. Panel A gives the price reactions classified by the market capitalisation. Purchases in the two smaller market capitalisation categories (up to £100m) are associated with higher returns and cumulate over day -1 to +50, to 3.78% and 2.12%. In contrast, none of the purchases in the three largest groupings are associated with significant returns. Although the average purchases are similar across most funds of different market capitalisations, purchases in smaller capitalised funds clearly generate higher positive returns. The results support the findings of Lakonishok and Lee (2001) and the notion that purchases in small market-capitalisation funds attract the particular notice of attention-driven investors.

Table IV about here

Table V shows the returns classified according to the likely information asymmetry in the investment mandates. Group A funds are those that invest in liquid, actively-traded UK securities, Group B funds are those that invest in quoted securities actively traded on liquid overseas markets, and Group C funds are those investing in hedge funds, private equity, and venture-capital firms. For each group, the purchases are categorized into high- and low-value. Low- (high-) value purchases are defined as those with a market-weighted value lower (higher) than the average market-weighted value of all the purchases in that Group.

The average return for all purchases in Group A and B, cumulated over day -1 to +50, are similar: 1.13% (0.08% + 1.05%) and 1.21% respectively; while the returns for the same time interval for Group C are much higher at 3.49%. These results are in line with the hypothesis that purchases in funds with the highest asymmetry will have the greatest price impact. As in the results in Table III, it is also clear that the magnitude of the purchases within each group also has an effect on returns although the difference is, in most cases, statistically insignificant. Within Group A, low-market-value-weighted purchases generate abnormal returns of 0.77% over day -1 to +50 while the high-value purchases generate 3.05%. The corresponding figures are almost identical for Group B purchases (0.73% and 3.64%). Group C figures are much higher at 2.88% for small-value purchases and 7.42% the high-value purchases. However, the results for Group C have to be treated with caution given that there are only 126 purchases, of which only 17 are high-value. In most cases, the price impact dissipates in the day +2 to +15 interval. The results suggest that director purchases do mitigate information asymmetries about the value of assets held by the fund but the size of the purchase still appears to be an important signal across all three groups.

Returns categorised by the status of the director are shown in Table VI. The first three rows show the returns classified by executive and non-executive. The abnormal return on day 0 is broadly similar across all three categories although purchases by former executive directors are more highly valued over subsequent weeks. A similar pattern is seen in rows four and five where purchases by chairmen generate an accumulated abnormal return of around one percent by day +50 compared to purchases made by other members of the board.

5.2 Liquidity effects

The results for the three liquidity measures are set out in Table VII and plotted in Figure II. As expected, abnormal trading volume increases significantly around the day of the transaction and in the couple of days following but then falls back, within 15 trading days, to pre-transaction levels.

Table VII and Figure II about here

Averaged over the 706 observations, the Amihud illiquidity measure increases from a value[6] of 0.12 over day -15 to -2 to 0.14 on day 0 suggesting that, on average, funds become more illiquid. The illiquidity measure is also shown for small/large funds (those with a market value less/more than the average market value of all funds) and then by the size of purchase.[7]

The Amihud measure for large- and small-capitalisation funds illustrates vividly this lack of liquidity. Even before the purchase, the measure for the small funds is about twice that for large funds and this difference is highly significant for all time intervals. First, for the 400 small purchases in the small funds group, the illiquidity worsens significantly on day 0. The measure on day 0 of 0.18 is significantly different from both the measure of 0.14 over day -15 to -2 (t-stat = 3.8) and the measure of 0.13 over day +2 to +15 (t-stat = 4.0). The impact of the purchase on illiquidity is very short-lived: there is no difference in the measure over the 14 days preceding and following day 0. Paradoxically, for the 90 large purchases in the small funds group, there is no significant difference in the Amihud measure for any of the intervals surrounding day 0.

In the group of large funds, liquidity on day 0 improves for both small and large purchases. The measure on day 0 of 0.06 for small purchases is significantly different from the measure of 0.07 over day -15 to -2 (t-stat = 3.3) while the corresponding measures for large purchases (0.03 and 0.06) are also significantly different (t-stat = 2.1). There is, however, no significant difference in the measure for small and large purchases over the 14 days preceding and following day 0. The impact of the purchase on liquidity is again short-lived.

The pre-transaction-date bid-ask spreads confirm the expected differences in liquidity. The spreads of the small funds are around twice of those of the large funds. The differences are highly significant: the t-stat for the 1.3% difference in the spread between small and large funds (measured over day -15 to -2) is 12.1. However, none of the differences in the spread for small funds and small/large purchases are significant across the various time intervals. Similarly, none of the differences in the spread for large funds and small/large purchases are significant across the various time intervals. This is in line with results of Greene and Smart

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[6] Note that the reported figures for Amihud's illiquidity measure are multiplied by $10^{3.}$
[7] Small/large purchases are those purchases which have a value less/more than the average value of all the purchases in the small (or large) fund group

(1999) that indicate that an increase in (uninformed) retail trading does not increase bid-ask spreads.

Although the results are mixed (liquidity worsens for small funds and improves for large funds) most of the evidence points to the investing activity of retail, attention-driven investors: trading volumes increase significantly on the day of the transaction but the changes in trading volume and Amihud measures of illiquidity are all very shorted-lived and revert back to pre-transaction levels within 15 days.

6. Summary

Most of the empirical work to date has examined the impact of director purchases in conventional companies with the assumption that such purchases help alleviate information asymmetry. The positive price reactions recorded by previous studies are assumed to result from the directors knowing more about the prospects of the company than outsider shareholders. This study examines the impact of director purchases in closed-end funds, the majority of which are simple and transparent entities where information asymmetry is not an issue. Despite this, director purchases are accompanied by significant positive price returns. This price reaction is attributed to the activities of retail, attention-driven investors. The results provide support for the theory of Barber and Odean (2008) and Barber et al. (2009). In line with their theory, director sells are not associated with abnormal price returns around the date of the transaction. Most of the empirical results are similar to those examining director purchases in conventional companies: the magnitude of the price reaction is positively related to the size of the purchase; purchases in smaller funds are associated with higher price returns; and a more positive return for purchases in those funds that hold assets which are likely to have higher informational asymmetries. In most cases the price impact begins to dissipate 15 days following the purchase, a result that is broadly similar to those reported by Barber et al. (2009).

Although the average director purchase and abnormal price return is modest in this sample compared to the existing insider-trader literature using conventional companies, it does raise the question of what part of the returns reported in the conventional-company literature is attributable to the activities of attention-driven investors and what part attributable to the resolution of information asymmetry.

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Table I:

Panel A

All director-purchase transactions (January 1999 to January 2008)	1,979
Less: more than 30 days between transaction date and the documented announcement date	(39)
	1,940
Less: purchases within 900 days following an IPO	(102)
	1,838
Less: multiple purchases on same day	(159)
	1,679
Less: transactions with overlapping pre- and post-purchase event periods	(832)
	847

Panel B

The number of director purchases by month and year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1999	6	8	9	6	7	10	3	3	8	4	6	6	76
2000	4	9	6	4	10	9	6	4	10	6	5	4	77
2001	4	5	6	4	6	4	5	2	10	5	5	0	56
2002	0	9	17	9	9	3	15	10	9	5	7	5	98
2003	9	6	16	17	3	13	10	7	8	12	9	0	110
2004	10	6	17	9	10	10	10	5	7	8	6	10	108
2005	3	9	7	3	10	10	9	7	6	7	8	12	91
2006	9	5	14	5	6	10	8	4	9	9	11	6	96
2007	8	11	13	8	10	10	9	11	10	8	10	12	120
2008	15												15
	68	68	105	65	71	79	75	53	77	64	67	55	847

The number of director sells by month and year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1999	5	1	2	2	1	1	0	0	1	1	0	0	14
2000	1	0	2	1	0	0	1	1	1	0	0	1	8
2001	1	0	2	2	0	1	0	0	0	0	2	0	8
2002	0	1	2	1	2	1	0	0	1	1	1	1	11
2003	0	1	1	0	1	0	0	0	2	1	0	0	6
2004	1	0	3	2	0	1	0	1	2	1	1	0	12
2005	1	2	3	2	0	2	1	1	0	1	2	0	15
2006	1	1	5	1	4	0	0	0	2	3	1	0	18
2007	2	1	2	0	0	2	0	0	2	1	1	0	11
2008	1												1
	13	7	22	11	8	8	2	3	11	9	8	2	104

Panel A reconciles the total number of purchases (1,979) made by directors with the number of purchases used in the sample (847). Panel B categorises the purchases and sells by month and year

Table II

Panel A

	Obs	CAR -50, -2	CAR -50, -16	CAR -15, -2	CAR -1, +1	CAR 0	CAR +2, +15	CAR +16, +50	CAR +2, +50
Purchases	847	-0.564%	-0.326%	-0.238%	0.383%	0.245%	0.497%	0.675%	1.172%
		(-1.67)	(-1.14)	(-1.31)	(4.57)	(5.06)	(2.75)	(1.99)	(4.10)
Sells	104	3.484%	2.194%	1.290%	-0.321%	-0.125%	0.303%	0.318%	0.621%
		(5.06)	(3.77)	(3.50)	(-1.88)	(-1.27)	(0.82)	(0.46)	(1.07)

Panel B

	Obs	CAR -50, -2	CAR -50, -16	CAR -15, -2	CAR -1, +1	CAR 0	CAR +2, +15	CAR +16, +50	CAR +2, +50
Purchases	847	-0.202%	-0.063%	-0.138%	0.391%	0.232%	0.493%	0.760%	1.252%
		(-0.62)	(-0.23)	(-0.80)	(4.88)	(5.02)	(2.85)	(2.35)	(4.58)
Sells	104	2.766%	1.876%	0.891%	-0.204%	-0.135%	0.427%	0.647%	1.073%
		(4.38)	(3.52)	(2.64)	(-1.31)	(-1.50)	(1.26)	(1.03)	(2.01)

Panel C

	Obs	CAR -1, +1	CAR 0	CAR +2, +15	CAR +16, +50	CAR +2, +50
Narrow relative discount	423	0.561%	0.460%	0.626%	0.774%	1.400%
		(1.08)	(2.14)	(0.46)	(0.26)	(0.48)
Wide relative discount	424	0.206%	0.032%	0.368%	0.570%	0.938%
		(1.30)	(2.63)	(0.54)	(0.29)	(0.55)

The tables above show the cumulative abnormal price returns (CARs) over various event periods surrounding the day of the director transaction (day 0). t-stats are shown in parentheses.

In Panel A, the abnormal price returns are computed by regressing the price returns against the net-asset-value returns (the independent variable) over the estimation period (day -450 to day -200) and using the coefficients from that regression to compute the abnormal returns for the event period.

In Panel B, instead of the net-asset-value returns, the independent variables comprise the return on the FTSE All Share Index, the return on a portfolio comprising the difference in returns of large and small capitalisation firms (SMB), and the return of a portfolio comprising the difference in returns of high and low book-to-market firms (HML). In estimating SMB, the FTSE 100 index is used as a proxy for the large-firm portfolio and FTSE Small Cap index for the small-firm portfolio. In estimating HML, the FTSE 350 Value index is used as a proxy for the low market-to-book firms and FTSE 350 Growth index for the high market-to-book firms.

Panel C show the CARs for the director purchases split equally by the level of discount on the date of purchase relative to the average level of discount of that fund measured over days -300 to -51.

Table III

Panel A

	Obs	CAR -50, -2	CAR -50, -16	CAR -15, -2	CAR -1, +1	CAR 0	CAR +2, +15	CAR +16, +50	CAR +2, +50
≤ £5,000	151	-1.084%	-0.944%	-0.139%	0.172%	0.105%	-0.368%	0.899%	0.531%
		(-1.48)	(-1.53)	(-0.36)	(0.95)	(1.01)	(-0.94)	(1.23)	(0.86)
£5,001 to £10,000	173	-0.934%	-1.085%	0.151%	0.159%	0.174%	-0.012%	0.627%	0.615%
		(-1.83)	(-2.52)	(0.56)	(1.26)	(2.39)	(-0.05)	(1.23)	(1.43)
£10,001 to £20,000	192	-0.283%	0.340%	-0.623%	0.571%	0.236%	0.739%	0.646%	1.385%
		(-0.41)	(0.59)	(-1.69)	(3.35)	(2.40)	(2.01)	(0.94)	(2.38)
£20,001 to £50,000	175	-0.672%	-0.692%	0.020%	0.330%	0.301%	0.856%	0.152%	1.009%
		(-1.05)	(-1.28)	(0.06)	(2.08)	(3.29)	(2.50)	(0.24)	(1.87)
£50,001 to £100,000	76	-0.206%	0.796%	-1.001%	0.811%	0.483%	1.234%	0.452%	1.687%
		(-0.22)	(1.01)	(-2.02)	(3.53)	(3.64)	(2.48)	(0.49)	(2.15)
>£100,000	77	0.468%	0.661%	-0.193%	0.559%	0.341%	1.220%	1.778%	2.998%
		(0.62)	(1.04)	(-0.48)	(3.00)	(3.17)	(3.03)	(2.36)	(4.71)

Panel B

	Obs	CAR -50, -2	CAR -50, -16	CAR -15, -2	CAR -1, +1	CAR 0	CAR +2, +15	CAR +16, +50	CAR +2, +50
≤ 0.0025%	147	0.327%	0.096%	0.231%	-0.185%	-0.025%	-0.455%	-0.106%	-0.561%
		(0.49)	(0.17)	(0.64)	(-1.11)	(-0.26)	(-1.27)	(-0.16)	(-0.99)
0.0025% - 0.0050%	88	-0.235%	-0.317%	0.082%	0.188%	0.091%	0.443%	0.538%	0.980%
		(-0.33)	(-0.53)	(0.22)	(1.06)	(0.89)	(1.16)	(0.75)	(1.63)
0.0050% - 0.0075%	86	-0.565%	-0.937%	0.373%	0.177%	0.246%	-0.224%	1.545%	1.321%
		(-0.77)	(-1.51)	(0.95)	(0.97)	(2.34)	(-0.57)	(2.10)	(2.12)
0.0075% - 0.0100%	42	0.025%	0.217%	-0.192%	0.064%	-0.004%	-0.013%	-1.242%	-1.255%
		(0.03)	(0.27)	(-0.38)	(0.27)	(-0.03)	(-0.03)	(-1.30)	(-1.55)
0.01% - 0.05%	298	-1.275%	-0.662%	-0.613%	0.458%	0.254%	0.645%	0.473%	1.119%
		(-2.54)	(-1.56)	(-2.29)	(3.69)	(3.55)	(2.41)	(0.94)	(2.64)
> 0.05%	174	-0.113%	0.135%	-0.248%	1.047%	0.590%	1.509%	1.679%	3.188%
		(-0.14)	(0.19)	(-0.56)	(5.12)	(5.00)	(3.42)	(2.03)	(4.57)

Panel A shows the cumulated price returns classified by the magnitude of the director purchase. Panel B shows the abnormal price returns classified by the purchase weighted by the market value of the fund in which the purchase is made.

Table IV

Panel A

Market value of fund	Obs	CAR -50, -2	CAR -50, -16	CAR -15, -2	CAR -1, +1	CAR 0	CAR +2, +15	CAR +16, +50	CAR +2, +50
≤ £50m	194	-1.563%	-1.126%	-0.437%	0.856%	0.386%	1.036%	1.886%	2.922%
		(-1.92)	(-1.63)	(-1.00)	(4.24)	(3.31)	(2.38)	(2.31)	(4.24)
£50m to £100m	171	-1.004%	-0.668%	-0.336%	0.623%	0.362%	0.546%	0.954%	1.500%
		(-1.71)	(-1.35)	(-1.07)	(4.28)	(4.32)	(1.74)	(1.62)	(3.02)
£100m to £300m	244	-0.346%	-0.132%	-0.214%	0.286%	0.256%	0.410%	-0.055%	0.356%
		(-0.75)	(-0.34)	(-0.86)	(2.49)	(3.87)	(1.66)	(-0.12)	(0.91)
£300m to £700m	137	0.936%	0.614%	0.322%	-0.049%	0.040%	0.231%	-0.078%	0.152%
		(1.62)	(1.26)	(1.04)	(-0.34)	(0.49)	(0.75)	(-0.14)	(0.31)
£700m to £1,000m	30	-0.040%	0.345%	-0.385%	-0.166%	-0.098%	-0.623%	0.840%	0.217%
		(-0.03)	(0.31)	(-0.54)	(-0.50)	(-0.51)	(-0.87)	(0.63)	(0.19)
> £1,000m	59	0.214%	0.194%	0.019%	-0.079%	0.029%	-0.007%	0.265%	0.258%
		(0.28)	(0.30)	(0.05)	(-0.41)	(0.26)	(-0.02)	(0.34)	(0.39)

Panel B

Size of Fund	Average Purchase (£)	Differences in Purchases (£) (p-values)				
≤ £50m	22,900	1				
£50m to £100m	23,900	(0.67)	1			
£100m to £300m	25,350	(0.28)	(0.54)	1		
£300m to £700m	24,100	(0.63)	(0.94)	(0.61)	1	
£700m to £1,000m	52,650	(0.00)	(0.00)	(0.00)	(0.00)	1
> £1,000m	26,050	(0.40)	(0.58)	(0.86)	(0.63)	(0.01)

Panel A shows the cumulated price returns of the director purchases classified by the market value of the fund in which the purchase is made. t-stats are shown in parentheses.

Panel B shows the average director purchases (£) in funds classified by their market values. Columns 3 to 7 (Differences in Purchases) shows the p-values testing for differences in the magnitude of the director purchases across fund sizes.

Table V

	Obs	CAR -50, -2	CAR -50, -16	CAR -15, -2	CAR -1, +1	CAR 0	CAR +2, +15	CAR +16, +50	CAR +2, +50
Group A									
All	280	-0.555%	-0.367%	-0.188%	0.083%	0.068%	0.538%	0.511%	1.049%
		(-1.30)	(-1.02)	(-0.82)	(0.79)	(1.11)	(2.35)	(1.20)	(2.90)
Small purchases	225	-0.811%	-0.432%	-0.379%	-0.040%	0.042%	0.499%	0.313%	0.812%
		(-1.87)	(-1.18)	(-1.63)	(-0.37)	(0.60)	(2.15)	(0.72)	(2.22)
Large purchases	55	-0.440%	-0.336%	-0.104%	0.542%	0.226%	0.827%	1.685%	2.511%
		(-0.43)	(-0.39)	(-0.19)	(2.16)	(1.56)	(1.53)	(1.66)	(2.93)
t-stat (small - large)		(-0.31)	(-0.10)	(-0.49)	(-1.69)	(-1.03)	(-0.63)	(-1.33)	(-1.60)
Group B									
All	441	-0.281%	-0.168%	-0.113%	0.361%	0.235%	0.291%	0.562%	0.853%
		(-0.67)	(0.48)	(-0.50)	(3.50)	(3.94)	(1.30)	(1.35)	(2.42)
Small purchases	368	-0.369%	-0.293%	-0.076%	0.171%	0.134%	0.024%	0.539%	0.563%
		(-0.92)	(-0.86)	(-0.36)	(1.72)	(2.34)	(0.11)	(1.34)	(1.65)
Large purchases	73	0.166%	0.460%	-0.295%	1.319%	0.742%	1.636%	0.682%	2.320%
		(0.14)	(0.47)	(-0.48)	(4.64)	(4.52)	(2.66)	(0.59)	(2.39)
t-stat (small - large)		(-0.42)	(-0.70)	(0.28)	(-2.16)	(-1.90)	(-2.25)	(-0.14)	(-1.36)
Group C									
All	126	-1.168%	-0.686%	-0.482%	1.145%	0.650%	1.070%	1.274%	2.344%
		(-1.27)	(-0.88)	(-.98)	(5.03)	(4.95)	(2.18)	(1.39)	(3.02)
Small purchases	109	-0.808%	-0.387%	-0.421%	1.205%	0.672%	0.769%	0.903%	1.672%
		(-0.84)	(-0.48)	(-0.82)	(5.07)	(4.89)	(1.50)	(0.94)	(2.06)
Large purchases	17	-3.480%	-2.609%	-0.871%	0.766%	0.512%	2.996%	3.656%	6.652%
		(-2.02)	(-1.80)	(-0.95)	(1.80)	(2.08)	(3.26)	(2.13)	(4.58)
t-stat (small - large)		(0.99)	(0.91)	(0.45)	(1.01)	(0.48)	(-2.47)	(-1.46)	(-2.50)

The table shows the cumulated price returns of director purchases in funds classified by the investment mandate. t-stats are shown in parentheses. Group A comprises those funds which invest in liquid, actively traded UK securities; Group B comprises those funds which invest in actively traded securities in other liquid markets globally; Group C comprises those funds which invest in securities which have uncertain values such as hedge funds, private equity, and venture capital.

The returns are further classified by purchases that are weighted by market value. Large purchases are those that are have a market-weighted-purchase value bigger than the average market-weighted-purchase value for all purchases in that Group.

Table VI

	Obs	CAR -50, -2	CAR -50, -16	CAR -15, -2	CAR -1, +1	CAR 0	CAR +2, +15	CAR +16, +50	CAR +2, +50
Executive	52	-0.170%	0.145%	-0.315%	0.261%	0.202%	1.286%	0.272%	1.558%
		(-0.18)	(0.18)	(-0.62)	(1.11)	(1.49)	(2.54)	(0.29)	(1.94)
Non-Executive	624	-0.524%	-0.238%	-0.286%	0.454%	0.253%	0.427%	0.454%	0.881%
		(-1.41)	(-0.76)	(-1.44)	(4.93)	(4.75)	(2.15)	(1.22)	(2.80)
Former Executive	168	-0.872%	-0.799%	-0.073%	0.177%	0.229%	0.522%	1.626%	2.149%
		(-1.36)	(-1.47)	(-0.21)	(1.12)	(2.50)	(1.52)	(2.54)	(3.96)
Chairman	126	-0.615%	-0.328%	-0.288%	0.211%	0.125%	0.942%	1.213%	2.155%
		(-0.96)	(-0.60)	(-0.84)	(1.32)	(1.36)	(2.74)	(1.88)	(3.96)
Non-Chairman	721	-0.555%	-0.326%	-0.229%	0.413%	0.266%	0.419%	0.581%	1.000%
		(-1.51)	(-1.05)	(-1.17)	(4.55)	(5.07)	(2.14)	(1.58)	(3.23)

The table shows the price returns classified by the position held by the director making the purchase. t-stats are shown in parentheses.

Table VII

	Obs	-50, -2	-50, -16	-15, -2	-1, +1	0	+2, +15	+16, +50	+2, +50
Abnormal trading volume	699	-4.29%	-4.60%	-3.60%	10.98%	15.13%	-2.07%	-4.89%	-4.07%
Amihud's illiquidity (10^3)	706	0.110	0.110	0.116	0.119	0.136	0.114	0.115	0.113
Small funds	490	0.129	0.129	0.137	0.143	0.178	0.134	0.131	0.131
Large funds	216	0.070	0.070	0.072	0.069	0.059	0.071	0.078	0.076
t-stat (small - large funds)		(11.38)	(11.19)	(10.58)	(8.64)	(9.28)	(10.61)	(9.35)	(10.16)
Small funds / small purchases	400	0.126	0.126	0.132	0.146	0.187	0.130	0.128	0.127
/ large purchases	90	0.145	0.142	0.157	0.132	0.147	0.150	0.144	0.144
t-stat (small - large purchases)		(-2.32)	(-1.86)	(-2.25)	(0.95)	(1.68)	(-1.86)	(-1.85)	(-2.07)
Large funds / small purchases	180	0.070	0.069	0.073	0.070	0.063	0.074	0.079	0.077
/ large purchases	36	0.071	0.074	0.065	0.061	0.033	0.057	0.074	0.069
t-stat (small - large purchases)		(-.09)	(-0.39)	(0.56)	(0.63)	(3.32)	(1.65)	(0.36)	(0.60)
Bid-ask spread	838	2.15%	2.14%	2.16%	2.11%	2.12%	2.18%	2.16%	2.17%
Small funds	597	2.51%	2.50%	2.52%	2.46%	2.45%	2.55%	2.54%	2.54%
Large funds	241	1.23%	1.22%	1.23%	1.22%	1.27%	1.24%	1.17%	1.19%
t-stat (small - large funds)		(12.48)	(12.39)	(12.12)	(10.86)	(8.58)	(11.26)	(12.73)	(12.54)
Small funds / small purchases	490	2.52%	2.52%	2.53%	2.46%	2.44%	2.57%	2.56%	2.56%
/ large purchases	107	2.46%	2.44%	2.51%	2.47%	2.51%	2.45%	2.44%	2.44%
t-stat (small - large purchases)		(0.30)	(0.37)	(0.09)	(-0.01)	(-0.32)	(0.58)	(0.59)	(0.30)
Large funds / small purchases	202	1.21%	1.21%	1.21%	1.18%	1.26%	1.23%	1.16%	1.18%
/ large purchases	39	1.32%	1.30%	1.38%	1.46%	1.35%	1.30%	1.24%	1.26%
t-stat (small - large purchases)		(-0.85)	(-0.68)	(-1.14)	(-1.20)	(-0.27)	(-0.38)	(-0.61)	(-0.62)

The table shows various measures of liquidity for intervals around the date of the director purchase.

The abnormal trading volume is computed as the percentage change in the average daily trading volume recorded over the various intervals above over the average trading volume measured over day -250 to -51.

Amihud's illiquidity is shown as a daily measure and computed for 706 transactions averaged over the interval noted (x 1000). The liquidity measure is also shown for small/large funds (those with a market value less/more than the average market value of all funds) and then by the size of purchase (small/large purchases are those purchases which have a value less/more than the average purchase value in that group).

The bid-ask spread is computed for the 838 transactions and averaged over the number of days in the interval noted. The categorisation between large/small funds and purchases is identical to that used for Amihud's illiquidity measure.
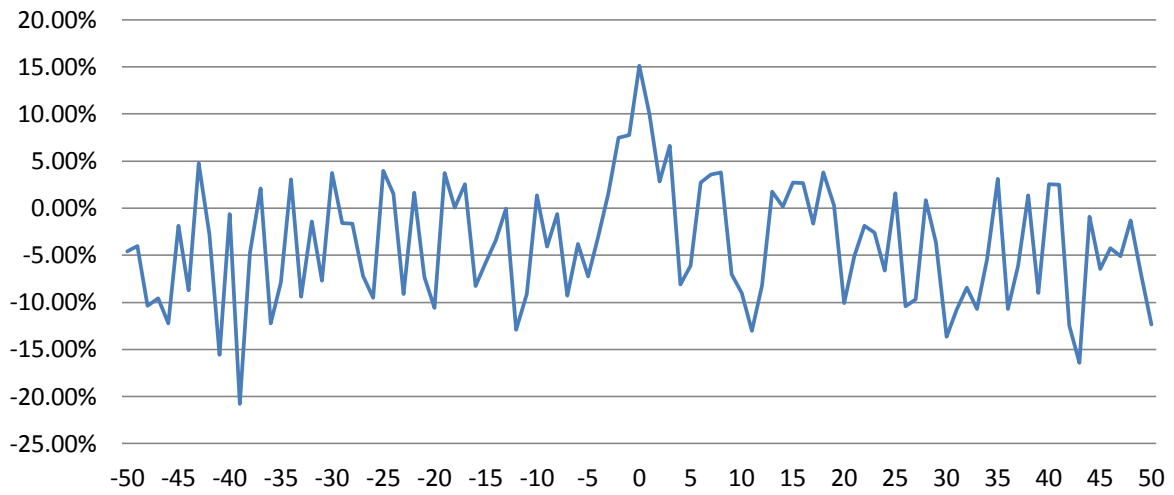
Figure I

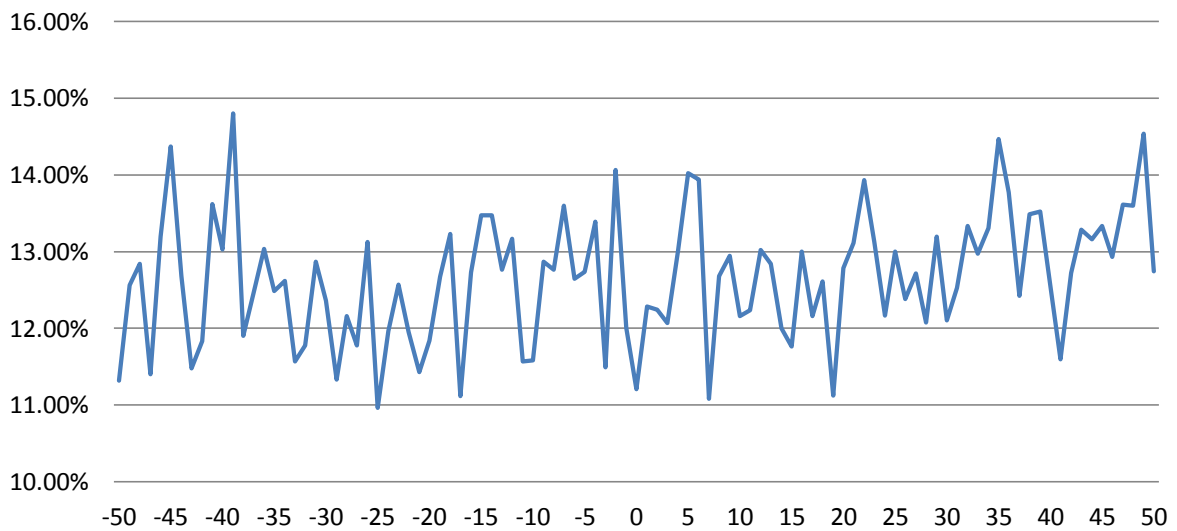# Fund-Price Returns around the Transaction Date
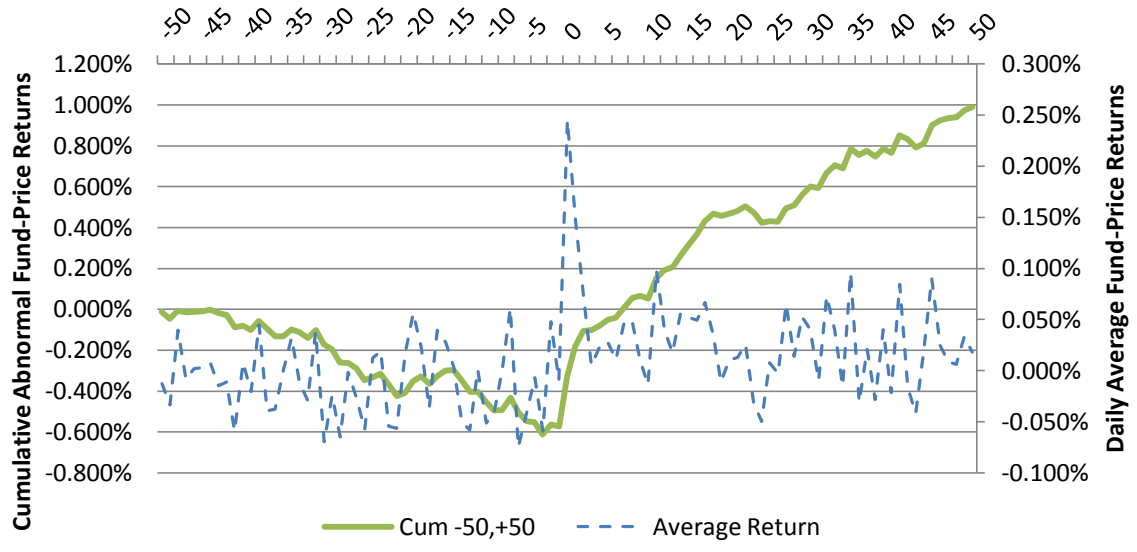
The figure shows the cumulative abnormal price returns (the solid line) over the period day -50 to +50 around the date of the transaction and the daily average price returns (the dotted line) over the same period.
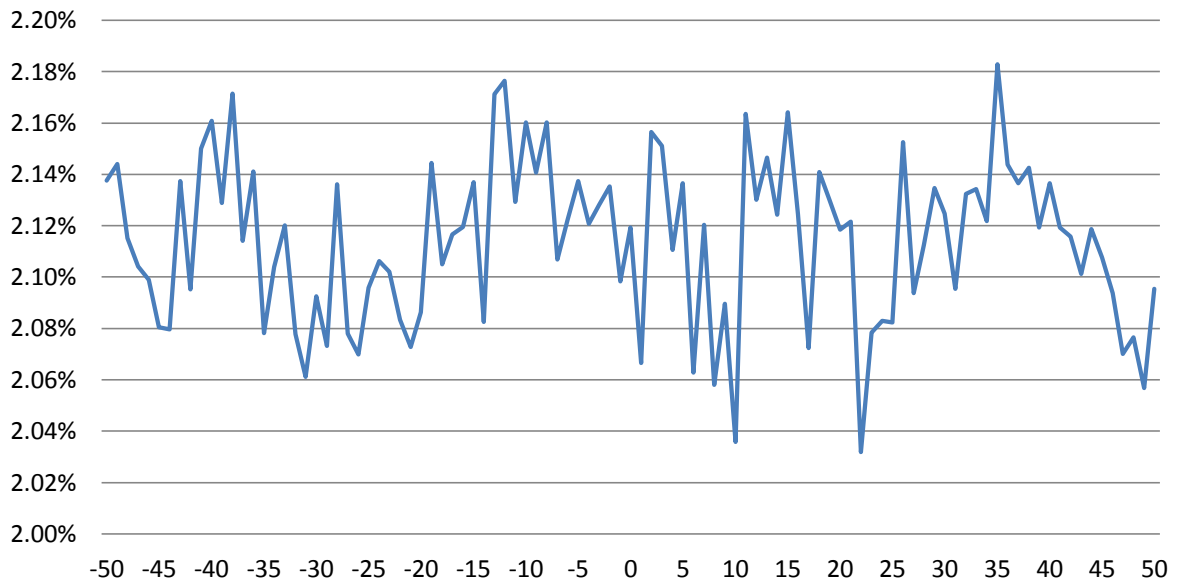
Figure II

Abnormal Trading Volume

Daily Average Amihud's Illiquidity (x 10^3)

Bid-Ask Spread

The three panels show the measures over the 50 days preceding and following the day of the transaction.

The abnormal volume is computed as the percentage change in the average volume in the period day -50 to +50 around the date of the director purchase over the volume averaged across all funds in the period day -250 to -51.

Both Amihud's illiquidity measure and the bid-ask spread are measured averaged across all funds for each of the days -50 to +50 around the date of the director purchase.