European Financial Management, Vol. 9999, No. 9999, 2013, 1–27
doi: 10.1111/j.1468-036X.2013.12013.x

Directors' Dealing and Post-IPO Performance*

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Abstract

We use a unique mainly hand-collected dataset to assess the impact of directors' trades on IPOs' long-term returns. We find that IPOs where directors are net sellers are more likely to generate positive long-run returns which occur mostly before the sell trades, suggesting that directors sell when their IPOs reach their optimal values. Conversely, IPOs where directors are net buyers underperform significantly. Our results are not consistent with insider trading in seasoned firms, partly because the valuation uncertainty of IPOs and the specific motivations to trade weaken the precision of the trades' informativeness.

Keywords: *long run IPO performance, insider trades, London Stock Exchange, market timing*

JEL classification: *G*12, *G*14, *G*24

1. Introduction

Previous studies show that IPOs generate no or negative excess returns in the long run, despite their relatively high exposure to market risk and level of underpricing.[1] This relatively low performance emanates from a combination of extreme differences of

We gratefully acknowledge comments from an anonymous referee, seminar participants at Cass Business School, Manchester Business School and Nottingham Business School. All remaining errors are our own responsibility. Correspondence: Meziane Lasfer.

[1] Ritter and Welch (2002) find that the average beta of their IPOs in 1980-2001 of 1.73. The asymmetric models suggest that IPOs underprice on purpose to subsequently be able to sell further shares at a higher price, and as a result, the long-run returns should be high (e.g., Benveniste and Spindt, 1989; Jenkinson and Ljungqvist, 2001).

opinion among investors, costly short selling, and small public floats on many IPOs.[2] In this paper, we contribute to this extensive literature by assessing whether the trading behaviour of insiders, defined as board members, affects IPO long-run performance. We follow previous studies on insider trading (e.g., Seyhun, 1998; Lakonishok and Lee, 2001) and expect directors to know better the true value of their IPO than outside investors and their trades will be informative. Since IPOs underperform because of high information asymmetries (Ritter and Welch, 2002), we test the hypothesis that directors' trades increase the long-run stock price accuracy and discovery by mitigating the relatively significant information asymmetries inherent in IPOs, thus leading to a more efficient long-run pricing.

Huddart and Ke (2007) argue that, in the case of insider trading, both Grossman and Stiglitz (1980) price-taking model and Kyle (1985) imperfect competition model, predict that higher information asymmetry leads to more positive (negative) abnormal returns following buy (sell) trades, and, thus, higher returns to directors. Given the great uncertainty about the value of their IPOs, directors are likely to benefit from their trades if they hold perfect information, suggesting that their trades will only affect strongly stock prices if their information is precise and credible, and if outsiders have lower information about the value of the IPO. Therefore, in line with previous studies (e.g., Lakonishok and Lee, 2001; Jenter, 2005), we expect directors to adopt contrarian strategies by buying (selling) shares in under- (over-) performing IPOs and those where they are net buyers (sellers) will generate positive (negative) long-term returns. This post-trade stock price behaviour will also be consistent with the agency theory framework (Jensen and Meckling, 1976) because directors' buy (sell) trades will lead to lower (higher) agency conflicts, and, consequently, to higher (lower) long-term returns. However, if they trade for non-private information reasons, such as liquidity and portfolio rebalancing considerations, or if they sell because the lockup has expired, then we expect weak or no relationship between insider trading and the long-run returns of IPOs.

To test these hypotheses we construct a unique hand-collected dataset of 830 UK IPOs containing all information from prospectuses and insider trading events, and assess their three-year post-IPO stock returns. We find contrasting results to our expectations as IPOs where directors are net sellers (*Net Sell*) generate positive returns, while those where they are net buyers (*Net Buy*) underperform substantially throughout the 36-months post-IPO period. We find similar results using the style-adjusted, equal and value-weighted cumulative abnormal returns, and the Fama and French (1993) three-factor model. Our regression results provide further support for these findings, as the coefficient of the net purchase ratio, *NPR*, defined as directors' net purchases over total transactions, measured in terms of trading value or volume, is negative and significant, suggesting that *Net Sell*

[2] See Jenkinson and Ljungqvist (2001), Ritter and Welch (2002), Ritter (2003), and Eckbo *et al*. (2007) for extensive reviews. Although the long-run underperfromance is observed in many countries including the US (e.g., Ritter and Welch, 2002; Brav and Gompers, 1997), UK (Vismara *et al*., 2012; Levis, 2011; Espenlaub *et al*., 2000; Goergen *et al*., 2007), Greece (Thomadakis *et al*., 2012), Switzerland (Kunz and Aggarwal, 1994), Finland (Keloharju, 1993), and Australia (Finn and Higham, 1988), its significance may suffer from econometrics misspecifications (Fama, 1998) and may be sample period dependent (Carter *et al*., 2011).

(*Net Buy*) IPOs generate positive (negative) long-run returns, even after accounting for the IPOs' fundamental factors.

We find that the directors' trades are not clustered around the lockup expiry dates; they are relatively evenly distributed across the 36 months sample period as the median number of years from the IPO date to the trading date is 1.45 years for both the *Net Buy* and *Net Sell* samples. We, thus, split our sample period into months 2 to 18 and months 19 to 36. We show that while the excess returns of *Net Sell* IPOs are positive in the first, but not significant in the second period, they are negative for the *Net Buy* IPOs in both sub-periods.

We investigate further the causality of our results, the drivers of this asymmetric performance, the timing ability of directors, and the information content of insider trading, by assessing the market reaction to each individual trade. We find that the pre-sell trades' excess returns are positive and significant. On the announcement date, share prices decrease, but, in the post trade period, they are mainly not significant, suggesting that directors time their trades by selling when they know that the price of their IPO is optimised. In contrast, for the buy trades, we find significant negative excess returns in both the pre- and post-event periods.

We account for any look-ahead bias in our results by running calendar time regressions with the Fama-French calendar time 3-factor model starting from the date of the trade rather than the IPO date. We expect the alpha of the buy (sell) trade portfolios to be positive (negative) and significant. We find similar results as the portfolio of *Net Sell* (*Net Buy*) IPOs earns positive (negative) alphas in the 3-factor regressions. Our results imply that directors' trades are a response to past performance, but they are less likely to be based on insider information and to predict future returns.

Overall, our results are puzzling as they indicate that the stock returns following the sell trades are not negative, and, for the buy trades, they are negative and significant in the pre- and the post-trade periods. Our results are not consistent with the information content of insider trading in seasoned firms documented in the previous literature (e.g., Seyhun, 1986; Lakonishok and Lee, 2001; Jenter, 2005). While the buy trades of directors in failing IPOs may be consistent with the price support hypothesis[3] our results indicate that this aim is not achieved as the post-trade returns are not positive,[4] suggesting that directors do not reverse the performance, systematically make losses on purchases, and the market does not value their trades. Similarly, the sell trades are not undertaken when the IPO is expecting bad news.

It is difficult to rationalise why the IPO directors adopt such perplexing strategies. One explanation could simply be that directors sell when they know that their IPO has reached its optimal valuation, but that they purchase more stock in their underperforming IPO to avoid admitting failure implicitly, in line with the disposition effect in behavioural

[3] In general, underwriters can support prices by stimulating demand or by restricting supply in the aftermarket and in many countries temporary price support in IPOs is legal including the US (1934 Securities Act, Rule 10b-7, since replaced by Regulation M) and UK (Securities and Investment Board Rules, chapter III, Part 10). We do not have data to test for such trading by the underwriters.

[4] One might wonder why directors would support prices rather than initiate a share repurchase program. We do not find evidence of share repurchases by these firms probably because of lack of the necessary cash.

finance. While this may remain a possibility, we are not aware of other means of testing further this hypothesis.[5] An alternative explanation for our results may be specific to IPOs. Huddart and Ke (2007) argue that the impact of insider trading depends on two fundamental factors: the precision of the insider's information and the level of uncertainty in the marketplace regarding the firm's value. We consider that, unlike seasoned firms, in the case of IPOs, there is great uncertainty about the value of the firm, and the directors' signal is likely to be less precise, resulting in low excess returns, and thus lower informativeness and weak signal. Nevertheless, we find that *Net Buy* IPOs perform better than *No Trade* IPOs, suggesting that the former IPOs could have had a worst performance without the buy trades of directors. The *Net Sell* IPOs are likely to have low information asymmetries as they perform well before the sell trades, but their signal is also weak as the post-trade returns are not negative, although the results suggest that these IPOs have reached their optimal valuation.

We contribute to two main areas of research that are not so far considered conjointly: IPO long-run performance and insider trading. Since Ritter (1991) documented the long-run underperformance of IPOs, a number of studies have sought to link this intriguing performance puzzle to factors such as prestigious underwriters and venture capital (VC) backing (e.g., Brav and Gompers, 1997) and more recently to mergers and acquisitions activity (Brau *et al*., 2012). We show that the trading activity of directors can also explain this underperformance. Our regression results show that directors' trades are affected by the IPOs' long-run returns, but not strongly by the previously documented signalling factors such as underpricing (Jenkinson and Ljungqvist, 2001), overhang (Mikkelson *et al*., 1997), reputation of underwriters (Carter and Manaster, 1990), venture capitalist (Brav and Gompers, 1997, Krishnan et al., 2011), and private equity backing (Levis, 2011).[6] Our results are also not consistent with the agency theory which predicts a positive relationship between ownership structure and IPO long-run performance.[7] Moreover, unlike previous insider trading literature, which focussed mainly on seasoned firms (See Korczak *et al*. (2010) for recent review), we do not find, as in Lakonishok and Lee (2001), that insider purchases, not sells, are more likely to predict future stock returns, and insider trading informativeness is not affected by free float, and is not more pronounced in smaller firms or IPOs listed on the Alternative Investment Market (AIM), a

[5] See Subrahmanyam (2007) and Barberis and Thaler (2003) for a review. Kaustia (2004) argues that the disposition effect is clearly identifiable in the IPO market because the offer price is a common purchase price. He finds that when the stock price is below the offer price the volume is low, but the volume increases when the price surpasses the offer price for the first time, and when the stock achieves a new maximum and minimum price, consistent with the reference price effect. This may apply mainly to periods closer to the IPO date, and we think that the offer price cannot be considered as a reference price because three years' time is too long. Directors might also anchor on the initial price of their stock, which, unfortunately, is not available.

[6] Doukas and Gonenc (2005) show that reputation of underwriters matters only for ~~not VC backed~~ IPOs.

[7] Previous studies provide mixed evidence on this relationship. For example, Mikkelson *et al*. (1997) show that the long-run returns are unrelated to ownership structure, but Jain and Kini (1994) find a positive relation between post-IPO operating performance and equity retention by original shareholders.

relatively less regulated market for mainly small and high growth firms. Our results also do not support Marin and Oliver (2008) who find that insiders sell up to 12 months before large monthly price drops, but buy one month before large price jumps, and Jiang and Zaman (2010) who show that insiders' ability to predict future cash flow news, rather than their adoption of contrarian strategies, explains the predictive ability of their aggregate trades. Overall, our results are likely to be specific to IPOs but raise further the puzzle as to why the underperformance of IPOs does not revert after the directors' purchases and why IPOs do not underperform after their sell trades.

The rest of the paper is structured as follows. Section 2 presents our data and the methodology. Section 3 provides the empirical results, and the conclusions are in Section 4.

2. ~~2.~~ Data and Methodology

We first gather the list of the 1,117 IPOs that went public in the London Stock Exchange, (LSE), in both the Main market and the Alternative Investment Market (AIM) between January 1999 and 2006 from the LSE website, together with the data on the quotation market (AIM or Main market), admission date, country of incorporation, issue price, market value, money raised, name of the broker, and for AIM IPOs, the advisor. We then download prospectuses from *Perfect Filings* database and hand-collect all information relating to lockup arrangements, including lockup dates, directors' ownership before and after the IPO and the fraction of their shares locked up, percentage sold at the time of the IPO, institutional ownership, venture capital backing and names of underwriters. We extract any delisting dates, and other accounting and stock market data, which include daily stock prices and indices to compute the stock returns, market capitalisation, which we use as proxy for size, accounting return on assets to measure profitability, and price-to-book ratio to proxy for growth from *DataStream*. We exclude 77 IPOs for which we could not find the prospectuses, 15 with missing share price data, and 195 with no lockup date or ownership data from the prospectuses. Our final sample includes 830 (74%) firms with complete data. We also obtain information on subsequent seasoned equity offerings (SEOs) from London Stock Exchange, and any M&A announcement from Thomson One Banker database.

Finally, we use a fifth database, *Directors' Deals*, which records all the trades undertaken by directors in the UK market. The database includes news items on directors' trades disclosed by UK quoted firms in the Regulatory News Service (RNS), such as transaction price, amount, and value, post-transaction holding, change in holding, name and position of the director, and announcement and transaction dates.[8] We exclude a

[8] The UK Model Code prescribes much faster reporting of directors' dealings. The directors must inform their company as soon as possible after the transaction and no later than the fifth business day after a transaction for their own account or on behalf of their spouses and children (Hillier and Marshall, 2002). In turn, the firm must inform the LSE without delay and no later than the end of the business day following receipt of the information. This implies that the information reaches the market as late as 6 days after transaction. In contrast, in the USA, during the pre-Sarbanes-Oxley period, directors have to report their trades on the 10th of the month following the transaction, resulting in a maximum delay of between 10 and 42 days, depending on the trading date. As a result, most previous studies could not analyse insider-trading event on or before the lockup expiry date.

number of observations not related to private information, such as exercise of options or derivatives, script dividends, bonus shares, rights issues, awards made to directors under incentive plans or reinvestment plans, and all directors' transactions in investment companies. After this screening, we obtain 36,943 directors' trades. We check the data for errors and exclude 2,952 (8%) trades as the difference in announcement and transaction date is more than the 5 days legally required in the UK (Korczak *et al*., 2010). Our final sample includes 33,991 directors' trades in 2,664 listed companies, split into 26,268 (77%) buy, and 7,723 (23%) sell trades. We, then, match all director trading event dates with the dates of the IPOs, and select IPOs where directors' trading occurs during the three-year period of IPO. We find 543 (65%) firms with at least one director trade during the 36 months period after IPO. We exclude 31 trades that occur on the same day. We identify 791 sell trades in 231 IPOs and 2,102 buy trades in 480 IPOs. Finally, we follow Lakonishok and Lee (2001) and define the *Net Purchases Ratio, NPR*, as:

$$NPR = \frac{Purchases - Sells}{Total\ Trades}$$

We find 190 (35%) IPOs with negative *NPR*, referred to as *Net Sell* sub-sample, and 353 (65%) with positive NPR, classified as *Net Buy* sub-sample, using both the number of transactions (*NPR transaction*), and the value of the trades (*NPR value*).

We use various methodologies to test our hypotheses. We first use the standard event study methodology to compute the cumulative abnormal returns over 3 years after the first month of the IPO. The abnormal returns are the monthly returns on each IPO *less* the return on the *Financial Times All Share Index*, FTA, which is a more representative index as it includes small as well as large companies. We also use the AIM index for our AIM IPOs and FTA for IPOs on the Main market, and compute both the equally- and value-weighted CARs. Following Ritter and Welch (2002), we compute the style-adjusted CARs, and buy and hold returns, BHARs, as the difference between the returns on an IPO and a style-matched firm, defined as the closest market capitalisation and book-to-market ratio listed firm to our IPO. We select the control firm only once, and if it is delisted prior to the IPO returns' ending date, we replace it with another matching firm on a point-forward basis. If the IPO is delisted, we compute the excess returns up to the date of delisting. We also use the market model to compute the abnormal returns over the event window [−40, +40] relative to the trading date, and the lockup expiry date. The α and β are from the regression of the security returns against the corresponding market indices, the AIM all share price[9] and FTA, for AIM and Main Market IPOs, respectively, over the period [−290, −41] trading days relative to each event date. We estimate the Fama-French (1993) calendar time regressions as in Ritter and Welch (2002):

$$R_{pt} - R_{ft} = \alpha + \beta_t(R_{Mt} - R_{ft}) + \beta_{t-1}(R_{Mt-1} - R_{ft-1}) + \gamma_t SMB_t + \gamma_{t-1} SMB_{t-1} + \delta_t HML_t + \delta_{t-1} HML_{t-1} + \varepsilon_{pt}$$

where $R_{pt} - R_{ft}$ is the excess return over the risk free rate on a portfolio in time period t, $R_{Mt} - R_{ft}$ is the market risk premium, with FTA as a proxy for R_{Mt}, and R_{ft} the 3 months Treasury bill rate. SMB_t is the return on small firms minus the return on large firms, and HML_t is the return on high book-to-market return minus the return of the low book-to-

[9] We also use the Hoare Govett Smaller Companies Index as the market index. Our results are similar.

market portfolio. We extract the relevant data for size and book-to-market indices from K. French data library: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#International. The β is the sum of β_t and β_{t-1}. We use similar method to assess our IPOs' exposures to SMB and HML factors. The signalling and agency theory hypotheses predict that $\alpha_{Net\ Buy} > \alpha_{Net\ Sell}$.

We relate the *CARs* to *NPR* after controlling for other factors defined in the previous literature, such as first day return, size, insider ownership (overhang), the underwriter reputation, venture capitalist backing, lockup length and expiry date returns, period dummies, and Seasoned Equity Offerings (SEO) to capture Myers and Majluf (1984) effects. We account for the impact of takeover activity, as reported by Brau *et al*. (2012) by using the actual takeover obtained from Thomson One Banker database, and by following Brar *et al*. (2008) method. We first build a two-way matrix by size and growth in turnover. We consider that large and high (small and low) growth firms are less (more) likely to be subject to a takeover bid, and thus assigned a value of zero (one). We then classify firms in the remaining two quadrants into yield groups: high yield IPOs have a higher probability, and, thus take a value of one, while those with low yield have a value of zero.

Finally, we run various logit regressions to determine the characteristics of the *Net Sell* and *Net Buy* subsamples. We use various explanatory variables to capture the IPO fundamentals. We use size, the log of market value of equity at the IPO date, to assess whether insider trading occurs in large, thus, less risky firms. We test for robustness by using a dummy variable for firms listed on the Alternative Investment Market (AIM). In addition, we include risk, the standard deviation of the stock returns over the 36-months period, and first day underpricing. We use market-to-book ratio, and $CAR_{-40,-2}$ relative to trading dates, to assess whether directors are contrarians. We measure insider ownership structures using shares locked, and lockup lengths. We also account for ownership of outsiders, including VC backing, and institutional holding, and for liquidity using overhang and free float. Finally, we use takeover and SEO probabilities, to assess trading on insider information and prestigious underwriters to evaluate the impact of corporate brokers in the UK.

3. Empirical Results

3.1 *Descriptive statistics*

Table 1 provides the descriptive statistics of our sample firms. Panel A. shows that the median length of the lockup is 365 days, in line with Espenlaub *et al*. (2001) and Hoque and Lasfer (2009),[10] and more than double the 180 days in the US (Brav and Gompers, 2003; Field and Hanka, 2001). The average *free float*, defined, in line with Levis (1993) and Goergen *et al*. (2006), as the proportion of money raised in IPO relative to total market value of the company at the time of IPO, amounts to 39.16%, and the *Overhang*, defined as shares retained to shares sold, amounts to 3.85%. The shares locked amount to 94.52% of the shares sold on the IPO date (equivalent to 29.5% of the shares outstanding). The underpricing of 22.5% is consistent with previous evidence (e.g., Chambers and Dimson, 2009). The

[10] Espenlaub *et al*. (2001) find mean (median) lockup of 561 (730) days in 1992-1998 when the lockup contracts are compulsory for mineral and scientific research based firms with less than three years trading records.

Table 1
Descriptive statistics of IPOs and directors' trading

	10th Percentile	Median	Mean	90th Percentile
Panel A. Descriptive statistics of IPOs fundamentals, N = 830 IPOs				
Lockup length	306	365	391	548
Free float (%)	12.38	32.85	39.16	81.19
Overhang (%)	0.23	2.04	3.85	7.08
Shares locked (%)	70	100	94.52	100
Underpricing (%)	−1.50	9.90	22.50	51.30
Market value of equity(2008 £m)	3.20	21.60	140.20	204.10
Market-to-book	0.88	3.01	3.88	11.15
Return on Assets	−52.6	−2.60	−34.60	11.10
Panel B: Descriptive statistics of the sell trades, N = 791 in 231 IPOs				
No of trades	1.00	2.00	3.56	8.00
Trade time after IPO(years)	0.52	1.45	1.52	2.63
No of Shares (000)	19.51	200.00	858.94	1,590.00
Value of shares (2008 £000)	24.24	298.57	2,334.45	2,940.68
Trade as % of market value	0.02	0.29	1.01	2.37
Percentage holding	0.04	1.35	7.14	22.44
Market capitalisation (£m)	9.00	112.35	537.60	1244.42
Panel C: Descriptive statistics of the buy trades, N = 2102 in 480 IPOs				
No of trades	1.00	3.00	4.38	9.10
Trade time after IPO(years)	0.41	1.45	1.46	2.61
No of shares (000)	5.00	27.00	172.88	250.00
Value of shares(2008 £000)	2.81	13.30	231.61	99.14
Trade as % of market value	0.005	0.05	0.21	0.41
Percentage holding	0.01	0.63	5.27	15.65
Market capitalisation (£m)	3.84	26.48	248.14	352.89

Panel E. Annual distribution of the sample IPOs and directors' trades

Year	1999	2000	2001	2002	2003	2004	2005	2006
IPOs	39	144	59	44	39	159	201	146
Average money raised (£m)	187.2	253.5	106.8	84.1	100.0	51.6	73.6	138.4
Lockup length	427	374	410	437	404	392	388	375
Buy Trades (%)	4	19	8	7	6	22	23	12
Sell Trades (%)	5	8	8	6	6	27	29	11
Net Buy (% IPO)	2	20	7	5	6	20	23	17
Net Sell (% IPO)	7	8	11	6	6	25	25	13

This table reports the descriptive statistics for 830 IPOs and directors trades in those IPOs from 1999 to 2006. *Lockup length* is lockup period in days, *free float* defined as the proportion of money raised in IPO relative to total market value of the company, *Overhang* is the ratio of the proportion retained to the proportion sold, *Shares locked* is the ratio of shares locked relative to shares sold in the IPO. *Underpricing* is the percent return on the first day from the offer price to the closing price, *Market value* is the offer price *times* shares outstanding in 2008 millions of Pound Sterling constant terms. *Market-to-book* is the ratio of market capitalisation at the IPO divided by the book value of the equity in the first reporting period after IPO, *Return on assets* is the net income divided by total assets in the first reporting period after the IPO. Panel B and C report the distribution of the buy and sell trades that occurred within 3 years of IPO. *Percentage Holding* is the percent of total shares owned by the director who traded. $CAR_{-42,-2}$ is the cumulative abnormal return 40 day pre-event window, where the abnormal returns are based on the standard event study methodology with α and β computed from a regression of stock returns on the FTSE All Share Price Index for main market companies and AIM All Share Price Index for AIM companies. In Panel E, *Net Buy* (*Net Sell*) is the proportion of IPOs with positive (negative) ratio of (Buys – Sells)/Total trade, *Average Money Raised* is the ratio of money raised in 2008 £m over the number of IPOs.

analysis of the fundamentals indicates that, while the average market value of equity of our firms is £140m (about $210m), our sample includes small as well as large firms. Consistent with US evidence (e.g., Brav and Gompers, 2003), our IPOs are loss making as the average return on equity is -34.6% and high growth as the average market-to-book ratio is 3.88.

Panels B. and C. report the distribution of the buy and sell trades during the three-year post-IPO period. On average, there are 3.56 sell and 4.38 buy trades, occurring roughly 1.5 years after IPO, suggesting that most of the trades occur after the lockup expiration date. The results indicate, however, that the number and value of shares sold are significantly higher than the buy trades; the value of shares sold of £2.3m is 10 times those bought of £0.23m. We also observe this difference (1.01% vs. 0.21%) when we scale the value of the trades by market capitalisation to account for size impact, as the average market value of IPOs subject to buy trades of £248m is significantly lower than the £538m for the sell trade IPOs. Overall, the buy trades are more frequent, but they appear to be smaller than the sell trades. Consequently, the average holding of directors is significantly larger in IPOs with sell trades.

Panel E. reports the annual distribution of sample IPOs and directors' trades. Consistent with previous evidence (e.g., Chambers and Dimson, 2009), the volume of IPOs is relatively high in the 'Bubble' periods of 2000, and 2004-2006, but 2001-2003 is a relatively quiet period. The next row reports the distribution of the amount of money raised. IPOs appear to be relatively larger in 1999 to 2000 period, with an average of £200m per issue, compared to £88m in the post-2001 period. In terms of the length of the lockup, the results show that the maximum of 437 days is in 2002 and the minimum of 374 is in 2000, but the distribution is relatively homogeneous, and in each year, the average is higher than 180 days documented in the USA. Interestingly, the analysis of the annual distribution of director trades and the *Net Sell* and the *Net Buy* sub-samples, reported in the last two rows, indicates that both the buy and sell trades are more frequent in 2004-2006, except for the 19% buy trades in 2000. In 1999, the total number of trades is 124, split into 84 (4% of 2,102) buy and 40 (5% of 791) sell trades, while the respective trades in 2005 are 483 (23%), and 229 (29%). We find similar distribution for the number of *Net Buy* and *Net Sell* IPOs. Only a small number of IPOs are subject to director trading activity in 1999-2003, except 2000 with 166 IPOs (20%). We account for this time effect in our regressions.

3.2 *The long-run performance of IPOs*

Table 2 reports the long-run performance over various sub-periods after the IPO date and over months 2 to 18, and 19 to 36, as Figure 1 shows that the periodicity of the buy and sell trades is relatively evenly distributed across these two sub-periods. Following Ritter and Welch (2002), we report in Panel A. and B. the style adjusted buy and hold average returns (BHARs) and cumulative abnormal returns (CARs) where the style-matched firm is the closest market capitalisation and book-to-market ratio listed firm. In Panel C and D we report equally weighted and value weighted CARs with $\alpha = 0$ and $\beta = 1$.[11] In Panel A

[11] We find similar results when we compute the raw BHARs. Brav *et al*. (2000) argue that tests of underperformance based on BHARs are biased towards rejecting the null hypothesis of no underperformance. Moreover, the raw equally-weighted returns may result in biased long-term returns as they are not compared to a benchmark and they may suffer from size effects. We report matched-firm approach results as under this method the underperformance disappears or shrinks (e.g., Brav and Gompers, 1997; Ritter and Welch, 2002).

Table 2
Long-run IPO performance

		Months					Event windows	
	N	1	6	12	24	36	2-18	19-36
	Panel A. Style-adjusted BHARs							
All IPOs	830	−0.002 (0.27)	−0.016 (−0.50)	−0.076*** (−2.02)	−0.139*** (−3.15)	−0.183*** (−3.43)	−0.055 (−1.36)	−0.226*** (−2.62)
AIM	691	−0.013 (−1.33)	−0.013 (−0.36)	−0.070 (−1.64)	−0.150*** (−2.96)	−0.187*** (−3.03)	−0.045 (−0.98)	−0.267** (−2.62)
Main	139	0.049*** (3.19)	−0.030 (−0.48)	−0.106 (−1.44)	−0.083 (−1.09)	−0.161** (−1.92)	−0.101 (−1.47)	−0.020 (−0.25)
AIM-Main (p-value)		0.00	0.80	0.67	0.46	0.80	0.50	0.06
No trade IPOs	287	−0.023 (−1.46)	−0.024 (−0.34)	−0.133*** (−2.38)	−0.340*** (−5.55)	−0.361*** (−5.26)	−0.229*** (−3.96)	−0.438** (−1.89)
AIM	257	−0.032 (−1.93)	−0.035 (−0.46)	−0.135** (−2.28)	−0.344*** (−5.14)	−0.362*** (−4.89)	−0.224*** (−3.59)	−0.470* (−1.85)
Main	30	0.057 (1.45)	0.074 (0.44)	−0.111 (−0.685)	−0.303** (−2.44)	−0.34** (−2.50)	−0.27* (−1.83)	−0.161 (−0.77)
AIM-Main (p-value)		0.04	0.55	0.89	0.77	0.91	0.76	0.35
Net buy IPOs	353	0.012 (0.93)	−0.086*** (−2.28)	−0.185*** (−2.95)	−0.277*** (−4.09)	−0.336*** (−4.50)	−0.152*** (−2.55)	−0.204*** (−3.49)
AIM	304	0.009 (0.64)	−0.067 (−1.54)	−0.172** (−2.44)	−0.273*** (−3.54)	−0.336*** (−3.98)	−0.140** (−2.09)	−0.218*** (−3.35)
Main	49	0.033 (1.32)	−0.199* (−1.76)	−0.271** (−2.13)	−0.297*** (−3.16)	−0.335*** (−2.76)	−0.223** (−2.19)	−0.114 (−1.11)
AIM-Main (p-value)		0.41	0.33	0.50	0.84	0.99	0.50	0.39
Net Sell IPOs	190	0.001 (0.11)	0.127*** (2.89)	0.212*** (2.75)	0.421*** (4.08)	0.371*** (2.49)	0.390*** (3.95)	0.055 (0.70)
AIM	130	−0.025 (−1.60)	0.160 (1.08)	0.295*** (2.92)	0.522*** (3.86)	0.508** (2.46)	0.530*** (3.98)	0.021 (0.21)
Main	60	0.058 (2.67)	0.056*** (2.68)	0.032 (0.30)	0.201 (1.45)	0.073 (0.49)	0.085 (0.77)	0.128 (0.98)
AIM-Main (p-value)		0.01	0.19	0.07	0.10	0.09	0.02	0.52
	Panel B. Style-adjusted CARs							
All IPOs	830	0.022* (1.89)	−0.002 (−0.05)	−0.056 (−1.37)	−0.175*** (3.05)	−0.261*** (−3.72)	−0.123** (−2.54)	−0.161*** (−3.23)
No Trade IPOs	287	0.012 (1.02)	−0.058** (−2.04)	−0.274** (−6.76)	−0.420*** (−7.32)	−0.513*** (−7.30)	−0.321*** (−6.64)	−0.204*** (−4.10)
Net buy IPOs	353	0.026** (2.19)	−0.017 (−0.61)	−0.107** (−2.64)	−0.280*** (−4.88)	−0.420*** (−5.97)	−0.192*** (−3.98)	−0.253*** (−5.10)
Net sell IPOs	190	0.027** (2.33)	0.082** (2.85)	0.145*** (3.45)	0.239*** (4.17)	0.239*** (3.40)	0.187*** (3.88)	0.024 (0.49)
	Panel C. Equal weighted CARs							
All IPOs	830	0.005 (0.36)	−0.023 (−0.71)	−0.106** (−2.33)	−0.270*** (−4.22)	−0.365*** (−4.66)	−0.162*** (−3.10)	−0.208*** (−3.75)
No Trade IPOs	287	−0.016 (−1.19)	−0.081*** (−2.52)	−0.219*** (−4.85)	−0.526*** (−8.22)	−0.679*** (−8.66)	−0.340*** (−6.50)	−0.324*** (−5.84)
Net buy IPOs	353	0.022* (1.65)	−0.051 (−1.59)	−0.179*** (−3.95)	−0.375*** (−5.85)	−0.483*** (−6.16)	−0.251*** (−4.80)	−0.254*** (−4.57)
Net sell IPOs	190	0.000 (0.03)	0.078*** (2.45)	0.120*** (2.65)	0.149*** (2.33)	0.133* (1.70)	0.153*** (2.93)	−0.020 (−0.37)

Table 2
Continued

		Months					Event windows	
	N	1	6	12	24	36	2-18	19-36
		Panel D. Value weighted CARs						
All IPOs	830	0.028 (1.16)	−0.059 (−0.99)	−0.256*** (−3.05)	−0.399*** (−3.37)	−0.351** (−2.41)	−0.303*** (−3.04)	−0.076 (−0.74)
No Trade IPOs	287	−0.003 (−0.11)	−0.061 (−1.03)	−0.274*** (−3.27)	−0.537*** (−4.53)	−0.530*** (−3.65)	−0.436*** (−4.38)	−0.092 (−0.89)
Net buy IPOs	353	0.056*** (2.29)	−0.036 (−0.60)	−0.343*** (−4.09)	−0.639*** (−5.39)	−0.655*** (−4.51)	−0.487*** (−4.89)	−0.223** (−2.17)
Net sell IPOs	190	0.019 (0.76)	−0.081 (−1.37)	−0.159* (−1.89)	−0.081 (−0.68)	0.056 (0.38)	−0.041 (−0.41)	0.079 (0.77)

This table presents the buy-and-hold abnormal returns (BHARs) and cumulative abnormal returns (CARs) for UK IPOs for 3-year post-IPO period. The abnormal returns are based on the FTSE All Share Price Index for main market IPOs and AIM All Share Price Index for AIM IPOs. Panel A and B report the style-adjusted (M/B and size) BHARs and CARs, respectively. *All IPOs* includes 830 UK IPOs over the period 1999-2006. *No Trade* (287 IPOs) include IPOs without any insider trading during 36 months period after IPO. IPOs with insider trades (543 IPOs) include any IPOs with at least one insider trade during 36 months period after IPO, split into 190 *Net Sell* IPOs and 353 *Net Buy* IPOs. The former are IPOs with positive *NPR* while the latter have negative *NPR*, where *NPR* is the difference between total value of purchases and sells divided by total value of shares traded over this 36 months period after IPO. The returns exclude first day returns. ***, **,* denotes significant at 0.01, 0.05 and 0.10 level, respectively.

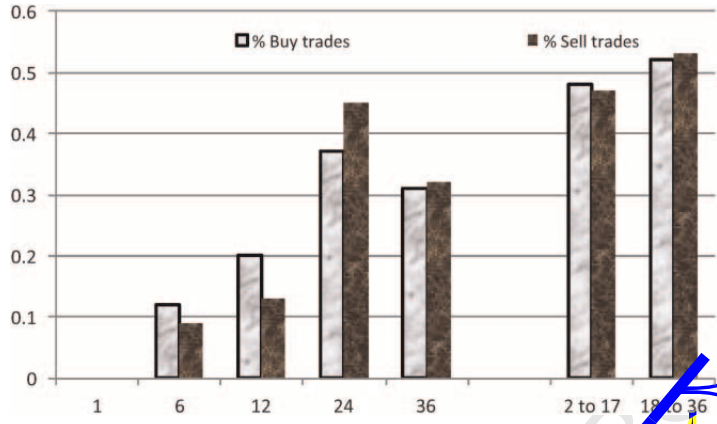

Fig. 1. Distribution of buy and sell trades

This figure reports the distribution of the proportion of the buy and sell trades over the 36 months period after IPOs. The sample includes 2,102 buy trades and 791 sell trades undertaken in 830 UK IPOs over the period 1999–2006. The event periods 2 to 18 and 19 to ~~26~~ 36 months show whether the trades occur during the first or second part of our sample period.

we compare IPOs listed on the AIM and the Main market. Since the impact of AIM is relatively marginal and the results are relatively similar across the estimation methods used, we do not distinguish between AIM and Main in the remaining panels and in the OLS regressions.

Our results are relatively consistent across these different methodologies. Overall, they indicate that the excess returns are not homogeneous across our sample firms. In particular, the overall underperformance of our sample of IPOs appears to be driven by IPOs without insider trading and *Net Buy* IPOs which underperform consistently across all our sample period except the first few months of quotation, while *Net Sell* IPOs over-perform. For example, the style-adjusted BHARs reported in Panel A in months 19 to 36 are -22.6%, -43.8%, and -20.4%, for *All*, *No Trade*, and *Net Buy* IPOs, respectively, while the *Net Sell* IPOs generate positive returns throughout the sample period. We show these results in Figure 2. Overall, our results suggest that these trades are less likely to be informative, directors do not trade on insider information, but they are likely to sell when their IPOs reach their peak.

3.3 *The timing of the excess returns*

In this section, we assess whether the positive (negative) excess returns of *Net Sell* (*Net Buy*) IPOs occur before or after the trades of directors. We assess directly the market reaction around each individual buy and sell trade undertaken by directors. Table 3, Panel A, shows that on the announcement date of buy trades, share prices increase substantially by 3.59%, compared to the 1.16% reported by Fidrmuc *et al*. (2006) for UK seasoned firms. In the various pre-event periods, the CARs are all negative and significant, suggesting that the trades occur when the IPO is underperforming. Interestingly, the post-event CARs are all negative suggesting that the positive signal of the buy trades is short-lived. For the sell trades, the pre-event period CARs are positive and highly significant, but on the event and post-event periods, they are not constantly negative and significant.

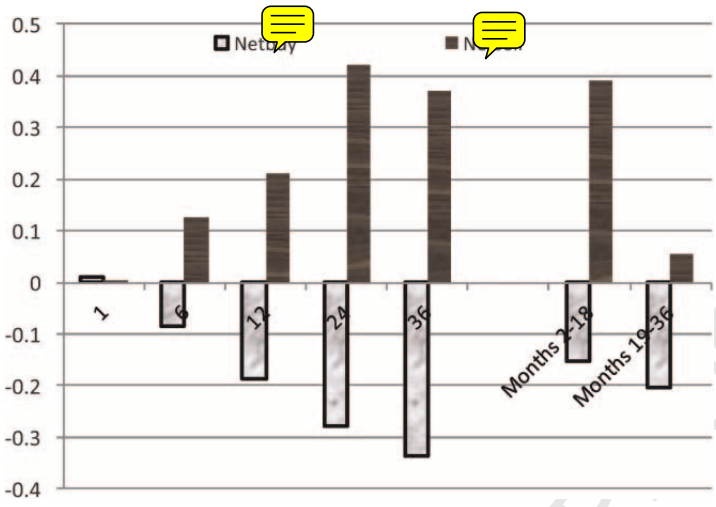

Fig. 2. Style-adjusted buy-and-hold long-run returns of ~~net buy and net sell IPOs~~

This figure presents the Buy-and-hold returns relative to size and book-to-market control firms for 3-years post-IPO period. We construct our samples as follows. We first select IPOs with insider trades (543 out of 830), which include any IPOs with at least one insider trade during 36 months period after IPO. Then we compute the Net purchase ratio, *NPR*, as the difference between the total value of purchases and sells, divided by the total value of shares traded over this 36 months period after IPO. IPOs with positive (negative) *NPR* are classified as *Net Buy* (*Net Sell*) IPOs. We identify 190 *Net Sell* IPOs and 353 *Net Buy* IPOs. We compute the first month returns without first day returns to exclude any potential effects of the level of underpricing.

These results suggest that, consistent with previous insider trading literature (e.g., Seyhun, 1986), directors adopt contrarian strategies by buying (selling) after significant share price decreases (increases), but the informativeness of these trades is weak, as stock prices do not increase (decrease) after their buy (sell) trades. Although the negative announcement dates abnormal returns implies that directors convey bad news to the market by selling shares, in line with Brau and Fawcett (2006), the impact is short lived. Our results also imply that since the returns in the period before the sell trades are positive, directors may have stopped the positive performance of the IPO. Without such trades, returns may have carried on increasing, although they are small.

In Panel B, we aggregate these trades for *Net Buy* and *Net Sell* sub-samples. The CARs for *Net Buy* sub-sample are all negative and significant, with the exception of the positive returns of 2.60% on the announcement dates. In contrast, for the *Net Sell* sample, the CARs are all positive, except for $CAR_{-1,+1}$ and $CAR_{+2,+40}$. However, the pre-trade CARs are relatively larger than the post-trade CARs, suggesting that, in line with the last two columns in Table 2, the pre-trade period is likely to drive the excess returns for the *Net Sell* sample.

3.4 *Fama and French (1993) Results*

We expand our robustness checks using the Fama-French (1993) regressions model. In line with previous insider trading literature, we use the director trading as event and calculate Fama-French regressions using trade dates, because our results on CAR and BHAR using IPOs may suffer from the look-ahead bias, as investors could not separate

Table 3

The behaviour of the equal weighted abnormal returns of directors' trades

	N	−1Y	−6M	(−40–2)	(−1, +1)	(+2, +40)	+6M	+1Y	+2Y
Panel A. Cumulative abnormal returns around directors' trading announcements within 36 months post-IPO period									
Buy Trades	2,102	−0.143*** (−7.60)	−0.125*** (−10.64)	−0.112*** (−18.4)	0.0359*** (13.95)	−0.0141** (−2.94)	−0.003 (−0.11)	−0.042** (−2.32)	−0.074* (−1.93)
Sell Trades	791	0.364*** (16.34)	0.225*** (13.84)	0.0603*** (6.89)	−0.0011 (−0.55)	−0.0247*** (−3.54)	0.023 (1.65)	−0.039* (−1.73)	−0.066 (−1.08)
Panel B. Cumulative abnormal returns around aggregate directors' trading within 36 months post-IPO period									
Net Buy	1,622	−0.179*** (−8.25)	−0.144*** (−10.37)	−0.0767*** (−10.40)	0.0260*** (3.97)	−0.0164** (−2.40)	−0.048*** (−3.61)	−0.128*** (−6.10)	−0.217*** (−4.77)
Net Sell	1,271	0.231*** (11.44)	0.122*** (9.01)	0.0461*** (5.25)	−0.001*** (−3.60)	−0.0146** (−2.57)	0.072*** (6.00)	0.066*** (3.40)	0.126*** (2.92)

This table presents the cumulative average abnormal returns around directors' share trading. We use the market-adjusted model with FTSE All Share Index and AIM all share price index as the proxy for market returns. We identify 2102 buy and 791 sell trades. (−40-2), (-1 + 1) and (+2 + 40) are for the cumulative abnormal returns over the −40 to −2 days, −1 to +1 days and +2 to +40 days relative to announcement date of the trade. M is for month and Y for Year. Panel A presents the results for each individual trade. Panel B. presents the aggregated trades for *Net Buy* and *Net Sell* IPOs. The sample period is limited to 36 months after the IPO to allow comparison with previous IPO studies. The sample period is 1999–2006. IPOs with positive (negative) *NPR* are classified as *Net Buy* (*Net Sell*), where *NPR* is the difference between total value of purchases and sells divided by total value of shares traded over this 36 months period after IPO. We identify 190 *Net Sell* IPOs and 353 *Net Buy* IPOs. The returns exclude first day returns. ***, **,* denotes significant at 0.01, 0.05 and 0.10 level, respectively.

IPOs on the basis of subsequent insider trading at the time of the IPO. We, therefore, assess the excess returns from the date of the buy and sell trades, rather than IPO date, to allow investors to trade on such information. We run the Calendar time portfolio regressions. The results in Table 4, Panel A, shows that the intercept α which measures the abnormal returns, is negative for buy but positive for sell trades, confirming that directors earn negative returns on their purchases, but share prices do not decrease after the sell trades, in line with our results above.

Panel B. reports the results based on equally weighted returns. For the sample as a whole, we find but not report for space considerations that α is -0.9%, equivalent to $CAR_{1,36}$ of -36% reported in Panel B, Table 2, and β, the sum of β_t and β_{t-1} is 1.66, in line with Ritter and Welch (2002) findings of 1.73, suggesting that our IPOs have relatively higher risk and, thus, they should generate positive long-term returns. Although this magnitude of β is relatively homogeneous across all our sub-samples, ranging between 1.45 for *Net Buy* and 1.66 for *Net Sell* IPOs, α is -1.9%, -1.5% and +2.1% for *No Trade*, *Net Buy* and *Net Sell* IPOs, in line with our findings in Table 2.

The remaining results are in line with Ritter and Welch (2002) in terms of signs, but the lagged coefficients of SMB are predominantly insignificant. Similarly, the coefficients of the lagged HML are predominantly not significant, but the coefficient of HML is more negative for the *Net Sell* IPOs. These results suggest that the exposure of the returns to size and growth indices is only contemporaneous. The results based value-weighted returns reported in Panel C show that α is not significant for *No Trade* IPOs, but positive for *Net Sell* and negative for *Net Buy* IPOs.

3.5 *The determinants of the long-run performance*

In this section, we run a set of regressions to assess whether the difference in the performance of *Net Buy* and *Net Sell* IPOs holds after controlling for IPO fundamentals. Table 5 reports the cross-sectional regressions results. We use *NPR*, the net purchase ratio based on number and value of the transactions to measure directors' trading activity, and a dummy variable for no insider trading. The last three columns replicate Regression (1) for *Net Buy*, *Net Sell* and *No Trade* subsamples. The results indicate that all the three insider-trading variables affect negatively IPO long-term performance. The negative coefficient of *NPR* implies that IPOs where directors are net buyers generate negative returns. Similarly, *No Trade* dummy is negative and significant, suggesting that IPOs not subject to insider trading underperform significantly more than their counterparts where directors trade. These insider trading variables have also increased the explanatory power of the regressions as previous studies report relatively much lower R^2 of 1 to 8% (e.g., Levis, 2011; Goergen *et al*., 2007).[12] Overall, our results suggest that insider trading is an additional and significant explanatory variable of the long-run performance of IPOs.

The remaining explanatory variables expand the findings reported in previous studies. For example, the relationship between long-run performance and *Underpricing* is negative and significant in all our specifications, except in the *Net Sell* subsample, in line with previous

[12] Levis (2011) obtained an R^2 of 1.4% for Non-private equity backed, 7.5% for venture capitalists-backed and 0.05% for buyout IPOs. Goergen *et al*. (2007) report R^2 for all firms of 8.45%. However, they report R^2 of 6.38% and 13.58% for small firms and large firms respectively.

Table 4

Fama French three-factor regressions on calendar-time portfolio returns (36 months)

	α	β_t	β_{t-1}	γ_t	γ_{t-1}	δ_t	δ_{t-1}	*Adj.* R^2
Panel A: Calendar time regressions 36 months post-trading date								
Buy trades	−0.018***	1.039***		1.079***		−0.506***		0.582
	(−3.76)	(12.52)		(6.63)		(−2.88)		
	−0.012***	0.945***	0.237***	0.909***	0.137	−0.372**	−0.421**	0.602
	(−3.06)	(12.39)	(3.12)	(5.64)	(1.32)	(−2.11)	(−2.41)	
Sell trades	−0.008	0.920***		1.322***		−0.815**		0.550
	(−1.54)	(8.71)		(4.65)		(−2.33)		
	0.016***	0.692***	−0.116	1.265***	0.508*	−0.602	−0.637**	0.534
	(2.88)	(5.64)	(−0.98)	(4.08)	(1.94)	(−1.56)	(−2.53)	
Panel B. Equally weighted returns 36 months post-IPO date								
No trade IPOs	−0.019*** (−3.79)	0.909*** (7.24)		0.991*** (6.86)		−0.495 ** (−2.17)		0.59
	−0.018*** (−3.75)	0.906*** (7.09)	0.203 (1.56)	0.868*** (5.65)	0.257** (2.02)	−0.499** (−2.30)	−0.293 (−0.093)	0.61
Net sell IPOs	0.021** (2.40)	1.197*** (8.38)		1.071*** (4.18)		−1.286*** (−3.53)		0.58
	0.024*** (2.93)	1.193*** (6.11)	0.122 (0.716)	0.975*** (5.01)	0.157 (0.702)	−1.278*** (−3.401)	−0.474 (−0.97)	0.59
Net buy IPOs	−0.015*** (−3.56)	0.887*** (8.25)		1.101*** (7.50)		−0.448* (1.87)		0.61
	−0.013** (−2.95)	0.896*** (8.06)	0.309*** (2.83)	0.975*** (7.10)	0.241 (1.63)	−0.532** (−2.44)	−0.125 (−0.38)	0.65
Panel C: Value weighted returns 36 months post-IPO date								
No trade IPOs	−0.008 (−1.22)	1.534*** (5.20)		1.168*** (4.83)		−1.457** (−1.96)		0.50
	−0.005 (−0.68)	1.547*** (5.45)	0.409 (1.22)	0.963*** (3.85)	0.153 (0.43)	−1.499** (−2.08)	−0.088 (−0.17)	0.51
Net sell IPOs	0.019** (2.39)	1.732*** (6.16)		0.908*** (3.62)		−1.463*** (−2.92)		0.52
	0.020** (2.69)	1.761*** (5.95)	0.156 (0.56)	0.824*** (3.66)	0.149 (0.63)	−1.475*** (−2.99)	0.231 (0.408)	0.52
Net buy IPOs	−0.011** (−1.95)	1.697*** (9.05)		1.382*** (4.41)		−0.031 (−0.77)		0.65
	−0.006 (−0.98)	1.681*** (9.72)	0.215 (1.11)	1.279*** (4.61)	−0.138 (−0.780)	−0.096 (−0.24)	−0.630** (−1.94)	0.65

This table reports the results of the following Fama and French (1993) three-factor model.

$R_{pt} - R_{ft} = \alpha + \beta_t(R_{Mt} - R_{ft}) + \beta_{t-1}(R_{Mt-1} - R_{ft-1}) + \gamma_t SMB_t + \gamma_{t-1} SMB_{t-1} + \delta_t HML_t + \delta_{t-1} HML_{t-1} + \varepsilon_{pt}$ $R_{pt} - r_{ft}$ is the excess return over the risk free rate on a portfolio in time period t, $R_{Mt} - R_{ft}$ is the market risk premium in period t, SMB_t is the return on small firms minus the return on large firms, and HML_t is the return on high book-to-market portfolio minus the return of the low book-to-market portfolio and R_{ft} is the 3 months Treasury bill rate. We follow Ritter and Welch (2002) and include also the lagged factors. The return on FTSE All Share Price Index is the market return. *No Trade* IPOs include 287 IPOs without any insider trades during 36 months period after IPO. The 353 *Net Buy* (190 *Net Sell*) IPOs are IPOs with positive (negative) Net Purchase Ratio, *NPR*, the difference between total value of purchases and sells divided by total value of shares traded over this 36 months period after IPO. The returns exclude first day returns. Panel A. reports the returns 36 months after the date of the trade while Panel B. and Panel C. report the 36 months returns after IPO. ***, **,* denotes significant at 0.01, 0.05 and 0.10 level, respectively.

Table 5

OLS regressions of 36 months IPO performance

	(1)	(2)	(3)	(4)	(5)	(6)	Net buy	Net sell	No trade
Constant	2.35** (2.86)	2.25** (2.82)	1.79 ** (2.69)	1.86** (−2.33)	1.78** (2.27)	1.22* (1.92)	2.94** (2.42)	0.84 (0.54)	0.146 (0.09)
NPR transaction	−0.33*** (−4.20)			−0.28*** (−3.79)					
NPR value		−0.34*** (−5.42)			−0.27*** (−4.77)				
No trade			−0.39*** (−3.78)			−0.33** (−3.36)			
Underpricing	−0.002** (−2.31)	−0.002** (−2.11)	−0.002 (−2.81)	−0.002** (−1.97)	−0.002* (−1.83)	−0.002** (−2.48)	−0.002* (−1.87)	−0.002 (−1.53)	−0.003** (−2.11)
Log(size)	−0.026 (−0.79)	−0.042 (−1.23)	−0.011 (−0.37)	−0.007 (−0.23)	−0.006 (−0.18)	−0.017 (−0.65)	−0.038 (−0.81)	−0.048 (−0.67)	−0.011 (−0.17)
Overhang	−0.009* (−1.67)	−0.010* (−1.71)	−0.011** (−2.17)	−0.011** (−1.97)	−0.011** (−1.97)	−0.011** (−2.25)	−0.007 (−1.02)	−0.012 (−1.51)	−0.016 (−1.58)
Prestigious underwriter	0.13 (1.12)	0.16 (1.37)	0.16 (1.41)	0.04 (0.41)	0.07 (0.66)	0.09 (0.88)	0.11 (0.68)	0.25 (1.01)	0.15 (0.55)
VC backing	0.000 (0.001)	−0.012 (0.10)	−0.07 (−0.65)	−0.13 (−1.04)	−0.13 (−1.11)	−0.15 (−1.46)	−0.074 (−0.41)	0.16 (0.65)	−0.37 (−1.35)
Lockup expiry return	1.26 (3.10)	1.23 (3.05)	1.02** (2.15)	1.48 (3.80)	1.45 (3.76)	1.01** (2.12)	1.19** (2.08)	1.63 (1.56)	0.56 (0.97)
Log(lockup length)	−0.31** (−2.45)	−0.30** (−2.43)	−0.29** (−2.42)	−0.39*** (−3.09)	−0.37*** (−3.03)	−0.30** (−2.75)	−0.46** (−2.39)	−0.03 (−0.13)	−0.012 (−0.05)
High tech dummy	−0.55*** (−3.19)	−0.50*** (−2.95)	−0.57*** (−4.00)	−0.59*** (−3.69)	−0.55*** (−3.48)	−0.60*** (−4.10)	−0.58 (−2.99)	−0.37 (−1.25)	−0.58* (−1.92)
Bubble dummy	−0.49*** (−3.47)	−0.48*** (−3.48)	−0.52*** (−4.75)	–	–	–	−0.46** (−2.81)	−0.58** (−2.19)	−0.39* (−1.86)
Hot dummy	−0.32*** (−2.62)	−031*** (−2.73)	−0.38*** (−3.34)	–	–	–	−0.37** (−2.22)	−0.21 (−0.97)	−0.54** (−1.98)
Takeover probability	0.007 (0.06)	0.022 (0.19)	0.13 (1.25)	0.06 (0.50)	0.07 (0.62)	0.16 (1.57)	0.03 (0.20)	0.002 (0.009)	0.32* (1.67)
SEO dummy	0.18 (1.17)	0.16 (1.10)	0.09 (0.69)	0.04 (0.32)	0.04 (0.28)	−0.007 (−0.06)	0.11 (0.63)	0.25 (0.93)	−0.12 (−0.47)
Year dummies	No	No	No	Yes	Yes	Yes	No	No	No
Adjusted R2 (%)	12.8	14.5	10.9	19.7	20.6	15.5	8.4	3.1	6.5

This table reports the estimates of OLS regressions where the dependent variable for all regressions is 36 months cumulative abnormal returns for 830 IPOs that went public in London stock exchange from 1999 to 2006. *NPR transaction* (*NPR value)* is the number (value) of insider purchases minus the number (value) of insider sells divided by the total number (value) of insider transactions over 36 months after IPO. *No Trade* is a dummy equal to 1 if the IPO does not have any insider trades within 36 months of IPO. *Underpricing* is the percent return on the first day from the offer price to the closing price. *Size* is the offer price *times* shares outstanding in 2008 millions of Pound Sterling constant terms. *Overhang* is the ratio of proportion retained to proportion sold. *Prestigious underwriter* is a dummy equal to 1 if the IPO is underwritten by a global underwriter defined in Derrien and Kecskes (2007). *VC backed* is a dummy equal to one if the IPO is backed by venture capitalists. *Lockup exp ret* is the cumulative abnormal return from −2 to +2 days around the lockup expiration date. *Lockup length* is the number of days of lockup. *High-tech Dummy* is equal to one if the IPO is in computer manufacturing, electronic equipment, computer and data processing services, and optical, medical and scientific equipment. *Bubble period* is equal to 1 if the IPO is issued in the 1999–2000 period following Levis (2011). *Hot market* is equal to 1 if the IPO is issued during the high volume period of January 1999 to March 2001 and January 2004 to end of 2006. *Takeover Probability* is a Dummy constructed by following Brar et al. (2008). *SEO Dummy* is equal to 1 if the IPO raised further equity within 3-years of IPO. The *t*–statistics are in parentheses. . ***, **,* denotes significant at 0.01, 0.05, and 0.1 levels, respectively.

evidence (e.g., Levis, 2011), suggesting that IPOs with high first day returns generate lower long-term returns, in contrast to the predictions of the signalling models (Jenkinson and Ljungqvist, 2001). The results also indicate that *Prestigious Underwriters* and *VC backing* do not affect performance, in line with Levis (2011), but in contrast to Krishnan *et al*. (2011). *Size* is negative, but not significant, in contrast to Brav and Gompers (1997) who show that underperformance is concentrated in small firms. We also find a positive relationship between long-term returns and the lockup expiry dates excess returns, suggesting that IPOs with high abnormal returns on the lockup expiry dates are more likely to have higher long-term returns, as insider are unlikely to have sold their holdings after the lockup, and, thus, lower agency conflicts. In addition, the *Lockup Length*, *High Tech*, *Hot market* and *Bubble* dummies, affect negatively the long-term returns, unlike Levis (2011) who reports a negative, but not significant, coefficient for bubble dummy. In unreported regressions, we include an AIM dummy, however, it is never significant. This is consistent with the univariate results in Panel A, Table 2, where we find no difference in long term performance in IPOs listed on the AIM and Main Market.

We test for liquidity of the shares using *Free float*, the proportion of money raised in IPO relative to total market value of the company at the time of IPO, and *Overhang*, defined as shares retained to shares sold. In particular, we assess whether *Net Sell* IPOs have a higher free float, while *Net Buy* IPOs have low free float, and following the buy trades, liquidity, trading, and research might dry up, and consequently, a drop in the stock price might follow. We find, but not report for space considerations, that *free float* is significantly correlated with *Overhang* ($r = -0.412$, $p = 0.000$), but not significantly related to our dependent variable, *CAR36* in all our regressions. We think that the impact of liquidity is better captured by overhang which is significant in (3) to (5), but not in (6) and in the subsample IPOs. Overall, these results suggest that liquidity is less likely to drive our IPOs long-term returns.

3.6 *The determinants of insider trading in IPOs*

In this section, we expand our analysis by assessing the likelihood of directors' trading through univariate analysis, and by running a set of logit regressions. We contrast further the fundamental characteristics of IPOs in three different samples: *Net Sell* vs. *No Trade*, *Net Buy* vs. *No Trade*, and *Net Buy* vs. *Net Sell*. Previous studies find that insiders do trade on private information (e.g., Seyhun, 1986; Korczak *et al*., 2010). The question is whether they trade shortly before news announcements and violate insider trading rules, with potential regulatory scrutiny and litigation, as well as potential political and reputational costs,[13] or whether the abnormal returns reflect the directors' superior knowledge about

[13] See Korczak *et al*. (2010) for a recent review and the specificities of the UK vs. US regulatory regimes and the difficulties in identifying what constitutes private information and an insider, and thus, the complexities in enforcing the insider trading rules. UK regulation prohibits trading by directors who possess any price sensitive information, and insider trading is a criminal offence since the introduction of the Companies Act 1980. Unlike US, UK directors are banned from trading in 'prohibited periods', which include 'close periods' of up to 60 days associated with earnings announcement, and any periods when there is 'any matter which constitutes inside information in relation to the company'. Directors have also to get clearance from the chairman.

their firms' prospects, and their ability to recognise pricing errors made by outside investors.

We distinguish between these two possibilities by using SEO dummy and takeover dummy to proxy for trading on news releases, since prospects for future deals grows after IPO (Brau and Fawcett, 2006; Bancel and Mittoo, 2009) and, if they trade on mispricing, they are expected to adopt contrarian strategies by buying (selling) stocks with poor (good) past performance (e.g., Jenter, 2005; Lakonishok and Lee, 2001). To capture this effect, we use the cumulative abnormal return 40 days before the trading dates, $CAR_{-40,-2}$, and market-to-book ratio, to assess whether directors buy a stock when it is selling at a low valuation, and sell it when it has a high valuation over a longer horizon.

We also control for other fundamental factors that might affect directors' trading. While Peress (2010) reports that firm size affects trading propensity, Seyhun (1986) finds that insiders are more likely to buy in small and sell in large firms. We use the natural logarithm of market capitalisation, defined as the IPO offer price *times* the number of shares offered. In addition, previous studies also identified ownership as an additional factor that might affect the propensity of insiders to trade. For example, Ofek and Yermack (2000) report that executives with large shareholdings sell stock after receiving new equity incentives to diversify their portfolios. We use *Shares Locked*, *Lockup Length*, *free float*, and *Overhang*. We control for outside ownership by including in our regressions *Institutional holdings*, and *VC backing*. We use *Prestigious Underwriters*,[14] *Standard Deviation* of returns and *Underpricing* to proxy for risk as previous studies report that risky IPOs are underpriced more (see Ljungqvist (2007) for a review) and Meulbroek (2000) finds that managers in more risky companies tend to sell equity more aggressively. We use time dummies to control for market conditions.[15]

Table 6 reports the univariate analysis. The first column reports the results for all IPOs with directors' trades. Consistent with the proposition that directors do not trade on private information, IPOs where directors do not trade have a higher takeover probability. Moreover, compared to *No Trade* sample, the results show that directors are more likely to trade in IPOs with low underpricing, standard deviation of returns, and market–to-book, underwritten by prestigious underwriters, and backed by venture capitalists. These IPOs also generate higher returns before the trade and on the lockup expiry date, are high technology firms, but less likely to be issued in bubble period. These results appear to suggest that directors are likely to trade in low risk IPOs.

We then focus on differences between *Net Sell*, *Net Buy*, and *No Trade* samples. The results indicate that *Net Sell* IPOs have lower free float, lockup lengths and risk, higher pre-trade returns and lockup expiry returns, are more likely to be underwritten by prestigious underwriters, less likely to be issued in bubble and hot periods, or to be taken ~~over than~~ *Net Buy* and *No Trade* sub-samples. In addition, they have lower underpricing and fraction of shares locked, and less likely to be backed by venture capitalists, than the

[14] Following Derrien and Kecskes (2007) these include global investment banks such as ABN AMRO (Hoare Govett), Cazenove & Co., Credit Lyonnais Securities, Dresdner Kleinwort Wassertein, HSBC Securities, Credit Suisse, Investec Hendersen Crosthwaite securities, KBC Securities, Peel Hunt, Lehman brothers, Nomura, Schroder Salomon Smith Barney, SG securities, UBS, West LB, Merrill Lynch International, Goldman Sachs.

[15] Bubble period is 1999–2000 (Levis, 2011), and hot period is high IPO volume in 2000 and 2004–2006.

Table 6
Characteristics of IPOs with and without Director Trades within 3-years of IPO

	IPOs with directors' trades			No trade IPOs	
	All	Net sell	Net buy		
	(1)	(2)	(3)	(4)	p-value of $\chi 2$
No of IPOs	543	190	353	287	
Takeover probability (%)	23.38[a]	18.94[bc]	25.77[d]	41.46	0.00
SEO dummy (%)	16.60	13.68	17.56	13.93	0.11
Market-to-book	6.31[a]	6.67[b]	5.17[d]	7.44	0.05
$CAR_{(-40,-2)}$ (%)	1.01[a]	5.88[bc]	−1.58[d]	−3.29	0.00
Size (2008 £m)	149.2	175.3	135.5	123.2	0.20
Shares locked (%)	93.98	92.2[c]	94.95	95.5	0.12
Lockup length	388.5	378.5[bc]	395.0	398.3	0.20
Free float	38.15	35.58 [bc]	39.54	39.76	0.09
Overhang (%)	3.82	4.41	3.51	3.99	0.23
Institutional holding (%)	60.7	58.9	59.94	63.41	0.16
Venture backed (%)	15.83[a]	17.89[c]	14.77[d]	10.45	0.05
Underpricing (%)	19.58[a]	15.62[c]	21.78	28.18	0.10
Prestigious underwriter (%)	23.38[a]	27.36[bc]	21.30[d]	13.93	0.00
Lockup expiry returns (%)	−1.59	−0.63[bc]	−2.10	−2.44	0.10
High tech dummy (%)	11.23[a]	10.00	11.89[d]	8.34	0.17
Bubble dummy (%)	19.33[a]	14.70[bc]	21.18[d]	27.18	0.00
Hot dummy (%)	80.29[a]	76.84[bc]	82.15[d]	87.80	0.00
Standard deviation	0.029[a]	0.026[bc]	0.030	0.031	0.01

This table presents the characteristics of IPOs with and without directors' trades within 3-years of IPO. The sample includes 287 IPOs without insider trading, and 543 IPOs with insider trading, split into 190 *Net Sell* and 353 *Net Buy* IPOs. *Takeover Probability* is a dummy constructed by following Brar et al. (2008). *SEO Dummy* takes value of one if the IPO raised further Equity within 3-years of IPO. $CAR_{(-40,-2)}$ are the cumulative abnormal return over pre-event window. For the no trade sample, we measure the 39-day abnormal return as the abnormal return over the whole period standardised to 39 days. *Size* is the market value of equity in 2008 constant terms. *Shares locked* is the ratio of shares locked relative to shares sold in the IPO. *Lockup length* is the lockup period in days. F*ree float* defined as the proportion of money raised in IPO relative to total market value of the company. *Overhang* is the ratio of proportion retained to proportion sold. *Institutional Holding* is the proportion of companies where institutions hold more than 3%. *Venture-backed* is the proportion of IPOs backed by venture capitalist. *Underpricing* is the percent return on the first day from the offering price to the closing price. *Prestigious underwriter* is equal to 1 if a global investment bank defined in Derrien and Kecskes (2007) has underwritten the issue. *Lockup expiry returns* is the Cumulative abnormal return over −2 to + 2 around lockup expiration. *High-tech Dummy* is equal to one if the IPO is in computer manufacturing, electronic equipment, computer and data processing services, and optical, medical and scientific equipment. *Bubble period* is equal to 1 if the IPO is issued in 1999–2000 period following Levis (2011). *Hot market* is equal to 1 if the IPO is during January 1999 to March 2001 and January 2004 to end of 2006. *Cold market* is the remaining sample period. *Standard Deviation* of returns is measured across the 36 months after the IPO. We report *p*-values for the mean difference test between different subsamples. [a, b, c, d] indicate significant differences between IPOs with insider trading vs. *No Trade*, *Net Sell* vs. *Net Buy*, *Net Sell* vs. *No Trade*, and *Net Buy* vs. *No Trade*, respectively. $\chi 2$ tests for homogeneity across the *No Trade*, *Net Sell*, and *Net Buy* samples. ~~***, **, * denotes significant at 0.01, 0.05, and 0.1 levels, respectively.~~

No Trade IPOs, but a higher risk than *Net Buy* IPOs. Compared to the *No Trade* IPOs, the *Net Buy* IPOs are more likely to be underwritten by prestigious underwriters and backed by venture capitalists, more likely to be high tech but less likely to be issued in hot period or to be taken over. They also generate relatively higher returns before the trades, but they have low market-to-book ratio, suggesting that they are likely to be undervalued. These results suggest that directors sell in IPOs with relatively shorter lockup lengths and a smaller proportion of shares locked, but they appear to undertake their trades after the lockup expiry date, as the abnormal returns on that date are significantly lower than the remaining IPOs. In addition, they have ~~the best~~ underwriters, ~~have~~ low risk and generate highest returns, suggesting that the underwriters are likely to be happy for them to sell, as the usual negative signal of sell trades is likely to be small. In contrast, the *Net Buy* IPOs have ~~strong~~ underwriters, ~~but more~~ risky and generate low returns before the trade and their low market-to-book ratio suggest that they are undervalued. These results imply that directors buy stocks to support the decrease in prices. Contrary to Seyhun (1986), our results do not suggest that directors buy in small IPOs.

Table 7 reports the logit results.[16] For each group, we run two regressions to account for multicollinearity, particularly between *Size* and *Prestigious Underwriters*. In equation (1) and (2), we assess the probability that directors are net sellers by comparing *Net Sell* IPOs, set equal to 1, against *No Trade* IPOs, equal to 0. The results indicate that the pre-trade stock price performance affect significantly the decision to sell rather than not to trade, in line with previous insider trading literature (e.g., Seyhun, 1986; Korczak *et al*., 2010). The positive and significant coefficient of $CAR_{(-40,-2)}$ suggests that directors sell in IPOs with significant increase in share prices, 38 trading days before the trade. These results are consistent with the notion that directors adopt contrarian strategies in their sell trades, but they appear to suggest that directors are more concerned with the short-term run up in share prices rather than the long-term valuation of their IPO, as the coefficient of market to book, *MB*, is not significant. Directors are more likely to sell in IPOs that are large, backed by venture capitalists, and where free float is low. Although these results suggest that directors sell in less risky firms, the coefficient of the standard deviation of returns is negative and not significant. The coefficient of the takeover probability is negative and significant, suggesting that directors are less likely to sell on private information for fear of litigation, political and reputational risks. The results based on non-correlated variables, reported in Equation (2) are relatively similar, except that the coefficient of *Prestigious Underwriters* is positive and significant.

Equations (3) and (4) report the results of *Net Buy*, relative to *No Trade*. Interestingly, while the coefficient of CAR is not significant, that of market to book, *MB*, is negative and significant, consistent with Lakonishok and Lee (2001) and Jenter (2005), and suggesting that directors buy stocks if they consider that their firm is undervalued in the long- not short-run. In addition, unlike *Net Sell* IPOs, firm size is positive and AIM dummy is negative, but not significant. However, in line with the first two columns, the results indicate that directors are less likely to buy when the probability of a takeover is high, probably to comply with the legal requirements.

Equations (5) and (6) report the probability of *Net Buy* vs. *Net Sell*. The results are relatively similar to the univariate findings in Table 5. In particular, the $CAR_{(-40,-2)}$ of *Net*

[16] We include year dummies. We find, but not report, similar results using *bubble*, *hot* and *high tech* dummies.

Table 7

Logit analysis of directors' trades within 36 months of IPO.

	Net sell = 1 No trade = 0		Net buy =1 No trade = 0		Net buy =1 Net sell =0		Net sell = 2 Net buy = 1 No trade = 0	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.208	6.04***	0.486	1.150	−2.057	−4.18***		
	(0.54)	(2.97)	(0.27)	(0.70)	(−1.08)	(−2.31)		
Takeover probability	−0.764***	−0.85***	−0.680***	−0.692***	0.220	0.230	−0.554***	−0.66***
	(−2.73)	(−3.50)	(−3.47)	(−3.85)	(0.25)	(0.96)	(−3.44)	(−4.34)
SEO dummy	−0.010	0.247	0.242	0.267	0.324	0.175	0.017	0.099
	(−0.02)	(0.77)	(0.98)	(1.16)	(1.08)	(0.63)	(0.11)	(0.54)
CAR (−40,−2)	3.869***	4.26***	1.375	1.345**	−2.557***	−2.84***	2.875***	2.92***
	(3.08)	(4.74)	(1.56)	(1.85)	(−2.75)	(−3.91)	(3.59)	(5.27)
Market-to-book	−0.005	−0.010	−0.014***	−0.013***	−0.009	−0.000	−0.008**	−0.01**
	(−0.70)	(−1.26)	(−2.03)	(−2.01)	(−0.71)	(−0.03)	(−1.74)	(−1.98)
Size	0.410***		0.075		−0.327***		0.189***	
	(4.47)	−1.25***	(1.17)	−0.007	(−4.12)	1.41***	(3.72)	−0.98***
AIM dummy		(−3.75)		(−0.02)		(4.71)		(−4.42)
	−0.454	−1.19**	−0.091	−0.264	0.478*	0.564	−0.260	−0.511
Lockup length	(−1.26)	(−1.65)	(−0.33)	(−0.44)	(1.58)	(0.85)	(−1.18)	(−1.07)
	−0.006	−0.011	0.005	−0.000	0.011**	0.01**	−0.009**	−0.01*
Shares locked	(−0.75)	(−1.59)	(0.07)	(−0.02)	(1.93)	(1.94)	(−1.93)	(−1.78)
	0.008		−0.016*		−0.014		0.003	
Overhang	(0.58)	−0.01***	(−1.63)	−0.000	(−1.00)	0.01***	(0.35)	−0.01**
		(−2.73)		(−0.06)		(2.71)		(−1.99)
Free float	−0.311	−0.286	−0.122	−0.173	0.251	0.207	−0.218	−0.229
	(−1.23)	(−1.25)	(−0.66)	(−0.98)	(1.15)	(0.99)	(1.51)	(−1.60)

Table 7
Continued

	Net sell = 1 No trade = 0		Net buy =1 No trade = 0		Net buy =1 Net sell =0		Net sell = 2 Net buy = 1 No trade = 0	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Institutional holding	0.589*	0.395	0.380	0.414	−0.074	0.051	0.390***	0.272
	(1.70)	(1.15)	(1.41)	(1.54)	(−0.25)	(0.17)	(2.01)	(1.32)
VC backed	−0.0005	−0.001	−0.0001	−0.001	0.004	0.002	0.000	−0.001
	(−0.04)	(−0.73)	(−0.108)	(−0.47)	(0.25)	(1.08)	(−0.37)	(−0.93)
Underpricing	0.074	0.022	0.475**	0.374	0.422	0.467	0.069	0.019
	(0.21)	(0.07)	(1.90)	(1.50)	(1.57)	(1.67)	(0.38)	(0.10)
Prestigious underwriters	0.744	0.452	0.062	0.039	−1.343	−1.238	0.482	0.501
Lockup expiry return	(0.79)	(0.50)	(0.09)	(0.06)	(−1.29)	(−1.13)	(0.82)	(0.85)
	−3.239	−16.2***	4.875	2.383	6.175	13.0**	−1.469	−4.096
Standard deviation	(−0.45)	(−2.47)	(1.03)	(0.54)	(0.87)	(1.99)	(−0.34)	(−1.06)
Pseudo R^2 (%)	23.20	17.19	7.80	3.92	12.40	10.17	6.10	6.66

This table presents the estimates of logit regressions. The dependent variable in the first two equations is equal to one for *Net Sell* IPOs (N = 190) and zero for *No Trade* IPOs (N = 287). In the second two equations, the dependent variable is equal to one for *Net Buy* IPOs (N = 353), and zero for *No Trade* IPOs. In the last two equations, the dependent is equal to one for *Net Buy* IPOs and zero for *Net Sell* IPOs. *Takeover Probability* is a dummy constructed by following Brar et al. (2008). *SEO Dummy* takes value of one if the IPO raised further equity within 3-years of IPO. $CAR_{(-40,-2)}$ is the cumulative abnormal returns over pre-event window. For the no trade sample, we measure the 39-day abnormal return as the abnormal return over the whole period standardised to 39 days. *Size* is the market value of equity in 2008 constant terms. *Shares locked* is the ratio of shares locked to shares outstanding. *Lockup length* is the lockup period in days. *Overhang* is the ratio of proportion retained to proportion sold. *Free float* defined as the proportion of money raised in IPO relative to total market value of the company. *Institutional Holding* is the proportion of companies where institutions hold more than 3%. *Venture-backed* is the proportion of IPOs backed by venture capitalists. *Underpricing* is the percent return on the first day from the offering price to the closing price. *Prestigious underwriter* is equal to 1 if a global investment bank defined in Derrien and Kecskes (2007) has underwritten the issue. *Lockup expiry returns* is the cumulative abnormal returns over −2 to + 2 around lockup expiration date. *Standard Deviation* of returns is measured across the 36 months after the IPO. The *t*–statistics are in parentheses. ***, **, * denotes significant at 0.01, 0.05, and 0.1 levels, respectively.

Buy IPOs are significantly lower than those of *Net Sell* IPOs, confirming the contrarian strategies adopted by directors. *Net Buy* IPOs are also smaller and more likely to be issued on AIM than *Net Sell* IPOs. Surprisingly, these IPOs have already a higher proportion of the directors' ownership which is locked, the lockup length is significantly longer, and the free float higher than the *Net Sell* IPOs. The remaining variables are relatively similar across the two samples.

Finally, Equation (7) and (8) reports the multivariate logit regression results where the dependent variable is equal to 2 for *Net Sell*, 1 for *Net Buy*, and 0 for *No Trade* IPOs. The results show that the pre-trade CARs are positive and significant, suggesting that these CARs are significantly higher for the *Net Sell* IPOs. These IPOs are also more likely to be backed by venture capitalists, issued on the Main market, and to be significantly larger, but they have lower proportion of shares locked, lower probability of takeover and market-to-book ratio.

4. Conclusion

We find strong relationship between directors' trading and the long-run returns of IPOs. As far as we are aware, our paper is unique, as previous studies did not consider these two issues simultaneously. We show that UK IPOs underperform in the long-run, in line with previous studies, but those where directors are net sellers generate substantial positive returns, and their Fama and French (1993) alpha coefficients are constantly positive. In contrast, IPOs where directors are net buyers and those not subject to insider trading have negative returns. Our results hold when we use the event study methodology to analyse short-term returns and the various methodologies to assess long-term returns, and when we account for all other factors that might affect the long-term returns in regression settings.

Although our results indicate that IPO directors are less likely to trade on insider information, and, thus, there is no transfer of wealth from uninformed to informed investors, they are puzzling as they indicate that the stock returns following the sell trades are not negative, and, for the buy trades, they are negative suggesting that directors do not reverse their IPO performance, systematically make losses on purchases, and the market does not value their buy trades. We rationalise these results by arguing that directors may simply sell when they know that their IPO has reached its optimal valuation, but they purchase more stock in their underperforming IPO to avoid admitting failure implicitly, in line with the disposition effect in behavioural finance. Alternatively, since unlike seasoned firms, there is a greater uncertainty about the value of IPOs, the information of directors is likely to be less precise. We suggest that further research is required to assess these factors, together with the possibility of the directors trading before news announcements, as in Korczak et al. (2010), the impact of private equity-backed IPOs, as in Levis (2011), the direct link between corporate brokers in the UK and trading by directors, and the trading by directors in the derivatives market to avoid the potential scrutiny by the regulators.

References

Bancel, F. and Mittoo, U.R., 'Why do European firms go public?', *European Financial Management*, Vol. 15, 2009, pp. 844–84.

Barberis, N. and Thaler, R., 'A survey of behavioural finance', in G. Constantinides, M. Harris R. Stultz, eds *Handbook of the Economics of Finance* (North Holland, Amsterdam Elsevier Science 2003), pp. 1053–112.

Benveniste, L.M. and Spindt, P.A., 'How investment bankers determine the offer price and allocation of new issues', *Journal of Financial Economics*, Vol. 24, 1989, pp. 343–61.

Brar G., Giamouridis, D. and Liodakis, M., 'Predicting European takeover targets', *European Financial Management*, Vol. 15, 2008, pp. 430–50.

Brau, J.C. and Fawcett, S.E., 'Initial public offerings: an analysis of theory and practice', *Journal of Finance*, Vol. 61, 2006, pp. 399–436.

Brau, J.C., Couch, R.B. and Sutton, N.K., 'The desire to acquire and IPO long-run underperformance', *Journal of Financial and Quantitative Analysis*, Vol. 47, 2012, pp. 493–510.

Brav, A. and Gompers, P.A., 'The long run underperformance of initial public offerings: evidence from venture and non-venture capital-backed companies', *Journal of Finance*, Vol. 52, 1997, pp. 1791–1821.

Brav, A. and Gompers, P.A., 'The role of lockups in initial public offerings', *Review of Financial Studies*, Vol. 16, 2003, pp. 1–29.

Brav, A., Geczy, C. and Gompers, P.A., 'Is the abnormal return following equity issuance anomalous', *Journal of Financial Economics*, Vol. 56, 2000, pp. 209–49.

Carter, R.B. and Manaster, S., ~~Initial~~ public offerings and underwriter reputation, *Journal of Finance*, Vol. 45, 1990, pp. 1045–67.

Carter, R.B., Dark, F.H., Floros, I.V. and Sapp, T.R.A., 'Characterizing the risk of IPO long-run returns: the impact of momentum, liquidity, skewness, and investment', *Financial Management*, Vol. 40, 2011, pp. 1067–86.

Chambers, D. and Dimson, E., 'IPO underpricing over the very long run', *Journal of Finance*, Vol. 64, 2009, pp. 1407–44.

Derrien, F. and Kecskes, A., ~~The~~ initial public offering of listed firms, *Journal of Finance*, Vol. 62, 2007, pp. 447–79.

Doukas, J. and Gonenc, H., 'Long-term performance of new equity issuers, venture capital and reputation of investment bankers', *Economic Notes*, Vol. 34, 2005, pp. 1–34.

Eckbo, B.E., Masulis, R. and Norli, O., 'Security issuance', in B. Espen Eckbo, ed., *Handbook of Corporate Finance: Empirical Corporate Finance, Volume 1* (Elsevier/North-Holland Handbooks in Finance Series, 2007), pp. 233–373.

Espenlaub, S, Gregory A. and Tonks, I., 'Re-assessing the long term performance of UK Initial Public Offerings', *European Financial Management*, Vol. 6, 2000, pp. 319–42.

Espenlaub, S., Goergen, M. and Khurshed, A., 'IPO lock-in agreements in the UK', *Journal of Business Finance and Accounting*, Vol. 28, 2001, pp. 1235–78.

Fama, E.F. and French, K.R., 'Common risk factors in the returns on stocks and bonds', *Journal of Financial Economics*, Vol. 33, 1993, pp. 3–56.

Fama, E.F., 'Market efficiency, long-term returns, and behavioral finance', *Journal of Financial Economics*, Vol. 49, 1998, pp. 283–306.

Fidrmuc, J., Goergen M. and Renneboog, L., 'Insider trading, news release and ownership concentration', *Journal of Finance*, Vol. 61, 2006, 2931–73

Field, L.C. and Hanka, G., 'The expiration of IPO share lockups', *Journal of Finance*, Vol. 56, 2001, pp. 471–500.

Finn, F. and Higham, R., 'The performance of unseasoned new equity issues-cum-stock exchange listings in Australia', *Journal of banking and Finance*, Vol. 12, 1988, pp. 333–51.

Goergen, M., Renneboog, L. and Khurshed A., 'Explaining the diversity in shareholder lockup agreements', *Journal of Financial Intermediation*, Vol. 15, 2006, pp 254-80.

Goergen, M., Khurshed A. and Mudambi, R., 'The long run performance of UK IPOs: can it be predicted?', *Managerial Finance*, Vol. 33, 2007, pp 401–19.

Grossman, S.J. and Stiglitz, J.E., 'On the impossibility of informationally efficient markets', *American Economic Review*, Vol. 70, 1980, pp. 393–408.

Hillier, D. and Marshall, A., 'Are trading bans effective? Exchange regulation and corporate insider transactions around earnings announcements', *Journal of Corporate Finance*, Vol. 8, 2002, pp. 393–410.

Hoque, H. and Lasfer, M., 'IPO lockup arrangements and trading by insiders' *Working Paper* (Cass Business School, London, 2009) Available at SSRN: http://ssrn.com/abstract=1344748

Huddart, S. and Ke, B., 'Information asymmetry and cross-section variation in insider trading', *Contemporary Accounting Research*, Vol. 24, 2007, pp. 195–232.

Jain, B.A. and Kini, ~~O.,~~The post issue operating performance of IPO ~~firms,~~ *Journal of Finance*, Vol. 49, 1994, pp. 1699–1726.

Jenkinson, T. and Ljungqvist, A., *The Theory and Evidence on How Companies Raise Equity Finance* ~~(Oxford Oxford University Press 2001),~~

Jensen, M. and Meckling, W., 'Theory of the firm: managerial behavior, agency cost and ownership structure', *Journal of Financial Economics*, Vol. 3, 1976, pp. 306–60.

Jenter, D., 'Market timing and managerial portfolio decisions', *Journal of Finance*, Vol. 60, 2005, pp. 1903–49.

Jiang X. and Zaman, M.A., 'Aggregate insider trading: contrarian beliefs or superior information', *Journal of Banking and Finance*, Vol. 34, 2010, pp. 1225–36.

Kaustia, M., 'Market-wide impact of the disposition effect: evidence from IPO trading volume', *Journal of Financial Markets*, Vol. 7, 2004, pp. 207–35.

Keloharju, M., 'The winner's curse legal liability, and the long run performance of initial public offerings in Finland', *Journal of Financial Economics*, Vol. 34, 1993, pp. 251–77.

Korczak, A., Korczak, P. and Lasfer, M., 'To trade or not to trade: the strategic trading of directors around news announcements', *Journal of Business Finance and Accounting*, Vol. 37, 2010, pp. 369–407.

Krishnan, C.N.V., Ivanov, V.I., Masulis, R.W. and Singh, A.K., 'Venture capital reputation, post-IPO performance, and corporate governance', *Journal of Financial and Quantitative Analysis*, Vol. 46, 2011, pp. 1295–1333.

Kunz, R.M. and Aggarwal, R., 'Why initial public offerings are underpriced: evidence from Switzerland', *Journal of Banking and Finance*, Vol. 18, 1994, pp. 705–24.

Kyle, A.S., 'Continuous auctions and directors' share trading', *Econometrica* Vol. 53, 1985, pp. 1315–35.

Lakonishok, J. and Lee, I., 'Are insider trades informative'? *Review of Financial Studies*, Vol. 14, 2001, pp. 79–111.

Levis M., 'The Long run performance of initial public offerings: the UK experience 1980-~~1988 '~~ *Financial Management*, Vol. 22, 1993, pp. 28–41.

Levis M., 'The performance of private equity-backed IPOs', *Financial Management*, Vol. 40, 2011, pp. 253–77.

Ljungqvist, A.~~P.~~ 'IPO underpricing', in B. Espen Eckbo ed., *Handbook of Corporate Finance: Empirical Corporate Finance*, Vol. 1 (Elsevier/North-Holland Handbooks in Finance Series, 2007), pp. 375–422.

Marin, J.M. and Olivier, J., 'The dog that did not bark: insider trading and crashes', *Journal of Finance*, Vol. 63, 2008, pp. 2429–76.

Meulbroek, L.K. 'Does risk matter? Corporate insider transactions in internet-based firms', Working Paper (Harvard Business School, 2000), available at http://ssrn.com/abstract=220128

Mikkelson, W.H, Partch, M.M. and Shah, K., ~~Ownership~~ and operating performance of companies that go ~~public,~~ *Journal of Financial Economics*, Vol. 44, 1997, pp. 281–307.

Myers, S.C. and Majluf, N.S., 'Corporate financing and investment decisions when firms have information that investors do not have', *Journal of Financial Economics*, Vol. 13, 1984, pp. 187–221.

Peress, J., 'Product market competition, insider trading, and stock market efficiency', *Journal of Finance*, Vol. 65, 2010, pp. 1–43.

Ofek, E. and Yermack, D., 'Taking stock: equity-based compensation and the evolution of managerial ownership', *Journal of Finance*, Vol. 55, 2000, pp. 1367–84.

Ritter, J.R., 'The long-run performance of Initial Public Offerings' *Journal of Finance*, 46, 1991, pp. 3–27.

Ritter, J.R. and Welch, I.I., 'A review of IPO activity, pricing and allocations', *Journal of Finance*, Vol. 57, 2002, pp 1795–1828.

Ritter, J.R., 'Investment banking and securities issuance' in G. Constantinides, M. M. Harris and R. M. Stulz, *Handbook of the Economics of Finance, Vol 1A, Corporate Finance* (Elsevier, North Holland 2003), Ch. 5.

Seyhun, H.N., 'Insiders' profits, costs of trading, and market efficiency', *Journal of Financial Economics*, Vol. 16, 1986, pp. 189–212.

Seyhun, H.N., *Investment Intelligence: from Insider Trading* (MIT Press, Cambridge MA 1998).

Subrahmanyam, A., 'Behavioural finance: a review and synthesis', *European Financial Management*, Vol. 14, 2007, 12–29

Thomadakis, S., Nounis, C. and Gounopoulos, D., 'Long term performance of Greek IPOs', *European Financial Management*, Vol. 18, 2012, 117–41

Vismara, S., Paleari, S. and Ritter, J.R., 'Europe's second markets for small companies', *European Financial Management*, Vol. 18, 2012, 352–88

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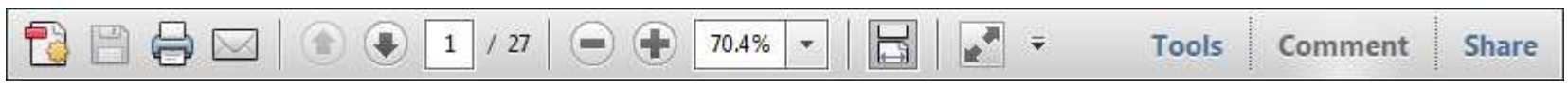
The latest version of Acrobat Reader can be downloaded for free at: http://get.adobe.com/reader/

Once you have Acrobat Reader open on your computer, click on the Comment tab at the right of the toolbar:



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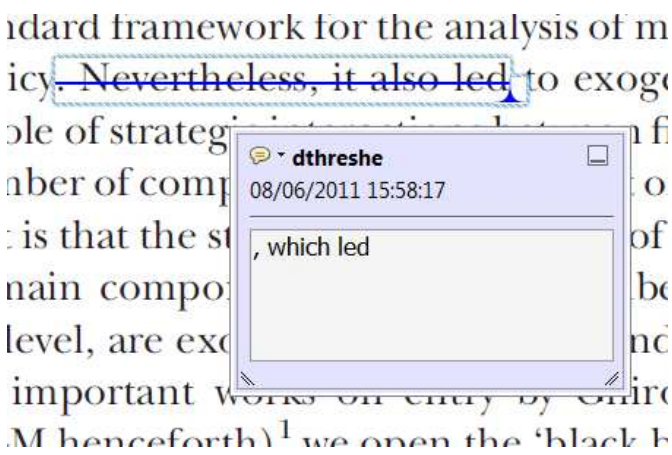
1. Replace (Ins) Tool – for replacing text.

Strikes a line through text and opens up a text box where replacement text can be entered.

How to use it

- Highlight a word or sentence.
- Click on the Replace (Ins) icon in the Annotations section.
- Type the replacement text into the blue box that appears.

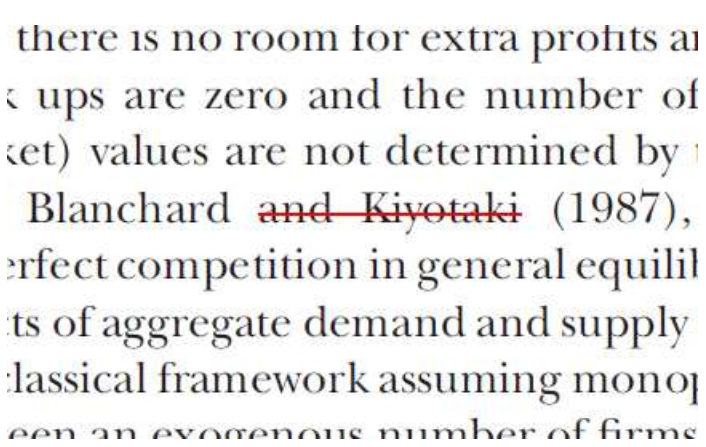


2. Strikethrough (Del) Tool – for deleting text.

Strikes a red line through text that is to be deleted.

How to use it

- Highlight a word or sentence.
- Click on the Strikethrough (Del) icon in the Annotations section.

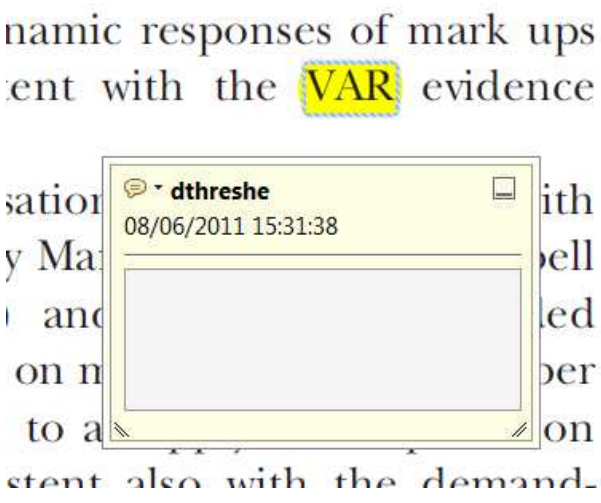


3. Add note to text Tool – for highlighting a section to be changed to bold or italic.

Highlights text in yellow and opens up a text box where comments can be entered.

How to use it

- Highlight the relevant section of text.
- Click on the Add note to text icon in the Annotations section.
- Type instruction on what should be changed regarding the text into the yellow box that appears.

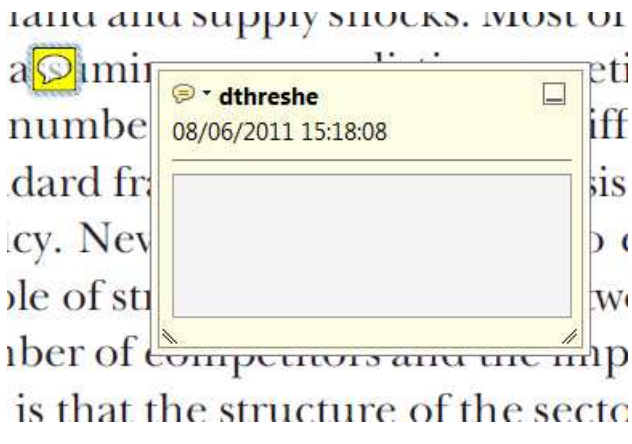


4. Add sticky note Tool – for making notes at specific points in the text.

Marks a point in the proof where a comment needs to be highlighted.

How to use it

- Click on the Add sticky note icon in the Annotations section.
- Click at the point in the proof where the comment should be inserted.
- Type the comment into the yellow box that appears.



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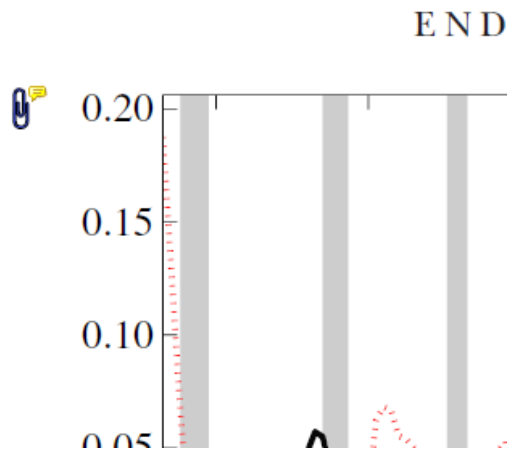
5. Attach File Tool – for inserting large amounts of text or replacement figures.

Inserts an icon linking to the attached file in the appropriate pace in the text.

How to use it

- Click on the Attach File icon in the Annotations section.
- Click on the proof to where you'd like the attached file to be linked.
- Select the file to be attached from your computer or network.
- Select the colour and type of icon that will appear in the proof. Click OK.



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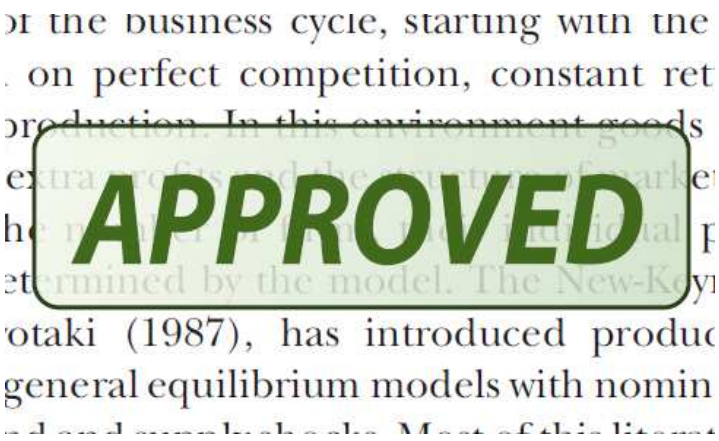

7. Drawing Markups Tools – for drawing shapes, lines and freeform annotations on proofs and commenting on these marks.

Allows shapes, lines and freeform annotations to be drawn on proofs and for comment to be made on these marks..

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- Click on one of the shapes in the Drawing Markups section.
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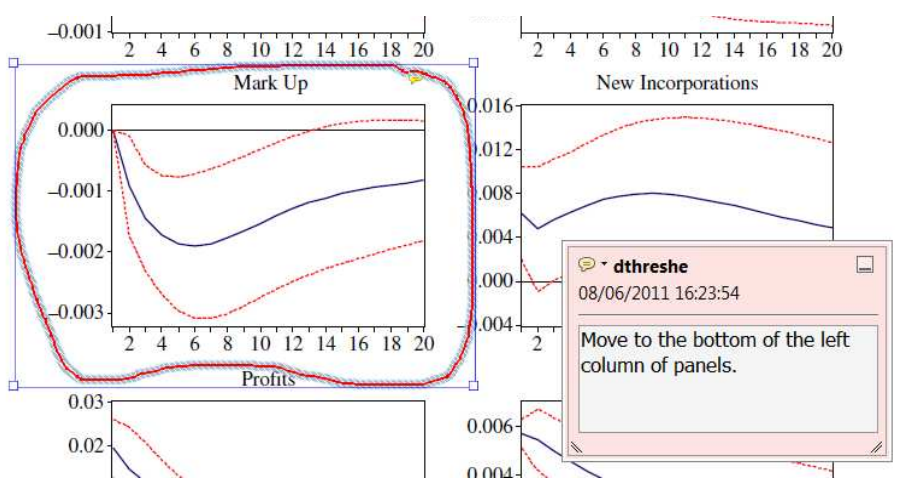

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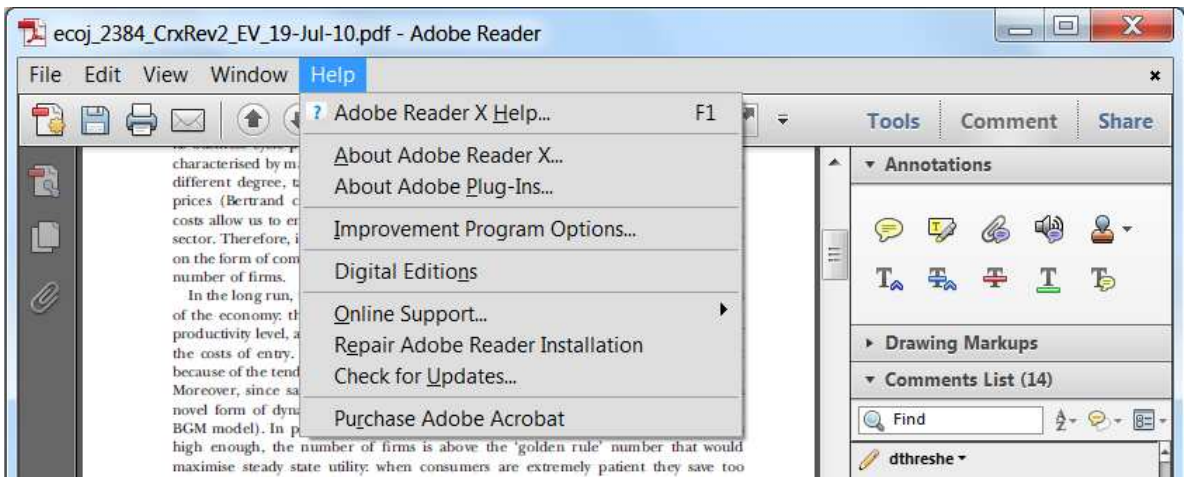

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Instruction to typesetter	*Textual mark*	*Marginal mark*
Leave unchanged	under matter to remain	stet
Insert in text the matter indicated in the margin	∧	∧ followed by new matter
Delete	through single character, rule or underline or through all characters to be deleted	
Substitute character or substitute part of one or more word(s)	through letter or through characters	new character or new characters
Change to italics	under matter to be changed	ital
Change to capitals	under matter to be changed	caps
Change to small capitals	under matter to be changed	sc
Change to bold type	under matter to be changed	bf
Change to bold italic	under matter to be changed	bf+ital
Change to lower case		lc
Insert superscript	∨	∨ under character e.g. ∨
Insert subscript	∧	∧ over character e.g. ∧
Insert full stop	⊙	⊙
Insert comma		
Insert single quotation marks		
Insert double quotation marks		
Insert hyphen		
Start new paragraph		
Transpose		
Close up	linking characters	
Insert or substitute space between characters or words	#	#
Reduce space between characters or words		