

**Does the stock market gender stereotype corporate boards?
Evidence from the market's reaction to directors' trades**

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Abstract

Attitudes towards male and female managers within organisations are well documented, but how the stock market perceives their relative capabilities is less studied. Recent evidence documents a negative short-run market reaction to the appointment of females CEOs and suggests that female executives are less informed about future corporate performance than their male counterparts. These results appear to dispute the stock market-value of having women on corporate boards. However, such short-run market reactions may retain a 'gender bias', reflecting the prevalence of negative stereotypes, where the market reacts to 'beliefs' rather than 'performance'. We test for such bias by examining the stock market reaction to directors' trades in their own companies' shares, by measuring both the short-run and longer-term returns after the director's trade. Allowing for firm and trade effects, we find some evidence that in the longer-term, markets recognise that female executives' trades are informative about future corporate performance, although initially markets under-estimate these effects. This has important implications for those studies that have attempted to assess the value of board diversity by examining short-run stock market responses.

Keywords: Insiders, director-trades, gender, board-diversity, stereotypes.

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An extensive literature exists attesting to the 'glass ceiling' that acts as a barrier to the progression of women to senior positions in organisations. Stereotyped and biased attitudes towards women are cited as one of the main explanations for the retention of these barriers (Everett *et al.*, 1996; Valian, 1998). Such negative attitudes and gender schema also explain the failure of the 'pipeline' argument which suggests that the comparatively low levels of female representation in senior positions merely reflects a time lapse between legislative or policy implementation and women progressing to the top of organisations rather than serving as a sign of intractable bias (Rhode, 2003). Crucially, the stereotyped attitudes are based on assumptions and perceptions rather than on any systematic review of actual behaviour and ability. Unsurprisingly, if only small numbers of women are given the chance to reach higher levels in organisations then there are fewer opportunities for them to demonstrate their ability. Consequently, studies on discrimination tend to focus on attitudes rather than seeking to contrast attitudes with evidence of performance. This paper seeks to explore both the initial market reaction to trading activities of women on corporate boards and the longer term market reactions once evidence of their ability is apparent. In doing so, we aim to demonstrate the ongoing bias reflected in attitudes towards women on corporate boards and present evidence that this bias is unfounded.

Broadbridge and Simpson (2011) note that it is now well-recognised that biological sex and the social construction of gender are not equivalents, as is commonly demonstrated with reference to Simone de Beauvoir's (1973[1949]) assertion that one is not born, but becomes a woman, and more recently through the work of West and Zimmerman (1987) and Butler (1989, 1993). However, the close association of gender and sex and the normative demands of conforming to the sex-gender stereotype for social recognition means that both the female sex and feminine gender are likely to be treated as if equivalents and equally face discrimination. It is argued that women have to 'manage like a man' (Wajcman, 1998) to succeed. This suggests a separation of sex and gender. However their 'token' status (Kanter, 1977) prevents them from being judged as an equal, even if conforming to a masculine ideal.

One of the challenges faced when explaining the current state of sex (or gender) discrimination and low levels of female participation in senior positions is providing

evidence on systematic and widespread bias in decision-making. Studies have either sought to provide accounts of the experience of discriminatory attitudes and glass ceiling barriers (Davies-Netzley, 1998; Ragins *et al.*, 1998; Daily *et al.*, 2000; Sheridan and Milgate, 2005; Castilla, 2008), or have explored reactions to women who have attained senior (board or CEO) levels (Wolfers, 2006). In the former case, these accounts are often limited in their number of observations and can also suffer from respondents' over- or under-representing their experiences as evidence of sex/gender discrimination. In the latter case, the small numbers of women reaching these levels can make it difficult to achieve statistically significant results (Wolfers, 2006).

There is a growing business case for diversity in board membership, and in particular gender diversity (typically used to mean sex diversity), due to tapping into broader talent pools (Singh *et al.*, 2008; Terjesen *et al.*, 2009), reflecting the diversity of the workforce and the product market (Brammer *et al.*, 2009), and breaking out of the 'old boys club' and thus introducing a more independent perspective (Adams and Ferreira, 2009; Terjesen *et al.*, 2009). Policy documents in the UK (Davies, 2011; Higgs, 2003; Tyson, 2003) and in the US (NACD, 1998; Brancato and Patterson, 1999) have also argued that board diversity leads to a more effective board. In Norway (Randøy *et al.*, 2006), Spain (Campbell and Minguez-Vera, 2008), Belgium (Corporate Governance Committee, 2011) and France (Allen and Overy, 2011), regulators have gone as far as to impose compulsory or quasi-compulsory recommendations on female representation on boards.¹ Yet the evidence drawn from a range of countries suggests that while representation of women at board level has increased, it remains low (Farrell and Hersch, 2005; Schein, 2007; Singh *et al.*, 2008; Catalyst, 2009), especially when looking at the most senior level, such as that of the CEO (Wolfers, 2006).

A compelling business case for gender diversity (Terjesen *et al.*, 2009) would suggest a demand for women entering the boardroom. However the persistence of comparatively low levels of board level representation, and some evidence of higher numbers of women who hold multiple directorships, thereby implying a smaller 'talent pool' from which to select directors (Farrell and Hersch, 2005), suggests that some problems remain. Davies (2011) recognises that these problems could be on the supply-side (not enough suitable candidates –

¹ Davies (2011) lists a number of countries (Norway, Spain, Iceland, Finland, France, Netherlands, European Union) that have implemented or are considering legislation for female quotas; and another list (US, Canada, Australia, Austria, Denmark, Germany, Sweden, Poland) that are considering alternative actions to encourage female representation.

the pipeline case) or on the demand-side. To explore the demand-side, we must question the business case for diversity, and prevailing attitudes towards women at the board level, and in particular the persistence of gender stereotypes which may in turn inform the alleged supply-side problems (where it is argued that women choose a different career path but may in fact be *perceived* to be less qualified and thus given less opportunities (Schein, 2007; Singh *et al.*, 2008).

A recent US-based study estimates that, at current trends, the number of women CEOs in the *Fortune 1000* will be around 6% by 2016 (Helfat *et al.*, 2006). At such low levels it is unlikely that the problem is merely a supply side/pipeline problem. As a consequence it is reasonable to hypothesise that boardrooms remain the preserve of men (Sheridan and Milgate, 2005), and that a ‘think manager – think male’ attitude prevails (Schein, 2007). Berthoin and Izraeli (1993) argued that the biggest barrier facing women was the gendered stereotype, a position supported more recently by the International Labour Organization (2004) and the Equal Opportunities Commission (2006). Johnson and Powell (1994) suggested that women are excluded from managerial positions because of stereotypes formed on the basis of the non-managerial population. Schein (2007) also reports that attitudes of male managers remain largely unchanged from the 1970s, while women managers now perceive both men and women as possessing the necessary characteristics for success. Despite these different attitudes, both men and women remain pessimistic about the likelihood of the effects of gender stereotyping changing in the foreseeable future (Wood, 2008).

While much of the literature on stereotypes has focused on the effects of this bias within an organisational context, equally important is the wider stock market’s perception of women managers, their performance and contribution to the firm’s overall performance. If it could be established that gender diversity is beneficial, or at least not detrimental to the firm’s performance and that markets perceive this to be the case, it may be possible to overcome some of the barriers to gender-equality of board membership. However, attempts to measure board performance and thus assess the value of board diversity² remain problematic (Erhardt *et al.*, 2003). Consequently there are few systematic evaluations with most of the arguments in favour of diversity remaining intuitive or reputational rather than demonstrable (Brammer

² By board diversity we refer to categorical or demographic/observable forms of diversity, rather than cognitive/ unobservable forms of diversity (see Brammer *et al.*, 2009).

et al., 2009). Previous studies attempting to assess the value of gender diversity on boards have done so in relation to firm value and have provided conflicting results.³ The problem with such an approach is that the market value of a company depends on many factors other than the gender composition of the board (Miller and Triana, 2009), and the statistical power of such tests is weak when the number of women represented in these positions are comparatively low (Wolfers, 2006). Furthermore the few women who achieve these positions are ascribed a token status given their numerical disadvantage (Kanter, 1997; Simpson, 1997) and often report having to ‘manage like a man’ to fit in (Davies-Netzley, 1998; Schein, 2007).

Kanter argued that a critical mass was required in order to affect the culture of a group; however this has been critiqued for being a gender-neutral theory that assumes numerical increases alone will improve the conditions for women within organisations, such as changing biased attitudes (Zimmer, 1988). Dobbin and Jung (2011) suggest that gender biases may exist even among institutional shareholders or the so called “smart money”. They investigate whether board diversity activates gender biases on the part of institutional shareholders by looking at its impact on stock price and firm performance. They find that while an increase in board diversity has no effect on profits, they have a negative effect on stock price which they attribute to non-block institutional investors selling stock of firms that appoint women to their boards. Gender stereotypes, therefore, remain an important focus of study.

Two recent papers (Lee and James, 2007; Bharath, Narayanan and Seyhun, 2009) propose a more targeted approach to identifying the role of gender, by adopting an event study procedure. The key difference with this research technique is not to link gender diversity directly to firm performance, but instead to consider the market’s reaction to actions that are related to the gender of the directors. This method examines whether stock markets react to the gender contingent signal in a manner that is consistent with gender diversity being beneficial. Lee and James (2007) find that markets react more negatively to the appointment of female CEOs than male CEOs. They relate this negative stock market

³Adams and Ferreira (2009), Carter *et al.* (2003), Erhardt *et al.* (2003), Carter *et al.* (2008), Smith *et al.* (2006), Campbell and Minguez-Vera (2008), and Francoeur, Labelle, and Sinclair-Desgagne (2008) all provide evidence of a positive effect of board diversity. Shrader *et al.* (1997) and Haslam *et al.* (2009) report a negative relationship; and Wolfers (2006) finds no differences in the stock market performance of female-headed versus male-headed S&P 500 companies.

response to Kanter's (1977) token status theory, whereby the solo and outsider status of female executives attracts attention and scepticism on the part of investors, who rely on stereotypes of women to assess their leadership qualities⁴. Bharath *et al.* (2009) show that markets perceive female insiders' trades as being less informative of future corporate performance than male insiders' trades and claim that this demonstrates that "*female executives have a disadvantage relative to males in accessing inside information*" (p. 1).

One explanation for these results is the "glass cliff" argument, due to Ryan and Haslam (2005), that has been subject to recent debate (Adams, Gupta and Leeth, 2009; Ryan and Haslam, 2009; Haslam *et al.*, 2010). It is argued that females are appointed to boards of companies that are already in a precarious position (a 'glass cliff'). In these circumstances it is not surprising that stock markets react relatively unfavourably to both female executive appointments and to trades of female insiders, since these events are occurring in distressed companies. An alternative explanation is that markets exhibit a gender bias in their short-term reaction to events involving female executives. However, if this alternative explanation holds, then we would expect these short-run inefficiencies to be corrected in the longer-term, assuming that costly discrimination would not persist at the expense of profit (Wolfers, 2006). More generally, economists are becoming increasingly sceptical as to whether stock markets are informationally efficient, particularly in the short-term (Shiller, 2005). For example, the Turner Report (Financial Services Authority, 2009) into the causes of the financial markets crisis of 2007/08 blames regulators and policymakers for reliance on the presumption of the efficient market hypothesis (EMH). Importantly, we would also expect any short-run inefficiencies to be corrected in the long-term. Indeed one of the arch-critics of the EMH (Shiller, 2003) argues that any market inefficiencies ultimately are corrected in the long-run when stock market bubbles burst and the market realigns to EMH values.

In the context of biased reaction based on gender this means that any mis-pricing due to these gender biases will be corrected in the long-run, since initial investor scepticism as to the actions of female directors should wane as markets become fully informed about the consequences of these actions. Differences between the short and long run responses

⁴ There is evidence to suggest that women have to work harder than men on their profile to 'reassure' the board of their ability to perform (Sheridan and Milgate, 2005:852), with 'name-brand' female directors being favoured (Daily *et al.*, 2000). Heilman *et al.* (2004) and Heilman and Okimoto (2007) find evidence from experimental studies that gender stereotypes prompt biases in evaluative judgements, even when women demonstrate their equal competence to men.

provide an insight into whether there is evidence to suggest that women are systematically initially undervalued by the stock market with reference to their senior position in the organisation. In the rest of this paper we investigate gender differences in the patterns of and returns to directors' trades in both the short-run and the long-run. We argue that directors' trades provide a more powerful test of market reaction to information related to board membership than studies which focus on the announcement of changes in boards, because they are far more numerous than directors' appointments. Critically, examining both long-term and short-term market reaction allows us to compare short-run *perceptions* of how informed female directors are thought to be with longer horizon returns that provide us with an indication of how the market may have re-evaluated such initial perceptions when more information on performance became available.

Corporate Boards and Directors' trading

Listed stock market companies are managed by a board of directors, whose executive and non-executive members are elected or appointed to oversee the activities of the company.⁵ According to Davies (2011) board size ranges between 6 to 18 members, and Gregg, Jewell and Tonks (2011) find that median board size of FTSE350 companies over the period 1993-2006 was 9 members. Although there was a subtle shift in the ratio of executives to non-executives from 5:4 in 1993 to 4:5 in 2006, reflecting the impact of various corporate governance reports (Higgs, 2003). The UK's corporate governance code (Financial Reporting Council, 2010; Paragraph B.1) recommends that for FTSE 350 companies, except for the chairperson, the majority of the board should comprise non-executive directors deemed to be independent of the company prior to appointment, where independence is defined by a set of criteria. The composition of corporate boards reflects a clear gender bias (Brancato and Patterson, 1999; Daily, Certo, and Dalton, 1999; Brammer *et al.*, 2007). Davies (2011) reports that in 2010 the average percentage of women directors for FTSE 100 and FTSE 250 companies was 12.5 and 7.8 per cent respectively, showing that women are under-represented. Similarly in the US, Bertrand and Hallock (2001) find that only 2.4% of the five most highly paid executive positions in S&P 500 firms were held by women. According to Catalyst Census (2009) women held 15.2 per cent of board seats of the Fortune 500 companies, reflecting little growth over the previous five years.

⁵ We use the UK definition of 'directors', meaning that we include all board members, incorporating both executive officers and non-executives, and we use the terms corporate insiders and directors interchangeably.

Subject to certain restrictions and disclosure requirements, corporate insiders (both executive and non-executive directors) may trade their own company stock. So, provided directors do not violate insider trading restrictions, do not trade within periods when trades are restricted, and are not acting on price-sensitive information, directors of UK companies are allowed to trade in their companies' securities with regulations requiring disclosure to be made within five days of the trade. Standard principal-agency theory applied to executive compensation recommends that managerial contracts include share incentives to align the interests of shareholders and managers (Murphy, 1999). Directors may legally sell shares for liquidity reasons, to diversify their accumulated holdings, or because they believe their company is over-valued. On the other hand, the typical reason for a director to buy their own company's shares is when they believe that the stock market is undervaluing the firm's assets, and that the long-term performance of their company is positive.⁶ It is the public disclosure of these own-share purchases that allows the stock market to infer that the director has information about future corporate performance.

When considering an individual's private trading decisions there are other factors extrinsic to the individual, such as stereotyping, old boys' networks, and tokenism, that could affect both the actual and/or the perceived information gathering capability of the director, which is reflected in the returns to the directors' trades.⁷ Oakley (2000) notes that in the presence of skewed sex ratios there is a tendency for the dominant groups to exclude less-dominant groups. This would imply that given the small numbers of women on the board, female directors may be isolated, and may face discrimination in accessing information (Kramer *et al.*, 2007).⁸

The evidence on corporate insider trading supports the conjecture that the stock market correctly infers from the directors' trading actions that the director has information about whether the current share price over- or under-values the future value of the company. Seyhun (1986), Jeng *et al.* (2003), Friederich *et al.* (2002), and Fidrmuc *et al.* (2006) all find

⁶ Although there may be an expectation that directors hold at least a modest stake in their own companies.

⁷ Other factors like attitudes to risk taking, ethics, and overconfidence may affect both market timing and the post trade returns. While we do not explicitly test for this, unreported results from a Fisher's exact test show that in general, there is no significant difference in the likelihood of trading between male directors and female directors, in firms for which the required data (proportion of male and female directors in the population) is available (only FTSE 100 firms).

⁸ Hoogendoorn *et al.* (2011) show using a group of undergraduate student subjects in an experimental setting that gender-mixed teams perform better than single-sex teams for both males and females.

that trades by corporate insiders in UK and US companies generate short-run abnormal returns. Further, studies of the long-run market reaction to directors' trades strengthen these short-run results (Gregory, Matatko and Tonks, 1997; Lakoniskok and Lee, 2001) with abnormal returns persisting for up to three years after the initial trade. However Bharath *et al.* (2009) show, using a sample of US insider trades from 1975-2008, that the short-run stock price reaction around male trades exhibit significantly greater returns than for female insider trades, regardless of their position in the organisation. They view their results as supporting an information access hypothesis, with the controversial implication that male executives have better access to information than female executives.

We believe that this contentious finding warrants a careful investigation in an alternative empirical stock market setting (the UK as opposed to the US) particularly as they look only at short run returns. If the market perceives female managers as being less skilled and knowledgeable about the firm's affairs, irrespective of their actual capability, the market will not consider female director trades as information revealing events, and stock price in the short-run reaction will be muted. However, if these short-term market reactions are based on a biased view of the knowledge or skill of female directors such effects will reverse in the longer term. By comparing the results for long-run with the short-run returns by gender, we may identify whether the stock market mistakenly inferred the information content of female directors' trades, due to tokenism or stereotyping. A potential complication is that Seyhun (1986) identifies an information hierarchy effect whereby directors who are more senior within a company in terms of their role and responsibilities have access to more valuable information, and we would expect such directors to trade more profitably. Hence, in examining gender differences in directors' trading, we also condition on the role of the director in the company, and in particular whether the director has an executive or non-executive position.

Data

The data on directors' (both executive and non-executive) dealings and directors' shareholdings for the period 1st January 1994 to 30th September 2006 for UK companies listed on the London Stock Exchange is sourced from the Hemscott directors' trading database. The source dataset contains 374,145 entries pertaining to corporate insider trades (including large shareholders) in 4,412 different firms, and covers all companies that have entered or exited since January 1994, and consequently avoids any survivorship biases. We

filter this dataset by only considering the constituents of the FTSE All Share Index and the companies listed on the Alternative Investment Market (AIM), and we only consider open market purchases and sales of ordinary shares by directors. To identify the directors' gender we use the Price Waterhouse Coopers CD register and the Corporate Register (various issues). Where information was available, we also cross checked our data for FTSE 350 companies with the female FTSE index reports published by the Centre for Women Business Leaders, Cranfield University. Daily returns, the daily market capitalisations for the event firms, and the benchmark FTSE All Share Index returns are sourced from Datastream.

After the dataset is cleaned of duplicate, inaccurate or incomplete transactions, missing announcement dates and transactions dates, there are 80,930 trades by directors over the sample period, composed of 62,106 purchases and 18,824 sales by 15,357 (split between 14,747 males and 610 females) and 6,689 (split between 6,517 males and 172 females) directors respectively. In our analysis we generate trading signals from these individual trades. In generating the trading signals for our tests (described below) we take into account multiple and possibly conflicting signals when more than one director trades on the same day in the same firm. When we condition on gender and role, we work with two subsets of the data. The first subset (sub-sample 1) conditions on gender, and is obtained by partitioning the raw dataset by gender of the director who is trading, after eliminating trades by directors of the both genders on the same day and aggregating the purchases and sales by gender and define the trading signal based on the net number of shares bought or sold: a buy signal results from positive net trades, and a sell signal from negative net trades. This leaves us with 36,129 purchase signals (split between 35,145 signals by males and 983 signals by females) and 10,975 sell signals (split between 10,817 signals by males and 158 signals by females)

Our second dataset (sub-sample 2) is a double sort that first sorts by director role and then sorts again by gender. We again eliminate transactions where any two directors with different roles or different genders have traded on the same day, and then aggregate the remaining purchases and sales to obtain the daily buy and sell signals. This leaves us with 15,565 male-executive purchase signals, 16,579 male non-executive purchase signals, 359 female executive purchase signals, 622 female non-executive purchase signals, 6,578 male executive sell signals, 3,357 non-executive male sell signals, 110 female executive sell

signals and 48 female non-executive sell signals. Summary statistics on the characteristics of sub-sample 1 and sub-sample 2 are provided in Table 1.

All of the panels show that for the aggregated data, the number of buy signals is greater than the number of sell signals. However, the mean and the median value of shares traded are larger for sell transactions. We report tests for differences in mean values and a Wilcoxon rank-sum test of each variable between males and females. On average the value of male directors' trades purchased is significantly larger than that for female directors, in both mean and median terms (Table 1, Panel A), although the significance is less pronounced in the case of sale trades. Panel A clearly shows that female directors are trading in larger firms, on average, on the buy side although there are no significant differences on the sell side. However, female trades are a bigger percentage of their initial holdings, both on the buy and sell sides.

When we turn to sub-sample 2, partitioned on the basis of gender and role (Table 1, Panel B), we see that the difference between male and female buy trades carries through to both executive and non-executive directors' categories in respect of both trade value and the percentage of holdings traded. In both groups, females trade a higher proportion of their initial holdings. However, the finding that females buy in larger firms on average is driven by the group of non-executive directors. On the sell side, differences are generally less significant, although we again see females tend to trade a larger percentage of their holdings, whether they are executives or non-executives.

Research Methods

To investigate the short run abnormal returns around directors' purchase signals, we apply an event study methodology based on a standard market model benchmark, with the market return (R_{mt}) being the FT All-Share Index.⁹ Specifically, the market model calculates the abnormal return, AR_{it} for firm i on day t as:

$$AR_{it} = R_{it} - (\hat{\alpha}_i - \hat{\beta}_i R_{mt})$$

⁹ We also run the event study using a market adjusted returns model and also using Buy-and-Hold abnormal returns (BHAR) as a robustness check. The market adjusted returns model calculates the abnormal returns as $AR_{it} = R_{it} - R_{mt}$. Unreported results show that our conclusions are robust to these alternative methodologies.

Where R_{it} is the firm i return on day t , and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are firm-specific regression parameters estimated over the 250 day period event day -310 to event day -61. For each event day, abnormal returns are aggregated across event firms to give average abnormal returns (AARs) and accumulated over various windows of interest to give cumulative average abnormal returns (CAARs). We focus on various CAAR windows for up to 60 days after the directors' trade. The event day is designated as the announcement date of the directors' trade. We use a standardized cross-sectional t-test which is robust to the problem of misspecification due to event-induced variance changes, developed by Boehmer *et al.* (1991) to test for the significance of the AARs and the CAARs. We also confirm the robustness of our results using the Corrado rank-sum test (Corrado, 1989) which is robust to non-normal distributions, cross sectional dependence, thin trading, serial dependence in abnormal returns and overlapping sample periods as demonstrated by Campbell and Wesley (1993).

We undertake two tests. First, we make simple comparisons of the post-trade CAARs across classes of director. However, event studies are univariate studies and it is possible that the characteristics of firms that employ female directors may well differ from those that do not and these need to be controlled for. Furthermore, there may be wealth effects that have an important role to play in explaining the returns to the trades. For example, we would need to control for the value of any transactions and directors prior holdings whilst assessing the impact of gender and role differences. Also, multiple trades on the same day may have more information content than single trades. To cope with these effects, our second test controls for firm size and trade characteristics and allows for other firm specific differences by employing a firm fixed-effects regression framework.¹⁰ This should accommodate any unobservable firm-specific characteristics which might differ between firms which have male and female directors. In our regressions we include control variables such as the log of a firm's market capitalization, the value of the transaction, the trade as a percentage of the prior holding of the director, and a dummy variable for multiple trades. Dummy variables are then used to identify trades by male non-executives, female executives and female non-executives, with male executives forming the base category.

¹⁰ We are grateful to an anonymous reviewer for pointing this out, and suggesting a fixed effects approach as the solution.

The long-run post-purchase returns are examined at horizons of 3, 6, 9 and 12 months following the trading signal. Following the recent literature on the measurement of long run returns we use a calendar time abnormal returns (CTAR) method. We control for the well documented size and value effects (Lakonishok and Lee, 2001; Gregory, Tharyan and Tonks, 2011) by using a survivorship-bias free set of Fama-French factors for the UK constructed by Gregory, Tharyan and Huang (2009)¹¹. The calendar time abnormal returns reported are monthly estimates, and include the month of the trade itself. Estimates of calendar time abnormal returns are established in the conventional manner by regressing the return on the calendar time portfolio of directors' trades in the previous N months on the Fama-French plus momentum factors, also called the Carhart model.¹² To allow for the possibility of heteroscedasticity in the calendar time portfolios, all standard errors are White (1980) heteroscedasticity-consistent estimates. We also employ a 60 day market model CAAR as a test of "longer" term reaction, which enables us to employ the fixed-effects regression framework described above.¹³

When testing abnormal returns, we find that returns following sell trades tend towards insignificance, a result that has been documented by other studies. In general, this effect would be expected if sales took place for liquidity reasons. In addition Korczak, Korczak and Lasfer (2010) argue that insider selling before bad news induces regulatory attention and litigation risk, and rational insiders anticipating these risks will be less likely to trade over-valued securities. Given this general insignificance, we drop sales transactions from the subsequent analysis, and concentrate on directors' purchases. The premise is that directors with private information about future corporate performance will purchase shares if they estimate that the current share price under-estimates future firm value.

Results

Short-run Market Reaction following Directors' Trades

In Table 2 we report the short-run CAARs following directors' trades. Panel A reports that 20 days after a directors' purchase of shares a company's stock price rises on average by 1.55%. Based on the gender of the director, we find that for male director buy trades the

¹¹ The factors are freely available at <http://xfi.exeter.ac.uk/researchandpublications/portfoliosandfactors/index>

¹² An alternative using only the three Fama-French factors gives similar conclusions, although CTARs tended to be smaller in magnitude.

¹³ At which point a calendar-time model should be preferred to a CAAR model is moot. Critically, CTARs have the advantage of being cross-sectionally independent, which CAARs are not. Our Corrado rank-sum tests deal with this problem in the case of the CAARs.

CAARs are significantly positive for all windows: +0.86% on announcement, 1.22% between days 1 to 10, and 1.57% after 20 days. In contrast the market's reaction to female trades are smaller. For female director buy trades the CAARs are a significant +0.88% for the (1, 20) window and +0.53% for the (1, 10) window, and there is an abnormal return of +0.59% on the announcement day. These results seem to suggest that the price reaction to male directors' buy trades is faster and larger than that for female directors'. The t-test and rank test confirms that there is a significant difference between the genders in the returns of buy trades for all the event windows.

[Table 2 about here]

In order to separate out the role and gender effects in the post-trade short-run event study, we now report the results after a two-way partitioning of the dataset using sub-sample 2. These results are presented in Panel B of Table 2. Male executive and male non-executive directors' buy transactions show significant positive abnormal returns for all windows. The female executive directors' transactions show significant abnormal returns for the (1, 10) period of +1.26%, and for the (1, 20) period of +1.54%, although these numbers are smaller than the stock price reaction to their counterpart male executive trades. Panel C shows that the abnormal returns to the female executive buy trades are not statistically significantly different from the stock market response to the male executive buy trades. For the female non-executives again we find small positive abnormal returns for all windows but these are generally insignificant, apart from the announcement day return which is 0.44%. We find significant differences between the returns of non-executive male and female directors at the (1, 10) and the (1, 20) horizons, although the latter are only significant at the 10% level.

In Table 3 we report the results from the firm fixed effects regression controlling for firm size, trade related characteristics and other unobservable firm level differences.

[Table 3 about here]

The results are quite striking. For the short event windows we see that firm size, trade value, trade as a percentage of prior holding and multiple trading are all significant explanatory variables and shows the expected sign. For the CAARs up to 10 days, none of the gender/role categories appears to be important. However, as we move through to the 20 and 60 day CAAR windows, trades by female executives start to assume *positive* significance,

over and above the abnormal returns to male executives. These results overturn the univariate statistics in Table 2 and lead us to question the conclusions of Bharath *et al.* (2009) that female executives are informationally disadvantaged. After 60 days, CAARs are a significant 2.84% greater following a trade by a female executive than that observed when a male executive trades. These findings emphasise that the conditioning variables in the panel regression are important determinants of the stock price reaction to insider trades. For example we obtain a negative coefficient on the firm market-cap variable in Table 3, but females are more likely to occupy board positions in larger than smaller firms (Davies, 2011),¹⁴ and Friederich *et al.* (2002) show that abnormal returns to insider trading is more pronounced in smaller firms. In which case the attenuated stock market reaction to female trades in the univariate results in Table 2 can be explained by women being under-represented in smaller firms. We next look to see if these effects carry through to the longer term.

Long-run returns following Directors' Trades

We analyse abnormal returns for horizons of up to 24 months post-trade to see whether male directors trade more profitably than females in the long-run.

[Table 4 about here]

The results we report in Table 4 are limited up to the 12-month horizon as returns beyond 12 months for all categories of buy trade are not significant.¹⁵ Table 4 Panel A shows the effect of partitioning on gender separately, and the results at three, six, nine and twelve months are reported. Partitioning on the basis of male/female, we see that at every horizon female trades exhibit slightly higher returns than their male counter parts. Male directors' trades earn 0.43%, 0.37%, 0.34%, and 0.33% per month at three, six, nine and twelve months horizons, whereas the female directors' trades earn 0.55%, 0.51%, 0.46% and 0.44% per month respectively. The differences between males and females are not significant.

¹⁴ Davies (2011) reports that women comprise 12.5% of directorships of large FTSE100 companies, but only 7.8% of the boards of smaller FTSE250 companies.

¹⁵ Note that this is consistent with the finding in Gregory, Tharyan and Tonks (2009) that any longer term abnormal returns are concentrated in smaller stocks and small value stocks in particular. Furthermore, the highest annualized returns to such trades are found at the 6 month horizon.

In Panel B of Table 4, we partition returns both by gender and by executive versus non-executive categories. Whilst male executives earn 0.50%, 0.41%, 0.38% and 0.37% per month at the three, six, nine and twelve months horizons respectively, the female executives earn 0.80%, 0.70%, 0.68% and 0.68% per month respectively. In other words, in the long term female executive trades earn larger abnormal returns than their male counterparts do. All of these returns are statistically significant, at the 1% level. However, the formal tests for differences reveal that none of these is actually significant at conventional levels, although the 12-month difference is close to being significant at the 10% level. When it comes to the non-executives, male non-executives earn significant abnormal returns of 0.39%, 0.35%, 0.31% and 0.31% per month at the three, six, nine and twelve month horizons, all of them significant at conventional levels. Female non-executive returns are generally similar, with the returns being 0.32%, 0.43%, 0.32% and 0.26% respectively, and all but the 3 month abnormal return is significant. Once again, none of the differences are significant.

In all, these results seem consistent with those in Table 3. Whilst CTARs have the statistical advantages explained above, they are somewhat imprecise estimates and do not lend themselves to testing in a fixed-effects regression framework. Nonetheless, the implications seem clear. The presence of abnormal returns beyond the event window suggest first that markets under-react to the information conveyed by directors' trades at the time of announcement, and that this under-reaction seems most marked in the case of female executives.

Discussion and Conclusions

This paper has examined gender differences in the market reaction immediately following the announcement of directors' trades, and whether these differences persist in the long-term. In all cases we controlled for whether the director occupied an executive or non-executive position. Our findings from a univariate event study methodology show that on announcement of the trades, markets react less favourably to trades by female directors. In this respect our UK results are partially consistent with Bharath *et al.* (2009), however their conclusion that women are informationally disadvantaged is not warranted for the UK sample. After controlling for firm and trade related characteristics, we find that returns to female executive trades are in fact significantly greater than the returns to male executive trades if we consider returns 10 days or more post-trade. The need to control for firm and

trade characteristics in interpreting stock market reactions responds to the need to consider particular contextual factors that influence reactions to trading behaviour, including the ‘glass-cliff’ arguments suggesting that women tend to be appointed to senior positions in distressed companies (Haslam *et al.*, 2010). These selection effects need to be allowed for in assessing how the stock market values gender diversity.

Further, our results show that relying on only the announcement period or the very short-run post event returns may give rise to a very different conclusion from that arrived at by observing longer period returns¹⁶. In relation to directors’ trades, we argue that the announcement period market reaction does not reflect the actual information gathering capabilities of female directors but reveals only the market’s perception of such capabilities, which may have less to do with their actual capabilities and more to do with gender stereotyping.

In this context, our short-run results are consistent with the sex-role stereotyping hypotheses of Lee and James (2007). However, if short-term market reactions are influenced by sex-role stereotyping, then we would expect this less favourable reaction to be mitigated once markets have more information. That is precisely what we find with regard to directors’ trades. In the long term, from three months to up to a year after the trade, there is no substantive difference in the market reaction to male and female directors’ trades. Indeed, overall female trades appear to be marginally more informative than male trades, although this effect is concentrated in the female executive group. Our study helps to explain the seemingly contradictory findings of Wolfers (2006), who concludes that it is not possible to reject the thesis that the long-run returns of male and female-headed firms are the same, and that of Lee and James (2007), who find negative announcement effects to female board appointments.

While demonstrating an economic basis for supporting the case for board diversity in that females appear to have the same information and capacity to use this information as their male counterparts, this paper also indicates the possibility of gendered stereotypes as the market initially undervalues the informative value of female trades. The market demonstrates the intractable nature of gender/sex discrimination in the boardroom and

¹⁶ This observation is also valid for the market reaction to many corporate events. For example, there is evidence from mergers and acquisition literature that announcement period returns may be poor predictors of long run outcomes (Schoenberg, 2006; Papadakis and Thanos, 2009).

beyond, and the role of gendered stereotypes that exist beyond the organisational boundaries in maintaining stereotypes within the organisation (Fortin, 2005). Following Wolfers (2006: p. 532) we agree that using financial data can offer useful insights into discrimination and “the persistence of biased beliefs about ability” with the advantage that the data is not affected by the need to disentangle the varied nature of individual accounts of discrimination.

We tend to agree with Haslam *et al.* (2010, p. 495) that “*clarifying the ongoing and long-term relationship between market reactions and the realities to which they relate also emerges as an important project for further research and one that is likely to have a number of important practical implications*”. At the heart of this statement is the need to locate discriminatory practices in the broader societal context in which they occur of which the market plays a central role (Fortin, 2005). With this in mind, we believe our work not only has important implications for understanding market reactions to executive appointments and the valuation of firms with female directors, but also contributes to the body of work that assesses the prevalence of sex-role/gender stereotypes. The findings of a negative market reaction to the inclusion of females on boards pose a challenge for those who advocate the beneficial effects of gender diversity in top management teams. However, the evidence from our study demonstrates that such a reaction may be based on perceptions rather than any real differences in ability. One limitation of our study, however, is that while the long-run calendar-time methodology has the statistical power to detect abnormal returns, these estimates do not allow for analysis of long-term abnormal returns within a fixed-effects regression framework. A promising avenue for future work would be to re-examine the evidence on executive appointments by considering the long run returns post-appointments, after controlling for firm characteristics.

It may be the case that “as women executives becomes less unique, there will be less difference in the reaction to the announcement of male appointments and female appointments” Lee and James (2007; p. 239), which suggests that gender stereotyping of boards might weaken with increased numbers of women directors (Kanter, 1977). However, the problem is that if firms and policy makers believe in such short term reactions as indicative of the markets’ beliefs that having women directors on boards does not increase value or is even detrimental to firm value then this would be a major problem for increased gender diversity on boards. Since boards are sensitive to the impact of their actions on stock price (Khurana,2002), the danger is that they may mistakenly believe that pursuing a gender

diversity agenda might be perceived by the market as moving away from a value orientation to a political orientation (Dobbin and Jung, 2011). Focusing on sex/ gender diversity as the ‘right’ thing to do diverts attention from the (market) value of having women in executive positions. This doesn’t negate the moral arguments for diversity on boards (understanding value in broader terms) but supplements it. Indeed, as Terjesen et al., (2009) note, women directors may also add to value in many qualitative ways which may not be reflected in pure accounting metrics. However, recognising the value of women in economic terms makes it clear that seeking board diversity is not a cost to the firm, and is entirely consistent with maximisation of long-term shareholder value.

However, the challenges faced in over-turning biased attitudes are unlikely to be achieved simply by reaching a critical mass of women who are performing well (and recognised as such). More research evidence is required in addressing the structural nature of gender discrimination within the organisation and beyond. In terms of future research, another line of inquiry would be to examine whether the under-reaction to women directors’ trades in the short-run is affected by the number of women on the board of directors. We might anticipate that those cases where the board of directors has several women directors, who have been able to demonstrate their abilities would generate an initial stock market reaction that is unaffected by tokenism. In any case, it important that studies using market reaction to events involving female executives should consider the long term effects. Only more extensive reporting of this kind of evidence that incorporates long term measures would serve to destabilise any stereotypical and entrenched views.

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Table 1: Descriptive Statistics: Aggregated Daily Trading Signals

Table 1 reports the descriptive statistics on the two sub-samples of data constructed from the raw data after aggregating individual directors’ daily trades to obtain aggregate daily trading signals for any company by gender (sub-sample 1) and by role and gender (sub-sample 2). Number of Daily Signals is the number of aggregated daily director trading signals in a company by trade type (buy and sell); and for all directors, and by gender; Market Value of Firms is the market capitalization of the companies in which these directors are trading; Value of Shares Traded is the market value of the shares traded by the director; % Holdings Traded is the number of shares traded by the director as a percentage of the shares held by that director; Trade Value as % of Market Cap is the value of shares traded by the director as a percentage of the market capitalization of the company. ME=Male Executive, MNE=Male Non-Executive, FE=Female Executive, FNE=Female Non-Executive.

Panel A:	Buy Samples	Sell Samples
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Sub-sample 1											
		All Dir	Male	Female	<i>t-test p-value</i>	<i>Rank-sum test p-value</i>	All dir	Male	Female	<i>t-test p-value</i>	<i>Rank-sum test p-value</i>
Number of Daily Signals		36,129	35,146	983			10,975	10,817	158		
Market Value of firms (£ million):	Mean	1,918	1,872	3,580	<.01	<.01	1,746	1,754	1,189	0.37	0.31
	Median	108	104	278			158	158	140		
Value of Shares Traded (£):	Mean	49,425	77,209	27,538	0.05	<.01	566,472	909,560	303,730	0.28	<.01
	Median	8,505	10,530	6,650			42,165	63,000	28,882		
% Holdings Traded:	Mean	29.87	29.33	49.16	<.01	<.01	20.00	20.00	27.00	<.01	<.01
	Median	11.83	16.86	42.10			9.00	9.00	13.00		
Trade Value as % of Market Cap:	Mean	0.19	0.20	0.06	0.22	<.01	0.76	0.76	0.39	0.81	0.07
	Median	0.01	0.01	0.00			0.05	0.05	0.03		

Panel B: Sub-sample 2		Buy Samples							
		ME	FE	<i>t-test</i>	<i>Rank-sum</i>	MNE	FNE	<i>t-test</i>	<i>Rank-sum</i>
Number of Signals:		15,565	359	<i>p-value</i>	<i>test</i>	16,579	622	<i>p-value</i>	<i>test</i>
					<i>p-value</i>				<i>p-value</i>
Market Value of firms (£ million):	Mean	2,478	2,047	0.49	<.01	1,402	4,442	<.01	<.01
	Median	111	207			108	388		
Value of Shares Traded (£):	Mean	61,423	15,542	<.01	<.01	73,863	34,542	0.32	<.01
	Median	9,750	3,000			10,046	7,925		
% Holdings Traded:	Mean	23.37	27.11	0.03	0.027	36.98	62.05	<.01	<.01
	Median	6.02	5.28			21.47	67.82		
Trade Value as % of Market Cap:	Mean	0.15	0.04	0.09	<.01	0.16	0.07	0.22	<.01
	Median	0.01	0.00			0.01	0.00		

Panel B: Sub-sample 2		Sell Samples							
		ME	FE	<i>t-test</i>	<i>Rank-sum</i>	MNE	FNE	<i>t-test</i>	<i>Rank-sum</i>
Number of Signals:		6,578	110	<i>p-value</i>	<i>test</i>	3,375	48	<i>p-value</i>	<i>test</i>
					<i>p-value</i>				<i>p-value</i>
Market Value of firms (£ million):	Mean	2,171	740	<.01	0.02	1,166	2,219	0.26	0.19
	Median	179	121			130	214		
Value of Shares Traded (£):	Mean	600,820	334,430	0.30	0.08	834,820	233,360	0.39	<.01
	Median	55,426	39,150			58,500	19,805		
% Holdings Traded:	Mean	19.25	24.75	0.02	0.04	23.57	30.37	<.01	0.14
	Median	8.97	10.69			10.61	19.80		
Trade Value as % of Market Cap:	Mean	0.48	0.51	0.94	0.57	0.54	0.12	0.16	<.01
	Median	0.03	0.04			0.06	0.01		

Table 2: Post-trade Short-run Abnormal Returns by Gender and Role

Table 2 reports the results of the event studies for various post-event windows. Panel A reports the results for all directors and sorted by gender (Sub-sample 1). In panel A, F=Female and M=Male. Panel B reports the results of a double sort by director role and director gender (Sub-sample 2). Panel C reports the results of the pairwise test for difference in CAARS between the various subgroups. The t and z are the statistics from a t-test and a Wilcoxon rank-sum test respectively. In Panel C, ME=Male Executive, MNE=Male Non-Executive, FE=Female Executive, FNE=Female Non-Executive. Individual t-statistics are not reported. The symbols *, ** and *** denote statistical significance at the 10 percent, 5 percent and 1 percent significance levels, respectively, using a two-tailed test.

Panel A: All directors and by gender

<i>Market Model</i> Director Group	<i>Buy</i>		
	(1,20)	(1,10)	(0,1)
All Directors	1.55%***	1.20%***	0.85%***
Male	1.57%***	1.22%***	0.86%***
Female	0.88%***	0.53%**	0.59%***
t-test for diff (M-F)	2.28**	3.26***	2.44***
Rank-sum test for diff (M-F)	2.26**	2.96***	2.37***

Panel B: Directors by gender and role

<i>Market Model</i> Director Group	<i>Buy</i>		
	(1,20)	(1,10)	(0,1)
ME	1.72%***	1.32%***	0.92%***
MNE	1.22%***	0.94%***	0.65%***
FE	1.54%***	1.26%***	0.87%***
FNE	0.52%	0.11%	0.44%***

Panel C: Differences by gender controlling for role

<i>Market Model</i> Director Group	<i>Buy</i>					
	(1,20)		(1,10)		(0,1)	
	t	z	t	z	t	z
ME-FE	0.35	0.5	0.17	0.26	1.26	0.73
MNE-FNE	1.86*	1.83*	3.24***	2.89***	1.24	1.29

Table 3: Fixed-effect regression tests of short run post-trade returns

Table 3 reports the results of a firm fixed-effects regression with, respectively, 1 day, 10 day, 20 day and 60 day CAARs as dependent variables. Independent variables are the log of the firms' market capitalisation (Mcap), the log of the value of the directors' trade (Value), the log of 1 plus the pre-trade holding (%holding), a dummy variable for multiple trades on the same day (Multiple) and dummy variables for Male Non-Executives (MNEs), Female Executives (FEs) and Female Non-Executives (FNEs). Male executives' trades form the base case. The symbols *, ** and *** denote statistical significance at the 10 percent, 5 percent and 1 percent significance levels, respectively, using a two-tailed test, with t-statistics in parentheses.

<i>Variables</i>	<i>Dep. Var 1-day CAAR</i>	<i>Dep. Var 10-day CAAR</i>	<i>Dep. Var 20-day CAAR</i>	<i>Dep. Var 60-day CAAR</i>
Mcap	-0.0048*** (-10.65)	-0.0254*** (-28.57)	-0.0458*** (-37.81)	-0.1152*** (-51.17)
Value	0.0015*** (9.22)	0.0033*** (10.36)	0.0034*** (7.87)	0.0028*** (3.51)
%holding	0.0021*** (4.41)	0.0023** (2.42)	0.0025* (1.88)	0.0009 (0.37)
Multiple	0.0016*** (2.92)	0.0026** (2.35)	0.0046*** (2.99)	0.0046 (1.61)
MNE	-0.0010 (-1.65)	-0.0005 (-0.47)	0.0007 (0.44)	0.0034 (1.14)
FE	0.0003 (0.10)	0.0123** (2.21)	0.0177** (2.33)	0.0284** (2.02)
FNE	0.0007 (0.31)	-0.0055 (-1.16)	0.0047 (0.73)	0.0190 (1.58)
Constant	0.0180*** (7.16)	0.1100*** (22.03)	0.2110*** (30.98)	0.5589*** (44.18)
R²	0.0376	0.0322	0.0305	0.0247
Prob F	<.01	<.01	<.01	<.01

Table 4: Post-trade Long-run Calendar-time Abnormal Returns by Gender and Role

Table 4 reports the results of the Calendar Time Portfolio regressions using the Carhart Four Factor model for holding periods of 3 months, 6 months, 9 months, and 12 months. The ARs are intercepts from a four-factor regression of the calendar time portfolio on a market factor, a size factor, a book-to-market factor, and a momentum factor and represents the average monthly abnormal return. Panel A reports the results for all directors and sorted by gender (Sub-sample 1). Panel B reports the results of a double sort by director role and director gender (Sub-sample 2). The t-statistic is heteroskedasticity corrected using White's procedure; E=Executive, N=Non-Executive, M=Male, F=Female, ME=Male Executive, FE=Female Executive, MNE=Male Non-Executive, FNE=Female Non-Executive. Individual t-statistics are reported underneath the abnormal returns. The symbols *, ** and *** denote statistical significance at the 10 percent, 5 percent and 1 percent levels, with t-statistics in parentheses.

Panel A: Buy Trades by Gender

<i>Director Group</i>	<i>3-month AR</i>	<i>6-month AR</i>	<i>9-month AR</i>	<i>12-month AR</i>
Male	0.0043*** (4.29)	0.0037*** (4.01)	0.0034*** (3.79)	0.0033*** (3.69)
Female	0.0055*** (2.66)	0.0051*** (3.42)	0.0046*** (3.32)	0.0044*** (3.23)
M-F	-0.0012 (-0.65)	-0.0014 (-0.85)	-0.0012 (-0.87)	-0.0011 (-0.81)

Panel B: Buy Trades by Gender and Role

<i>Director Group</i>	<i>3-month AR</i>	<i>6-month AR</i>	<i>9-month AR</i>	<i>12-month AR</i>
ME	0.005*** (4.17)	0.0041*** (3.67)	0.0038*** (3.62)	0.0037*** (3.48)
FE	0.008*** (2.37)	0.007*** (2.56)	0.0068*** (2.67)	0.0068*** (2.80)
ME-FE	-0.003 (-1.04)	-0.0029 (-1.24)	-0.003 (-1.47)	-0.0031 (-1.61)
MNE	0.0039*** (3.91)	0.0035*** (3.85)	0.0031*** (3.54)	0.0031*** (3.60)
FNE	0.0032 (1.21)	0.0043** (2.27)	0.0032** (1.90)	0.0026** (1.76)
MNE-FNE	0.0007 (0.25)	-0.0008 (-0.4)	-0.0001 (-0.05)	0.0005 (0.31)