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## Firm performance and boardroom gender diversity: A quantile regression approach

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### ABSTRACT

We investigate the relation between firm performance and boardroom gender diversity using quantile regression methods. Using annual data on over 3000 US firms from 2007 to 2014, we show that the presence of women on the board has a positive effect on firm performance, and this effect varies at different parts of the performance distribution. Critically, we demonstrate that the presence of women directors alters the dispersion of firm performance. Our quantile regression results suggest that female directors have a significantly larger positive impact in high-performing firms relative to low-performing firms. The board gender diversity effect is not homogeneous as assumed in previous research. In addition, we account for the endogenous selection of women to the board. Using instrumental variable quantile regression, we find that in general there is a positive correlation between firm performance and board gender diversity. Overall, we suggest that boardroom gender diversity has an effect on both the conditional mean and the dispersion of firm performance, and quantile regression adds value to the empirical examination of the performance impact of board gender diversity.

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### 1. Introduction

The issue of women representation on corporate boards has attracted considerable interest among practitioners, policymakers, and researchers in recent years. In part, this is due to the relatively low representation of women on boards compared to their presence in the general population at large and in the corporate world in general. Terjesen, Aguilera, and Lorenz (2015), in a recent comprehensive review of the literature, document that female boardroom representation is only 10.3% across 67 countries. In the United States, a MSCI (2014) survey concludes that the average proportion of women directors on boards of S&P 1500 firms is about 15.8% in 2014 and approximately 81.4% of these companies have at least one woman director.

The academic literature has hypothesized a number of organizational level benefits associated with gender diversity in the boardroom. These include improved board decision making quality

(Milliken & Martins, 1996), more effective board strategic control (Nielsen & Huse, 2010), more stringent board monitoring (Adams & Ferreira, 2009), and better firm financial performance (Terjesen, Sealy, & Singh, 2009). The empirical evidence in support of these claims however has been mixed, especially regarding the performance impact of board gender diversity (Ferreira, 2015; Larcker & Tayan, 2011; Post & Byron, 2015). Although some studies have documented that a higher proportion of female directors on boards is associated with positive accounting or market performance (Campbell & Miguez-Vera, 2008; D. Carter, Simkins, & Simpson, 2003), other studies have found exactly the opposite by showing a negative association between female director representation and firm performance (Ahern & Dittmar, 2012; Matsa & Miller, 2013), while another studies have concluded that there is no clear relationship between female board representation and firm performance (Adams & Ferreira, 2009; D. A. Carter, D'Souza, Simkins, & Simpson, 2010; Jurkus, Park, & Woodard, 2011). Mixed findings in the literature may result from differences in empirical specifications and methodologies in terms of performance measures, statistical models, time horizons, omitted variables, etc. (Adams, Haan, Terjesen, & Ees, 2015; Ferreira, 2015). In an attempt to reconcile such inconclusive evidence, Post and Byron (2015) further suggest that it is essential

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to consider conditions and contexts that may affect the impact of female board members on firm performance.

This study augments the extant literature by introducing an important contingency factor, namely firm performance to the investigation of board gender diversity. We predict and demonstrate that the effect of board gender diversity on firm performance is not constant across the performance distribution as assumed by the prior literature. In sharp contrast, we show for the first time that the influence of board gender diversity is quantitatively larger in magnitude for better performing firms compared to worse performing firms. We draw upon threat-rigidity theory (Gladstein & Reilly, 1985; Staw, Sandelands, & Dutton, 1981) in social psychology and job sorting and matching theories in labor economics (Kremer & Maskin, 1996; Wheeler, 2001) to explain this phenomenon from two different angles. We argue that women directors' unique perspectives and experiences are less likely to be utilized in low performing firms as a result of group dynamic changes in response to threats posed by declining performance, which in turn undermines their contribution to firm performance. We also suggest that job sorting and matching result in differences in female directors' quality and firms' capability to utilize gender related talent between low performing and high performing firms, and consequently lead to the differential impact of board gender diversity on firm performance. To the best of our knowledge, no prior empirical literature has utilized and integrated these theories to explain heterogeneity of gender diversity effect on firm financial performance. Empirically, we use a novel research technique, quantile regression method, to investigate the connection between board gender diversity and firm performance at different firm performance levels. The prior empirical literature has commonly applied standard linear regressions using the conditional means method built on the assumption that the average gender effect in the boardroom is constant. We propose and demonstrate that such an assumption is highly disputable. Instead, we show that women on boards also influence the dispersion of firm performance, and thus generate distinct effects at different parts of the performance distribution. As a result, the conditional mean regression method used in prior studies conceals significant parameter heterogeneity in the link between board gender diversity and organizational performance, which is unmasked using the quantile regression method. Specifically, we show that because the effect of board gender diversity is not constant across the performance distribution, it is quite easy to inadvertently miss the true effect of female directors on corporate performance. From this perspective, our paper also makes a significant methodological contribution toward a deeper understanding of boardroom gender diversity effects.

The rest of this paper is organized as follows. The next section synthesizes extant literature to develop our hypotheses. Section 3 discusses the quantile regression method and its key merits. Section 4 describes our data and empirical models. Section 5 presents the empirical findings. Lastly, Section 6 offers some concluding remarks.

## 2. Literature review and hypothesis development

As a primary monitoring and advisory group, the board of directors plays an essential role in protecting and promoting shareholder interests, guiding the firm's strategic directions, and influencing firm performance (Finkelstein, Hambrick, & Cannella, 2009; Hambrick, 2007; Hambrick & Mason, 1984). In recent years a growing number of studies have investigated the influence of board diversity on firm level outcomes (Terjesen et al., 2009) and especially gender diversity measured by the presence of women directors on the board (Hillman, 2015; Post & Byron, 2015). Extant academic research not only indicates that there are few women on boards relative to their presence in the population, but also suggests that board gender diversity can

give rise to several beneficial organizational outcomes, arising from differences in human and social capital as well as decision making styles between men and women (e.g. Burgess & Tharenou, 2002; Simpson, Carter, & D'Souza, 2010; Terjesen et al., 2015).

First of all, a gender diverse board is argued to be associated with better quality decisions compared to a homogeneous male only board (Milliken & Martins, 1996). Because male and female directors often differ systematically in their core values, risk attitudes, backgrounds, and perspectives, gender diversity is associated with cognitive diversity (Adams & Funk, 2012; Perryman, Fernando, & Tripathy, 2016; Simpson et al., 2010). For example, D. A. Carter et al. (2010) suggest that female directors tend to hold more college degrees and are more likely to hold advanced degrees compared to their male counterparts. Additionally, female directors likely possess more marketing and sales experiences, are more prudent to risks, and pay more attention to corporate social responsibility and philanthropy (Burgess & Tharenou, 2002; Post & Byron, 2015). Female board members also have different socialization experiences and are connected with distinct social networks compared to their male counterparts (Simpson et al., 2010). As a result, a gender diverse board may benefit firms through these unique knowledge, information, experiences, skills, and networks of women directors (Hillman, Shropshire, & Cannella, 2007; Miller & del Carmen Triana, 2009). Moreover, Post and Byron (2015) point out that women directors are prone to value different opinions, elicit information from all board members, and adopt a cooperative decision-making approach to stimulate collaboration within the group. Gender diversity can also help reduce 'groupthink', which is the tendency for individuals acting in groups to succumb to consensus decisions without an appropriate critical evaluation of alternative ideas or viewpoints (Janis, 1972). While the problem of 'groupthink' tends to be more severe in a homogeneous group, a gender diverse board is more likely to consider different perspectives of board-level problems, and subsequently improves the quality of board decision-making (Conyon & Mallin, 1997). As a result of improved board decision quality, extant literature has associated board gender diversity with more corporate innovation (Miller & del Carmen Triana, 2009), enhanced firm capability to utilize firm resource and investments (Triana, Miller, & Trzebiatowski, 2013), better understanding of the marketplace and the firm's stakeholders (Carter et al., 2003), more effective board strategic control (Nielsen & Huse, 2010), more stringent board monitoring (Adams & Ferreira, 2009), and ultimately superior firm performance (Campbell & Mnguez-Vera, 2008; Carter et al., 2003).

Set against the potential benefits of board diversity are possible costs. Boards that are too dissimilar might lack sufficient cohesion and unity. This in turn might increase the likelihood of team conflicts and thus impede the speed and quality of decision making (Pelled, Eisenhardt, & Xin, 1999). Board diversity may also foster social categorization within boards that is disruptive to board effectiveness. Li and Hambrick (2005), for example, suggest that demographic diversity may cause undesirable in-group versus out-group stereotyping, and subsequently disrupts the board decision-making processes. In addition, diversity might result in unintended tokenism and lead to the hiring of people based not necessarily on the grounds of merit (Larcker & Tayan, 2011; Torchia, Calabrò, & Huse, 2011). For example, in their study of mandatory gender quotas in Norwegian boards, Aherne and Dittmar (2012) argue that the 40% female board representation quota results in the appointment of younger and less experienced women directors to the boardroom, and negatively influences firm performance. Theoretically, Baranchuk and Dybvig (2009) discuss how consensus may be achieved when individual directors have different preferences over various courses of action. As a result, corporate decisions may not be optimal but reflect trade-offs of board bargaining.

Given board gender diversity is a double-edged sword, it is essential to investigate the conditions when the benefits from gender diversity

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