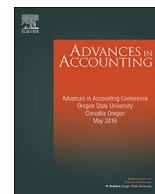




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## CEO network centrality and bond ratings

Christopher J. Skousen<sup>a</sup>, Xuehu (Jason) Song<sup>b</sup>, Li Sun<sup>c,\*</sup><sup>a</sup> Jon M. Huntsman School of Business, Utah State University, United States<sup>b</sup> College of Business Administration, California State University, Stanislaus, United States<sup>c</sup> Collins College of Business, University of Tulsa, United States

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## ABSTRACT

This study examines the impact of Chief Executive Officer (CEO) network centrality on bond ratings at the firm level. Using multiple dimensions of social connectedness, we find a significant positive relation between CEO network centrality and bond ratings, suggesting that firms with better connected CEOs are more likely to receive high bond ratings. Our results still hold after a battery of additional tests. We also find that firms with better connected CEOs experience lower cost of debt. Overall, our study supports the notion in social science research that well-connected individuals can bring benefits to their firms.

## 1. Introduction

The sequential rank order tournament theory (i.e., Lazear & Rosen, 1981; Knoeber, 1989; Becker & Huselid, 1992; Knoeber & Thurman, 1994; Lazear, 1999; Connelly, Tihanyi, Crook, & Gangloff, 2014) states that an organization's hierarchy is modeled as a multiple-stage and winner-take-all tournament and the Chief Executive Officer (CEO) is the ultimate winner, suggesting that the CEO is the best performer and perhaps the most influential individual in the organization. Given the importance of a CEO, recent years have witnessed a rapidly increasing interest in whether and how CEO characteristics and performance contribute to firm performance and other outcomes. In particular, CEO network centrality, an important CEO characteristic, has received tremendous attention in recent accounting and finance literature. The purpose of our study is to investigate the impact of CEO network centrality on bond credit ratings at the firm level.

CEO network centrality refers to the degree of centrality of a CEO's position in a social network hierarchy. A high centrality CEO is regarded as a socially well-connected CEO. Recent research has focused on the impact of having high centrality CEOs on various firm-level outcomes, and it is still not clear whether having such CEOs can lead to positive outcomes. Some studies argue that high centrality CEOs can have better access to valuable and even private information, relative to low centrality CEOs. This information advantage may lead to positive outcomes for firms with well-connected CEOs. Furthermore, Tsai and Ghoshal (1998) argue that social capital, largely derived from social ties in a network, can improve a firm's ability to create value, suggesting a

positive relation between social ties and firm performance. For example, it is documented that firms with well-connected CEOs or other executives enjoy better loan treatment from their banks (Engelberg, Gao, & Parsons, 2012), receive favorable treatment from the government (Bertrand, Kramarz, Schoar, & Thesmar, 2005), demonstrate superior operating performance and experience high stock returns (Larcker, So, & Wang, 2013), and have a lower likelihood of engaging in questionable or unethical accounting practices (Omer, Shelley, & Tice, 2016). However, other studies argue that high centrality CEOs can weaken an effective corporate governance mechanism, adopt questionable or unethical corporate practices, and abuse their social influence and power, leading to negative outcomes. For instance, Fracassi and Tate (2012) find that high centrality CEOs lead to more value-decreasing acquisitions. Chidambaran, Kedia, and Prabhala (2012) suggest that high centrality CEOs may increase the likelihood of corporate fraud. Prior research (e.g., Chiu, Teoh, & Tian, 2012; Brown & Drake, 2014; Cai, Dhaliwal, Kim, & Pan, 2014) find that high centrality CEOs are more likely to adopt questionable accounting practices such as aggressive earnings management and tax avoidance activities.

Despite the surge of attention on the impact of having high centrality CEOs, there is little empirical research on whether and how CEOs' centrality influences a firm's bond ratings, a key determinant of a firm's overall credit worthiness. Extant studies find that bond ratings convey significant information to investors (Dichev & Piotroski, 2001), and bond ratings are determined by a firm's operating performance and overall financial conditions (Pogue & Soldofsky, 1969) and other firm characteristics such as corporate governance (Ashbaugh-Skaife, Collins,

\* Corresponding author.

E-mail addresses: [chris.skousen@usu.edu](mailto:chris.skousen@usu.edu) (C.J. Skousen), [xsong@csustan.edu](mailto:xsong@csustan.edu) (X.J. Song), [li-sun@tulsa.edu](mailto:li-sun@tulsa.edu) (L. Sun).<https://doi.org/10.1016/j.adiac.2017.12.003>Received 25 July 2017; Received in revised form 13 December 2017; Accepted 14 December 2017  
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& LaFond, 2006). In this study, we posit a positive relation between CEO network centrality and bond credit ratings because prior literature links high centrality CEOs to better firm performance and value, a (positive) key determinant of bond ratings.<sup>1</sup>

Using a sample of 5857 firm-year observations based on 716 unique U.S. firms from 2004 to 2014, we find a significant positive relation between CEO network centrality<sup>2</sup> and bond ratings, suggesting that firms with high centrality CEOs receive high bond ratings. Our results support the information advantage view of network centrality and also the notion in Tsai and Ghoshal (1998) that more social capital leads to more positive outcomes. We conduct a battery of additional tests to mitigate concerns about possible endogeneity issues and the robustness of our primary findings. First, we perform a changes analysis to investigate whether an increase (a decrease) can lead to an increase (a decrease) in bond ratings. Second, we use lagged CEO network centrality measures (i.e., in year  $t-1$ ). Third, we perform a firm fixed effect regression and a two-stage OLS regression. Lastly, we repeat our main analysis using alternative measures of bond rating and CEO network centrality and alternative samples. We obtain consistent results in these additional tests, lending support to our primary findings that link high CEO centrality to high bond ratings.

Our study makes several important contributions. First, our study contributes to a rapidly growing literature in accounting and finance using social network theory (i.e., graph theory) to better understand the information flows and social ties in a social network hierarchy. Second, we join the debate on whether having well-connected executives is beneficial or detrimental to an organization. Our findings suggest that it is beneficial to have high-centrality CEOs. Our results are also in line with the notion in Tsai and Ghoshal (1998) that social capital can lead to positive outcomes. More importantly, we strengthen the validity of Tsai and Ghoshal (1998) by providing empirical evidence. Third, a large body of prior literature (e.g., Palmer, Friedland, & Singh, 1986; Haunschild, 1993; Gulati & Westphal, 1999; Chiu et al., 2012; Brown & Drake, 2014; Cai et al., 2014) only focuses on one single connectedness dimension (degree centrality or interlock) and ignores other dimensions of social connectedness. We extend these previous studies by using more social connectedness dimensions. Thus, our study should lead to a more comprehensive understanding of the concept of social connectedness. Next, our study obviously contributes to bond rating studies. Although we do not attempt to construct a prediction model of firm-level bond ratings, our study can inform various stakeholders of the impact of socially well-connected CEOs on bond ratings. Lastly, our findings should be of interest to investors, managers, and academics who are interested in the impact of being socially connected on various firm-level outcomes. In particular, our findings may encourage managers to become more socially connected. Our study should also interest

bond credit ratings agencies when they design and implement guideline on the determinants of bond ratings.

The remainder of the paper is organized as follows. Section 2 reviews related literature and develops our hypothesis. Section 3 presents research design. Section 4 reports the primary findings, and Section 5 presents the results of additional tests. Section 6 concludes the study.

## 2. Literature review and hypothesis development

### 2.1. CEO network centrality

Based on the graph theory (e.g., Proctor & Loomis, 1951; Sabidussi, 1966; and many others), a network is established by a set of units (nodes) and the links (relationships) between them. The units are usually not equal, thus creating a network hierarchy in social relationships. The links in a social network are regarded as channels by which information and knowledge are exchanged, existing relationships are reinforced, and new relationships are developed. Prior research argues that individuals, who reside higher in the social network hierarchy (i.e., better connected individuals), can better gather and process important information, and gain access to private information in a less costly way, leading to positive outcomes. For example, Engelberg et al. (2012) find that firms, where senior executives (i.e., CEO) have informal relationships with executives in their banks, receive loans with lower interest rates and less restrictive covenants. Using French companies, Bertrand et al. (2005) find that CEOs with personal relationships with governmental officials receive additional benefits (e.g., favorable tax treatment). Cohen, Frazzine, and Malloy (2010) find that sell-side analysts make more-accurate stock recommendations when these analysts are socially connected with senior managers and/or board members of the firms that they cover. Larcker et al. (2013) find that firms with better connected board members (i.e., CEO) earn higher future stock returns and show better operating performance. Omer et al. (2016) find that firms with better connected board members are less likely to engage in questionable accounting practices. El-Khatib, Jandik, and Jandik (2017) find that well-connected CEOs are associated with positive abnormal returns (more personal gains) when these CEOs purchase (sell) their company's stocks. From the social capital perspective, Tsai and Ghoshal (1998) find that a high level of social relationships (ties) results in more social capital, which brings more benefits and positive outcomes to firms.

On the other hand, prior research argues that well-connected individuals including managers and board members may lead to negative consequences such as interfering with and weakening an effective corporate governance mechanism, sharing and adopting questionable accounting practices, and abusing their social influence and power. For example, Hwang and Kim (2009) find that CEOs that are socially connected to board members have higher compensation, lower pay-performance sensitivity, and lower turnover ratio, relative to CEOs that are not socially connected to board members. Fracassi and Tate (2012) find that firms with more CEO-director relationships lead to more value-decreasing acquisitions, suggesting that these well-connected CEOs weaken the mechanism of board monitoring and internal control. Similarly, El-Khatib, Fogel, and Jandik (2015) find that well-connected CEOs are associated with higher frequency of acquisitions and more value-decreasing acquisitions, suggesting that these CEOs abuse their social influence and power to push for deal completion. Chidambaran et al. (2012) find that well-connected CEOs may increase the likelihood of corporate fraud. Some studies (e.g., Brown & Drake, 2014; Cai et al., 2014; Chiu et al., 2012) suggest that social network facilitates the spreading of questionable or unethical accounting practices such as aggressive earnings management and tax avoidance activities, and firms with these well-connected board members are more likely to adopt or mimic those accounting practices.

<sup>1</sup> It is possible that a negative relation may exist between CEO network centrality and bond ratings because prior research suggests that high-centrality CEOs weaken corporate governance, a (negative) key determinant of bond ratings.

<sup>2</sup> Consistent with prior research (e.g., Larcker et al., 2013; Omer et al., 2016), we use five commonly-used network centrality measures (namely, degree centrality, eigenvector centrality, closeness centrality, betweenness centrality, and composite centrality) to capture the level of CEO network centrality. Degree centrality captures the number of a CEO's direct ties and is calculated as the number of direct links between a CEO and other directors (i.e., interlocks). Eigenvector centrality captures whether a CEO is well-connected and is calculated as the degree to which a CEO is related to other well-connected directors. Closeness centrality captures how closely a CEO is related to other directors and is calculated as the number of steps in the shortest path between a CEO and other directors. Betweenness centrality captures the importance of a CEO in a social network and is calculated as the number of ties a CEO lies in the path between a pair of other directors. The last measure, composite centrality, is an aggregated measure (based on the four individual network measures), which is calculated by using a principal component analysis. Using the above five network measures offers several advantages. First, these measures are objective, not based on survey or opinions, and can be easily calculated. Second, it allows us to investigate a diverse and large sample of firms. Third, it allows us to capture not only each unique dimension of network centrality, but also the overall syntactic centrality of a firm's CEO in a social network hierarchy.

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