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**BOARD AGE AND GENDER DIVERSITY: A TEST OF COMPETING LINEAR AND  
CURVILINEAR PREDICTIONS**

Suitable Section: Corporate Governance

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## **BOARD AGE AND GENDER DIVERSITY: A TEST OF COMPETING LINEAR AND CURVILINEAR PREDICTIONS**

### **Abstract**

The inconsistent findings of past board diversity research demand a test of competing linear and curvilinear diversity-performance predictions. This research focuses on board age and gender diversity, and presents a positive linear prediction based on resource dependence theory, a negative linear prediction based on social identity theory, and an inverted U-shaped curvilinear prediction based on the integration of resource dependence theory with social identity theory. The predictions were tested using archival data on 288 large organizations listed on the Australian Securities Exchange, with a one-year time lag between diversity (age and gender) and performance (employee productivity and return on assets). The results indicate a positive linear relationship between gender diversity and employee productivity, a negative linear relationship between age diversity and return on assets, and an inverted U-shaped curvilinear relationship between age diversity and return on assets. The findings provide additional evidence on the business case for board gender diversity and refine the business case for board age diversity.

Key terms: Board diversity, Age diversity, Gender diversity, Performance, Competing Predictions

## Introduction

Corporate boards are responsible for governance and overseeing the overall direction and functioning of the organization (Carroll and Buchholtz, 2011). They manage relationships with multiple stakeholders, such as shareholders, employees, government, and communities (Australian Institute of Company Directors, 2011). There is a growing understanding that a demographically diverse board is best positioned to address the concerns of diverse stakeholders (Carroll and Buchholtz, 2011). Recent changes in corporate governance laws, rules and regulations on board composition have catalyzed a discussion on board demographic diversity (Schwartz-Ziv, 2012). For instance, some countries have introduced gender diversity quotas as a strategy to improve the representation of women in boards (Branson, 2012). The examples include Norway, France and Spain with 40%, Belgium with 33%, and Malaysia with 30% women's quotas (Deloitte, 2011). Other countries have introduced rules and regulations to indirectly push companies toward greater diversity on their boards. For example, the Australian Securities Exchange requires companies to adopt and disclose a diversity policy, and report on their gender diversity initiatives and gender proportions at all levels including boards (Australian Securities Exchange, 2010). Similarly, the US Securities and Exchange Commission requires companies to disclose whether (and how) the nominating committee considered diversity in the director nomination process (US Securities and Exchange Commission, 2012).

These push initiatives were driven by social justice motives. The countries adopting them hoped to develop just societies in which women and men would experience equal opportunity at all levels. Push initiatives have improved board diversity in the last few years (Australian Institute of Company Directors, 2012a). However, at the current pace, it will take several decades before we achieve a decent level of board demographic diversity (Ellemers et al., 2012).

Board diversity can experience further sustained improvements if there is also a pull factor in place – evidence that diversity brings economic returns (the business case for diversity).

Empirical studies have examined the business case for various dimensions of demographic diversity in corporate boards. The focus of that body of literature has been mainly on board gender diversity (for a review, see Rhode and Packel, 2010; Simpson et al., 2010; Terjesen et al., 2009). The findings of that body of research have been inconsistent. Some studies found a positive linear association of gender diversity with various performance measures (e.g., Bear et al., 2010; Bonn, 2004; Bonn et al., 2004; Campbell and Mínguez-Vera, 2008; Mahadeo et al., 2012; Nguyen and Faff, 2006; Srinidhi et al., 2011). Another body of research found a negative linear relationship between board gender diversity and performance (e.g., Adams and Ferreira, 2009; Bøhren and Strøm, 2010; Dobbin and Jung, 2011; Haslam et al., 2010). Other studies found that board gender diversity did not have a significant relationship with outcomes (e.g., Carter et al., 2010; Jhunjhunwala and Mishra, 2012; Shukeri et al., 2012; Wang and Clift, 2009) (see Appendix for details on some gender diversity studies).

The business case for board age diversity has not attracted much attention by researchers, but this small body of research also found mixed results. On the positive side, high board age diversity is associated with large donations for not-for-profit organizations (Siciliano, 1996) and high return on assets for for-profit organizations (Mahadeo et al., 2012). Similarly, low average age of directors (which suggests high age diversity as most board members are over 50) is linked to high market value of an organization compared to its book value (Bonn et al., 2004). On the negative side, board age diversity is related to low corporate social performance (Hafsi and Turgut, 2013). However, other research indicates that board age diversity does not have a significant relationship with earnings per share (Jhunjhunwala and Mishra, 2012), return on

assets (Bonn et al., 2004), or return on equity (Bonn, 2004). The small body of research, with mixed findings, makes it unclear whether age-diverse boards improve organizational performance (see Appendix for details on some age diversity studies).

The inconsistent findings suggest that future research should focus on competing predictions based on contrasting theories (Armstrong et al., 2001) and sophisticated models (van Knippenberg et al., 2011) such as curvilinear predictions with reverse causality tests (Ali et al., 2011). This study aims to fill some of these research gaps. It endeavors to test contrasting theories through presenting and analyzing competing linear predictions on the relationship between diversity (age and gender) and performance. It also proposes and tests a refined curvilinear prediction between diversity (age and gender) and performance, and tests reverse causality. Specifically, we present a positive linear diversity-performance prediction using resource dependence theory (Pfeffer and Salancik, 1978), a negative linear prediction based on social identity theory (Tajfel, 1978), and an inverted U-shaped curvilinear prediction based on the integration of resource dependence theory with social identity theory. We test these predictions using archival data on board diversity (age and gender) and performance (intermediate performance measure of employee productivity and financial performance measure of return on assets) of companies listed on the Australian Securities Exchange.

## **Competing Linear and Curvilinear Predictions**

### **Competing Linear Predictions**

Resource dependence theory states that the external environment of an organization influences that organization's performance (Pfeffer and Salancik, 1978). Organizations within a context are dependent on one another and other entities in that context. These external entities control important resources, and so they create challenges and uncertainties for organizations. For an

organization to be successful, its directors and managers must develop links with these entities to reduce that dependency and enable the organization to obtain needed resources (Hillman et al., 2007).

Organizations need diverse boards due to the important functions the board serves. Specifically, the board makes strategic decisions, develops links with external stakeholders (e.g., suppliers, consumers), and helps to engage talent from the labor market. Diversity can facilitate each of these functions. First, a diverse board can integrate a wider range of information to make more informed decisions (Hillman et al., 2000; van der Walt and Ingley, 2003). Younger directors tend to be highly educated (Hatfield, 2002) and familiar with new technologies (Jhunjhunwala and Mishra, 2012); older directors bring to the board valuable experience that they accumulated in the industry (Jhunjhunwala and Mishra, 2012; Li et al., 2011). The attributes of younger and older directors complement one another and the organization can leverage these differences to improve its strategic decision-making. For example, an organization that wants to expand into high-tech manufacturing can use the younger directors' technological skills to identify startups operating in this space, and leverage the older directors' experience to assess whether the startups are viable acquisition targets. Male and female directors possess different skills, knowledge, and perspectives; the integration of these different perspectives contributes to higher quality decisions (Rogelberg and Rumery, 1996). For instance, female directors may be more detail-focused (Stendardi et al., 2006) and risk-averse (Graham et al., 2002) than male directors. Integrating both male and female directors' perspectives, an organization may be better positioned to critically weigh the risks and benefits associated with decisions to expand or shrink the business, make capital investments or adopt new processes.

Second, board diversity helps create linkages with important external stakeholders, such as suppliers and consumers. Organizations may reduce uncertainties and dependencies if they capitalize on the full range of connections delivered by a diverse board (Miller and Triana, 2009; Pfeffer and Salancik, 1978). For example, younger directors may be more likely to know early career entrepreneurs, whereas older directors might be more likely to have senior contacts in established firms. Organizations that take advantage of these non-redundant ties will have greater access to suppliers of critical resources (e.g., information technology or raw materials) and reduce their dependency on individual suppliers (Miller and Triana, 2009). Similarly, male and female directors may help the organization to access a wider range of consumers. Compared to men's networks, women's networks are more diverse (containing both same-sex and cross-sex linkages) and are more likely to contain weak ties (Ibarra, 1992; Miller and Triana, 2009). Weak ties are particularly valuable to an organization because they deliver non-redundant information that can be critical to a firm's success (Granovetter, 1973). The different networks maintained by male and female directors give the organization access to more market segments, enabling the organization to serve a wider range of customers. Organizations with diverse boards are able to access critical resources from diverse suppliers and develop products valued by diverse consumer groups (Fredette et al., 2006), and therefore are likely to achieve greater bottom line benefits (Campbell and Mínguez-Vera, 2008; Carter et al., 2003).

Third, a diverse board signals the organization's commitment to diversity which may help the organization to attract and retain individuals from diverse demographic backgrounds (Spence, 1973). Female and young job applicants may be more attracted to organizations that have a diverse board because such a board signals that the organization is diversity-conscious, is likely to encourage diversity in its hiring and promotion practices, and values the contributions



of its diverse members (Mattis, 2000). The presence of female directors signals growth and advancement opportunities for women within the organization, which inspires lower-level female workers (Kurtulus and Tomaskovic-Devey, 2012). Similarly, younger directors may serve as role models and inspiration to young newcomers. Research suggests that a diverse board helps the organization to attract and retain diverse talents (Fredette et al., 2006; Stephenson, 2004). These talents may contribute to better organizational performance and help the organization to achieve a sustained competitive advantage.

In sum, diverse boards may improve strategic decisions, expand networks, and engage talent, which may help organizations to become productive and financially successful. Past research demonstrated a positive link between board diversity and financial performance. For instance, Mahadeo et al. (2012) studied the effects of board age and gender diversity on performance. The findings indicate a positive relationship between board diversity (age and gender) and return on assets. Similarly, Campbell and Minguez-Vera (2008) examined the effects of board gender diversity on organizational performance. The authors found that board gender diversity is positively associated with Tobin's Q (market capitalization divided by the value of total assets; a forward-looking measure of organizational performance). Thus, it is proposed:

*Hypothesis 1: There will be a positive relationship between board diversity (age and gender) and organizational performance.*

Social identity theory (Tajfel, 1978) suggests that individuals use demographic attributes, such as age and gender, to categorize self and others into social groups. In order for individuals to maintain a positive self-identity, they maximize the differences between in-group members (similar others) and out-group members (dissimilar others). As a result of self-categorization

processes (Turner et al., 1987), individuals engage in behaviors, such as stereotyping (Loden and Rosener, 1991; van Knippenberg and Schippers, 2007), that impede group functioning.

Specifically, members of a diverse group are more likely to experience a lack of cohesion, communication and cooperation, and more dissatisfaction and conflict (Chatman and Flynn, 2001; Jehn et al., 1999; Pelled, 1996; Shapcott et al., 2006; Triandis et al., 1994).

Consistent with social identity theory, age and gender diverse boards are likely to create in-groups and out-groups, and develop “us vs. them” perceptions among its members (Brown and Turner, 1981). Older (or younger) directors are more likely to interact with other board members from the same age group, finding that same-age group individuals are easier to interact with and more likely to share their values and expectations (Twenge et al., 2010). In contrast, out-group members are perceived as less trustworthy, more dishonest, and less cooperative (Brewer, 1979). Because of this positive bias toward one’s own group and negative attitudes toward the out-group, directors with different demographic attributes are less likely to openly communicate with one another. For example, in-group and out-group separation makes female directors less likely to fully participate in male-dominated board meetings (Tuggle et al., 2011). Thus the proposed benefits of diversity (e.g., a wider range of perspectives, improved decision-making and creativity) are less likely to materialize (Richard et al., 2013), and the negative processes (e.g., dissatisfaction and conflict) are likely to negatively influence the organization’s overall performance.

Empirical research supports the argument that board gender and age diversity is negatively associated with organizational performance. For instance, Adams and Ferreira (2009) found that board gender diversity is linked to low Tobin’s Q and return on assets, whereas Hafsi

and Turgut (2013) found a negative relationship between board age diversity and corporate social performance. Thus, it is proposed:

*Hypothesis 2: There will be a negative relationship between board diversity (age and gender) and organizational performance.*

### **An Integration: Curvilinear Prediction**

Integrating resource dependence theory (Pfeffer and Salancik, 1978) with social identity theory (Tajfel, 1978), we propose an inverted U-shaped curvilinear relationship between board diversity and organizational performance. The theoretical integration suggests that the impact of diversity on outcomes depends on the *level* of diversity (Ali et al., 2011; Richard et al., 2002; Richard et al., 2007).

In line with resource dependence theory, organizations that have a homogenous board of directors may display low performance because they lack a broad portfolio of skills and expertise. For instance, a board that is dominated by older directors may lack knowledge about current technologies (Jhunjhunwala and Mishra, 2012). Further, with a homogenous board, the organization may have multiple connections with a narrow set of external constituents (e.g., a particular customer group; Hillman et al., 2009). For instance, in the absence of female directors, a male-dominated board may have few connections with female stakeholders. However, as diversity increases, access to resources and information (e.g., skills and knowledge) increases, which leads to improved organizational performance (Li et al., 2011). At low levels of diversity, minority members have greater opportunities to interact with majority members (Blau, 1977). Frequent contact (and the resultant perceived support; South et al., 1982) between minority and majority members may lead to improved problem-solving and creativity. The inclusion of at least one minority member (e.g., a female director or a young director) contributes to improved

performance (Carter et al., 2003; Rogelberg and Rumery, 1996). In sum, skewed boards are beneficial to organizations and the benefits continue to increase from low to moderate levels of diversity (Knouse and Dansby, 1999).

However, when diversity increases further, members of a moderately diverse board (e.g., 25% female directors or young directors) are likely to categorize themselves and others based on demographic attributes (Lau and Murnighan, 1998). Board members of the same demographic group are categorized as in-group and others are categorized as out-group. Consistent with social identity theory (Tajfel, 1978), board members are likely to perceive in-group members as superior to out-group members and hold unfavorable attitudes toward out-group members. As a result of psychological categorization, directors on a diverse board are likely to engage in destructive behaviors, such as decreased intergroup communication (Kravitz, 2003) and increased intergroup conflict (Pelled, 1996). Board effectiveness is likely to be negatively affected by unproductive intergroup interactions which will then negatively influence organizational performance. From moderate to high levels of diversity (i.e. 25-50% female directors or young directors), the adverse effects of diversity intensify due to increasingly salient categorizations (Ali et al., 2011). The high representation of female directors or young directors may create a sense of threat among the majority directors (male/older), which will then generate greater competition (Blalock, 1967) and intergroup conflict (Pelled, 1996). The increased competition and conflict may lead to poor decisions and low performance.

In sum, the effect of board diversity on organizational performance is largely dependent on the level of diversity: from low to moderate levels of diversity, diversity will be beneficial, but from moderate to high levels of diversity, diversity will be detrimental. No prior research investigated a curvilinear relationship between board diversity and performance. However, past

research found some support for an inverted U-shaped curvilinear relationship between diversity and performance at other levels. For instance, Ali et al.'s (2011) findings indicate an inverted U-shaped curvilinear relationship between organizational gender diversity and employee productivity. Thus, it is proposed:

*Hypothesis 3: There will be an inverted U-shaped relationship between board diversity (age and gender) and organizational performance.*

## **Methods**

We used archival data to test the competing linear predictions and the curvilinear prediction between board diversity (age and gender) and performance (employee productivity and return on assets), with a one-year time lag between diversity (2011) and performance (2012).

### **Sample and Data Collection**

The population of this research comprises for-profit large organizations across nine industries in Australia. Australian laws prohibit discrimination based on demographics, including age and gender. However, Australian antidiscrimination laws do not require a minimum representation of young people or women on the boards of organizations. Australian organizations have autonomy in terms of the targets they set and the programs they develop to reach those targets (Strachan et al., 2010). Recent Australian Securities Exchange guidelines on diversity initiatives have helped increase the proportion of board roles held by women from 8.8 % to 14.6 % in the last four years (Australian Institute of Company Directors, 2012b). The average age of Australian board members is around 60-69 years for men and around 50-59 years for women (Australian Institute of Company Directors, 2012b).

The initial sample comprised 2164 organizations listed on the Australian Securities Exchange (ASX) in October 2012. Four hundred and forty-six organizations with over 100

employees were selected for this research (e.g., Wang and Clift, 2009). The small organizations were excluded because public databases are less likely to have complete data on age and gender diversity of their boards. Missing data on board member age reduced the sample size to 288 organizations. Data on age and gender diversity for 2011 (obtained from the Orbis database) were matched with data on employee productivity for 2012 (data on operating revenue were obtained from the Osiris database and data on number of employees were obtained from the DatAnalysis database) and return on assets for 2012 (obtained from the Osiris database). Data on control variables were obtained as follows: organization size (DatAnalysis), organization age (Osiris), organization type in terms of holding/subsidiary or stand-alone (OneSource), and industry (ASX website).

The final sample of 288 organizations was diverse in terms of size and industry, and demonstrated a range of board member age and gender diversity. The sample organizations ranged in size from 101 to 190,000 employees. They represented nine industry groups based on Standard Industrial Classification codes; no organization belonged to the Public Administration category. The most frequent industry groups were: Transportation, Communications, Electric, Gas, and Sanitary Services (24% of the organizations); Mining (18%); Services (16%); Construction (15%), and Finance, Insurance and Real Estate (12%). Women's representation on the corporate boards ranged from 0 to 5 women (mean 0.82). Ages of board members ranged from 34 years to 89 years (mean 58.9).

### **Australian Context**

Gender diversity is the most salient dimension of demographic diversity in Australia (Cotter, 2004; Strachan et al., 2004). The Workplace Gender Equality Act 2012 requires employers to provide equal opportunities to men and women, and encourages employers to improve women's

representation (Workplace Gender Equality Agency, 2012a). The law requires non-public sector employers with 100 or more employees to report the gender composition of their workforce and boards, and their gender diversity initiatives, to the Workplace Gender Equality Agency on a yearly basis (Workplace Gender Equality Agency, 2012b). Recently, age diversity of board members is gaining importance (Stuart, 2009), with most present board members described as “pale, male and stale” (Shand, 2012, para. 2). The Age Discrimination Act 2004 aims at ensuring equal opportunities to all people regardless of their age (Commonwealth of Australia, 2004).

### Measures

**Outcomes.** Scholars recommend using multiple measures of performance when investigating the impact of a variable on organizational effectiveness (Lumpkin and Dess, 1996). This study uses objective performance measures of *employee productivity* and *return on assets* (e.g., Mahadeo et al., 2012; Shrader et al., 1997). Employee productivity was calculated using operating revenue (obtained from Osiris database) and number of employees (obtained from DatAnalysis database). Operating revenue was divided by number of employees and the resulting values were transformed using a natural logarithm (Huselid, 1995; Konrad and Mangel, 2000). Data on return on assets were obtained from the Osiris database. Osiris calculates return on assets as profits or loss before tax divided by total assets (Osiris, 2012). The two measures can provide insight into how board diversity impacts an organization's use of its human resources (employee productivity) and its financial resources (return on assets).

**Predictors.** This research operationalizes age and gender diversity as separate dimensions of diversity, because scholars advise against aggregating multiple dimensions of diversity into a single index (Harrison and Klein, 2007). Age diversity was calculated using the coefficient of variation formula. The standard deviation of board members' ages was divided by their mean

age. Larger standard deviation (larger age differences between board members) and lower mean age (higher representation of young board members) would generate higher age diversity values. Gender diversity was calculated using Blau's index of heterogeneity for categorical variables (Blau, 1977). As per Blau's index, heterogeneity equals  $1 - \sum p_i^2$ , where  $p_i$  represents the fractions of the population in each category. Blau's index is a continuous scale (Buckingham and Saunders, 2004) that increases as the representation of men and women in the organization's workforce becomes more equal. The index ranges from zero representing complete homogeneity (0/100 gender proportions) to 0.5 representing maximum gender diversity (50/50 gender proportions).

**Controls.** The analyses controlled for the effects of organization size, organization age, organization type, and industry type on performance. Compared to small organizations, large organizations may have more potential to perform better because of economies of scale. Large organizations are also likely to have diverse boards (Carter et al., 2003; Wang and Clift, 2009). Consistent with previous research, organization size was operationalized as the total number of employees (Alexander et al., 1995; Jackson et al., 1991). Organization age may have an impact on performance. Compared to old organizations, new organizations with fewer formalized structures may be better positioned to capitalize on the benefits of diversity such as creativity and innovation. Organization age was operationalized as the number of years since the organization was founded (Jackson et al., 1991; Perry-Smith and Blum, 2000). Organizations that are holding companies or subsidiaries, compared to stand-alone organizations, may benefit from the combined financial resources (Richard et al., 2003). A dummy variable called "Organization type" was created with "0" representing "Holding or subsidiary" and "1" representing "Stand-alone."



The effect of diversity on performance can vary across manufacturing and services industries, because of the different level of interaction among employees, and between employees and customers, in the two industry types (Ali et al., 2011; Godthelp and Glunk, 2003). Industry type also predicts the level of age and gender diversity of boards (Brammer et al., 2007; Hillman et al., 2007; Kang et al., 2007). The nine SIC industry groups of the sample organizations were categorized into manufacturing and services. “Transportation, Communications, Electric, Gas and Sanitary Services,” “Wholesale Trade,” “Retail Trade,” “Finance, Insurance and Real Estate,” and “Services” made up the services category. “Agriculture, Forestry and Fishing,” “Mining,” “Construction,” and “Manufacturing” made up the manufacturing category (Richard et al., 2007). A dummy variable called “Industry type” was created with “1” representing manufacturing and “0” representing services.

## **Results**

Table 1 presents the means, standard deviations, and correlation coefficients for all variables. Multicollinearity does not seem to be an issue because of low correlations among controls and predictor variables.

Insert Table 1 about here

We used hierarchical multiple regression to test the three hypotheses. The predictor variables of age diversity and gender diversity were centered to reduce multicollinearity with the squared terms (Aiken and West, 1991). Hypothesis 1 proposed that age diversity and gender diversity would be positively related to performance. Hypothesis 2 proposed that age diversity and gender diversity would be negatively related to performance. To test Hypotheses 1 and 2, employee productivity and return on assets were separately regressed on age diversity and gender diversity. The control variables were entered in Step 1, then age diversity and gender

diversity were entered in Step 2 (see Tables 2 and 3). The results shown under Model 2 in Table 2 indicate that age diversity did not have a significant effect on employee productivity ( $\beta = -.09$ , n.s.). However, gender diversity had a significant positive effect on employee productivity ( $\beta = .12$ ,  $p < .05$ ). Together age diversity and gender diversity accounted for an additional 2% of variance in employee productivity. The results shown under Model 2 in Table 3 indicate that age diversity had a significant negative effect on return on assets ( $\beta = -.18$ ,  $p < .01$ ). However, gender diversity did not have a significant effect on return on assets ( $\beta = -.07$ , n.s.). An additional 3% of variance in return on assets was accounted for by age diversity and gender diversity. The results suggest that both Hypothesis 1 and Hypothesis 2 were partially supported: gender diversity had a significant *positive* effect on employee productivity, and age diversity had a significant *negative* effect on return on assets.

Insert Tables 2 and 3 about here

Hypothesis 3 proposed that age and gender diversity would have an inverted U-shaped curvilinear relationship with performance. The squared terms of age diversity<sup>2</sup> and gender diversity<sup>2</sup> were created to test this curvilinear relationship. To test Hypothesis 3, employee productivity and return on assets were again separately regressed on age diversity and gender diversity. The control variables were entered in step 1; age and gender diversity were entered in Step 2; and age diversity<sup>2</sup> and gender diversity<sup>2</sup> were entered in Step 3. The results shown under Model 3 in Table 2 indicate that age diversity<sup>2</sup> ( $\beta = -.03$ , n.s.) and gender diversity<sup>2</sup> ( $\beta = -.04$ , n.s.) did not have a significant effect on employee productivity. The results shown under Model 3 in Table 3 suggest that age diversity<sup>2</sup> significantly affected return on assets ( $\beta = -.22$ ,  $p < .01$ ); age diversity<sup>2</sup> and gender diversity<sup>2</sup> accounted for an additional 3% of variance in return on assets. The negative coefficient on age diversity<sup>2</sup> indicates an inverted U-shaped relationship.

However, gender diversity did not have a significant curvilinear relationship with return on assets ( $\beta = .01$ , n.s.) (see under Model 3 in Table 3). Therefore, partial support was found for Hypothesis 3; only age diversity had an inverted U-shaped curvilinear relationship with return on assets.

We plotted the effects of age and gender diversity on performance. Figure 1 presents the regression line for the positive linear effect of gender diversity (Blau's index ranged from 0 to .50) on employee productivity. Figure 2 presents the regression lines for the negative linear and inverted U-shaped curvilinear effects of age diversity (coefficient of variation ranged from 0 to .45) on return on assets. The inverted U-shaped curvilinear relationship was weakly positive at low levels of age diversity. The return on assets increased from -.22 (age diversity = .00) to 4.76 (age diversity = .10). At higher levels of diversity, the relationship became stronger and progressively more negative. Return on assets decreased from a peak of 4.76 (age diversity = .10) to -59.42 (age diversity = .45).

Insert Figures 1 and 2 about here

### **Reverse Causality and Analyses without Controls**

To improve the rigor of our analyses, we performed the reverse causality test and reran the reported regression analyses without controls. Organizations with high financial performance levels (e.g., high return on assets) may have more resources to attract young directors and female directors leading to high board diversity. To eliminate this possibility of reverse causality between diversity and performance (i.e. performance  $\rightarrow$  diversity), we tested the impact of return on assets in 2010 on board diversity in 2011 (Campbell and Mínguez-Vera, 2008). We separately regressed board age diversity and board gender diversity on return on assets, after controlling for organization size, organization age, organization type and industry type. The results of these

regression analyses indicate that return on assets did not predict board age diversity ( $\beta = -.03$ , n.s.) or board gender diversity ( $\beta = -.04$ , n.s.). We could not perform reverse causality tests for employee productivity because 2010 data on number of employees for most organizations are not publicly available. Moreover, multicollinearity among predictors and controls may contaminate the results (Becker, 2005). Therefore, we repeated the regression analyses reported in Tables 2 and 3 without control variables. In the absence of control variables, gender diversity ( $\beta = .17$ ,  $p < .01$ ) continued to significantly affect employee productivity, and age diversity ( $\beta = -.18$ ,  $p < .01$ ) and age diversity<sup>2</sup> ( $\beta = -.20$ ,  $p < .01$ ) continued to significantly affect return on assets.

## Discussion

The main objectives of testing competing linear and curvilinear predictions on the impact of board diversity (age and gender) on multiple measures of performance (employee productivity and return on assets), with a one-year time lag between diversity and performance, were: (1) to provide additional evidence on the relationship between board diversity (age and gender) and performance; and (2) to perform a rigorous test of the curvilinear relationship between both board age and gender diversity and performance that may reconcile some of the inconsistent findings of past research. The results indicate a positive linear board gender diversity-employee productivity relationship, a negative linear board age diversity-return on assets relationship, and an inverted U-shaped curvilinear board age diversity-return on assets relationship.

### Linear Effects of Gender Diversity and Age Diversity

The results indicate a positive linear relationship between board gender diversity and employee productivity. The findings support resource dependence theory (Pfeffer and Salancik, 1978) and suggest that a gender-balanced board enjoys a mix of resources that can help improve the

operating revenue of an organization, leading to high employee productivity. Applying historical subjective standards (Cohen, 1988), 2% of variance constitutes a “small” effect. But the economic impact of increased gender diversity is considerable (Cortina and Landis, 2009). Keeping all other variables at their mean values, employee productivity increased by \$23,200 (on average) with every five point increase in gender diversity on Blau’s index (e.g., from .10 to .15). These results both support and build upon prior research. While the positive board gender diversity-performance findings are consistent with some prior research (e.g., Bonn, 2004; Bonn et al., 2004; Campbell and Mínguez-Vera, 2008; Carter et al., 2003; Mahadeo et al., 2012; Srinidhi et al., 2011), they are also unique because the effects are found on employee productivity. No prior research on board gender diversity found a significant effect of board gender diversity on employee productivity. Thus the findings of this research strengthen the business case for board gender diversity by quantifying the impact of board gender diversity on employee productivity. The non-significant linear relationship between board gender diversity and return on assets can be explained by the two different types of performance measures studied. Employee productivity is an intermediate form of performance measure based on operating revenue and number of employees, whereas return on assets is a more distal financial performance measure (Richard et al., 2007). The resources provided by gender diversity, such as improved decision-making and diverse external linkages, may take time before they can have an impact on return on assets. Moreover, female directors are likely to be given operational responsibilities rather than strategic ones (Peterson and Philpot, 2007), and thus have minimal impact on the efficient use of assets (return on assets).

The findings show a negative linear relationship between age diversity and return on assets. The results support social identity theory (Tajfel, 1978) and indicate that age diversity can

lead to psychological groupings of younger board directors and older board directors, triggering negative group behaviors. With every five-point increase in board age diversity (e.g. from .05 to .10 on coefficient of variation), return on assets decreased by an average of 3.75, keeping all other variables studied at their mean values. The results of this study are consistent with Hafsi and Turgut's (2013) study that found a negative association between age diversity and corporate social performance. Apart from that, our findings are inconsistent with past research which found either a significant positive relationship between age diversity and performance (e.g., Mahadeo et al., 2012; Siciliano, 1996) or a non-significant relationship between age diversity and performance (e.g., Jhunjhunwala and Mishra, 2012). The results of this study weaken the business case for age diversity put forward by prior research. However, the results should be interpreted in conjunction with the higher order curvilinear relationship found between age diversity and return on assets (discussed below).

Overall, the results suggest different linear effects for age and gender. Gender diversity is the most salient dimension of diversity in Australia and is generally acknowledged and appreciated by practitioners (Mercer, 2012). Therefore, the psychological groupings into male and female board directors may be weaker than the resources gender diversity produces, leading to net positive effects on performance (Nielsen and Huse, 2010). This may not be the case for age diversity; it seems that the resources age diversity produces are weaker than the psychological categorization into old and young board directors, leading to negative group behaviors. For instance, older directors may see young directors violating norms that director positions should be "earned" with seniority (Lawrence, 1984). Older directors with these negative attitudes would be reluctant to fully engage the younger directors in the board's decision making and strategic activities.

### **Inverted U-Shaped Age Diversity-Return on Assets Relationship**

The findings of this research suggest an inverted U-shaped curvilinear relationship between age diversity and return on assets. The squared age diversity term refined the previously discussed negative board age diversity-return on assets relationship. The relationship was positive from homogeneity to low levels of age diversity (return on assets increased from -.22 at .00 level of age diversity to 4.76 at .10 age diversity) and then negative from low to high levels of age diversity (return on assets decreased from 4.76 at .10 age diversity to -59.42 at .45 age diversity). The negative relationship from low to high levels of age diversity was much stronger than the positive relationship from homogeneity to low levels of age diversity, which resulted in an overall negative linear relationship when the squared term was not included in the analysis. The inverted U-shaped relationship supports the integration of resource dependence theory (Pfeffer and Salancik, 1978) with social identity theory (Tajfel, 1978). With strong theoretical arguments and a rigorous test of the curvilinear relationship, we were able to demonstrate that the most desirable level of age diversity is relatively low (about 10-15% younger members). A low level of age diversity brings valuable resources to the board table, but higher levels of age diversity trigger psychological groupings and negative group behaviors.

### **Theoretical and Research Implications**

This research might be the first to propose competing linear and curvilinear predictions between board demographic diversity and performance based on contrasting theories. Therefore, the study's findings have several theoretical and research implications. First, the findings provide indirect support to resource dependence theory (Pfeffer and Salancik, 1978) and social identity theory (Tajfel, 1978). Direct support would require studying when and how diversity would produce mediating processes (resources and negative behaviors) and, in turn, how these

mediating processes impact performance. Second, this research also provides indirect support to the integration of resource dependence theory (Pfeffer and Salancik, 1978) with social identity theory (Tajfel, 1978). Our findings suggest that the impact of age diversity on performance is different at different levels of diversity. The support for an inverted U-shaped relationship calls for refinements of current theories or the development of new theories that can predict and explain a curvilinear relationship between diversity and performance.

Third, this research fills important gaps in the diversity literature. It strengthens the business case for board gender diversity by providing the first evidence for a positive association between board gender diversity and employee productivity. It also adds to the small body of research that investigated the impact of board age diversity on performance. Moreover, it provides pioneering evidence for a curvilinear relationship between board age diversity and return on assets. Further research in this direction needs to focus on qualitative investigation of board processes, sampling the boards based on their levels of age diversity. Findings of these studies will provide detailed insights into why different levels of age diversity can have different effects, and why a low level of age diversity is optimal. Further, the curvilinear relationship found in this research can help reconcile some of the inconsistent findings of past research on board age diversity. For instance, the non-significant findings pertaining to the age diversity-performance relationship (Bonn, 2004; Bonn et al., 2004; Jhunjhunwala and Mishra, 2012) may be attributed to the lack of focus on the curvilinear relationship -- the scholars did not include a squared age diversity term in their regression analyses. Similar tests of the curvilinear relationship between board racial diversity and performance should be conducted in countries such as the United States, where board racial diversity is higher than in Australia. Future research can also benefit from testing competing predictions in other contextual settings. The



relationship between board demographic diversity and performance may vary across countries because of different legal, social and cultural variables (Kang et al., 2007). For instance, research in Scandinavian countries with higher proportions of women on boards (Deloitte, 2011) and extremely low masculinity (where social roles and behaviors tend not to be based on gender) (Hofstede, 2001) may discover a curvilinear relationship between board gender diversity and performance.

### **Practical Implications**

This research demonstrates an association between corporate board diversity and organizational financial performance. Many other factors, such as the national economy, global competition, and skill shortages, also impact financial performance (Carroll and Buchholtz, 2011). However, these distal factors may be difficult for organizations to influence. In contrast, organizations can exercise some control over their board's diversity by carefully considering how new appointments will change the demographic mix of directors. Therefore, we develop some practical recommendations for current directors, nomination committees and shareholders to consider as they appoint new directors to their organization's board.

Overall, the results present a strong business case for increasing gender diversity on corporate boards. Higher levels of gender diversity were associated with higher levels of employee productivity, supporting a view that increasing gender diversity may be the key to higher productivity (Goldman Sachs, 2009). Improving productivity is especially important in Australia; the nation is consistently experiencing lower levels of productivity compared to other developed nations (Hannan and Gluyas, 2012). Therefore, when generating nominations for an open board position, organizations need to consider the effect the new appointment will have on gender diversity (Sweeney, 2012).

Organizations sometimes experience internal and external resistance to female appointments (Rhode and Packel, 2010), but our empirical evidence for a positive linear effect of gender diversity refutes stakeholder concerns that high female representation will deteriorate board quality (Grosvold et al., 2007). Our results also weaken the argument that having only one or two female directors has little benefit (Konrad et al., 2008; Torchia et al., 2011). The demonstrated value of even small increases in gender diversity is especially important in Australia where 38% of ASX-listed organizations do not have a single woman on their boards (Australian Institute of Company Directors, 2012b). A higher representation of women on boards is likely to have trickle down diversity effects, increasing the representation of women in senior management positions, management roles, and the overall workforce (Bilimoria, 2006; Kurtulus and Tomaskovic-Devey, 2012; Terjesen and Singh, 2008).

Broadening the shortlist to include more female nominees and appointing new female directors will increase gender diversity directly, but will also indirectly increase age diversity; the average age of female directors is lower than male directors (Australian Institute of Company Directors, 2012b). Our results suggest that adding a couple of young directors to an older board could produce an optimal level of age diversity which might generate higher return on assets. But organizations need to be mindful that excessive levels of age diversity might reflect insufficient experience and ultimately lower return on assets.

In addition to gender and age diversity's positive effects on organizational financial performance, demographic diversity may have further, less tangible, benefits. Diversity improves a board's ability to address concerns of diverse shareholders (Carroll and Buchholtz, 2011). Female board members are likely to be highly educated, have non-business educational qualifications and have past work experience in high level positions (Hillman et al., 2002). As a

result, female board members are especially sensitive to ethical and social issues; they draw a board's attention to the impact of decisions on community stakeholders (Burgess and Tharenou, 2002; Luthar et al., 1997; Wang and Coffey, 1992; Williams, 2003). Similarly, young directors will have been sensitized to environmental concerns and corporate ethics during their education (Rowe, 2007); they are likely to encourage boards to consider environmental social responsibility and ethical issues.

### **Limitations**

This study has three main limitations. First, the study design did not allow us to make strong inferences regarding the causal effect of board diversity on performance. We ensured temporal precedence of diversity over performance, controlled for the effects of multiple factors on the diversity-performance relationship, reran the analyses without control variables, and performed a test of reverse causality. However, a longitudinal research design with multiple data points mapping changes in diversity and performance over time would provide stronger evidence (Menard, 1991). Second, we could not take into account the impact of ethnic/racial diversity of board directors on performance. Some of the variance in employee productivity and return on assets might be attributed to racial diversity of board members. However, the very low levels of ethnic/racial diversity on Australian boards suggest that the results would not be different with a racial diversity variable included in the regression analyses. Third, unique aspects of the Australian context, including its emphasis on gender diversity (Strachan et al., 2010) and moderately masculine culture (where social roles and behaviors tend to be based on gender) (Hofstede, 2001), might have impacted the study findings. The diversity-performance relationship may show different strength or direction in other legal and cultural contexts. Similarly, some of the inconsistent results of the studies listed in Appendix might reflect

contextual variations such as state of the economy (developed vs. emerging), diversity dimension (gender vs. age), or outcome variables (financial performance vs. market performance vs. corporate social responsibility performance). For instance, Adams and Ferreira (2009) reported negative effects of board gender diversity in the U.S. (developed economy), whereas Mahadeo et al. (2012) reported positive effects of board age and gender diversity in Mauritius (emerging economy).

### **Conclusion**

This study contributes to our understanding of the impact of board diversity (age and gender) on employee productivity and return on assets. The findings suggest that organizations that have a low level of board age diversity experience high levels of return on assets, and organizations that have high levels of board gender diversity experience high levels of employee productivity. These results add to the little evidence on the board age diversity-performance relationship, present pioneering evidence on the curvilinear board age diversity-performance relationship, and provide additional evidence on the board gender diversity-performance relationship. These results can help reconcile some of the inconsistent findings of past research on board age and gender diversity. The results also inform practice by indicating that different levels of different dimensions of diversity may be desirable. Moreover, the impact of diversity on performance may not be uniform across different dimensions of diversity.

## APPENDIX

### Some board age and gender diversity studies

Study	Gender/Age Diversity Operationalization	Performance Measures	Empirical Settings and Final Sample Size	Design and Methods	Key Findings
Adams and Ferreira (2009)	Gender (Fractions)	ROA, Tobin's Q	8,253 firm-years of data on 1,939 US firms	Unbalanced panel data 1996-2003	Average effect of gender diversity on performance is negative
Bear et al. (2010)	Gender (no. of women)	Corporate reputation and corporate social responsibility	51 Fortune 2009 world's most admired companies – US	Cross-sectional, archival	CSR mediated the relationship between gender diversity and reputation
Bohren and Strom (2010)	Gender (Proportion)	Tobin's Q, ROA, ROS	About 1200 observations of Norwegian firms	Panel data 1989-2002, archival	Negative relationship between gender diversity and all three performance measures
Bonn (2004)	Age (average age), gender (ratios of women)	Return on equity, market-to-book value ratio	84 Australian manufacturing organizations	Four years time lag, archival	Positive relationship between ratio of female directors and market-to-book value, non-significant effects of age diversity
Bonn et al.(2004)	Age (average age), gender (ratios of women)	Return on assets, market-to-book value ratio	169 Japanese manufacturing organizations, and 104 Australian manufacturing organizations	One year time lag, archival	Japanese firms: negative relationship between average age and market-to-book value for Japanese firms (equivalent to a positive relationship between age diversity and market-to-book value, non-significant effects of gender diversity) Australian firms: positive relationship between gender diversity and market-to-book value, non-significant effects of age diversity
Campbell and Minguez-Vera (2004)	Gender (Percentage, Blau, Shannon index)	Tobin's Q	68 Spanish organizations with 408 observations	Panel data 1995-2000, archival	Support for a positive relationship
Dobbin and Jung (2011)	Gender (Number of women)	Stock value, profits	432 US firms	Cross-sectional, archival	Female directors have negative effects on stock value and no effects on profits
Hafsi and Turgut (2013)	Gender, age (indices)	Corporate social performance	US 95 S&P 500 firms	Cross-sectional (Year 2005), archival	Gender diversity has positive and age diversity has negative effect on corporate social performance
Haslam et al. (2010)	Gender (Percentage)	ROA, ROE, Tobin's Q	UK FTSE 100 organizations	2001-2005 panel data, archival	No relationship with accounting measures (ROA and ROE) and negative relationship with market measures (Tobin's Q)
Mahadeo et al. (2012)	Gender (proportion of women), age (categories)	ROA	42 Mauritian organizations	Cross-sectional, archival	Support for a positive relationship between diversity (gender and age) and ROA
Nguyen and Faff (2006)	Gender (number of women)	Tobin's Q, ROA	500 largest Australian organizations, 793 final observations	Panel data 2000 and 2001	Support for a positive relationship between gender diversity and Tobin's Q
Siciliano (1996)	Gender (proportions), age (categories)	Operating efficiency, social performance, level of donations	240 US YMCA organizations	Cross-sectional, survey	Gender: positive with social performance, negative with level of donations Age: positive with level of donations
Srinidhi et al. (2011)	Gender	Earnings quality	US organizations, 2,480 firm year observations	Panel data 2001-2007, archival	Positive relationship between female participation and earnings quality

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**TABLE 1**  
**Means, Standard Deviations, and Correlations<sup>a</sup>**

Variable	Mean	SD	1	2	3	4	5	6	7
<b>Controls</b>									
1. Organization size	4719.37	14694.76							
2. Organization age	36.95	33.75	.27**						
3. Organization type (0 = Holding/subsidiary; 1 = Stand-alone)	.10	.30	-.09	-.07					
4. Industry type (0 = Services; 1 = Manufacturing)	.42	.50	-.05	.09	.10				
<b>Predictors</b>									
5. Age diversity 2011	.12	.06	-.04	-.03	.03	.02			
6. Gender diversity 2011	.17	.17	.22**	.25**	-.07	-.21**	-.10		
<b>Outcomes</b>									
7. Employee productivity 2012	12.44	2.25	.04	.14*	-.30**	-.12	-.12	.18**	
8. Return on assets 2012	2.85	19.86	.05	.06	-.12*	-.14*	-.18**	.01	.29**

<sup>a</sup> 2-tailed; \*  $p < .05$ , \*\*  $p < .01$

TABLE 2

<b>Hierarchical Regression Analyses – Employee Productivity 2012</b>			
<b>Variable</b>	<b>Age and gender diversity predicting employee productivity</b>		
	<b>Hypotheses 1/2</b>		<b>Hypothesis 3</b>
	<b><math>\beta</math> (Model 1)<sup>b</sup></b>	<b><math>\beta</math> (Model 2)</b>	<b><math>\beta</math> (Model 3)</b>
<b>Controls</b>			
Organization size	-.03	-.05	-.05
Organization age	.14*	.11	.11
Organization type	-.29***	-.28***	-.28***
Industry type	-.10	-.07	-.08
<b>Predictors</b>			
Age diversity 2011		-.09	-.08
Gender diversity 2011		.12*	.13*
<b>Squared terms</b>			
Age diversity 2011 <sup>2</sup>			-.03
Gender diversity 2011 <sup>2</sup>			-.04
$R^2$	.12	.14	.14
$F$	9.28***	7.49***	5.70***
$\Delta R^2$	.12	.02	.00
$F$ for $\Delta R^2$	9.28***	3.58*	.42

<sup>a</sup>  $n = 288$

<sup>b</sup> Standardized coefficients are reported

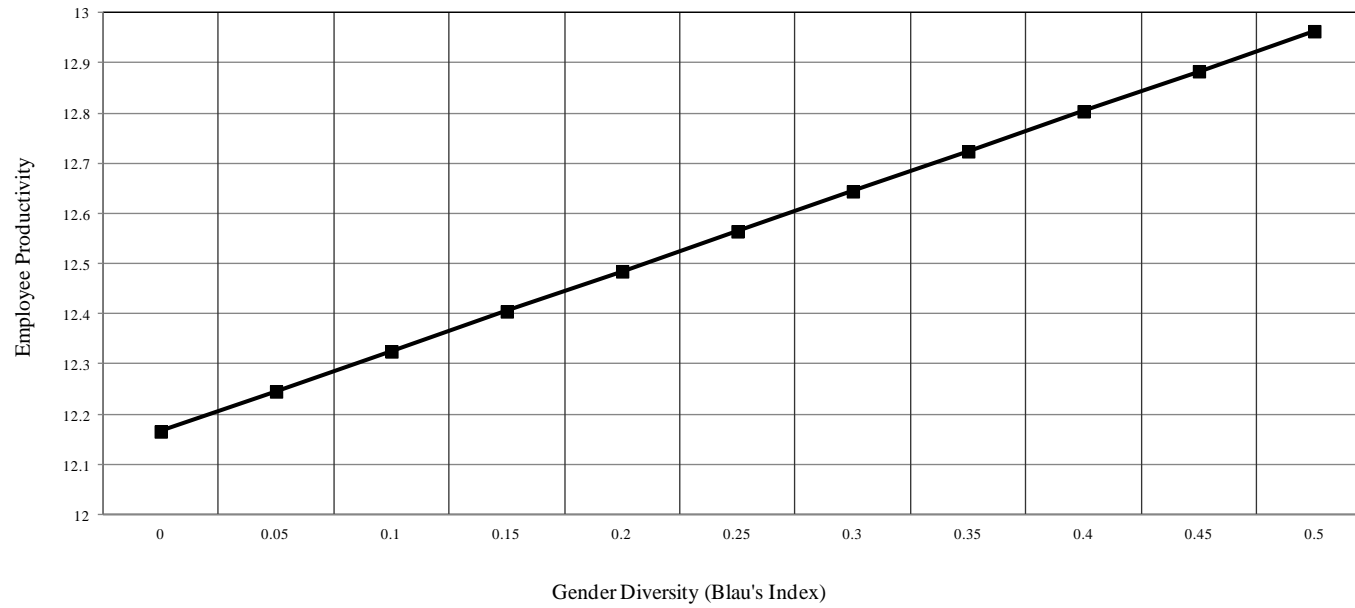
\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

TABLE 3

<b>Hierarchical Regression Analyses – Return on Assets 2012</b>			
<b>Variable</b>	<b>Age and gender diversity predicting return on assets</b>		
	<b>Hypotheses 1/2</b>		<b>Hypothesis 3</b>
	$\beta$ (Model 1) <sup>b</sup>	$\beta$ (Model 2)	$\beta$ (Model 3)
<b>Controls</b>			
Organization size	.02	.02	.01
Organization age	.06	.08	.07
Organization type	-.10	-.10	-.10
Industry type	-.13*	-.14*	-.16**
<b>Predictors</b>			
Age diversity 2011		-.18**	-.07
Gender diversity 2011		-.07	-.08
<b>Squared terms</b>			
Age diversity 2011 <sup>2</sup>			-.22**
Gender diversity 2011 <sup>2</sup>			.01
$R^2$	.04	.07	.10
$F$	2.55*	3.49**	4.05***
$\Delta R^2$	.04	.03	.03
$F$ for $\Delta R^2$	2.55*	5.23**	5.38**

<sup>a</sup>  $n = 288$ <sup>b</sup> Standardized coefficients are reported\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

**FIGURE 1**  
**Linear gender diversity-employee productivity relationship**



**FIGURE 2**  
**Linear and curvilinear age diversity-return on assets relationship**

