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Board Composition and Persistence on Capital Markets: Empirical Evidence of Companies Delisting from the ASX

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ABSTRACT

This article explores board composition in relation to the persistence of companies as listed entities on the Australian Securities Exchange (ASX) between 1990 and 2015. A data-driven investigation into existing theory of board heterogeneity evidences relationships between the proportion of non-executive directors, listing length and delisting likelihood.

KEYWORDS: Capital Markets, Analytics Approaches & Methods, Organizational Theory, Corporate Governance

INTRODUCTION

With an intention to extend the discussion of persistence of companies in terms of resilience as it relates to corporate governance, we began a data-driven investigation into Australian companies transitioning between listing states. In this paper we focus on delisting, which is a relatively uncommon event. The literature exploring reasons for companies' delisting is limited (Bortolon & da Silva Jr 2015). We report empirical findings of the relationship between board independence, company age and the likelihood of a company delisting from the ASX. This article therefore commences with an exploration of some of the background theory into capital market participation and board composition within an Australian corporate governance context, developing notions of persistence in the context of resilience theory.

BACKGROUND

Companies that raise equity capital by listing their securities may have a variety of underlying motivations. Research indicates these motivations vary between countries (Bird, 1995; Bebchuck & Roe, 1999). Delisting is the withdrawing of quoted company securities from a capital market. The next section considers delisting processes and literature on reasons for delisting. Relevant implications of studies on board composition and independence are proposed, and company persistence is linked to its resilience.

Delisting process in Australia

Delisting is a transition that comes in response to changed circumstances. Listing imposes certain requirements on companies that ensures delisting is not an overnight process and may be a departure from longer-term strategy. It can be considered a change in strategic direction for a company, generally accompanied by a restructuring of capital (Cohn, Mills, & Towery, 2014) and control (Cumming, Siegel, & Wright, 2007). As the company board of directors is responsible for providing strategic direction for the company (Baysinger & Hoskisson, 1990), the impetus for such a change falls within the board of directors' jurisdiction.

Under Australian corporations law, a company with “enhanced disclosure” securities included in a licensed financial market’s official list is subject to specified disclosure requirements and the market’s listing rules (*Corporations Act 2001* (Cth), s 111). Australia’s official list is the Australian Securities Exchange (ASX) with some 2,182 listed disclosing entities on list at the time of writing (ASX, 2015b). Enhanced disclosure requires companies to prepare and lodge independently audited half-year and annual financial reports as well as to meet continuous disclosure requirements (*Corporations Act 2001* (Cth), Ch 6CA). Under continuous disclosure, a company is required to immediately release any information that could materially affect the price or value of company securities (ASX, 2014, Listing Rule 3.1). Listed disclosing entities must also report on the extent to which they have complied with ASX Corporate Governance Principles and Recommendations (ASX Corporate Governance Council, 2014) in accordance with Listing Rule 4.10.3.

Action to delist results in a change in status under the *Corporations Act* with corresponding changes to reporting requirements. In general, a public company may continue to raise funds by offering securities to large numbers of people. Where prospectus requirements are relaxed for listed disclosing entities (*Corporations Act 2001* (Cth) s 713) in an acknowledgement of continuous disclosure activity, a public company that is not a listed disclosing entity must comply with Ch 6D’s disclosure requirements when seeking to raise funds through an offer of securities. A company with no more than 50 members may apply to convert to a proprietary company, which minimises the company’s financial reporting obligations. Movement away from continuous disclosure requirements is sometimes referred to as “going dark” (Campbell, Knowles, & Martin, 2014). Evidence suggests this process is likely to result in a restructuring, reconfiguring separation between management and ownership so their interests are much less differentiated (Cumming et al., 2007).

Delisting may be as an active or a passive process from a company’s perspective. ASX acceptance of a company’s request for removal from the official list is often termed voluntary, regardless of the circumstances of the request. A passive delisting process stems from an ASX decision and is imposed upon the company. On-going requirements are in areas such as level of operations, financial condition, proportion of assets in cash and level of spread of security holdings. ASX may suspend or remove a company if listing rules are not complied with, following a compulsory acquisition, upon failure to lodge documents or pay annual listing fees, if the company has no quoted securities, or for other reasons deemed appropriate to the circumstance (ASX, 2014).

Perhaps due to a notion of a company’s “coming of age”, as a company meets listing requirements before an initial public offering, IPO, (Pagano, Panetta, & Zingales, 1998) and subsequently maintains performance for continued listing, some authors present delisting as a “death” (Reeves, Levin, & Ueda, 2016), while others present it as a “momentous” event in a company’s life (Mehran & Peristiani, 2009). It is surprising that such an important event is so underreported that commentators note the infrequency with which aggregation of delisting data is found in published empirical research (Bortolon & da Silva Junior, 2015). The research upon which this paper is based does take an approach to aggregating delisting data. In an email from a past legal practitioner of Australian corporate law, we have been advised that delisting is treated as a matter of responding appropriately to changed circumstances (J Streeter 2016, pers. comm., 9 January). Delisting may not always be as dramatic an occurrence as some theorists suggest, however the dataset compiled for this research article indicates delisting is a relatively rare occurrence.

Why delist?

As noted by Campbell et al. (2014), “the reasons why companies might delist from a major stock exchange are controversial, as is whether delisting sends a positive, neutral, or negative signal to markets and investors” (Campbell et al., 2014: 22). The significance of the delisting gatepost is downplayed, or ignored, in the literature on firm failure, possibly as a result of this ambiguity. Studies on delisting tend to focus on a particular scenario. In collecting data for a bankruptcy forecasting model, Shumway (2001) searched for delisted firms, ultimately including companies that filed for bankruptcy within 5 years of delisting (Shumway, 2001). Balios, Eriotis, Missiakoulis, and Vasiliou (2015) investigated the probability of delisting from the Athens Exchange, finding companies with performance issues such as poor liquidity, high leverage, low trading activity and big stock price decline are more likely to delist, voluntarily or not. A recent multivariate analysis into voluntarily delisting companies indicated five predictors of delisting in the Brazilian context: greater concentration of ownership and control; lower free float; lower liquidity of shares (particularly when majority of shareholdings are privately owned); greater availability of cash (particularly when main shareholders are public companies); and larger size (Bortolon & da Silva Junior, 2015).

A common difficulty researchers encounter in this domain is in obtaining post-delisting data (Campbell et al., 2014). Cohn et al. (2014) overcame this by accessing U.S. corporate tax returns. They concluded the delisting of the majority of companies in their study of leveraged buyouts, LBO's, was motivated in order to effect a sustained change in capital structure. Circumstances leading to delisting decisions are likely to be as varied as the number of companies who actually delist, returning us to the research problems inherent in the domain.

Conflicting results are not uncommon. Bharath and Dittmar (2010) consider the decision for delisting as the result of a trade-off, a reversal of decision to go public. Their research suggests that informed insiders (controlling shareholders) use private information to take their companies private before periods of unexpected good performance to avoid sharing the performance improvements with other shareholders. However, in their investigation into delistings by controlling shareholders in Europe, Croci and Giudice (2014) found no evidence of a change in operating performance before and up to 3 years after delisting, with minority investors benefiting from the premium on the market price of their shares at the point of delisting offer (see also Cohn et al. (2014) for a similar result from U.S. data).

According to Ferreira, Manso, and Silva (2012), a listing strategy is optimal for the exploitation of existing ideas, where transparency to market rivals is less of a concern. They observed a tendency to delist prior to pursuing an innovation strategy, with private investors being considered more tolerant of failures. A different strategic example is of relocation to another exchange in an attempt to increase company value, demonstrated in Singtel's recent delisting announcement (Singapore Telecommunications Limited, 2015). A multinational company, Singtel's shares had been traded simultaneously on two exchanges. As the ASX-quoted shares have performed poorly the company recently decided to consolidate all shares onto a single exchange. This appears to be a common event. In a study of both voluntary and involuntary delistings from prominent U.S. exchanges in 2008 and 2009 (of which involuntary delistings constituted over 60 percent), Campbell et al. (2014) found 69 percent immediately switched to an alternate exchange. However, as Australia has only the one major exchange, geographical barriers would seem to make this a less likely proposition, certainly for those companies that do not have multinational operations.

Board composition and independence

Cai, Garner, and Walkling (2009) suggest board independence is a measure of the degree to which managers entrench themselves in a company. Management entrenchment describes individual manager actions and decisions taken to increase their value to shareholders and making them costly to replace (Shleifer & Vishny, 1989). Understanding management's incentives is a long-standing central theme of organisation theory (Watts & Zimmerman, 1978). Where there is a higher degree of entrenchment, shareholders have less control over management (Cai et al., 2009). The ASX Corporate Governance Principles and Recommendations document states the "board needs to have an appropriate number of independent, non-executive directors who can challenge management and hold them to account, and also represent the best interests of the listed entity and its security holders as a whole rather than those of individual security holders or interest groups" (ASX Corporate Governance Council, 2014).

Corporate governance develops along country-specific paths (Bird, 1995). The 'if not, why not' Australian approach requires listed disclosing entities to specifically address the ASX Corporate Governance Council's Principles and Recommendations in annual reporting. Directors' duties are presented in Section 181(1) of the *Corporations Act 2001* (Cth) whereby "A director or other officer of a corporation must exercise their powers and discharge their duties: (a) in good faith in the best interests of the corporation; and (b) for a proper purpose." The oversight role of board members is associated with "legitimate authority and power to hire, fire, and compensate, provide advice, and monitor top managers" (Lim & McCann, 2013: 1568). It is argued that a company with an independent board can consider options and exert control over important decisions that are not necessarily in management's interest (Salancik & Pfeffer, 1980; Baysinger & Hoskisson, 1990).

Westphal (1998) notes an offsetting effect of increased board independence with subsequent CEO ingratiating and persuasion behaviour, or "managerial influence tactics". Increased independence is considered to come with greater control over top management, although Zajac and Westphal (1996) noted both board-controlled and CEO-controlled firms coexist and persist.

Along with reducing agency costs that arise through divergence of shareholder and manager interests (Jensen & Meckling, 1976), board independence is linked with more diverse input into decision-making (Dalton, Daily, Johnson, & Ellstrand, 1999), enhancing the board's ability to think strategically and see things differently (Roberts, McNulty, & Stiles, 2005), improved unbiased oversight of management by representing shareholders' interests (Fama & Jensen, 1983) and improved credibility in financial markets (Kroszner & Rajan, 1997). Recent work focuses on board heterogeneity "beyond independence" (Johnson, Schnatterly, & Hill, 2013). The ASX Corporate Governance Principles and Recommendations suggest a diversity policy would include gender, but also extend to "matters of age, disability, ethnicity, marital or family status, religious or cultural background, sexual orientation and gender identity" (ASX Corporate Governance Council, 2014).

When considering claims of representation of a diverse range of shareholder interests, it is interesting to note the influence of institutional investors. In Australia, New Zealand and the U.S., institutional investors hold more than 50% of all equities (Farrar, 1999). Schnatterly and Johnson (2014) find institutional investors are more likely to choose to invest in companies with a greater level of board independence over those predominantly made up of executive directors. As Lawrence and Stapledon (1999) point out, "even if independent directors do not add value, companies should still engage them because investors and potential investors believe they add value" (Lawrence & Stapledon, 1999: 5).

Linking persistence and resilience

Using performance of the organisation to indicate the adequacy of board oversight is a focus of existing literature. Investigating the longevity of public firms in the United States, Reeves et al. (2016) observe a market-wide emphasis on maximising short-term performance rather than long-term robustness. In contrast, Mitchell (1991) employs company survival itself as a measure of performance. Theory of resilience of organisations is a platform to develop understanding as to how companies persist in particular operating states.

Examining companies as complex dynamic self-adaptive systems (e.g. Levin, Xepapadeas, Crépin, Norberg, de Zeeuw, Folke, Hughes, Arrow, Barrett, Daily, Ehrlich, Kautsky, Mäler, Polasky, Troell, Vincent, & Walker, 2013) provides a useful frame for the context of strategy research into company transitions, such as those associated with delisting. Engle (2011) defines resilience as “achieving desirable states in the face of change”.

The notion of survival is employed to examine company persistence in the face of challenging circumstances (Mitchell & Singh, 1996; Reeves et al., 2016). By incorporating investigation into companies “thriving”, resilience theory expands on this substantively. Vogus and Sutcliffe (2007) articulate two focal questions for organisational resilience research: “Why are some organizations and institutions capable of maintaining function and structure in the face of environmental jolts and other large disruptions? Why do some organizations crumble in the face of high levels of ongoing strain while others thrive and grow more resourceful and poised to tackle future challenges?” (Vogus et al., 2007: 3418).

A variety of factors have been identified and investigated. Flexibility is considered in resilience research. Adaptive capacity covers the idea that the more successful entities not only have a capacity to adapt in response to external threats and opportunities, but can also influence the environment within which they exist (Folke, 2006). Dependability is argued to hinge on available slack (Schulman, 1993), emphasising redundancy (Haimes, 2009).

As noted by Goodstein and Boeker (1991), strategic changes may be implemented in response to changes in a company’s circumstances. These changes may be exogenous such as regulatory or technological environment changes, as well as a change in tracked performance. The authors suggest an organisation’s flexibility in implementing responsive changes may be constrained by an existing political or power structure. The finding that stability in ownership and board interests tends toward resistance of CEO-proposed strategic changes, suggests the lower the level of board independence, the more dynamic and responsive an organisation may be.

Researchers have noted a weak correlation with company survival and traditional performance measures (e.g. Shumway, 2001). According to Mitchell (1991), “[c]orporate strategists... have recognised survival as one organizational goal. Survival potential also is of interest to a firm’s employees, the community in which it is based, and its competitors. The comparative investigation is particularly important given the potential for trade-offs between market share and survival” (Mitchell, 1991: 89).

RESEARCH HYPOTHESES

We initially set out to test for relationships between the lengths of company listing, board composition and delisting. A corollary with identified higher likelihood of delisting in years just following IPO’s (Mehran & Peristiani, 2009) leads us to investigate persistence in our first hypothesis.

Hypothesis 1: The longer a company is listed on the ASX, the less likely it is to delist.

Due to earlier discussed findings, we wanted to investigate the idea that the level of board independence influences the likelihood of a company choosing to delist. The second hypothesis was developed to capture this tension.

Hypothesis 2: The greater the proportion of non-executive directors on the board, the less likely the company is to delist.

We also were interested in investigating the interaction between age and proportion of non-executive directors, and developed a third hypothesis to this end.

Hypothesis 3: The longer a company is listed and the greater the proportion of non-executive directors on the board, the less likely a company is to delist.

METHODOLOGY

We applied a Cox proportional hazards approach to the three hypotheses. A hazard model allows for an estimation of risk of an event over time. Cox's (1972) extension allows for a changing risk of an event over a predefined time function with covariation. The Cox proportional hazards (*coxph*) model is widely used for analysing survival data (Harrell Jr., 2001). Observations of each individual in a population are taken until the event or censoring. In the case of censored data, records for which an event has not been observed during the period of study, we know that the time to the event is beyond the censoring time (Cox, 1972). T is a random variable representing time to the event with a survivor function represented as, $F(t) = pr(T \geq t)$. A semiparametric model, the predictors are assumed to have a parametric relationship with the hazard function, but there are no assumptions about the form of the hazard function itself (Harrell Jr., 2001). The hazard rate, or intensity of failure, is specified as a function of time $\lambda(t) = \lim_{h \downarrow 0} pr[T \leq t + h | T > t]$ (Andersen & Gill, 1982) for time listed T of an individual company with a covariate vector X which may depend on time t as follows: $\lambda(t|X) = \lambda(t) \exp(X\beta)$, $t \geq 0$. (Harrell Jr., 2001)

Cox's approach has been shown to have wider application apart from medical survival data. Mehran and Peristiani (2009) use hazard modelling in testing their financial visibility hypothesis whereby "young firms are choosing to exit the public market because they have failed to attract an adequate level of investor recognition" (Mehran & Peristiani, 2009: 3). Henebry (1996) and Shumway (2001) use Cox proportional hazards to build predictive models of company failure. Mitchell (1991) considers companies' survival in industry subfields. Tran, Thom Pham, Yang, and Tien Nguyen (2012) seek to predict the remaining useful life of a machine by modelling machine failure. Settanni, Newnes, Thenent, Bumblauskas, Parry, and Goh (2015) apply Cox proportional hazards to recurrent failure events (see also Settanni, Newnes, Thenent, Bumblauskas, Parry, & Goh, 2016).

There are various trade-offs involved in our analytical modelling decisions. Board composition and length of listing are modelled as independent variables. We are interested in the separation between management and shareholders and have defined independence through the proportion of non-executive directors. As previously mentioned, independence is frequently defined more rigorously with the meaning of independence of non-executive directors differing widely between countries (Zattoni & Cuomo, 2010). Williams, Bingham, and Shimeld (2015), for example, define independence requiring no affiliations to the company other than a role on the board. An Australian study into the top 100 largest listed companies of 1995 identified a proportion of 41% of non-executive directorships were affiliated with the company (Stapledon & Lawrence, 1997).

We retained the executive/ non-executive distinction as our measure of board composition in order to investigate a larger sample. The large number of observations within the scope of this initial investigation made it impractical to access individual companies' annual reports and incorporate this data. In an investigation into 69 commercial banks from six OECD countries for the 1996-2006 period, de Andres and Vallelado (2008) also define their proportion of outside directors as the number of non-executives out of the total. They also faced a limitation from their data source.

Apart from the incorporation of time into our dataset for Cox proportional hazards processing, our model is constrained from recognising that director selection doesn't occur in a vacuum (Zajac & Westphal, 1996). We also have not controlled for sector- or industry-specific effects. It is a market-wide investigation into delisting for any reason.

Data structure

We compiled secondary data from the DatAnalysis database (Morningstar Inc., 2015). All companies that had board membership data were included. Observations were obtained in October 2015, constraining the time series to the 25 years from 1990 to 2015 (September). DatAnalysis records commence in 1990. We have not categorised companies in any way, such as by GICS sector.

In order to prepare for the modelling process, the observations were structured with one record per interval between each event time per company. This allows for the partial-likelihood including a contribution at each event time (Thomas & Reyes, 2014). Table 1 depicts the simple structure of our dataset.

timeperiod	listing_age	director_ratio	delisted
0	5	1	0
0	29	0.5	0
...			
24	21	0.86	1
....			
25	8	0.83	0

We used the same dataset for both investigations, only using complete observations. Financial time-series data from DatAnalysis prior to 2000 is patchy on account of the introduction of GICS in Australia in that year leading to reclassification of industries. Further, comprehensive director data is not available until early 2000s. Figure 1 demonstrates the distribution of the total 28,185 observations over the 25-year period and Figure 2 shows the delistings.

Figure 1: Number of observations for each year of the dataset. Timeperiod 0 corresponds with 1990, timeperiod 25 corresponds with 2015. Observations for 2015 are complete to September 30.

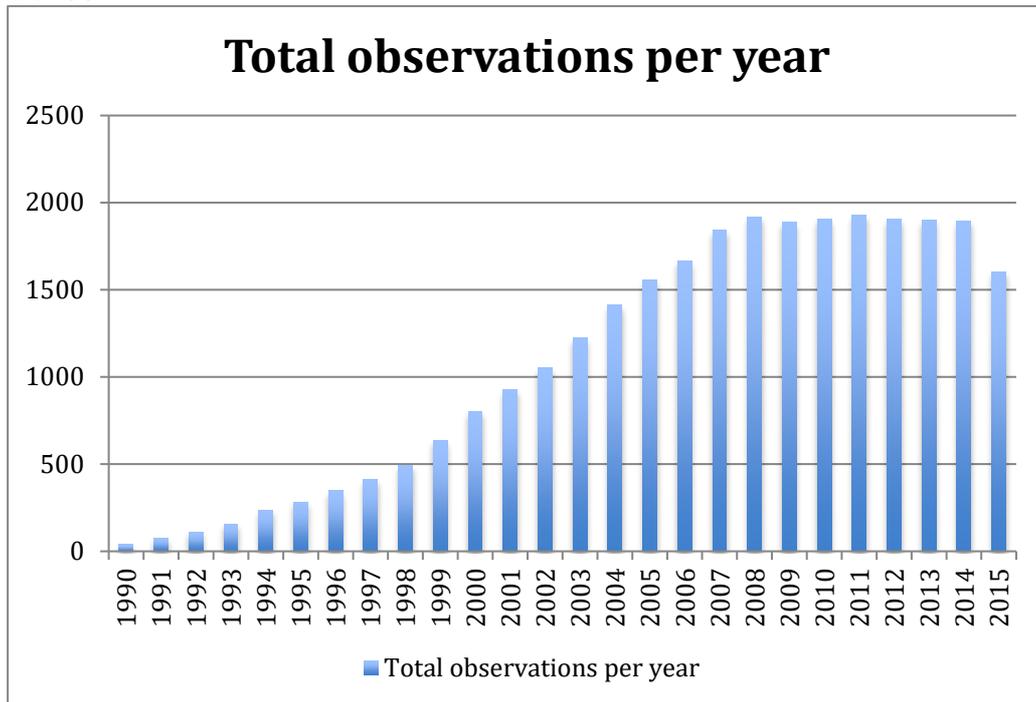
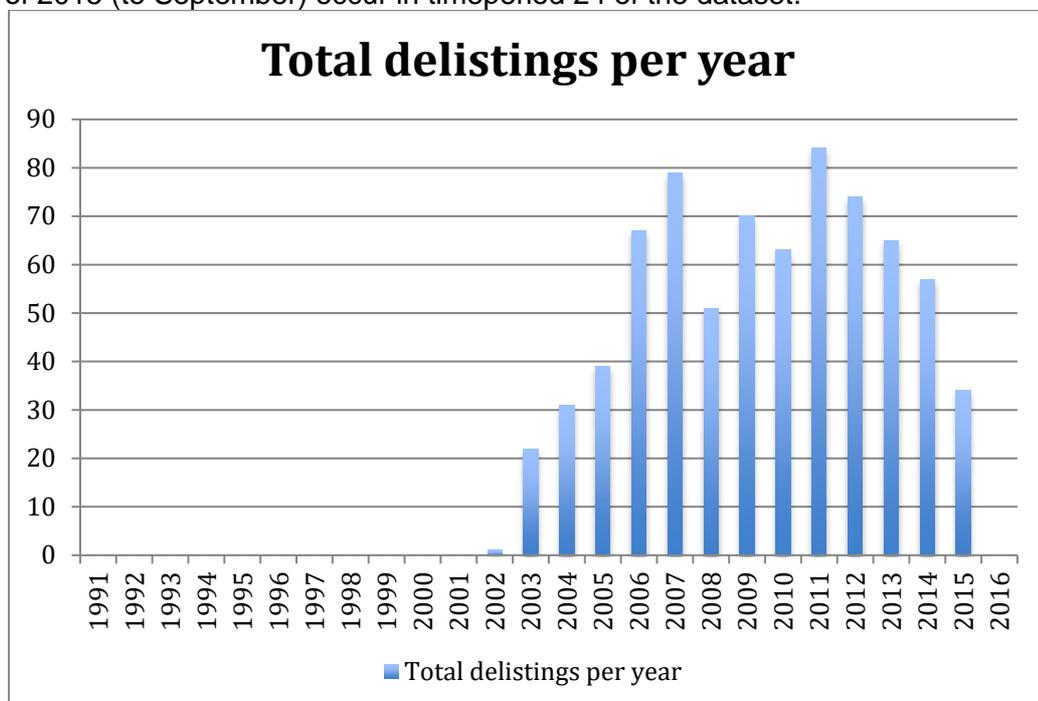


Figure 2: Number of delistings for each year of the dataset. A delisting event is recorded in the previous timeperiod. The single delisting of 2002 occurs in timeperiod 10, the 34 delistings of 2015 (to September) occur in timeperiod 24 of the dataset.



The dramatic rise in total observations from only 39 in 1990 to over 1,800 in 2007 (from which point it appears to remain fairly stable) and the lack of delisting records until 2002 is due to incomplete board composition data. Previous director data has only been captured by

DatAnalysis since November 2001 (Morningstar Inc., 2015), from which point the totals in our dataset have slight disparities with ASX-reported listing numbers (ASX, 2015a). This may be attributable to the fact that the ASX count includes listed managed investment funds, which may not have been accessed through the DatAnalysis search interface.

Records prior to 2001 are only of those companies that had a director still serving that was appointed prior to 2001. The dataset is not representative of the number of actual listings and delistings over that period. The Cox proportional hazards model allows us to incorporate what data we do have from the long early period with few recorded delisting events (Harrell Jr., 2001). Figure 2 illustrates a jump in delistings during the 2006 – 2007 onset of the global financial crisis (Williams et al., 2015) and an interesting sharp drop during 2008. The highest point at 2011 has been followed by a fall in each subsequent year.

Time period

The time period is a discrete value, representing events in each calendar year 1 January to 31 December. Observations for the year 1990 were attributed to time period 0, observations for the year 2015 to time period 25. Our total number of observations for the period is 28,185, with 737 delisting events.

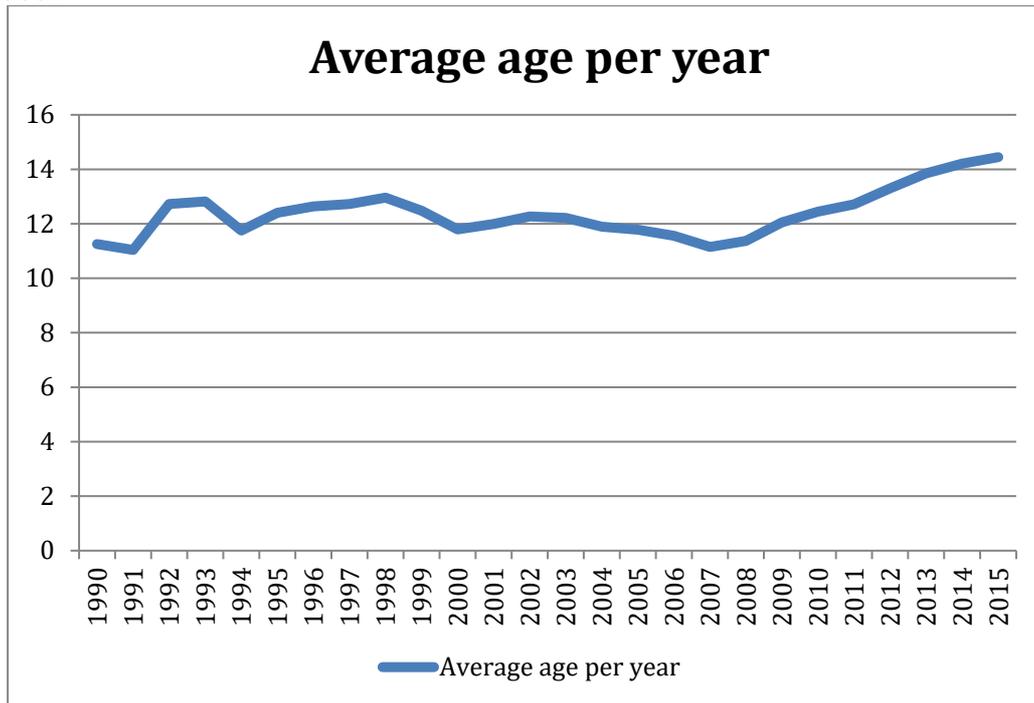
Delisting year

The delisted event is recorded as a binary attribute, where 1 indicates a delisting event occurred in that time period. Due to the relationship between delisting and reporting requirements, data is not available in the actual year of delisting for the majority of the delisted companies (only about 150 of the 737 records). To incorporate all events, delisting has been associated with the year prior. A recorded delisting event therefore actually took place in the subsequent time period. This approach was taken for all companies, including those that have data associated with their delisting year. As a result, the observed data for delisted companies in the actual year of delisting has not been included in the dataset.

Company age

Following Shumway (2001), company age represents the number of years the company has traded shares on the Australian capital market. Age was calculated as the year of the observation, less the original year of listing plus one. Therefore, if the year of the current observation is the same as the year the company first listed, the value of the age variable is 1 and not 0. Figure 3 gives an overview of the average age of companies in the dataset.

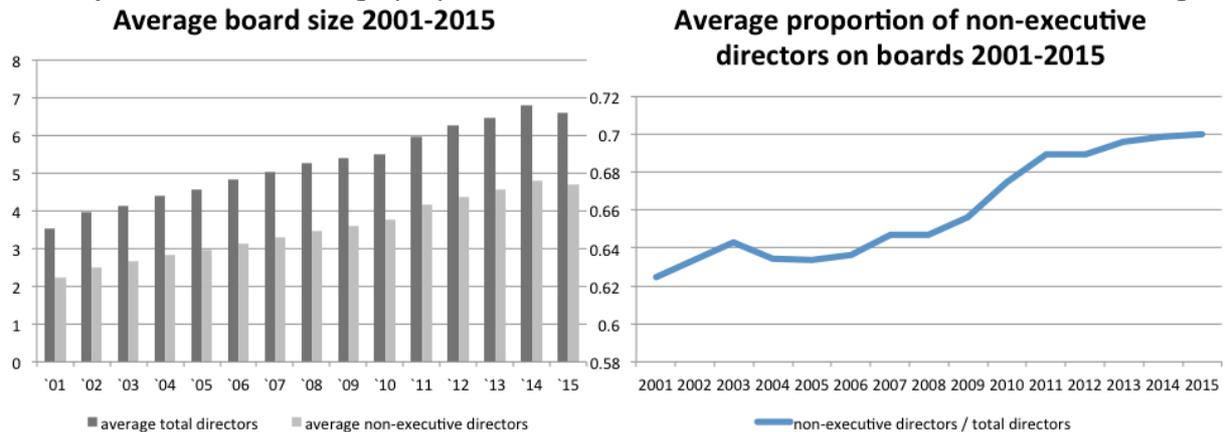
Figure 3: Average age (number of years of listing) of companies observed for each year of the dataset



Board composition

Figure 4 demonstrates the increase in both average board size and average non-executive directors over the observation period. Clearly average board size is increasing.

Figure 4: Average board size and average number of non-executive directors has increased steadily since 2001. Average proportion of non-executive directors is also at an all-time high.



Discretisation of the proportion of non-executive directors

We chose to investigate the non-executive director ratio as both a continuous variable and a discrete variable. For purposes of Cox proportional hazards modelling, we divided the total observations into the categories shown in Table 2. These ranges were chosen in order to keep a sizeable proportion of the observations in each division, while retaining some domain meaningfulness and enhancing interpretability. Conheady, McIlkenny, Opong, and Pignatell

(2015) and Puterman (2005) also use this approach, albeit with slightly different divisions and application.

Proportion of non-executive directors (inclusive ranges)	Number of observations
0 – 40%	4,523
40.01% – 50%	4,117
50.01 – 67%	6,047
67.01 – 80%	5,582
80.01 – 100%	7,916

Procedures In R

The *coxph* method from the survival package for R was used (Therneau & Lumley, 2015) with the exact partial likelihood method for handling tied event times.

Our code for approximation of the age hazard function for hypothesis 1 is,

```
result <- coxph(formula = Surv(timeperiod, delisted) ~ listing_age, data
= inputs.dat, method = "exact")
```

Our code for testing of the non-executive director ratio as a continuous variable is,

```
result <- coxph(formula = Surv(timeperiod, delisted) ~ director_ratio, data
= inputs.dat, method = "exact")
```

Our code for dividing the director ratio into five discrete categories is,

```
independence.dat <- cut(inputs.dat$director_ratio, br = c(-1,0.4,0.5,0.67,0.8,1.01), labels
= c([0-0.4],[0.4001-0.5],[0.5001-0.67],[0.6701-0.8],[0.8001-1]))
```

Then we run the *coxph* method as follows,

```
result <- coxph(Surv(timeperiod, delisted)~independence.dat, data = inputs.dat, method
= "exact")
```

The code for testing the interactive effects of age and proportion of non-executive directors is for the third hypothesis is,

```
result.interaction <- coxph(formula
= Surv(timeperiod, delisted)~listing_age * director_ratio, data
= inputs.dat, method = "exact")
```

RESULTS

The results from this process are presented below.

Hypothesis 1

The results of the *coxph* function for hypothesis 1 are presented in the following table. We were testing

$$\lambda(t, x_i^{listing_age}) = \lambda(0, \alpha) \exp(\beta x_i^{listing_age}) \quad (1)$$

Table 3: Results of the Cox model of the first hypothesis, concerning delisting hazard and age							
variable	coefficient, β	exponent of the coefficient, $\exp(\beta)$	standard error of the coefficient, $se(\beta)$	z	p	lower .95	upper .95
age	-0.004127	0.995882	0.003388	-1.218	0.223	0.989	1.003

This gives us a hazard rate of $(1 - 0.995882) * 100 = 0.4118\%$ decrease per additional year of listing. Our p-value is greater than 0.05.

Hypothesis 2

In hypothesis 2, we were testing

$$\lambda(t, x_i^{director_ratio}) = \lambda(0, \alpha) \exp(\beta x_i^{director_ratio}) \quad (2)$$

a) The results of the non-executive director ratio as a continuous variable are shown in Table 4.

Table 4: Results of the Cox model of the second hypothesis, with proportion of non-executive directors as a continuous variable							
variable	β	$\exp(\beta)$	$se(\beta)$	z	p	lower .95	upper .95
ratio	-0.9156	0.4003	0.1621	-5.648	1.62e-08	0.2913	0.55

The exponent of the coefficient 0.4003 gives us a 60% less hazard of delisting with 100% independent directors than with 0% independent directors. The p-value is less than 0.05, indicating a statistically significant result.

b) The results of the independent director ratio as a discrete variable are shown in Table 5.

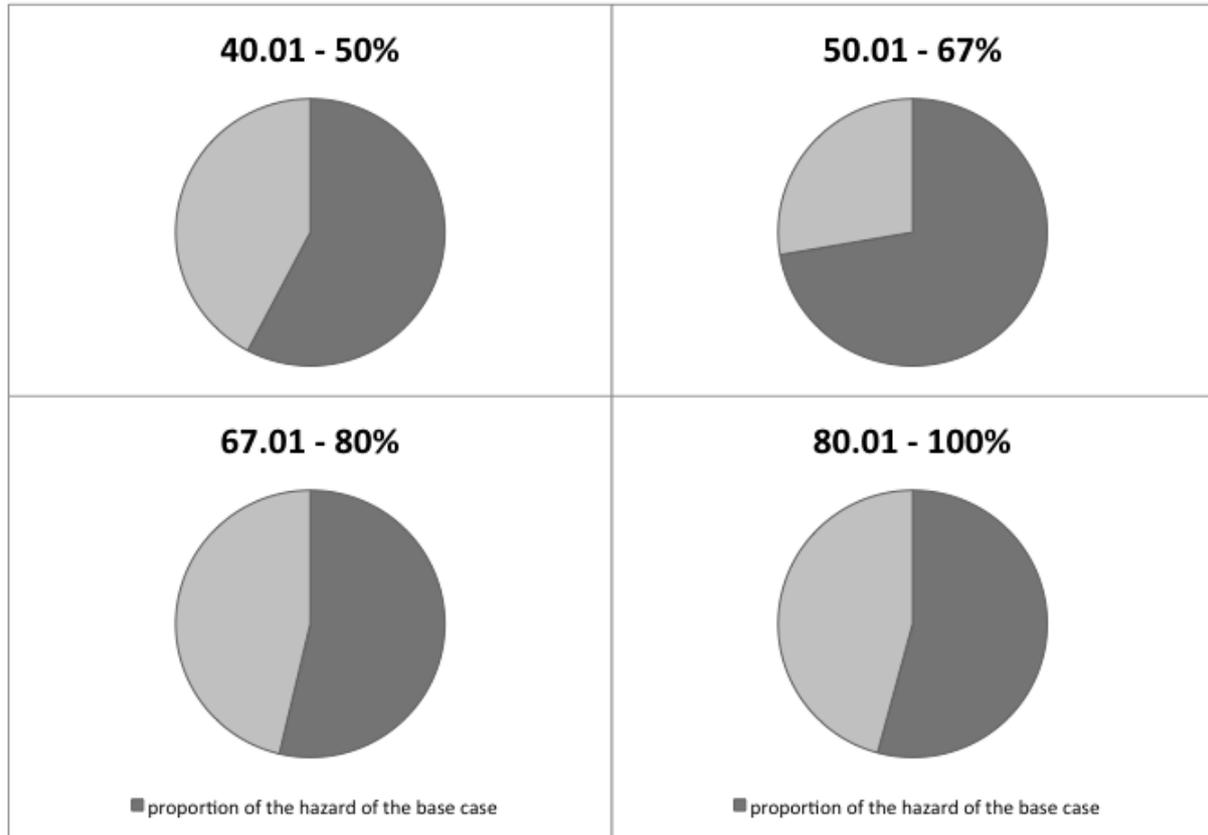
Table 5: Results of the Cox model of the second hypothesis, with proportion of non-executive directors as a discrete variable. Each category was tested against a proportion of non-executive directors between 0% and 40% (inclusive)							
categories	β	$\exp(\beta)$	$se(\beta)$	z	$Pr(> z)$	lower .95	upper .95
40.01 – 50%	-0.550	0.577	0.140	-3.92	8.9e-05	0.4382	0.7597
50.01 – 67%	-0.325	0.723	0.115	-2.82	4.8e-03	0.5769	0.9055
67.01 – 80%	-0.621	0.537	0.121	-5.12	3.1e-07	0.4236	0.6817
80.01 – 100%	-0.612	0.542	0.120	-5.10	3.5e-07	0.4286	0.6863

The *coxph* function compares each of these with the delistings of the category with the lowest proportion of non-executive directors, 0 to 40% inclusive, as the base case. All exponents of the coefficients depict lower hazard rates than the base case with $p < 0.05$. The

p-value of less than 0.05 for each category shows statistically significant results. Figure 5 illustrates the relative proportions for each category.

The relative risk of delisting of a company that hasn't yet delisted in the 40.01 – 50% range is 58% of the hazard of delisting for a company in the 0 – 40% range. A company with board composition in the range 50.01 – 67% range is 72% as likely to delist and in the two ranges encompassing 67.01 – 100% is 54% as likely to delist than the base case.

Figure 5: Hazard rate of delisting for each category of the non-executive director ratio, as a proportion of the hazard rate for delisting for any reason, of a company with 40% or less non-executive directors



Hypothesis 3

For hypothesis 3, we are testing the proposition,

$$\lambda(t, x_i^{list_age}, x_i^{dir_ratio}) = \lambda(0, \alpha) \exp\left(\beta_{dir_ratio} x_i^{dir_ratio} + \beta_{list_age \cdot dir_ratio} x_i^{list_age} x_i^{dir_ratio}\right) \quad (3)$$

We already know from hypothesis 1 that the effect of listing_age is not statistically significant on its own, hence its exclusion. The result of the test for interaction is shown in Table 6.

Table 6: Results of the Cox model of the third hypothesis, testing for interaction between company length of listing and proportion of non-executive directors, with both as continuous variables							
variable	β	$\exp(\beta)$	$se(\beta)$	z	p	lower .95	upper .95
age	0.01792	1.01809	0.01022	1.754	0.0795	0.9979	1.0387
ratio	-0.53336	0.58663	0.24552	-2.172	0.0298	0.3626	0.9492
age:ratio	-0.03036	0.97010	0.01466	-2.070	0.0384	0.9426	0.9984

The hazard rate for the interaction coefficient is $(1 - 0.97) * 100 = 3\%$ decrease per additional year of listing. The p-value is < 0.05 .

DISCUSSION

The length of time a company has had shares quoted on the ASX does not have a statistically significant relationship to delisting on its own. However, when interacting with the director ratio, the risk of delisting decreases 3% for each additional year of listing. This is in keeping with resilience theories that emphasise experience as an important predictor of persistence.

Increasing average size of boards and the average proportion of non-executive directors may be attributable to an attempt by listed disclosing entities to “regain investor confidence through strengthening their corporate governance practices and disclosure practices” (Williams et al., 2015: 341). ASX recommends in Principle 2, ‘Structure the board to add value’, that the board “should be of sufficient size so that the requirements of the business can be met and changes to the composition of the board and its committees can be managed without undue disruption. However, it should not be so large as to be unwieldy.” (ASX Corporate Governance Council, 2014: 14). Williams et al. (2015) raise the question whether recent series of board changes add value to a company’s governance structure or are designed merely to create an impression of good governance. Schnatterly and Johnson (2014) suggest increasing board independence would make a company’s securities more attractive to institutional investors. They found evidence that this preference is a result of institutional pressure rather than performance benefit.

Our results indicate companies’ persistence in terms of length of listing on the ASX is related to our measure of board composition. Particularly for investors seeking longer-term investment, a company more likely to persist is a more attractive investment prospect. Although Cox’s proportional hazards modelling does not provide information about the nature of the relationship between persistence and board composition (e.g. causality), we can recognise the strength of the association.

The results from evaluating board representation in isolation show that companies with non-executive director representation exceeding 40% are much less likely to delist, for any reason, than those with at least a 60% majority of executive directors. This result is statistically significant ($p < 0.05$), permitting us to generalise about our findings, keeping in mind the limitations of the dataset. In the context of previously introduced theory, the higher likelihood of delisting for companies with a very low proportion of non-executive director representation on the board is not surprising, with CEO-driven firms more likely to take advantage of opportunities to innovate afforded by that going dark. They were also seen to be more able to adapt quickly to changed circumstances and choose options that are in the interests of a less diverse range of shareholders.

The result for the category for between 40 and 50% non-executive director was surprising given that these boards are dominated by management, only 58% of the likelihood of delisting of those in the lowest range. In this case, the management oversight function is being performed by a board that is somewhat independent, but with no clear majority. The result may be explained by theory presented earlier concerning barriers to change that stem from inner political tension and corresponding inertia in such a circumstance.

The 72% proportional hazard for companies with a non-executive director ratio between 50 and 67% is also unexpected. This higher likelihood of delisting may be attributable to increased internal turmoil. As apparent control of the board is no longer with the executive, focus may be on inside political negotiating rather than on operational and strategic direction. Delisting may seem a viable option at this point if negotiations are not effective.

The final result, testing for the interaction between length of listing and the proportion of non-executive directors, both as continuous variables, reiterated our finding from investigating the director ratio in isolation. That is, the proportion of non-executive directors on the board has a significant effect on delisting ($p < 0.05$), that the effect of age as an additive variable is not significant ($p > 0.05$), but that age has an interactive relationship with the ratio of non-executive directors that is also statistically significant. This gives us the final model,

$$\lambda(t, x_i^{list_age}, x_i^{dir_ratio}) = \lambda(0, \alpha) \exp\left(-0.53x_i^{dir_ratio} - 0.03x_i^{list_age}x_i^{dir_ratio}\right) \quad (4)$$

CONCLUSION

Whether the delisting process is instigated from within a company's governance structure or imposed externally, it is a transition that is associated with strategic change, restructuring and sometimes company failure. Delisting decisions are in the domain of the board of directors. Amidst a trend of increasing average board size and non-executive representation on the boards of Australian listed disclosing entities, our investigation into the relationship between board composition and a proportional likelihood of delisting is suggestive of the following story. As the proportion of non-executive directors on a board heads beyond 40%, while management still holds control, board politics are fairly stable. Where the composition is such that non-executive members are only just in the majority, managerial influence tactics may cause the board's focus to turn inwards, detracting from the type of informed decision-making envisioned by the authors of corporate governance principles to come about through diversity amongst the decision-makers. This phase is associated with relatively high likelihood of delisting. As the proportion of non-executive directors reaches more than two-thirds of total representation, the executive directors are in a clear minority and management structures take on a different rhythm. Increasingly diverse board heterogeneity enables representation of a more diverse ownership group. Our findings suggest that this leads to a tendency for a company to persist in capital markets.

FURTHER WORK

Further investigation into the delisting transition could be extended by controlling for sector- or industry-specific effects and incorporating more complex definitions of board composition as suggested by the work of Atinc, Simmering, and Kroll (2011), Gertner and Kaplan (1996) and Johnson et al. (2013). Also of interest is the retention of the non-executive director ratio categories and widening the investigation to differentiate between official reasons for delisting.

REFERENCES

Andersen, P. K., & Gill, R. D. (1982). Cox's regression model for counting processes: a large sample study. *The Annals of Statistics*, 10(4), 1100-1120.

ASX (2014). ASX Listing Rules. ASX Limited.
<http://www.asx.com.au/regulation/rules/asx-listing-rules.htm>. Accessed January 2016.

ASX (2015a). Historical Market Statistics. ASX Limited.
<http://www.asx.com.au/about/historical-market-statistics.htm> . Accessed January 2016.

ASX (2015b). The Official List (Listed Companies).
<http://www.asx.com.au/asx/research/listedCompanies.do> . Accessed January 2016.

ASX Corporate Governance Council (2014). Corporate Governance Principles and Recommendations. Sydney: Australian Securities Exchange.

Atinc, G., Simmering, M. J., & Kroll, M. J. (2011). Control variable use and reporting in macro and micro management research. *Organizational Research Methods*, 15(1), 57-74, DOI: 10.1177/1094428110397773.

Balios, D., Eriotis, N., Missiakoulis, S., & Vasiliou, D. (2015). Delisted versus voluntary delisted versus remain listed: an ordered analysis. *Applied Economics Letters*, 22(1), 66-70.

Baysinger, B., & Hoskisson, R. E. (1990). The composition of boards of directors and strategic control: effects on corporate strategy. *Academy of Management Review*, 15(1), 72-87.

Bebchuck, L. A., & Roe, M. J. (1999). A theory of path dependence in corporate ownership and governance. *Stanford Law Review*, 52, 127.

Bharath, S. T., & Dittmar, A. K. (2010). Why do firms use private equity to opt out of public markets? *Review of Financial Studies*, 23(5), 1771-1818.

Bird, H. (1995). Rise and fall of the independent director. *Australian Journal of Corporate Law*, 5, 235-258.

Bortolon, P. M., & da Silva Junior, A. (2015). Determining factors for delisting of companies listed on BM&FBOVESPA. *Revista Contabilidade & Finanças - USP*, 26(68), 140-153.

Cai, J. I. E., Garner, J. L., & Walkling, R. A. (2009). Electing directors. *The Journal of Finance*, 64(5), 2389-2421.

Campbell, L., Knowles, R., & Martin, K. (2014). Disappearing Act: Insight for the Management Accountant on Recently Delisted U.S. Companies. *Management Accounting Quarterly*, 15(2), 21-30.

Cohn, J. B., Mills, L. F., & Towery, E. M. (2014). The evolution of capital structure and operating performance after leveraged buyouts: evidence from U.S. corporate tax returns. *Journal of Financial Economics*, 111(2), 469-494.

Conheady, B., McIlkenny, P., Opong, K. K., & Pignatelli, I. (2015). Board effectiveness and firm performance of Canadian listed firms. *The British Accounting Review*, 47(3), 290-303.

Corporations Act 2001 (Cth). <https://www.comlaw.gov.au/Details/C2015C00003>. Accessed January 2015.

Cox, D. R. (1972). Regression models and life-tables. *Journal of the Royal Statistical Society. Series B (Methodological)*, 34(2), 187-220.

Croci, E., & Giudice, A. D. (2014). Delistings, controlling shareholders and firm performance in Europe. *European Financial Management*, 20(2), 374-405.

Cumming, D., Siegel, D. S., & Wright, M. (2007). Private equity, leveraged buyouts and governance. *Journal of Corporate Finance*, 13(4), 439-460.

Dalton, D. R., Daily, C. M., Johnson, J. L., & Ellstrand, A. E. (1999). Number of directors and financial performance: a meta-analysis. *Academy of Management Journal*, 42(6), 674-686.

de Andres, P., & Vallelado, E. (2008). Corporate governance in banking: the role of the board of directors. *Journal of Banking & Finance*, 32(12), 2570-2580.

Engle, N. L. (2011). Adaptive capacity and its assessment. *Global Environmental Change*, 21(2), 647-656.

Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The Journal of Law & Economics*, 26(2), 301-325.

Farrar, J. H. (1999). A brief thematic history of corporate governance. *Bond Law Review*, 11(2), 259-276.

Ferreira, D., Manso, G., & Silva, A. C. (2012). Incentives to innovate and the decision to go public or private. *Review of Financial Studies*, 27(1), 256-300.

Folke, C. (2006). Resilience: the emergence of a perspective for social–ecological systems analyses. *Global Environmental Change*, 16(3), 253-267.

Gertner, R., & Kaplan, S. N. (1996). The value-maximising board. Working Paper, University of Chicago and NBER.

Goodstein, J., & Boeker, W. (1991). Turbulence at the top: a new perspective on governance structure changes and strategic change. *Academy of Management Journal*, 34(2), 306-330.

Haimes, Y. Y. (2009). On the definition of resilience in systems. *Risk Analysis*, 29(4), 498-501.

Harrell Jr., F. E. (2001). *Regression modeling strategies: With applications to linear models, logistic regression, and survival analysis*. New York: Springer.

Henebry, K. L. (1996). Do cash flow variables improve the predictive accuracy of a Cox Proportional Hazards model for bank failure? *Quarterly Review of Economics & Finance*, 36(3), 395.

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4(1), 1-23.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.

Johnson, S. G., Schnatterly, K., & Hill, A. D. (2013). Board composition beyond independence: social capital, human capital, and demographics. *Journal of Management*, 39(1), 232-262.

Kroszner, R. S., & Rajan, R. G. (1997). Organization structure and credibility: evidence from commercial bank securities activities before the Glass-Steagall Act. *Journal of Monetary Economics*, 39(3), 475-516.

Lawrence, J. J., & Stapledon, G. P. (1999). Is board composition important? A study of listed Australian companies. Social Science Research Network. <http://ssrn.com/abstract=193528>. Accessed January 2016.

Lim, E. N. K., & McCann, B. T. (2013). The influence of relative values of outside director stock options on firm strategic risk from a multiagent perspective. *Strategic Management Journal*, 34(13), 1568-1590.

Mehran, H., & Peristiani, S. (2009). Financial visibility and the decision to go private. *Staff Reports*: Federal Reserve Bank of New York.

Mitchell, W. (1991). Dual clocks: entry order influences on incumbent and newcomer market share and survival when specialized assets retain their value. *Strategic Management Journal*, 12(2), 85-100.

Mitchell, W., & Singh, K. (1996). Survival of businesses using collaborative relationships to commercialize complex goods. *Strategic Management Journal*, 17(3), 169-195.

Morningstar Inc. (2015). DatAnalysis Premium. <http://datanalysis.morningstar.com.au>. Accessed October 2015.

Pagano, M., Panetta, F., & Zingales, L. (1998). Why do companies go public? An empirical analysis. *The Journal of Finance*, 53(1), 27-64.

Prigogine, I., & Allen, P. M. (1982). The challenge of complexity. In W. C. Schieve, & P. M. Allen (Eds.), *Self-Organization and Dissipative Structures: Applications in the Physical and Social Sciences*. Austin, Texas: University of Texas Press, 3-39.

Puterman, M. (2005). *Markov decision processes: Discrete stochastic dynamic programming (2nd ed.)*. New York: John Wiley and Sons.

Reeves, M., Levin, S., & Ueda, D. (2016). The biology of corporate survival. *Harvard Business Review*, 94(1), 46-55.

Reid, J. (2012). The Neoliberal subject: resilience and the art of living dangerously. *Revista Pleyade*, 10(July-December), 143-165.

Roberts, J., McNulty, T., & Stiles, P. (2005). Beyond agency conceptions of the work of the non-executive director: creating accountability in the boardroom. *British Journal of Management*, 16, S5-S26.

Salancik, G. R., & Pfeffer, J. (1980). Effects of ownership and performance on executive tenure in U.S. corporations. *Academy of Management Journal*, 23(4), 653-664.

Schnatterly, K., & Johnson, S. G. (2014). Independent boards and the institutional investors that prefer them: drivers of institutional investor heterogeneity in governance preferences. *Strategic Management Journal*, 35(10), 1552-1563.

Schulman, P. R. (1993). The negotiated order of organizational reliability. *Administration & Society*, 25(3), 353-372.

Settanni, E., Newnes, L. B., Thenent, N. E., Bumblauskas, D., Parry, G., & Goh, Y. M. (2015). A case study in estimating avionics availability from field reliability data. *Quality and Reliability Engineering International*.

Settanni, E., Newnes, L. B., Thenent, N. E., Bumblauskas, D., Parry, G., & Goh, Y. M. (2016). Applying forgotten lessons in field reliability data analysis to performance-based support contracts. *Engineering Management Journal*, (In Press).

Shleifer, A., & Vishny, R. W. (1989). Management entrenchment. *Journal of Financial Economics*, 25(1), 123-139.

Shumway, T. (2001). Forecasting bankruptcy more accurately: a simple hazard model. *The Journal of Business*, 74(1), 101-124.

Singapore Telecommunications Limited (2015). General Announcement: Singtel seeks delisting from ASX. ASX Limited.

<http://www.asx.com.au/asxpdf/20150421/pdf/42y06805t028gp.pdf>. Accessed December 2015.

Stapledon, G. P., & Lawrence, J. J. (1997). Board composition, structure and independence in Australia's largest listed companies. *Melbourne University Law Review*, 21(1), 150.

Therneau, T. M., & Lumley, T. (2015). survival: Survival Analysis package for R. Version 2.38-3. <https://cran.r-project.org/web/packages/survival/index.html>. Accessed November 2105.

Thomas, L., & Reyes, E. M. (2014). Tutorial: survival estimation for Cox regression models with time-varying coefficients using SAS and R. *Journal of Statistical Software*, 61(Code Snippet 1), 23.

Tran, V. T., Thom Pham, H., Yang, B.-S., & Tien Nguyen, T. (2012). Machine performance degradation assessment and remaining useful life prediction using proportional hazard model and support vector machine. *Mechanical Systems and Signal Processing*, 32(0), 320-330.

Vogus, T. J., & Sutcliffe, K. M. (2007). Organizational resilience: towards a theory and research agenda. *IEEE International Conference on Systems, Man and Cybernetics, 2007. ISIC*. 3418-3422.

Watts, R. L., & Zimmerman, J. L. (1978). Towards a positive theory of the determination of accounting standards. *Accounting Review*, 53(1), 112.

Westphal, J. D. (1998). Board games: how CEOs adapt to increases in structural board independence from management. *Administrative Science Quarterly*, 43(3), 511-537.

Williams, B. R., Bingham, S., & Shimeld, S. (2015). Corporate governance, the GFC and independent directors. *Managerial Auditing Journal*, 30(4/5), 324-346.

Zajac, E. J., & Westphal, J. D. (1996). Director reputation, CEO-board power, and the dynamics of board interlocks. *Administrative Science Quarterly*, 41(3), 507-529.

Zattoni, A., & Cuomo, F. (2010). How independent, competent and incentivized should non-executive directors be? An empirical investigation of good governance codes. *British Journal of Management*, 21(1), 63-79.