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# Predictors of corporate survival in the U.S. and Australia: An exploratory case study

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## Abstract

**Purpose** - Our paper investigates the relationship of financial ratios and non-financial factors of successful and failed corporations in the United States (U.S.). Specifically, we provide evidence on whether financial ratios and non-financial factors can be jointly included as indicators to improve the predictive capacity of organisational success or failure in different countries and sectors.

**Design/methodology/approach** - The paper utilises a mixed method exploratory case study focusing on listed corporations in the U.S. and Australian manufacturing, agriculture, finance and property sectors.

**Findings** - The financial ratio findings demonstrate that (with the exception of the failed Australian manufacturing sector) the Integrated Multi-Measure (IMM) ratio approach consistently provides a higher classification rate for the failed and successful groups than those provided by an individual measure. In all cases the IMM method scored higher for U.S. companies (with the exception of the failed Australian property sector). The findings also show that irrespective of the country location or sector, non-financial factors such as board composition and managements' involvement in organisational strategy impact on a corporation's success or failure.

**Practical implications** - Our findings reveal that non-financial factors occur prior to financial ratios when attempting to predict organisational success or failure and the IMM approach enables a more thorough examination of the predictive ability of financial ratios for U.S. and Australian organisations. This intuitively indicates that when combined with financial ratios, non-financial factors may be a useful predictor of corporate success or failure across countries and sectors.

**Originality/value** - Sound internal processes and the identification of both financial ratios and non-financial factors can be utilised to improve the reliability of financial failure models, enable corrective and preventative steps to be implemented by management and potentially reduce the costs of failure for U.S. and Australian organisations.

**Key words** Corporation, Failure, Financial, Non-financial, Strategy, Success
**Paper type** Research paper

# 1. Introduction

The cost of failure, both direct and indirect, is significant. There have been several recession-driven cycles of corporate failure, fraud or 'near death' experiences in recent times; as illustrated by Lehman Brothers, AIG, Chrysler and Borders in the United States (U.S.) and Allco Finance Group, Great Southern, and MFS in Australia. The Australian Bureau of Statistics (ABS) (ABS, 2012) reported that between 2007 and 2009, 26.4% of Australian businesses failed, while in the U.S. more than 140 banks failed in 2009 (Matthews and Driver, 2015). Consequently, these turbulent times coerce management into making short-term strategic actions/responses that may not be in the best interests of the company or its stakeholders. Such decision making is not conducive to the long-term growth of an organisation and may lead to credit rating downgrades, government handouts (as evidenced in the U.S. vehicle manufacturing sector), legal issues, receivership and/or failure (Matthews and Driver, 2015).

Knowledge of factors affecting organisational success or failure is important for corporations (Purves, Niblock and Sloan, 2015, 2016). For instance, studies (Altman, 1968; Beaver, McNichols and Rhie, 2005; Gepp and Kumar, 2015; Hossari, 2006; Lussier and Corman, 1995; Purves, Niblock and Sloan, 2015, 2016; Shumway, 2001) indicate that a combination of financial ratios and non-financial factors can be a useful predictor of organisational success or failure. In recent times, cross-country comparative studies conducted in this area are becoming more prevalent due to advances in technology and shrinking business distances (Ciampi, 2015; Lussier and Pfiefer, 2001).

However, no studies have explored the relationship of financial ratios and non-financial factors of listed corporations in the U.S. and Australia in similar business sectors, nor have they provided evidence on whether such factors contribute to organisational success or failure. This is notable as Australia and the U.S. share a deep history of trade and business given similar ideologies, values and globalisation. Historically, U.S. businesses have established operations in Australia in agriculture, manufacturing, finance and property, with Australia undertaking a reciprocal establishment of similar sector businesses in the U.S. With this inter-country activity, the originator country imports its management paradigms but this may not always be applicable in the re-located country. Thus, the country differences may become apparent with the respective country laws and stakeholder requirements. For instance, creditor, debtor and company laws are country specific. Given the close business association between the U.S. and Australia, country/legal differences and perceived importance of financial ratios and non-financial factors for organisational success, further cross-country comparative investigation is warranted.

Therefore, the identification and combination of financial ratios and non-financial factors for the development of an early warning predictor for cross-country organisational success or failure in the U.S. and Australia is the key motivation of this paper. Our paper aims to provide evidence of financial ratios and non-financial factors related to organisational success or failure/distress for prominent U.S. and Australian firms and improve the predictive capacity of financial failure models using a new Integrated Multi-Measure (IMM) approach. Employing the theoretical approaches of Purves, Niblock and Sloan (2015, 2016), we collate both financial ratios and non-financial factors relevant to business failure prediction and then examine their influence on organisational success in an exploratory multiple case study framework using U.S. and Australian companies from 2004 to 2008. Twenty-four companies (ten Australian Securities Exchange (ASX) listed companies (five successful and five failed) and fourteen New York Securities Exchange (NYSE) listed companies (seven successful and seven failed)) across the agriculture, finance, manufacturing and property sectors are chosen for the study. The research question posed is:

*'Are financial ratios and non-financial factors jointly reliable predictors of success or failure in U.S. and Australian firms?'*

In addressing the research question, we further establish two propositions:

$P_1$: The incorporation of non-financial factors is useful in predicting U.S. and Australian corporate success or failure.

**P**<sub>2</sub>: An advantage is gained from the incorporation of an IMM approach in predicting U.S. and Australian corporate success or failure.

To the best of our knowledge, this is the first time a cross-comparative study of its kind has been conducted; thus, presenting as an opportunity to make a timely contribution to the expanding international corporate success/failure literature. Our paper considers methods for establishing whether financial ratios and non-financial factors jointly improve the predictive capacity of organisational success or failure. The main contribution of our paper is the application of a mixed method (i.e., qualitative and IMM ratio approaches), exploratory case study of U.S. and Australian organisations. Our findings reveal that non-financial factors occur prior to financial ratios when attempting to predict organisational success or failure and the IMM approach allows a more thorough examination of the predictive ability of financial ratios in the U.S. and Australia. Notably, financial ratios are applied to time lagged historical financial results that indicate organisational health symptoms. However, we show that financial ratios do not always indicate causative organisational health factors. On the other hand, non-financial factors impact organisational operations, which are then scored through financial ratios. This intuitively indicates that when combined with financial ratios, non-financial factors may be a useful predictor of corporate success or failure in U.S. and Australian organisations.

Sound internal processes and the identification of both financial ratios and non-financial factors can be utilised to improve the reliability of financial failure models, enable corrective and preventative steps to be implemented by management and potentially reduce the costs of failure. The study also adds to an understanding of financial ratios and non-financial factors by supporting findings in the extant literature (Purves, Niblock and Sloan, 2015, 2016). We also anticipate that comparative research between countries in similar business sectors may assist management in achieving business success. We expect our results to have implications for corporate investment and government taxation policies and will be of interest to managers, the investing public, regulatory agencies and academics. The paper proceeds as follows: Section 2 introduces key literature; Section 3 discusses the exploratory case study methodology employed; Section 4 presents the exploratory case study results; and Section 5 concludes and identifies opportunities for further research.

## 2. Literature Review

### 2.1 Financial ratios

To identify the causes of failure, several prediction studies have utilised variations of multiple discriminant analysis and other quantitative modeling in examining company financial statements (i.e., balance sheets, income statements and cash flow statements) (Beaver, McNichols and Rhie, 2005; Casey and Bartczak, 1984; Ciampi, 2015; Charitou, Neophytou and Charalambous, 2004; Murty and Misra, 2004). Research has been undertaken using financial performance ratios to examine organisational success. For instance, Katchova and Enlow (2013) explore the historical financial performance of publicly-traded U.S. agribusinesses and reveal that agribusinesses outperform the median financial performance of the market. Similarly, Russell, Langemeier and Briggeman (2013) investigate the impact of liquidity and solvency and show that such measures have a significant impact on improving cost efficiency.

Financial performance predictability has been the primary ratio driver, along with other factors such as corporate governance characteristics (Ciampi, 2015). Further, exploratory studies in business failure prediction with non-parametric techniques, such as decision trees, have been found to be superior to discriminant analysis and effective in handling qualitative data. However, these studies employed a large number of ratios rather than specific sector ratios (Gepp, Kumar and Bhattacharya, 2010). Also, studies have confirmed that statistical techniques including decision trees (e.g., new versions of TreeNet and Random Forests) are still not used in isolation but intelligent techniques such as neural networks are (Gepp and Kumar, 2015; Gepp, Kumar and Bhattacharya, 2010; Kumar and Ravi, 2007). Although it appears mixed predictor systems remain popular among researchers (Gepp and Kumar, 2015).

Studies (Beaver, McNichols and Rhie, 2005; Chakraborty and Sharma, 2007; Charitou, Neophytou and Charalambous, 2004; Kumar and Ravi, 2007) based upon Altman's (2000) financial ratio and artificial neural network analyses have also been undertaken in corporate failure. While financial factors have had some success as historical indicators of organisational failure (Altman, 2000; Altman and Hotchkiss, 2006), the ability of these methods to solely predict the financial solvency of an organisation within two years of the company's failure does not appear to be reliable (Charitou, Neophytou and Charalambous, 2004; Lussier, 1995) and issues of restrictive statistical requirements imposed by quantitative models have arisen (Ohlson, 1980; Tseng and Lin, 2005). Further, studies on organisational failure (Cressy, 2006; Crutzen and Van Caillie, 2007; D'Aveni, 1999) tend to highlight the symptoms of failure rather than the causes (Altman, 2000; Dambolena and Khoury, 1980; Ooghe and Prijcker, 2008; Sun, Li, Huang and He, 2014).

The accuracy of accounting information used by organisations due to varying international accounting standards is also of concern. For example, Australia currently uses International Financial Reporting Standards ("IFRS") and the U.S. has traditionally adhered to Generally Accepted Accounting Principles ("GAAP") (Chuvakhin and Gertmenian, 2003).[1] Differences in the way accounting information is prepared, presented and interpreted can be misleading and ultimately compromise any financial analysis undertaken. Another significant concern regarding the use of financial ratios as a single failure prediction tool is that comparisons between organisations need to be sector specific, as different sectors have varying acceptable ratios (Altman, 2000; Madrid-Guijarro, Garcia-Perez-de-Lema and van Auken, 2011; Niemann, Schmidt and Neukirchen, 2008). Further, financial ratio selection has predominantly been undertaken either by statistical or expert selection that relies heavily upon the users' knowledge and ability, which is indeed problematic if used universally (Sun, Li, Huang and He, 2014). While statistical selections have their own disadvantages due to strict model assumptions, they are not often achieved in practice; thereby, yielding unacceptable results (Sun, Li, Huang and He, 2014).

*2.2 Non-financial factors*

To overcome the reported shortfalls of financial factors, researchers (Ciampi, 2015; Lussier, 1995; Lussier and Corman, 1995: Lussier and Pfeifer, 2001; Madrid-Guijarro, Garcia-Perez-de-Lema and van Auken, 2011; Smith, 1993; Steyn-Bruwer and Hamman, 2006; Sun, Li, Huang and He, 2014) have considered both financial ratios and non-financial factors in co-determining the causes of organisational success or failure. An increased emphasis is being placed on non-financial factors to determine the likelihood of firm success (Madrid-Guijarro, Garcia-Perez-de-Lema and van Auken, 2011; Smith, 1993; Steyn-Bruwer and Hamman, 2006; Sun, Li, Huang and He, 2014). Corporate governance studies have been undertaken specifically relating to corporate takeovers, investment strategies and shareholder rights, with factors such as experience and education being predominantly used because of their direct comparability to the countries and companies examined (Gompers, Ishii and Metrick, 2003). Further, studies (Altman, 1968; Beaver, McNichols and Rhie, 2005; Ciampi, 2015; Hossari, 2006; Shumway, 2001) have found that a combination of non-financial ratios and financial factors may lead to an improved predictor of corporate success or failure.

Corporate operations, including changes in senior management (Pfeffer, 1981), board positions (Ciampi 2015; Daily and Dalton, 1995; Daily, Johnson and Dalton, 1999; Moulton and Thomas, 1993), management skill and strategy (D'Aveni, 1999; Hambrick and D'Aveni, 1992; Hambrick and Mason, 1984; Lussier, 1995; Lussier and Corman, 1995: Lussier and Pfeifer, 2001; Mankins and Steele, 2005) together with environmental factors (Moulton and Thomas, 1993) have been considered when predicting organisational success. For instance, Baker and Leidecker (2001) propose that strategic planning is positively related to financial performance. On the other hand, Shukla (2004) suggests that the management of organisations approaching failure may not have the appropriate skill set to deal with the problems besetting the firm, and that the firm may survive if the appropriate managerial skill set is introduced (D'Aveni, 1999; Handy, 2002; Heifetz, Grashow and Linsky, 2009).

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[1] It is recognised that the U.S. moved towards IFRS in 2015.

Further, if a company is already in a failure spiral then non-recognition of its position could have already occurred, whether being impacted individually or through the combination of poor internal systems and management (Sheppard and Chowdhury, 2005).

Continuous internal monitoring may identify the signs of financial distress by enabling management to develop and deploy effective counter-measures when events, even those outside anyone's control, throw strategic plans off course (Ooghe and Waeyaert, 2004; Salloum, Azoury and Azzi, 2013). The monitoring process may enable a company to avoid failure if management has the capacity to change direction upon recognition of poor strategy. External monitoring has also become more vigilant since the Global Financial Crisis (GFC). For example, finance companies, both in the U.S. and Australia, now have their capital adequacy ratios constantly monitored and scrutinised by market regulators. However, evidence suggests that internal problems with management and the board are more prominent than environmental or external problems (Ciampi, 2015; Filatotchev and Toms, 2006; Hwa-Hsien and Yu-Hsuan, 2010; Lohrke, Bedeian and Palmer, 2004; Purves, 2013).

Subsequent studies on managerial discretion (emanating from internal and external environmental conditions), governance and executive job demands (task and performance challenges and executive aspirations) also show an impact on organisational performance (Ciampi, 2015; Finkelstein, 1992; Hambrick and Finkelstein, 1987; Hambrick, Finkelstein and Mooney, 2005; Lussier and Corman, 1995; Purves, 2013). For example, Finkelstein (1992) and Lussier and Corman (1995) reveal that top management team members' accountable power yielded stronger predictions of strategic behaviour, as illustrated by many acquisitions undertaken by the team. Hu and Miller (2005) demonstrated that leadership generational differences across different business sectors result in a mis-match between leadership generation and industry sector, as illustrated by the manufacturing sector being more suited to 'Baby Boomer' generation leaders. In the finance sector, they show that there is a need to focus on relationships such as customer service and communication, and that the sector is more suited to generation 'X' leaders.

Bridges and Mitchell (2000) and Shukla (2004) claim that corporate leaders require individual assistance where they can learn to bring their followers through various transitions they face and with their own goals, limitations and concerns create a development plan that prepares them for the future. To ensure a successful organisation, the senior management team and the board of directors must also have a cohesive and unified function that suites the organisation and its life-cycle (Katzenbach and Smith, 2005; Salloum, Azoury and Azzi, 2013). Accordingly, the board's skill set needs to match the life-cycle of the organisation but simultaneously complement the Chief Executive Officer's (CEO's) skill set (Shukla, 2004). For instance, Hambrick and Mason (1984) review senior executives' prior situations of career experiences, formal education and socioeconomic backgrounds and find that these factors need to be matched with the board and the CEO for a successful organisation. International experience of senior management or the use of professional advisors has also been positively associated with organisational performance measured against those organisations without international managerial experience (Carpenter and Fredrickson, 2001; Lussier and Corman, 1995). Several studies have also examined business failure characteristics that illustrate significant prediction improvement for those organisations adhering to sound corporate governance practices (Ciampi, 2015; Salloum, Azoury and Azzi, 2013). Further, Athanassiou and Nigh (1999), Carpenter (2002) and Herrmann and Datta (2002) found that performance was greater in organisations that had high levels of internationalization.

Research on non-financial factors and firm success has also received significant industry sector attention where it was shown that board characteristics and experience impacted on successful strategies (Carpenter, Pollock and Leary, 2003; Ciampi, 2015). In a multi-country analysis, Howard, Litzenberg, Schneider and Fairnie (1990) investigate the various skills and attributes managers possess for Agribusiness success in Australia, Canada and the U.S. Notably, they show that personal qualities and communication skills ranked the highest, followed by business and economic knowledge, technical, computer and quantitative skills, and experience. Cross-sector analysis has also shown that similar skills can be used in different industry sectors. For instance, Harling and Quail (1990) show that agriculture businesses are becoming similar to other types of business and general

management principles and decision-making that has been effective for non-agriculture management may also prove useful to agricultural sector management. Rosenberg and Cowen (1990) also assert that greater emphasis on organisational and personnel management and strategic planning may improve financial performance in agricultural organisations. More recently, Purves, Niblock and Sloan (2015) examine non-financial ratios and financial factors in Australian agricultural firms. Using an exploratory case study and IMM approach, they show that non-financial factors occur prior to any financial predictors, intuitively indicating a relationship between non-financial ratios and financial factors that may improve the predictive capacity of organisational success or failure.

## 3. Data and Methods

We undertake an exploratory mixed method case study in specific business sectors that enable inter- and intra-comparisons between the U.S. and Australia. The mixed method approach assists in compensating for the individual weaknesses of quantitative and qualitative methods, allowing companies to be examined from different perspectives (Birnberg, Shields and Young, 1990; Brannen, 2005; Gable, 1994; Jacobs, 2005). Mixed method analysis also provides broader and deeper analysis beyond the limitations of a single approach (Easterby-Smith, Thorpe and Lowe, 1991; Kumar and Ravi, 2007; Pager and Quillian, 2005; Spratt, Walker and Robinson, 2004). As the mixed method case study approach is exploratory, sampling logic is not used and the typical criteria regarding sampling size deemed irrelevant (Eisenhardt, 1989; Yin, 2009). To enable theoretical replications across subgroups to be complimented by literal replications within each sub-group, the study is intentionally two-tailed, (i.e., successful and failed) (Yin, 2009). The cases compared are all designed as embedded case studies, with multiple units of analysis (Yin, 2009). This research design enables the use of a feedback loop via study review, thereby strengthening the positions of data collection and analysis in attempting to address the research propositions stated previously.

By employing a mixed method approach, this study attempts to search for patterns within specific sector operations of U.S. and Australian firms, enabling the research to explore both corporate success and failure from both a cross-country and cross-sector perspective. The study recognised organisational failure when a company was suspended from its respective stock exchange for an insolvency event. Success was established through the organisations continued listing on the respective stock exchange, together with an average profitability over the five years studied. Although several longitudinal methods can be used to observe the process of successful companies, we found these inappropriate for studying the process of failed organisations, since failure is studied after it occurs. Failure also brings with it limitations on access to information (Chowdhury, 2002; Hambrick and D'Aveni, 1988). For instance, existing management and directors move on to other ventures after failure and are difficult to source, making it a challenge to capture the dynamic process of failure.

Also, it is widely accepted by researchers that financial ratios vary across industries and their sectors (Altman and Hotchkiss, 2006; Beaver, 1968; Hossari, 2006; Sun, Li, Huang and He, 2014). To avoid incorrect interpretation, twenty-four listed companies (twelve successful and twelve failed) over four sectors (agriculture (6), finance (4), manufacturing (8) and property (6)) are chosen for the analysis at hand. Fourteen of the companies are U.S. (NYSE) based and ten are Australian (ASX). These four sectors are recognised as key reporting sectors on both the NYSE and ASX stock exchanges and have been chosen in this study due to their respective economic materiality. The twelve failed companies are chosen because of their failure recognition (i.e., suspension from trading on their respective exchanges), coming from the same sector, similar time-frames of failure and their relative size position within the country industry sector. The twelve successful companies are matched to the twelve failed companies over different sectors, as it is imperative to match companies in similar sectors, thereby enabling the paired companies to be more comparable in terms of their business activities.

An optimal period of five years has been recognised for any investigation into company failure (Altman, 1968; Hossari, 2006). Consequently, this study is undertaken over a five-year period (January 2004 – December 2008), and was chosen for its uniqueness as an important lead up period into the GFC. The time periods used in the study have been broken into annual reporting time periods

reviewing one set of financial statements per year. For example, $t$ is the twelve-month period immediately prior to failure ($t-4$, $t-3$, $t-2$, $t-1$). Data collection for the case studies is undertaken via annual reports, public communications, and half yearly financial statements, which include items of general information such as the organisation vision, objectives and structure. Available non-financial factors (such as age, education, experience, company history, board/management composition and involvement, strategic plans, business plans, training, external communication, and regulatory compliance) are then grouped together for simplicity and comparability (Gompers, Ishii and Metrick, 2003).

The quantitative analysis includes the use of the emerging market score (EMS), providing an integrated approach that combines the latest modified version of the Z-score[2], comparative ratio analysis and ratio trend analysis. For instance, EMS includes a constant of 3.25 to standardise the zero scores for default, enabling lower scored results to be evaluated within the Z-score parameters. This use of standardised ratios reduces any issues pertaining to ratio selection, either through statistical approaches or the expert system method, and has been consistently employed in the international literature (Altman, Iwanicz-Drozdowska, Laitinen and Suvas, 2017; Sun, Li, Huang and He, 2014).Triangulation is also introduced in this study by incorporating a combination of sophisticated ratio-based prediction models for corporate failure with traditional analytical tools for financial ratio analysis. In addition, qualitative analysis is also used over the same sample firms and time periods to develop a richer and comparative analysis of each individual case.

Essentially, EMS is employed to determine if financial ratios can be used as a predictor of organisational success or failure (Altman and Hotchkiss, 2006; Sun, Li, Huang and He, 2014). In the EMS model, if a company scores below 5.85 it is deemed financially distressed, while anything above 5.85 is considered financially healthy. The comparative ratio analysis assigns correct classification when more than 50% of the sixteen financial ratios[3] (see Appendix 1) for each pair indicate that the failed firm in a pair is showing signs of relative weakness to its successful company pair. The ratio trend analysis correct classification occurs when the trend for more than 50% of the sixteen financial ratios indicates that most financial ratios are less favourable for the failed firms than the successful firms.

The predictive ability of financial information is then examined by combining the comparative ratio and ratio trend analyses with the EMS model. The use of financial ratios in this format compliments and supports an integrated approach. This integrated approach has been described as the Integrated Multi-Measure (IMM) approach (Tuvadaratragool, 2012). Consequently, the IMM approach tests the power of financial ratios to signal success or failure. If two of the three methods (i.e., EMS, comparative ratio analysis and ratio trend analysis) classify a firm as failed or successful prior to the actual event of failure or continued non-failure, then this is deemed to validate the predictive ability of financial ratios. The ratio-based measures then enable the non-financial factors to be benchmarked against and augment the financial predictors.

## 4. Results

Tables 1-4 (non-financial factors) and Tables 5-8 (financial ratios) provide the main findings for the successful and failed U.S. and Australian organisations studied. Note: due to the availability of data from 2004 to 2008 and relatively small sample size employed, generalisations made between the countries and sectors are made only with specific reference to this experimental study. In summary, 57% of failed U.S. organisations exhibited a combination of four non-financial factors. The predominant non-financial factors in the U.S. include: (1) the board of directors had less than eight

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[2] Empirical evidence supports the use of EMS in sophisticated economies for predicting corporate success or failure, albeit with a warning that different sectors and industries may have varying levels of critical scores in sophisticated economies rather than those applicable to emerging markets (Altman, 2000; Altman and Hotchkiss, 2006).

[3] The sixteen selected ratios were selected based upon their use in previous studies (Purves, Niblock and Sloan, 2015, 2016) and are referred to as common ratios and placed under four financial classifications, namely (1) liquidity; (2) turnover/performance; (3) leverage/solvency; and (4) profitability (Brigham and Ehrhardt, 2008; Gibson and Frishkoff, 1986; Palat, 1989).

members; (2) less than 70% of the board members were non-executive directors; (3) the CEO had less than 20 years' industry experience; and (4) no actions were taken on unachieved strategic indicators. On the other hand, 60% of the Australian failed organisations exhibited a combination of six non-financial factors. The predominant non-financial factors in Australian include: (1) the CEO was aged less than 50 years and not appointed by the board of directors; (2) the CEO had less than 20 years' industry experience; (3) the CFO had less than 10 years' experience; (4) the board of directors had less than eight members; (5) less than 70% of the board were non-executive directors; and (6) no actions were taken on unachieved strategic indicators. A minimum combination of four non-financial factors rather than individual non-financial factors were evident in all failed companies, irrespective of country. Interestingly, of the failed U.S. companies only 14% did not have their CEO appointed by the board, while in Australia it was 80%. Australian failed companies also had 38.5% worse combined non-financial factors than the successful Australian companies, while U.S. failed companies had 35.25% worse combined non-financial factors than the successful U.S. companies. Successful companies in both countries did not exhibit poor combined non-financial factors that were observed in the failed companies. Note: we tested for differences in the financial ratios between failed and non-failed Australian and U.S. firms and found no statistical significance.

[Insert Tables 1-4]

[Insert Tables 5-8]

*4.1 Successful organisations*

The non-financial factors for successful U.S. and Australian organisations in all sectors, except for one successful U.S. manufacturing organisation, show the Chairman had industry experience, university industry specific qualifications and tenure with the company prior to appointment as Chairman. Australian organisations in the agriculture, finance and property sectors and U.S. organisations in all sectors reveal the CEO had industry experience, university industry specific qualifications, was operating with a Chief Financial Officer (CFO) and was appointed by the board. Also, all organisations had no original company founders involved with the company; produce monthly financial statements that were reported against and any indicated action taken; reveal strategic plans that were undertaken by management and reported to the board; and demonstate that frequent public communication of more than once a month was undertaken by the company and all public documents lodged in a timely manner.

The financial ratios for successful U.S. and Australian organisations show that the EMS model only correctly classified Australian sector firms at 28% and U.S. sector firms at 54%. These classifications represent the percentage of companies that scored above 5.85 and are recognised as financially healthy according to the EMS model. These results are relatively low when solely examining the ratios of successful organisations (particularly with regard to the Australian sector firms); hence, supporting the efficacy of the combined IMM approach. Ratio trend analysis correctly classified all Australian sector firms at 60% and all U.S. sector firms at 60%, while comparative ratio analysis correctly classified all Australian sector firms at 76% and all U.S. sector firms at 89%. The combined IMM method correctly classified the Australian non-failed firms at 57% and the U.S. non-failed firms at 67%. Further, the combined IMM method correctly classified non-failed firm sectors as follows:
1) Australian agriculture firms at 50% and the U.S agriculture firms at 53%;
2) Australian finance firms at 53% and the U.S. finance firms at 80%;
3) Australian manufacturing firms at 66% and the U.S. manufacturing firms at 71%; and
4) Australian property firms at 60% and the U.S. property firms at 63%.

*4.2 Failed organisations*

The non-financial factors for failed U.S. and Australian organisations in all sectors show the Chairman had significantly less tenure than the respective Chairman of the successful companies prior to appointment and had no university or industry specific qualifications. The CEO also had relatively

little industry experience or no industry specific qualifications, and was partnered with a CFO who had limited industry experience (except for the U.S. finance sector). Further, the failed organisations reveal a relatively small number of non-executive directors were on the board in comparison to the successful companies. There was also a relatively smaller board size in comparison to the successful companies in the U.S. sectors of manufacturing and property and the Australian agriculture sector. Also, the original company founders had some involvement with companies in the U.S. property sector and in the Australian agriculture and property sectors.

The financial ratios for failed U.S. and Australian organisations reveal that the EMS model correctly classified the Australian firms at 64% and the U.S. firms at 69%. These classifications represent the percentage of companies that scored below 5.85 and are recognised as financially distressed according to the EMS model. Ratio trend analysis correctly classified the Australian firms at 44% and the U.S. firms at 77%, while comparative ratio analysis correctly classified the Australian firms at 76% and the U.S. firms at 89%. The combined IMM method correctly classified the Australian failed firms at 65% and the U.S. failed firms at 79%. The combined IMM method correctly classified failed firm sectors as follows:

1) Australian agriculture firms at 53% and the U.S agriculture firms at 73%;
2) Australian finance firms at 80% and the U.S. finance firms at 100%;
3) Australian manufacturing firms at 46% and the U.S. manufacturing firms at 80%; and
4) Australian property firms at 80% and the U.S. property firms at 63%.

## 5. Conclusions

Our findings indicate that there is a relationship shared between financial ratios and non-financial factors in the U.S. and Australia across the sectors examined (agriculture, manufacturing, finance and property). When combined, financial ratios and non-financial factors appear to be useful in improving the predictive accuracy of corporate success or failure in U.S. and Australian organisations; thus, leading to acceptance of $P_1$ and $P_2$. The analysis of the case studies suggests clear differences between failed and successful U.S. and Australian companies both in the non-financial areas of management, board and strategy, and in the financial ratios analyzed; which is consistent with previous literature (Ciampi, 2015; Filatotchev and Toms, 2006; Hwa-Hsien and Yu-Hsuan, 2010; Lohrke, Bedeian and Palmer, 2004; Purves, Niblock and Sloan, 2015, 2016; Sun, Li, Huang and He, 2014).

Time sensitive relationships between financial and non-financial factors and corporate failure or success were also identified. This sensitivity supports the use of non-financial factors in advance of financial ratios. For instance, the results indicated that Australian failed companies total combined non-financial factors were 38.5% worse than successful Australian successful companies. Similarly, U.S. failed companies total combined non-financial factors were 35.25% worse than successful U.S. companies. Importantly, regardless of location or sector, our findings reveal that non-financial factors occur prior to financial ratios when attempting to predict organisational success or failure. We also show that irrespective of country, the most prominent non-financial factor in failed companies was that no action was implemented against unachieved indicators from the company's strategic plan. The next highest non-financial factor in failed companies was that the board consisted of less than 70% non-executive directors, which supports the work of Salloum, Azoury and Azzi (2013). In Australia, the highest failure combination of non-financial factors was the CEO being under the age of 50 years, along with a CFO that had less than 10 years' industry experience. In the U.S., the highest failure combination of non-financial factors in companies was that the board consisted of less than eight members and less than 70% were non-executive members, and that the CEO had less than 20 years' experience. Ultimately, the timing of a combined early warning predictor is imperative for a company's success and supports non-financial factors as leading indicators rather than causal factors (Ocasio, 1995; Sun, Li, Huang and He, 2014).

While we acknowledge that a small sample size and the generalisability of our results is a limitation of our study, the availability of data for the period under investigation made it difficult for us to obtain a larger sample of companies. Further, while we could have obtained a larger sample post-GFC, it is the lead up to the crisis that was deemed to be an important period in the modern

history of corporate failure. Future research propositions and questions could center upon more business sector specific components of the company's non-financial factors that were examined in this case study, together with management's expertise and financial ratio analysis (Ocasio, 1995; Shukla, 2004). The inclusion of non-financial factors, together with financial performance measurement would overcome the historical weakness of solely relying on financial ratios. Future research involving other multiple case studies should also be undertaken to confirm similar emerging themes and focus on board structure, CEO selection, management skill and operational style (Ciampi, 2015; Ocasio, 1995; Purves, Niblock and Sloan, 2016; Sun, Li, Huang and He, 2014).

Essentially, our research has established a platform for further examination and the development of more accurate failure predictors inclusive of larger sample sizes and non-financial factors across different countries (both developed and developing), sectors and firms; however, we leave this for further research, perhaps also considering the mixed method approach employed by Kumar and Ravi (2007). Finally, the company operations and management skill relationships, accounting standards and insolvency country differences were not analysed in detail. These areas also require further examination. It is critical for managers, directors, investors, policy makers and academics to examine and understand the failures of past corporations so that similar mistakes can be avoided. It is also imperative that the causes of failure are treated rather than the symptoms. The development of organisational criteria necessary for a company to be protected against failure needs to be developed and sector specific (such as educational and experience requirements) for different management levels. Moreover, the use of an improved predictor of success or failure may reduce the number of failed organisations. The cost of not doing so is far too high to ignore.

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**Appendix 1.**

Financial ratios

| Category | Ratio |
|---|---|
| Liquidity | Current Assets to Current Liabilities[2] |
| | Quick Ratio[2] |
| | Working Capital to Total Assets[1, 2] |
| Turnover/Performance | Sales to Total Assets[2] |
| | Total Equity to Sales[2] |
| | Sales to Inventory[2] |
| Leverage/Solvency | Total Liabilities / Total Assets[2] |
| | Total Liabilities / Total Equity[2] |
| | Earnings Before Interest and Tax / Interest[2] |
| | Total Equity /Total Liabilities[1,2] |
| Profitability | Earnings Before Interest and Tax / Sales[2] |
| | Net Interest / Sales[2] |
| | Earnings Before Interest and Tax / Total Assets[1,2] |
| | Return on Assets[2] |
| | Return on Equity[2] |
| | Retained Earnings / Total Assets[1,2] |

Notes: [1] Ratios used in EMS calculations. [2] Ratios used in ratio trend analysis, comparative ratio analysis and IMM.

**Table 1.**

Non-financial factors for U.S. and Australian organisations – Agriculture

| | Australia | | | | United States | |
|---|---|---|---|---|---|---|
| | **AAUNF1** | **AAUNF2** | **AAUF1** | **AAUF2** | **AUSNF1** | **AUSF1** |
| Chairman industry experience over 20 years | ✓ | ✓ | ✗ | ✗ | ✓ | ✗ |
| Chairman's age over 50 years | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CEO board appointed | ✓ | ✓ | ✗ | ✗ | ✓ | ✓ |
| Board members at least 70% non-executive | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ |
| Company founders not involved in management | ✓ | ✓ | ✗ | ✓ | ✓ | ✓ |
| Board numbers greater than 8 | ✓ | ✓ | ✗ | ✗ | ✓ | ✓ |
| CEO industry experience over 20 years | ✓ | ✓ | ✗ | ✗ | ✓ | ✗ |
| CEO's age over 50 years | ✓ | ✓ | ✗ | ✗ | ✓ | ✓ |
| CFO industry experience over 10 years | ✓ | ✓ | ✗ | ✗ | ✓ | ✗ |
| Strategic plan reported on | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Actions taken on strategic plan | ✓ | ✓ | ✗ | ✗ | ✓ | ✗ |
| Business plan reported on monthly | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Staff training available | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Company external communication | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Timely document lodgment to public authorities | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| No ASIC/SEC Investigation | ✓ | ✓ | ✗ | ✗ | ✓ | ✗ |
| Matrix Key          Yes Count ✓ | 16 | 16 | 6 | 8 | 16 | 10 |
| No Count ✗ | 0 | 0 | 10 | 8 | 0 | 6 |

Notes: A = Agriculture, AU = Australia, US = United States, F = Failed, and NF = Non-failed.

**Table 2.**
Non-financial factors for U.S. and Australian organisations – Finance

| | Australia | | United States | |
|---|:---:|:---:|:---:|:---:|
| | **FAUNF1** | **FAUF1** | **FUSNF1** | **FUSF1** |
| Chairman industry experience over 20 years | ✓ | ✓ | ✓ | ✗ |
| Chairman's age over 50 years | ✓ | ✓ | ✓ | ✓ |
| CEO board appointed | ✓ | ✓ | ✓ | ✓ |
| Board members at least 70% non-executive | ✓ | ✓ | ✓ | ✗ |
| Company founders not involved in management | ✓ | ✓ | ✓ | ✓ |
| Board numbers greater than 8 | ✓ | ✓ | ✗ | ✓ |
| CEO industry experience over 20 years | ✓ | ✓ | ✓ | ✗ |
| CEO's age over 50 years | ✓ | ✗ | ✓ | ✓ |
| CFO industry experience over 10 years | ✓ | ✗ | ✓ | ✓ |
| Strategic plan reported on | ✓ | ✓ | ✓ | ✗ |
| Actions taken on strategic plan | ✓ | ✗ | ✓ | ✓ |
| Business plan reported on monthly | ✓ | ✓ | ✓ | ✓ |
| Staff training available | ✓ | ✓ | ✓ | ✓ |
| Company external communication | ✓ | ✓ | ✓ | ✓ |
| Timely document lodgment to public authorities | ✓ | ✓ | ✓ | ✗ |
| No ASIC/SEC Investigation | ✗ | ✗ | ✓ | ✗ |
| Matrix Key        Yes Count ✓ | 15 | 12 | 15 | 10 |
| No Count ✗ | 1 | 4 | 1 | 6 |

Notes: F = Finance, AU = Australia, US = United States, F = Failed, and NF = Non-failed.

**Table 3.**
Non-financial factors for U.S. and Australian organisations – Manufacturing

| | Australia | | United States | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **MAUNF1** | **MAUF1** | **MUSNF1** | **MUSNF2** | **MUSNF3** | **MUSF1** | **MUSF2** | **MUSF3** |
| Chairman industry experience over 20 years | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ |
| Chairman's age over 50 years | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CEO board appointed | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Board members at least 70% non-executive | ✓ | ✗ | ✗ | ✗ | ✓ | ✗ | ✓ | ✗ |
| Company founders not involved in management | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Board numbers greater than 8 | ✓ | ✗ | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ |
| CEO industry experience over 20 years | ✗ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ |
| CEO's age over 50 years | ✗ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ |
| CFO industry experience over 10 years | ✗ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ |
| Strategic plan reported on | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Actions taken on strategic plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ |
| Business plan reported on monthly | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Staff training available | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Company external communication | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Timely document lodgment to public authorities | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| No ASIC/SEC Investigation | ✗ | ✗ | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ |
| Matrix Key      Yes Count ✓ | 12 | 5 | 15 | 14 | 16 | 12 | 13 | 9 |
| No Count ✗ | 4 | 11 | 1 | 2 | 0 | 4 | 3 | 7 |

Notes: M = Manufacturing, AU = Australia, US = United States, F = Failed, and NF = Non-failed.

**Table 4.**

Non-financial factors for U.S. and Australian organisations – Property

| | Australia | | United States | | | |
|---|---|---|---|---|---|---|
| | **PAUNF1** | **PAUF1** | **PUSNF1** | **PUSNF2** | **PUSF1** | **PUSF2** |
| Chairman industry experience over 20 years | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ |
| Chairman's age over 50 years | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CEO board appointed | ✓ | ✗ | ✓ | ✓ | ✓ | ✗ |
| Board members at least 70% non-executive | ✓ | ✗ | ✓ | ✓ | ✓ | ✗ |
| Company founders not involved in management | ✓ | ✗ | ✓ | ✓ | ✓ | ✗ |
| Board numbers greater than 8 | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ |
| CEO industry experience over 20 years | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ |
| CEO's age over 50 years | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ |
| CFO industry experience over 10 years | ✓ | ✗ | ✓ | ✗ | ✗ | ✓ |
| Strategic plan reported on | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Actions taken on strategic plan | ✓ | ✗ | ✓ | ✓ | ✗ | ✗ |
| Business plan reported on monthly | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Staff training available | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ |
| Company external communication | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Timely document lodgment to public authorities | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| No ASIC/SEC Investigation | ✗ | ✓ | ✓ | ✓ | ✗ | ✗ |
| Matrix Key      Yes Count ✓ | 15 | 10 | 16 | 15 | 10 | 10 |
| No Count ✗ | 1 | 6 | 0 | 1 | 6 | 6 |

Notes: P = Property, AU = Australia, US = United States, F = Failed, and NF = Non-failed.

**Table 5.**

Classifications of failure and success for U.S. and Australian organisations using the IMM approach – Agriculture

| | Measure | t-4 | t-3 | t-2 | t-1 | t |
|---|---|---|---|---|---|---|
| AAUF1 | Comparative | Incorrect | Incorrect | Correct | Correct | Correct |
| | EMS | Incorrect | Incorrect | Correct | Correct | Correct |
| | Data Trend | Incorrect | Correct | Incorrect | Incorrect | |
| AAUF2 | Comparative | Correct | Incorrect | Incorrect | Correct | Correct |
| | EMS | Correct | Incorrect | Correct | Correct | Correct |
| | Data Trend | Incorrect | Incorrect | Correct | Incorrect | |
| AAUNF1 | Comparative | Incorrect | Incorrect | Correct | Correct | Correct |
| | EMS | Correct | Correct | Incorrect | Incorrect | Incorrect |
| | Data Trend | Correct | Incorrect | Correct | Correct | |
| AAUNF2 | Comparative | Correct | Incorrect | Incorrect | Correct | Correct |
| | EMS | Incorrect | Incorrect | Incorrect | Incorrect | Incorrect |
| | Data Trend | Correct | Correct | Incorrect | Correct | |
| | | | | | | |
| AUSF1 | Comparative | Incorrect | Correct | Correct | Correct | Correct |
| | EMS | Correct | Correct | Correct | Correct | Incorrect |
| | Data Trend | Incorrect | Correct | Correct | Correct | Correct |
| AUSNF1 | Comparative | Correct | Correct | Incorrect | Correct | Correct |
| | EMS | Correct | Correct | Incorrect | Correct | Correct |
| | Data Trend | Incorrect | Correct | Correct | Incorrect | Incorrect |

Correct classification (green)
Incorrect classification (blue)

| AAU | F | NF |
|---|---|---|
| IMM | 53% | 50% |
| **AUS** | **F** | **NF** |
| IMM | 73% | 53% |

Notes: The time periods used in the above calculations have been broken into annual reporting time periods. For example, **t** is the twelve-month period immediately prior to failure. A = Agriculture, AU = Australia, US = United States, F = Failed, and NF = Non-failed.

**Table 6.**

Classifications of failure and success for U.S. and Australian organisations using the IMM approach
– Finance

| | Measure | t-4 | t-3 | t-2 | t-1 | t |
|---|---|---|---|---|---|---|
| FAUF1 | Comparative | green | green | green | green | blue |
| | EMS | green | green | green | green | blue |
| | Data Trend | green | green | green | green | blue |
| FAUNF1 | Comparative | green | green | green | green | blue |
| | EMS | blue | blue | blue | blue | blue |
| | Data Trend | green | green | green | green | blue |
| | | | | | | |
| FUSF1 | Comparative | green | green | green | green | green |
| | EMS | green | green | green | green | green |
| | Data Trend | green | green | green | green | green |
| FUSNF1 | Comparative | green | green | green | green | green |
| | EMS | blue | blue | blue | green | green |
| | Data Trend | green | green | green | green | green |

green = Correct classification
blue = Incorrect classification

| FAU | F | NF |
|---|---|---|
| IMM | 80% | 53% |
| FUS | F | NF |
| IMM | 100% | 80% |

Notes: The time periods used in the above calculations have been broken into annual reporting time periods. For example, **t** is the twelve-month period immediately prior to failure. F = Finance, AU = Australia, US = United States, F = Failed, and NF = Non-failed.

**Table 7.**

Classifications of failure and success for U.S. and Australian organisations using the IMM approach – Manufacturing

| | Measure | t-4 | t-3 | t-2 | t-1 | t |
|---|---|---|---|---|---|---|
| **MAUF1** | **Comparative** | Green | Green | Green | Green | Blue |
| | **EMS** | Blue | Blue | Green | Green | Blue |
| | **Data Trend** | Blue | Green | Blue | Blue | Blue |
| **MAUNF1** | **Comparative** | Green | Green | Green | Green | Blue |
| | **EMS** | Green | Green | Green | Green | Green |
| | **Data Trend** | Blue | Green | Blue | Blue | Blue |
| | | | | | | |
| **MUSF1** | **Comparative** | Blue | Green | Blue | Green | Green |
| | **EMS** | Blue | Green | Blue | Blue | Green |
| | **Data Trend** | Green | Green | Green | Green | Green |
| **MUSF2** | **Comparative** | Green | Green | Green | Green | Green |
| | **EMS** | Blue | Blue | Green | Green | Green |
| | **Data Trend** | Green | Blue | Green | Green | Green |
| **MUSF3** | **Comparative** | Green | Green | Green | Green | Green |
| | **EMS** | Green | Green | Green | Green | Green |
| | **Data Trend** | Green | Green | Green | Green | Green |
| **MUSNF1** | **Comparative** | Blue | Green | Blue | Green | Green |
| | **EMS** | Blue | Blue | Blue | Blue | Blue |
| | **Data Trend** | Green | Blue | Green | Green | Blue |
| **MUSNF2** | **Comparative** | Green | Green | Green | Green | Green |
| | **EMS** | Green | Green | Green | Green | Green |
| | **Data Trend** | Green | Blue | Blue | Blue | Green |
| **MUSNF3** | **Comparative** | Green | Green | Green | Green | Green |
| | **EMS** | Green | Green | Green | Green | Green |
| | **Data Trend** | Green | Green | Green | Green | Green |

Green = **Correct classification**
Blue = **Incorrect classification**

| MAU | F | NF |
|---|---|---|
| **IMM** | **46%** | **66%** |
| **MUS** | **F** | **NF** |
| **IMM** | **80%** | **71%** |

Notes: The time periods used in the above calculations have been broken into annual reporting time periods. For example, **t** is the twelve-month period immediately prior to failure. M =Manufacturing, AU = Australia, US = United States, F = Failed, and NF = Non-failed.

# Table 8.

Classifications of failure and success for U.S. and Australian organisations using the IMM approach – Property

| | Measure | t-4 | t-3 | t-2 | t-1 | t |
|---|---|---|---|---|---|---|
| PAUF1 | Comparative | Correct | Correct | Correct | Correct | Correct |
| | EMS | Incorrect | Incorrect | Correct | Correct | Correct |
| | Data Trend | Correct | Incorrect | Correct | Correct | Correct |
| PAUNF1 | Comparative | Correct | Correct | Correct | Correct | Correct |
| | EMS | Incorrect | Incorrect | Incorrect | Incorrect | Incorrect |
| | Data Trend | Correct | Incorrect | Correct | Correct | Correct |
| | | | | | | |
| PUSF1 | Comparative | Correct | Correct | Correct | Correct | Correct |
| | EMS | Incorrect | Incorrect | Incorrect | Incorrect | Incorrect |
| | Data Trend | Correct | Correct | Correct | Incorrect | Correct |
| PUSF2 | Comparative | Correct | Incorrect | Correct | Correct | Correct |
| | EMS | Correct | Correct | Correct | Correct | Correct |
| | Data Trend | Incorrect | Incorrect | Incorrect | Correct | Incorrect |
| PUSNF1 | Comparative | Correct | Correct | Correct | Correct | Correct |
| | EMS | Incorrect | Incorrect | Incorrect | Incorrect | Incorrect |
| | Data Trend | Correct | Correct | Correct | Incorrect | Correct |
| PUSNF2 | Comparative | Correct | Incorrect | Correct | Correct | Correct |
| | EMS | Correct | Correct | Correct | Correct | Correct |
| | Data Trend | Incorrect | Incorrect | Incorrect | Correct | Incorrect |

- Green = Correct classification
- Blue = Incorrect classification

| PAU | F | NF |
|---|---|---|
| IMM | 80% | 60% |
| PUS | F | NF |
| IMM | 63% | 63% |

Notes: The time periods used in the above calculations have been broken into annual reporting time periods. For example, **t** is the twelve-month period immediately prior to failure. P = Property, AU = Australia, US = United States, F = Failed, and NF = Non-failed.