

DOES MANAGEMENT ATTITUDE TOWARDS ECONOMIC UNCERTAINTY INFLUENCE THE VALUE RELEVANCE OF INTELLECTUAL CAPITAL?

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Abstract: This paper examines whether the management attitude towards economic uncertainty affects the value relevance of intellectual capital (IC) and how management attitude towards economic uncertainty influences investors' perception of future earnings generated by IC. Content analysis of 318 annual reports of Australian firms listed on the Australian Securities Exchange (ASX) is used to obtain information on IC and management attitude. T-tests and ordinary least squares (OLS) regressions are used to examine the hypotheses. This study finds that during the economic uncertainty period, the investors incorporate future earnings generated by IC to stock returns only when firms show an optimistic attitude towards the economic uncertainty. The results suggest that investors' perceptions of future earnings generated by IC depend on the firm's attitude towards the economic uncertainty.

Keywords: Intellectual capital; Value relevance; Signalling theory; Management attitude; Economic uncertainty

1 INTRODUCTION

According to the World Health Organization, Covid-19 first appeared in December 2019 in the city of Wuhan, Hubei Province, China. The virus then spread rapidly all over the world and is continuing to circulate globally. Covid-19 has caused the greatest disruption of the global economy. Although protective precautions such as social distancing, travel bans and lockdowns have proven effective in curbing transmission of the virus to a large extent, they have had adverse effects on financial markets [1] and lead the economic uncertainty.

Intellectual capital (IC) is generated by or developed from unique organisational design, innovation and human resources that can be used as core drivers to increase the economic benefits of a firm in the context of uncertainty and challenges such as those caused by the Covid-19 pandemic. During this pandemic, firms that accounted for their IC could positively influence investors' perceptions of the value of firms. Based on signalling theory, this paper attempts to examine whether the economic uncertainty (proxy by Covid-19 pandemic), has influenced the value relevance of IC. This paper also attempts to examine how management attitude to the economic uncertainty (proxy by Covid-19 pandemic) has influenced investors' perceptions of future firm performance generated by IC. The sample used for this study is from the Australian Securities Exchange (ASX) top 200 listed firms. Australia was chosen as the research context because Australian firms are considered to follow best practice in IC reporting, which has led many studies examine IC in the Australian context [2]. Two subsamples are used in this paper: firms in the year 2017 are chosen to examine the pre-Covid-19 period and firms in the year 2020 are chosen to examine the Covid-19 pandemic period (i.e., economic uncertainty period).

The results of this study reveal a significant and positively relationship between IC disclosure and the amount of future earnings reflected in current annual returns in the pre-Covid-19 period, suggesting that IC is value relevant to the market in reflecting the future earnings of the firm. However, the findings reveal that during the Covid-19 pandemic period (i.e. economic uncertainty), market did not efficiently reflect the future earnings generated by IC. The examination of how management attitude to the economic uncertainty influences the value relevance of IC reveals that the market reacts favourably to IC and views IC as value relevant in reflecting firms' future earnings when firms are optimistic in relation to the economic uncertainty.

In the additional test, this study investigates whether management attitude towards the economic uncertainty influences the value relevance of the three IC elements (i.e. internal capital, external capital and human capital) as evidenced by investors incorporating future earnings information in current stock returns. The result of this test reveals that when firms are optimistic in relation to the economic uncertainty, external capital can effectively communicate current earnings information to the market, while human capital and internal capital can communicate future earnings information and reflect this future earnings information in current stock returns. The results of the additional test indicate that when management attitude about the economic uncertainty is optimistic, the market perceives external capital to be value relevant in reflecting the firm's current earnings information, while human capital and internal capital are value relevant in reflecting the firm's future earnings.

This paper makes several contributions to existing literature on IC disclosure and value relevance. First, the paper extends understanding of value relevance of IC in Australia by examining whether disclosing IC through annual reports can reflect firms' future economic performance and help investors to evaluate firms' stock prices. Second, the paper builds a theoretical framework based on signalling theory to develop the research hypotheses. This development of a theoretical framework underlying IC is valuable given that few studies on IC have provided a strong theoretical basis

for interpreting their findings[3]. Third, to the best knowledge of the researcher, few study has investigated the effect of the economic uncertainty on the value relevance of IC or how management attitude towards the economic uncertainty influences investors' perceptions of the firm performance generated by IC.

The remainder of this paper is organised as follows. Section 2 presents a review of the relevant literature. Section 3 explains the theoretical framework and develops the hypotheses. Section 4 describes the research design of the study. Section 5 presents the empirical results. Section 6 presents the additional test. Section 7 provides the implications of this study. Section 8 presents the conclusion.

2 LITERATURE REVIEW

2.1 Value Relevance of IC Disclosure

Previous studies found that investors perceive IC as value-relevant with regards to decision-making, and they generally react favourable to such reporting, so a firm's stock price or market value would be enhanced in this sense. The most widely used tool to measure the market valuation of IC is market-to-book ratios. Studies have confirmed that IC disclosure has positive effects on the market-to-book ratios in Taiwan [4], Denmark [5], China [6], which suggests that IC disclosure is value-relevant for market valuation.

However, the extant literature does not present a consistent view of the value relevance of IC. In addition, most studies have employed traditional measures (e.g. market-to-book ratio, market value, and earnings models) to evaluate value relevance [7]. Such measurement methods do not accurately evaluate the value relevance of IC because they consider only IC as generating earnings for the current year. However, IC reflects not only current performance but also future wealth creation and can generate forward-looking benefits, which should also be considered by the market. This study addresses this gap in the literature by including the future earnings in the empirical model to examine whether IC can generate forward-looking benefits.

2.2 IC and Financial Performance in Australia

Evidence about the influence of IC on a firm's financial performance can be found in several literature in Australia.

For example, Joshi et al. [8] examined the relationship between IC measured by VAICTM measurement and a firm's financial performance, measured by ROA, in the Australian financial sector for the period from 2006 to 2008. The study found that all Australian-owned banks have relatively higher human capital efficiency than capital employed efficiency and structural capital efficiency. The study also found that the size of the bank in terms of total assets, total number of employees and total shareholders' equity, has little or no impact on the IC efficiency of the Australian-owned banks.

Clarke et al. [9] examined the effect IC efficiency has on firm performance of Australian listed firms between 2004 and 2008. The IC efficiency was measured by VAICTM measurement, and the firm's financial performance was measured by ROE, ROA, growth in revenues and employee productivity. The results found that there was a direct relationship between IC efficiency and the performance of Australian publicly listed firms, particularly regarding capital employed efficiency and human capital efficiency. A positive relationship between human capital efficiency and structural capital efficiency in the prior year and performance in the current year was also found.

Most prior researchers have employed numerical Value Added Intellectual Coefficient (VAICTM) measurement to calculate IC, but this method has now been overly used and has received significant criticism. VAICTM measurement produces inconsistent results, and its effectiveness has been questioned [10]. This paper contributes to the literature by using established scorecard framework rather than the VAICTM model to measure IC.

3 THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

3.1 Value Relevance of IC

According to signalling theory, useful signals would make investors and other stakeholders reassess the value of a firm before making decisions that are more favourable to the firm[11]. Firms have several ways of signalling information about themselves, of which voluntary disclosure of positive accounting information is considered to be one of the most effective. Voluntary disclosing the IC information is a very effective means for firms to signal their superior quality due to the significance of IC for future wealth creation and forward looking benefits [11]. In this sense a firm's share price would rise with adequate IC information when the IC reflects information of future economic benefits. Inadequate IC information, on the other hand, increases a risk of insider trading [12]. This could potentially make capital more costly because investors demand a premium for bearing risky information [13].

For a signal to be useful to a firm, it is important to ensure the signal cannot be imitated by competitors. This paper forms its theoretical foundation based on signalling theory, which argues that a good-quality firm is likely to use multiple signals to encourage its investors to view the firm favourably. IC is a very effective signal of firm quality to the market because it is rarely imitable and replaceable, and it reflects forward-looking benefits. This means that IC disclosure can signal a firm's future performance to outsiders, which affects stock price. This study hypothesises that if a firm reveals information that is value relevant for its future earnings through its IC, then future earnings will be reflected in current returns as a result of disclosure of IC information. In such cases, the coefficient on the interaction

term between IC and future earnings will be positively related to current stock returns. That is, IC can ‘bring the future forward’ by revealing relevant information about future earnings. Therefore, this paper proposes the following hypothesis:

H1: IC positively influences the relationship between stock returns and future earnings.

3.2 Influence of Economic Uncertainty on Value Relevance of IC

The COVID-19 has disrupted the global economy since 2020. Although several protective precautions (e.g., social distancing, travel bans and lockdowns) have proven effective to a large extent, they have a cost in terms of adverse impacts on financial markets and decreased business revenue [1]. To increase the confidence of investors during this economic uncertainty, firms could disclose more IC information. This study assumes that IC information disclosed by a firm can influence investors’ perception of the ability of the firm to generate future earnings, and that the attitude of a firm during the Covid-19 pandemic (i.e., economic uncertainty) can influence investors’ evaluation of the value of the firm. That is, if a firm has sufficient IC and optimism about its current and future developments during the economic uncertainty, investors could incorporate this information in their evaluation of the stock price of the firm. In contrast, if a firm is pessimistic about the economic uncertainty, despite disclosing IC information to the market, investors may feel uncertain about the future development of the firm as a result of the economic uncertainty, and they may not incorporate information about future earnings in their evaluation of current stock returns.

Thus, this paper assumes that if a firm has an optimistic attitude towards economic uncertainty and reveals IC information that is value relevant to its future earnings, then the investors’ confidence in the firm’s future performance will increase. In such a case, the coefficient on the interaction term between IC and future earnings will be positively related to current stock returns when firms are optimistic during the economic uncertainty. Therefore, this paper proposes the following hypothesis:

H2: During the economic uncertainty period, IC positively influences the relationship between stock returns and future earnings when firms are optimistic in relation to the economic uncertainty.

4 RESEARCH DESIGN

4.1 Data and Sample Selection

This study examines ASX 200 firms in the year 2017 (pre-Covid-19 period) and the year 2020 (Covid-19 pandemic period) as the sampling frame. Information related to financial data was obtained from the DatAnalysis database. Following Dahmash et al. (2009), firms involved in the areas of finance, insurance and real estate were excluded because they are subjected to different reporting requirements. ASX 200 firms were selected as the sample frame because the ASX 200 is recognised as the primary investment benchmark in Australia. ASX 200 firms account for approximately 78% of Australian equity market capitalisation. The study also deletes firms that did not have financial information available on the database over the period from 2016 to 2022. After excluding firms with missing data, the sample size decreased from 200 firms to 159 firms for the pre-Covid-19 period and the Covid-19 pandemic period, thus the total sample size is 318 firm-year observations.

4.2 Content Analysis

To capture IC information, this paper applies the content analysis for 318 annual reports. In analysing the IC content disclosed in the annual reports, this chapter counted the frequency of IC items reported. Annual reports are an ideal research object to apply the IC framework to because they are a good proxy to measure the comparative positions and trends of IC between firms, industries and countries [14]. This chapter conceptualises IC according to Yang [15]’s scorecard framework. To undertake a content analysis of the 318 annual reports, the IC items collected from reading and analysing annual reports were entered into a coding sheet. A numerical coding scheme was used for each IC item. For each firm, the frequency of occurrence of each IC item was used to present the level of IC disclosures; zero was used if the IC item did not appear in the annual report.

To capture management attitude about the economic uncertainty, this study employs content analysis of 159 annual reports for the Covid-19 pandemic period. In analysing firms’ attitude about the Covid-19 pandemic as disclosed in the annual reports, the study scaled attitude from 0 to 5: 0 representing that Covid-19 was not mentioned; 1 representing that the firm reacted pessimistically to the Covid-19 pandemic and presented a pessimistic attitude in the letter from the chair at the front of the annual report; 2 representing that the firm reacted pessimistically to the Covid-19 pandemic but did not present a pessimistic attitude in the letter from the chair; 3 representing that the firm reacted optimistically to the Covid-19 pandemic but also presented information about challenges caused by Covid-19; 4 representing that the firm reacted optimistically to the Covid-19 pandemic but did not present an optimistic attitude in the letter from the chair; and 5 representing that the firm reacted optimistically to the Covid-19 pandemic and presented an optimistic attitude in the letter from the chair.

4.3 Empirical Model

Lundholm and Myers [16] measured the disclosure activities of firms by rating the published reports of the Association

for Investment Management Research, and found that increasing firms' discretionary disclosure activities would bring credible, relevant information about future earnings into the current market place, which then increases the stock price. Their model is based on the residual income valuation model, and they characterise the current annual stock return as the sum of unexpected current earnings, the cumulative change in expectations about future earnings and noise. The researchers used the level of current earnings and past year's earnings as proxy for unexpected current earnings. The proxy for changes in expected future earnings is central to the model. As future earnings have expected and unexpected components, the unexpected component to future earnings is a measurement error when using the realised future earnings to proxy for expected future earnings. The future stock returns are included to control for the measurement error in the model, as they believe an unexpected shock to future earnings should also generate future returns. The measurement error (future returns) should not be associated with current returns in a regression excluding future earnings, nor should it be negatively associated with current returns in the model. Extending the model, their study assumes that a significant source of changing expectations about a firm's future performance is disclosure activity by the firm itself. If a firm reveals news relevant to its future earnings through its disclosure activity, the realised future earnings will be reflected in current returns, albeit with some measurement error. Thus, they include the interaction effect between future earnings and the level of a firm's disclosure activity on stock returns as an interested variable. The interaction between the future earnings and voluntary disclosure activity is labeled as 'revealed future earnings'. As a result, Lundholm and Myers found a positive relationship between 'revealed earnings' and stock returns.

Lundholm and Myers [16] is more appropriate to examine the market value-relevance of IC in this study because this paper attempts to consider whether IC could bring information regarding a firm's future earnings into current stock returns. Lundholm and Myers [16] found that accounting-based earnings beyond three years have little explanatory power and due to the availability of the data in this study, this study regards future earnings as the sum of two years of future accounting based earnings for each current year (investigation year) of the sample.

The empirical model for this study is as follow:

$$R_{j,t} = a_0 + a_1E_{j,t-1} + a_2E_{j,t} + a_3E_{j,t+1to2} + a_4R_{j,t+1to2} + a_5DM_{j,t,k} + a_6DM_{j,t,k} * E_{j,t-1} + a_7DM_{j,t,k} * E_{j,t} + a_8DM_{j,t,k} * E_{j,t+1to2} + a_9DM_{j,t,k} * R_{j,t+1to2} + a_{10}Mtkcap_{j,t} + a_{11}MtoB_{j,t} + a_{12}Opcycle_{j,t} + \text{Year effects} + \text{Industry effects} + e_{j,t} \quad (1)$$

Where:

$R_{j,t}$ —the annual stock return for firm j , year t , over the 12-month period beginning on the first day of the third month of the given year and ending on the last day of the second month of the subsequent year, measured by natural logarithm of stock price three months after year end t / stock price three months after year end $t-1$;

$DM_{j,t,k}$ —is a determinant of value relevance, including $IC_{j,t}$ and management attitude. The $IC_{j,t}$ is measured by the sum of natural logarithm of frequency counts of internal capital items, external capital items, and human capital items for firm j , in year t . The $MA_{j,t}$ is management attitude on economic uncertainty (i.e., COVID 19 pandemic) which scaled from 0 to 5 for firm j , in year 2020.

$E_{j,t-1}$ —earnings before tax for firm j , in year $t-1$, deflated by the market capitalisation at beginning of year t for firm j ;

$E_{j,t}$ —earnings before tax for firm j , year t , deflated by the market capitalisation at beginning of year t for firm j ;

$E_{j,t+1to2}$ —the sum of earnings before tax for firm j , years $t+1$ and $t+2$, deflated by the market capitalisation at beginning of year t for firm j ;

$R_{j,t+1to2}$ —the sum of annual stock returns for firm j , years $t+1$ and $t+2$ over the 12-month period beginning on the first day of the third month of the given year and ending on the last day of the second month of the subsequent year;

$MtoB_{j,t}$ —market-to-book equity ratio, measured as market value of equity divided by the book value of equity for firm j , in year t ;

$Opcycle_{j,t}$ —natural logarithm of days of accounts receivable plus days of inventory for firm j , in year t ;

$MktCap_{j,t}$ —size of the firm, measured as a natural logarithm of market capitalisation of firm j , at beginning of year t ;

j —firm observation;

t —year 2017 and 2020.

5 EMPIRICAL RESULTS

5.1 Descriptive Statistics

Table 1 presents the summary statistics of the variables for the hypotheses. The results demonstrate that the mean of IC in the Covid-19 pandemic period (mean = 4.991) is significantly higher than the mean of IC in the pre-Covid-19 period (mean = 4.534) (t -value = -2.535 , p -value = 0.006). Among the three IC elements, human capital accounts for the majority of IC in Australia, and it has the highest mean (1.995 for pre-Covid-19; 2.193 for Covid-19 pandemic) in both periods. The mean of human capital is higher during the Covid-19 pandemic than in the pre-Covid-19 period (t -value = -2.772 , p -value = 0.003). The mean of internal capital is higher during the Covid-19 pandemic (1.140) than in the pre-Covid-19 period (0.939) (t -value = -2.395 , p -value = 0.009). The mean of external capital does not change significantly during the Covid-19 pandemic period. Thus, the analysis of the descriptive statistics reveals that the increased IC during the Covid-19 pandemic results from higher levels of human capital and internal capital. This is reasonable because during the Covid-19, employee welfare and safety were a priority and the social distancing rules and lockdowns meant that most employees were working from home, which resulted in firms investing more in training programmes, information technology systems and adopting smarter business management procedures.

Table 1 Descriptive Statistics

Variable	Pre COVID 19 period (year 2017)			COVID 19 period (year 2020)			T-test	
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	t-value	p-value
IC _{j,t}	159	4.534	1.667	159	4.991	1.545	-2.535***	0.006
HUC _{j,t}	159	1.995	0.788	159	2.193	0.469	-2.772***	0.003
INC _{j,t}	159	0.939	0.732	159	1.140	0.764	-2.395***	0.009
EXC _{j,t}	159	1.600	0.754	159	1.658	0.772	-0.677	0.249

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: IC_{j,t} is the sum of natural logarithm of frequency counts of internal capital items, external capital items, and human capital items for firm j, in year t. INC_{j,t} is natural logarithm of frequency counts of internal capital for firm j, in year t. EXC_{j,t} is natural logarithm of frequency counts of external capital for firm j, in year t. HUC_{j,t} is natural logarithm of frequency counts of human capital for firm j, in year t. t is year 2017 and year 2020.

5.2 Pearson and Spearman Correlations for Three IC Elements

Table 2 panel A presents the results of Pearson and Spearman correlations between IC, external capital, human capital and internal capital, revealing that internal capital, external capital and human capital are significantly and positively correlated to each other. In addition, all three individual elements of IC are highly correlated to total IC. Table 2 panel B presents the factor analyses of the three individual elements, while in panel B, internal capital, external capital and human capital are represented by one factor. The results presented in Table 2 panel A and panel B indicate that making the total of the three individual elements of IC represent total IC is appropriate in this study.

Table 2 Pearson and Spearman Correlations for Three Individual IC Elements

Panel A: Pearson and spearman correlations				
	IC	HUC	INC	EXC
IC _{j,t}	1.000	0.685*** (0.000)	0.767*** (0.000)	0.779*** (0.000)
HUC _{j,t}	0.690*** (0.000)	1.000	0.288*** (0.000)	0.312*** (0.000)
INC _{j,t}	0.776*** (0.000)	0.333*** (0.000)	1.000	0.393*** (0.000)
EXC _{j,t}	0.737*** (0.000)	0.326*** (0.000)	0.362*** (0.000)	1.000
Panel B: Factor analysis				
Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	0.839	0.962	1.637	1.637
Factor2	-0.123	0.081	-0.240	1.397
Factor3	-0.204	0.000	-0.397	1.000
Number of obs	318			
Retained factors	1			
Number of params	3			
chi2(3)	97.04			
Prob>chi2	0			
Factor loadings (pattern matrix) and unique variances				
Variable	Factor1	Uniqueness		
HUC _{j,t}	0.471	0.778		
INC _{j,t}	0.547	0.701		
EXC _{j,t}	0.564	0.682		

p-value in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Pearson (spearman) correlations are presented above (below)

Note: IC_{j,t} is the sum of natural logarithm of frequency counts of internal capital items, external capital items, and human capital items for firm j, in year t. HUC_{j,t} is natural logarithm of frequency counts of human capital for firm j, in year t. INC_{j,t} is natural logarithm of frequency counts of internal capital for firm j, in year t. EXC_{j,t} is natural logarithm of frequency counts of external capital for firm j, in year t.

5.3 Management Attitude to Economic Uncertainty

Table 3 presents the frequency count and the percentage of each attitude rating during the economic uncertainty. The results show that 18% presented optimistic information in the letter from the chair at the front of the annual report (i.e. rating 5). Moreover, 30% of firms reacted optimistically to the Covid-19 pandemic but did not present optimistic information in the letter from the chair(i.e. rating 4). In addition, 23% of firms reacted optimistically to the Covid-19 pandemic but also presented information about challenges caused by the Covid-19 pandemic (i.e. rating 3). Further, 20% of firms reacted pessimistically to the Covid-19 pandemic but did not present pessimistic information in the letter from the chair (i.e. rating 2) and 8% of firms presented reacted pessimistically to the Covid-19 pandemic and presented pessimistic information in the letter from the chair (i.e. rating 1).

Table 3 Firms' Attitude on Economic Uncertainty

MA	Count	Percentage
0	2	1%
1	13	8%
2	31	20%
3	37	23%
4	48	30%
5	28	18%

Note: MA represents the firms attitude on economic uncertainty (i.e., COVID 19 pandemic), it is scaled from 0 to 5. where 0 presents that the COVID 19 is not mentioned, 1 presents that the firms react pessimistically on COVID 19 and presents pessimistic attitude in the Chairman letter in the front of the annual reports, 2 presents that the firms react pessimistically on COVID 19 but not presents pessimistic attitude in the Chairman letter, 3 presents that the firms react optimistically on COVID 19 but also presents some challenges that caused by COIVD 19, 4 presents that the firms react optimistically on COVID 19 but not presents optimistic attitude in the Chairman letter, 5 presents that the firms react optimistically on COVID 19 and presents optimistic attitude in the Chairman letter in the front of the annual reports.

5.4 Results for Hypothesis

5.4.1 Results for H1

Table 4 presents the results for H1, with stock returns as the dependent variable using ordinary least squares (OLS) regressions. The result of Table 4 model 1 reveals that $E_{j,t+1to2}$ is significantly and positively associated with $R_{j,t}$ (coefficient = 0.631, p-value = 0.000), consistent with the results of Lundholm and Myers (2002). When incorporated with IC, the results of Table 4 model 2 reveal that $IC_{j,t} * E_{j,t}$ is significantly and positively associated with $R_{j,t}$ (coefficient = 0.111, p-value = 0.043) and that $IC_{j,t} * E_{j,t+1to2}$ is significantly and positively associated with $R_{j,t}$ (coefficient = 0.153, p-value = 0.012), which indicates that investors perceived IC information as useful and relevant information in reflecting firms' current and future earnings. This result is consistent with H1's proposal that IC information signals not only current earnings but also future earnings information to the market, and that the market perceives such reporting as value relevant and incorporates the IC information in current stock returns.

Table 4 Results for Value Relevance of IC in Pre-Covid 19 Period

	Model 1 with $R_{j,t}$ as dependent variable				Model 2 with $R_{j,t}$ as dependent variable			
	Coef.	Std. Err.	t	P>t	Coef.	Std. Err.	t	P>t
$E_{j,t-1}$	-0.006	0.064	0.100	0.920	-0.579***	0.219	-2.640	0.009
$E_{j,t}$	0.064	0.111	0.580	0.565	2.181***	0.607	3.590	0.000
$E_{j,t+1to2}$	0.631***	0.072	8.800	0.000	0.140	0.217	0.650	0.518
$R_{j,t+1to2}$	-0.127***	0.031	-4.100	0.000	-0.178***	0.064	-2.760	0.006
$IC_{j,t}$					0.106***	0.017	6.260	0.000
$IC_{j,t} * E_{j,t-1}$					-0.521***	0.145	-3.590	0.000
$IC_{j,t} * E_{j,t}$					0.111**	0.054	2.040	0.043
$IC_{j,t} * E_{j,t+1to2}$					0.153**	0.061	2.530	0.012
$IC_{j,t} * R_{j,t+1to2}$					0.016	0.016	0.980	0.330
$MtoB_{j,t}$	0.012	0.008	1.570	0.118	0.010	0.006	1.640	0.104
$Mktcap_{j,t}$	0.019**	0.007	2.610	0.010	0.013**	0.006	2.000	0.047
$Opcycle_{j,t}$	-0.029	0.034	-0.880	0.382	-0.023	0.029	-0.810	0.421
Industry effects	0.009	0.007	1.320	0.187	0.002	0.006	0.370	0.709
_cons	-0.433***	0.122	-3.550	0.001	-0.749***	0.115	-6.540	0.000
Number of obs	159				159			

R-squared 36.4% 55.9%

*p<0.10, **p<0.05, ***p<0.01

Note: $R_{j,t}$ is the annual stock return for firm j, year t, over the 12-month period beginning on the first day of the third month of the given year and ending on the last day of the second month of the subsequent year, measured by natural logarithm of stock price three months after year end t/ stock price three months after year end t-1. The $IC_{j,t}$ is measured by the sum of natural logarithm of frequency counts of internal capital items, external capital items, and human capital items for firm j, in year t. $E_{j,t-1}$ represents earnings before tax for firm j, in year t-1, deflated by the market capitalisation at beginning of year t for firm j. $E_{j,t}$ is earnings before tax for firm j, year t, deflated by the market capitalisation at beginning of year t for firm j. $E_{j,t+1to2}$ is the sum of earnings before tax for firm j, years t+1 and t+2 deflated by the market capitalisation at beginning of year t for firm j. $R_{j,t+1to2}$ is the sum of annual stock returns for firm j, years t+1 and t+2, over the 12-month period beginning on the first day of the third month of the given year and ending on the last day of the second month of the subsequent year. $MtoB_{j,t}$ represents market-to-book equity ratio, measured as market value of equity divided by the book value of equity for firm j, in year t. $Opcycle_{j,t}$ is measured by natural logarithm of days of accounts receivable plus days of inventory for firm j, in year t. $MktCap_{j,t}$ is size of the firm, measured as a natural logarithm of market capitalisation of firm j, at beginning of year t; j is firm observation. t is year 2017.

5.4.2 Results for H2

Table 5 presents the results for H2, with stock returns as the dependent variable using OLS regressions. As seen in Table 5 model 3, $E_{j,t+1to2}$ is significantly and positively associated with $R_{j,t}$ (coefficient = 0.674, p-value = 0.000), which is consistent with the results of [16]. However, when examining Table 5 model 4, $E_{j,t+1to2}$ is significantly and positively associated with $R_{j,t}$ (coefficient = 1.090, p-value = 0.027), but $IC_{j,t} * E_{j,t+1to2}$ is not significantly associated with $R_{j,t}$, suggesting that IC was not efficiently incorporated by investors in evaluating the future earnings of firms during the Covid-19 pandemic. This may be because the economic uncertainty and challenges caused by the Covid-19 pandemic influenced negatively on investors' evaluation of firms' future earnings generated by IC.

When evaluating management attitude towards the economic uncertainty, Table 5 model 5 reveals that $MA * IC_{j,t} * E_{j,t+1to2}$ is significantly and positively associated with $R_{j,t}$ (coefficient = 0.030, p-value = 0.007). This positive relationship indicates that when firms are optimistic during the economic uncertainty period, investors react favourably in relation to the firm's future earnings generated by IC. Thus, the study finds that stock returns reflect future earnings through IC information when firms have an optimistic attitude towards the economic uncertainty. This finding supports H2.

The results presented in Table 5 reveal that, on average, IC was not efficiently incorporated by investors in evaluating the future earnings of firms during the economic uncertainty. However, investors reacted favourably about future earnings generated by IC when firms presented an optimistic attitude towards the economic uncertainty.

Table 5 Regression Results for Value Relevance of IC during COVID 19 Pandemic

	Model 3 with $R_{j,t}$ as dependent variable				Model 4 with $R_{j,t}$ as dependent variable				Model 5 with $R_{j,t}$ as dependent variable			
	Coef.	Std. Err.	t	P>t	Coef.	Std. Err.	t	P>t	Coef.	Std. Err.	t	P>t
$E_{j,t-1}$	-0.046	0.243	-0.190	0.851	-0.425	0.899	-0.470	0.637	-0.682	0.556	1.230	0.221
$E_{j,t}$	0.173	0.251	0.690	0.492	1.378	1.353	1.020	0.310	0.034	0.851	0.040	0.968
$E_{j,t+1to2}$	0.674***	0.092	7.310	0.000	1.090**	0.489	2.230	0.027	0.269	0.267	1.010	0.316
$R_{j,t+1to2}$	-0.081**	0.037	-2.160	0.032	-0.115	0.108	-1.060	0.290	-0.066	0.072	-0.910	0.363
$IC_{j,t}$					0.041	0.032	1.290	0.199	0.016	0.032	-0.490	0.628
$IC_{j,t} * E_{j,t-1}$					-0.043	0.177	0.250	0.806				
$IC_{j,t} * E_{j,t}$					0.219	0.263	0.830	0.407				
$IC_{j,t} * E_{j,t+1to2}$					0.067	0.081	0.830	0.409				
$IC_{j,t} * R_{j,t+1to2}$					-0.008	0.022	0.360	0.717				
MA									0.038	0.041	0.930	0.354
$MA * IC_{j,t} * E_{j,t-1}$									-0.052*	0.030	-1.760	0.081
$MA * IC_{j,t} * E_{j,t}$									0.022	0.049	0.440	0.663
$MA * IC_{j,t} * E_{j,t+1to2}$									0.030**	0.017	1.820	0.007
$MA * IC_{j,t} * R_{j,t+1to2}$									0.000	0.004	-0.090	0.932
$MtoB_{j,t}$	0.105***	0.016	6.700	0.000	0.121**	0.018	6.840	0.000	0.107**	0.017	6.420	0.000
$Mktcap_{j,t}$	0.005	0.009	0.610	0.542	0.005	0.009	0.560	0.574	0.007	0.009	0.760	0.447
$Opcycle_{j,t}$	-0.084**	0.043	-1.940	0.054	-0.094**	0.044	-2.140	0.034	-0.092**	0.043	-2.140	0.034

Industry effects	0.018	0.011	1.620	0.107	0.019*	0.011	1.740	0.084	0.019	0.011	1.650	0.101
_cons	-0.488***	0.178	-2.740	0.007	-0.706**	0.234	-3.020	0.003	-0.571**	0.247	-2.310	0.022
Number of obs	159				159				159			
R-squared	43.1%				44.7%				45.6%			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Note: $R_{j,t}$ is the annual stock return for firm j , year t , over the 12-month period beginning on the first day of the third month of the given year and ending on the last day of the second month of the subsequent year, measured by natural logarithm of stock price three months after year end t / stock price three months after year end $t-1$. The $IC_{j,t}$ is measured by the sum of natural logarithm of frequency counts of internal capital items, external capital items, and human capital items for firm j , in year t . $E_{j,t-1}$ represents earnings before tax for firm j , in year $t-1$, deflated by the market capitalisation at beginning of year t for firm j . $E_{j,t}$ is earnings before tax for firm j , year t , deflated by the market capitalisation at beginning of year t for firm j . $E_{j,t+1to2}$ is the sum of earnings before tax for firm j , years $t+1$ and $t+2$, deflated by the market capitalisation at beginning of year t for firm j . $R_{j,t+1to2}$ is the sum of annual stock returns for firm j , years $t+1$ and $t+2$, over the 12-month period beginning on the first day of the third month of the given year and ending on the last day of the second month of the subsequent year. MA represents the firms attitude on COVID 19 pandemic, it is scaled from 0 to 5. $MtoB_{j,t}$ represents market-to-book equity ratio, measured as market value of equity divided by the book value of equity for firm j , in year t . $Opcycle_{j,t}$ is measured by natural logarithm of days of accounts receivable plus days of inventory for firm j , in year t . $MktCap_{j,t}$ is size of the firm, measured as a natural logarithm of market capitalisation of firm j , at beginning of year t ; j is firm observation. t is year 2020.

6 ADDITIONAL TEST

This section investigates whether management attitude towards the economic uncertainty influences the value relevance of the three IC elements as evidenced by investors incorporating future earnings information in current stock returns. Table 6 presents the results of H2 with $HUC_{j,t}$ (see Table 6 model 6); $INC_{j,t}$ (see Table 6 model 7); and $EXC_{j,t}$ (see Table 6 model 8) as independent variables using OLS regressions. The results reveal that $MA * HUC_{j,t} * E_{j,t+1to2}$ and $MA * INC_{j,t} * E_{j,t+1to2}$ are positively and significantly associated with $R_{j,t}$ (coefficient = 0.074, p-value = 0.042; coefficient = 0.142, p-value = 0.001, respectively), which suggests that the market believes that human capital and internal capital help to reflect firms' future earnings during the economic uncertainty when firms reacted optimistically to the economic uncertainty. Table 6 also reveals that $EXC_{j,t} * E_{j,t}$ and $R_{j,t}$ are positively and significantly associated (coefficient = 0.204, p-value = 0.027), which suggests that external capital can incorporate current economic benefits to firms. Thus, the study finds that the benefit of external capital is released faster than the other two elements because the market reacts positively to the current earnings of firms with external capital, and that the market reacts positively to the future earnings of firms with human capital and internal capital during economic uncertainty when firms react optimistically about the economic uncertainty.

Table 6 Regression Results for Value Relevance of Three Individual IC Elements

	Model 6 with $R_{j,t}$ as dependent variable				Model 7 with $R_{j,t}$ as dependent variable				Model 8 with $R_{j,t}$ as dependent variable			
	Coef.	Std. Err.	t	P>t	Coef.	Std. Err.	t	P>t	Coef.	Std. Err.	t	P>t
$E_{j,t-1}$	-1.087*	0.613	1.770	0.079	-0.288	0.372	-0.770	0.441	-0.457	0.499	0.920	0.361
$E_{j,t}$	0.028	1.017	-0.030	0.978	1.658**	0.724	2.290	0.023	0.604	0.442	-1.370	0.174
$E_{j,t+1to2}$	0.188	0.273	0.690	0.492	0.046	0.230	-0.200	0.841	0.772**	0.160	4.830	0.000
$R_{j,t+1to2}$	-0.033	0.083	-0.400	0.692	-0.033	0.053	-0.620	0.535	-0.109*	0.063	-1.710	0.089
MA	0.017	0.040	0.430	0.670	0.053	0.037	1.420	0.157	0.082**	0.039	2.090	0.038
$HUC_{j,t}$	0.108	0.105	1.030	0.305								
$MA * HUC_{j,t} * E_{j,t-1}$	-0.173**	0.076	-2.280	0.024								
$MA * HUC_{j,t} * E_{j,t}$	0.055	0.130	0.420	0.672								
$MA * HUC_{j,t} * E_{j,t+1to2}$	0.074**	0.036	2.050	0.042								
$MA * HUC_{j,t} * R_{j,t+1to2}$	-0.004	0.011	-0.360	0.722								
$INC_{j,t}$					-0.049	0.068	-0.730	0.465				
$MA * INC_{j,t} * E_{j,t-1}$					0.027	0.079	0.340	0.73				

In summary, this research offers valuable information for readers in academia and practice, and practical guidance for businesses and managers in adapting their strategies and communications to enhance the value relevance of intellectual capital during and after the economic uncertainty.

8 CONCLUSION

This paper employs signalling theory to examine whether the economic uncertainty changed the value relevance of IC to reflect current and future earnings to the market. Moreover, the paper examines how management attitudes towards the economic uncertainty influenced investors' perceptions of future earnings generated by IC.

Using content analysis, t-tests and OLS panel regressions on a sample of 318 annual reports from ASX 200 listed firms, the study confirms the hypotheses. The findings reveal that before economic uncertainty, IC positively influences the relationship between current stock returns and future earnings, suggesting that IC reflects future economic performance, and that the information signals from IC reporting are relevant to future earnings because the signals are incorporated in the current stock returns. However, during the economic uncertainty period, the study finds that investors incorporate future earnings generated by IC to stock returns only when firms show an optimistic attitude towards the economic uncertainty. The results suggest that the economic uncertainty has created uncertainties and challenges for firms, and that investors' perceptions of future earnings generated by IC depend on the firm's attitude towards the economic uncertainty.

These findings enrich not only the current debate about the value relevance of the IC but also present important implications for external stakeholders assessing firms' future economic performance that generated by IC during the economic uncertainty period.

There are several limitations of this study. First, the results of this study may not be applicable to countries other than Australia and to non-listed Australian firms because the study investigated only ASX 200 firms. Second, the coding framework used in the study comprises 33 IC items. However, other studies have used coding frameworks comprising fewer or more varied IC items. Therefore, when comparing the results of this and other studies, the interpretation of the findings must recognise the differences in approach.

Future research should examine IC and its implications for other aspects of a firm's benefits, such as corporate reputation. Moreover, future research should extend the current study on the value relevance of IC into a detailed examination from a different perspective using different methods. For example, future research could conduct interviews or surveys to examine directors' perceptions of the role played by IC in a firm's financial performance.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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