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The impact of corporate performance on innovation management: Empirical evidence from emerging Asian economies

Matteo Rossi [a,b], Ghassan H. Mardini [c], Niki Kyriakidou [d], Giuseppe Festa [e,*]

[a] Department of Law Economics Management and Quantitative Methods, University of Sannio, Via Nazionale delle Puglie No. 82, 82100 Benevento, Italy
[b] Wyzsza Szkoła Bankowa w Poznaniu, WSB Universities, Dabrowie Gornicka, Poland
[c] College of Business and Economics, Qatar University, Qatar
[d] Leeds Business School, Leeds Beckett University, UK
[e] Department of Economics and Statistics, University of Salerno, Via Giovanni Paolo II No. 132, 84084 Fisciano, SA, Italy

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ABSTRACT

Innovation is the key to survive, adapt, and succeed in modern markets, which are increasingly exposed to and impacted by the transformation in progress, especially from a technological point of view, and even more so as a result of the COVID-19 pandemic. However, the propensity to innovate is not only a desirable orientation of enterprises, but also a business process that absorbs relevant resources. In this vein, this study aims to understand if there is a connection, in the form of a direct and positive effect, between corporate performance and innovation, measured in terms of both expenses and intensity, with a specific focus on the Asian region (China, Hong Kong, Malaysia, Singapore, South Korea, and Thailand). While a direct relationship seems to exist when assessed by financial indicators (Tobin's Q), the same cannot be completely proved in relation to accounting ones (return on equity). Related implications, at the theoretical and practical level, are then provided, especially in regard to the potential contribution (and consequent appreciation) of intellectual capital.

1. Introduction

Globalization is generally recognized as an irreversible process characterized by the "… international economic exchange relationships of any one country with all other countries around the world" (Verbeke et al., 2018, p. 1101), and nowadays, this is one of the most recurrent themes in international business research. The reason for this is linked to the fact that – in recent decades – globalization has ensured an enormous flow of goods, services, ideas, capital, and people across national borders that act as key factors in the global economy, underpinning the links between both developed and emerging economies (Coeurderoy, 2020).

However, there are naturally many issues related to this phenomenon, especially when considering the turbulent evolutions of economies, markets, and societies (Gruver et al., 2009; Idnani et al., 2021; Festa et al., 2022; Kolte et al., 2023). From one point of view, the main concern relates to the sustainability of the internationalization and globalization themes, at the environmental and social level (for example, Gabler et al., 2015; Backman et al., 2017; Beal et al., 2017; Orazayeva and Arslan, 2022). From another

* Corresponding author.
E-mail addresses: mrossi@unisannio.it (M. Rossi), ghassan.mardini@qu.edu.qa (G.H. Mardini), n.kyriakidou@leedsbeckett.ac.uk (N. Kyriakidou), gfesta@unisa.it (G. Festa).

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perspective, i.e., in terms of economic sustainability, despite the increasing relevance of global value chains for enhanced socio-economic development, there are some gaps in terms of the knowledge, competence, and expertise required to fully capitalize on global development, especially for emerging economies (Kumar et al., 2013; Pereira et al., 2019).

One of the most important themes is therefore the relation between innovation and competitiveness, so that firms can be better prepared to face the emerging economic, social, and environmental challenges of globalization (OECD, 2008). Even though many recent studies (Choi and Lee, 2008; Mahlich, 2010; Terziovski, 2010; Nybakk and Jenssen, 2012; Ezzi and Jarboui, 2016; Santos et al., 2018) have investigated this topic, there is no consensus in the literature on the effect of innovation on financial performance. Bearing in mind the growing importance of innovation as a tool to generate growth and to improve firm performance, this paper aims to analyze the correlation between innovation management and corporate performance, with a cross-country analysis focused on the Asian region.

2. Theoretical approach and literature review

In the last 30 years, the analysis of the impact of research and development (R&D) expenses on corporate performance has been a topic of great interest for both the academic and professional environments, with a particular focus on the theoretical approach that can be ascribed to the agency theory and/or the legitimacy theory. With more specific reference to the topic under analysis in this research, many studies have analyzed the relationship between R&D expenditure (R&DE) and financial performance (for example, Kolte et al., 2021). In particular, several examined the relationship between Tobin's Q (TQ), return on equity (ROE, or return on asset – ROA), and R&DE (Megna and Klock, 1993; Chung and Pruitt, 1996; Sundaram et al., 1996; Lantz and Sahut, 2005; VanderPal, 2015).

The most important parts of these studies concerned listed firms; the motivation for this is related to the fact that they account for the largest proportion of R&D expenses within strategic innovation plans and have a more intense propension/obligation to transparency. The main objectives of these works involved identifying possible connections between the companies' financial performance and their immaterial expenditure (for example, patents). Previous contributions (Hirschey and Weygandt, 1985; Hall, 1993; Skinner, 1993; Sougiannis, 1994; Agrawal and Knoeber, 1996; Toivanen et al., 2002; Pindado et al., 2010; Duqi and Torluccio, 2011) have generally shown a strong correlation between TQ (as a measure of corporate value) and the intangible expenditure of firms.

Starting from the seminal works of Hall (2000) and Hall et al. (2000) – which found a significant relation between R&D outlays, patent citations, and corporate value – other research (for example, Eberhart et al., 2004) has shown similar results, highlighting a significant positive correlation between stock price, abnormal returns, and variations in R&D investment plans. Similarly, Toivanen et al. (2002), based on a sample of 877 UK companies operating in the fields of mineral extraction, general manufacturing, consumer goods, or utilities sectors, confirmed "… earlier results for the US – that the market values R&D. However, although the valuation varies year by year, we do not find any consistent trend in the valuations of the type reported by Hall for the US" (58).

Duqi and Torluccio (2011) concentrated their attention on a sample of European listed firms (UK and continental Europe); they analyzed the relation between the R&DE of the sampled companies and their market value over a five-year period, testing the relationship with two different econometric models (a pooled cross-section model and a fixed-effect panel model). They identified that R&D investments have a positive significant influence in estimating future returns for those companies; moreover, research has shown that, according to the values emerging from the financial arena, R&D undertakings perform better in investor-friendly environments, characterized by a high degree of legal protection.

Based on these studies, and considering that several works about innovation have adopted the TQ indicator (for example, Klock et al., 1996; Bardhan et al., 2013; Lewellyn and Bao, 2015; Cui et al., 2022; Sommer and Bhandari, 2022), we have developed the first research hypothesis:

H1a. : Financial performance as a market indicator (TQ) has a significant positive impact on R&DE.

Other studies (Cañibano et al., 2000; Chen et al., 2005; Pandit et al., 2011; VanderPal, 2015) investigated the relation between R&DE and the returns of firms. For example, Cañibano et al. (2000), in their literature review concerning accounting for intangibles, stated that returns rise with an increase in R&DE. Likewise, Chen et al. (2005), using data for Taiwanese listed companies, have shown a positive relationship between R&D effort and financial performance measured by ROE and ROA, highlighting the importance of the former for the future increase of revenues and profits of the organization. Similar results were supported by Pandit et al. (2011). They studied the relationship between successful R&DE and the volatility of future performance; starting from previous research that indicated a positive correlation between R&D and the variability of future earnings, they employed measures of innovation outcomes, such as patent citations, and underlined that future performance is positively correlated with the number and quality of patents.

In recent years, VanderPal (2015) has conducted an empirical analysis using a sample of 103 firms with high values of R&D in the period 1980–2013. The results are line with previous literature, since the "… results of the panel data analysis on 103 companies from different fields during 1980 and 2013 show that R&D expense indicator is positively correlated with the financial performance of the company (revenues, net income, equity and ROE)" (VanderPal, 2015: 145).

Based on these studies, we have assumed that a natural connection between innovation management and economic performance may exist, with mutual interactions. Therefore, we have developed the second research hypothesis:

H1b. : Financial performance as an accounting indicator (ROE) has a significant positive impact on R&DE.

Other studies (Griliches, 1981; Cockburn and Griliches, 1988; Megna and Klock, 1993; Hsieh et al., 2003; Yeh et al., 2010; Zhu et al., 2019) focused their attention on financial performance and R&D intensity (R&DI). This latter indicator, the R&DI of a firm, shows the strategic importance of innovation for the firm; although a high level of R&DI does not assure the generation of successful

innovation, companies that invest in R&D are more likely trying to compete because of their innovation effort and probable technology breakthroughs (O'Brien, 2003).

Several scholars (Griliches, 1981; Cockburn and Griliches, 1988; Megna and Klock, 1993) have tested the relationship between R&D investment and the company market value, and one strand of literature on this topic considers the relationship between TQ and R&DI. More specifically, starting from the seminal paper by Griliches (1981), who analyzed the relationship between the stock of knowledge and market value in a framework assuming that the market values the firm as a bundle of tangible and intangible assets, it was identified that R&D investment has a positive impact on TQ.

In later studies, Cockburn and Griliches (1988) and Megna and Klock (1993) confirmed this result for the US market. More generally, in fact, it must be mentioned that scientific literature with reference to the impact of R&DI on the market value has mainly examined the US stock market, while some works have concerned other European markets, and only a few have examined emerging markets. Hall and Oriani (2006) assessed the market valuation of the R&D capital in France, Germany, and Italy in comparison to Anglo-Saxon countries (UK and US). The impact of the R&D capital on market value was statistically significant for all the sampled countries, except for Italy.

More recently, Parcharidis and Varsakelis (2010) conducted research to study the consequences of R&D investment on TQ for firms publicly traded in an emerging financial market, for the period 1996–2004. The empirical findings highlighted that also in an emerging market "… firms' R&D investment effect on the market value of a firm is consistent with other US and European studies. Second, the impact of the R&D investment on the market value is higher for small firms" (Parcharidis and Varsakelis, 2010: 353).

Based on these studies and considering, as mentioned above, that in several works about innovation the TQ indicator has been adopted, we have developed the third research hypothesis:

H2a. : Financial performance as a market indicator (TQ) has a significant positive impact on R&DI.

Another branch of research concerns the study of the relationship between R&DI and ROE. Hsieh et al. (2003) found a positive relation between R&DI and companies' performance, and they highlighted an impact of R&D investment that was two times higher on market capitalization in comparison with the investment in tangible assets. Yeh et al. (2010) tested the effect of R&DI on firm performance for publicly traded Taiwanese information technology and electronic firms. The results showed that a single-threshold effect does exist, showing an inverted U-shaped correlation between R&DI and firm performance. Li (2012) examined the interrelations among R&DI and corporate performance. The results revealed that the empirical relation is nonlinear but "… its performance varies with the phase: prior R&D investments have a positive effect on current performance, and current R&D investment has a negative effect on current performance" (Li, 2012: 49).

Zhu et al. (2019) conducted sectorial research in the Chinese context. They analyzed "… 98 new energy companies listed in China's Shanghai and Shenzhen stock markets from 2012 to 2016 to conduct an empirical study to understand the relationship between their R&D investment intensity and their corporate financial competitiveness". The main result was that the R&D investment intensity has a significant positive relation with the financial competitiveness of Chinese new listed firms in the energy sector, and it also has a lag effect. Shamsuddin et al. (2021) presented similar results. They analyzed a sample of 45 active Malaysian listed companies for the period 2017–2019, and their final conclusion was that, for the Malaysian context, the association between R&DI and firm financial performance is significant.

Based on these works, we have developed the last research hypothesis:

H2b. : Financial performance as an accounting indicator (ROE) has a significant positive impact on R&DI.

3. Methodology

3.1. Sampling selection and data

In regard to the investigation perimeter, we excluded small and medium-sized firms, focusing on large non-financial listed firms with valid data about R&D expenses and strategic innovation plans (as mentioned above). The subsequent focus is on six Asian countries (China, Hong Kong, Malaysia, Singapore, South Korea, and Thailand), because (1) those six countries are leading actors in Eastern Asia who are currently adopting innovative strategic plans for the near and far future (the only relevant exception is for Japan, which represents a mature and not emerging industry), and (2) there are data available for related firms on the Eikon and Compustat databases, with a sample period from 2014 to 2020 (with the probable exclusion of the COVID-19 pandemic impact, due to the

Table 1
Distribution of the sample by country (period of observation: 2014–2020) (authors' calculations from Eikon and Compustat databases).

Country	No. of firms	No. of observations	% (No. of firms/total)
China	172	1204	18.14
Hong Kong	223	1561	23.52
Malaysia	115	805	12.13
Singapore	120	840	12.66
South Korea	208	1456	21.94
Thailand	110	770	11.60
Total	**948**	**6636**	**100**

tremendous uniqueness of this phenomenon: Cortez and Johnston, 2020; Petro, 2020; Ritter and Pedersen, 2020; Meunier et al., 2022).

Finally, we excluded firms with missing data or values. The final sample, shown in Table 1, consists of 948 firms from six Asian countries, with 6636 year-firm observations.

3.2. Variables and models

3.2.1. Dependent variables

Innovation management represents one of the main pillars of the structural capital of the firm that enables it to operate its strategic plans, with R&DE and R&DI referring to the knowledge that is embodied in organizational infrastructures and strategic innovation plans. In accordance with prior studies, we measured the innovation intensity variable using the two most common variables, namely R&DE and R&DI; more specifically, prior literature utilized the logarithm value of R&D expenses, while the latter measurements calculated the R&D expenses scaled by assets in total.

3.2.2. Independent variables

This study examines the effect of corporate performance on innovation intensity; we employed two of the most common financial and economic performance measurements used in the literature, namely TQ and ROE. Prior works have argued that corporate performance plays a vital role in certain aspects of the firm, such as strategic innovation plans, which widely depend on the financial and economic successfulness of the firm.

3.2.3. Control variables: Board composition and company characteristics

The structure of the board composition is one of the main factors that may have an impact on the innovative needs and strategic plans of a company, because its members have skills and experience in the decision-making process. For example, the level of governance, monitoring, and engagement of the board plays a vital role for the innovation strategies of the firm as well as to deliver useful information to the shareholders' decision-making needs.

Hence, we controlled for several variables that prior literature finds to be related to innovation intensity. More specifically, we included variables related to corporate governance, i.e., board size, meetings, and independence, as well as female representation and the presence of foreign directors on the board.

The scientific literature documents that firm characteristics influence the innovation intensity, so we also included some variables such as firm size, leverage, and liquidity. Table 2 shows a summary of the variables that have been employed in this study, while Fig. 1 depicts the structure of the research model.

3.2.4. Models

Concerning the R&DE measurement, the following logistic regression models have been adopted.

$$R\&DE_{i,t} = \beta_0 + \beta_1 TQ_{i,t} + \beta_2 BSIZ_{i,t} + \beta_3 \mathrm{BME}_{i,t} + \beta_4 \mathrm{BIND}_{i,t} + \beta_5 \mathrm{BFR}_{i,t} + \beta_6 \mathrm{BFD}_{i,t} + \beta_7 \mathrm{FSIZ}_{i,t} + \beta_8 \mathrm{LEV}_{i,t} + \beta_9 \mathrm{LIQ}_{i,t} + \beta_{10} YEAR + \varepsilon_{i,t} \quad (1)$$

$$R\&DE_{i,t} = \beta_0 + \beta_1 ROE_{i,t} + \beta_2 BSIZ_{i,t} + \beta_3 \mathrm{BME}_{i,t} + \beta_4 \mathrm{BIND}_{i,t} + \beta_5 \mathrm{BFR}_{i,t} + \beta_6 \mathrm{BFD}_{i,t} + \beta_7 \mathrm{FSIZ}_{i,t} + \beta_8 \mathrm{LEV}_{i,t} + \beta_9 \mathrm{LIQ}_{i,t} + \beta_{10} YEAR + \varepsilon_{i,t} \quad (2)$$

In regard to the R&D innovative intensity measurement, the following logistic regression models have been adopted.

$$R\&DI_{i,t} = \beta_0 + \beta_1 TQ_{i,t} + \beta_2 BSIZ_{i,t} + \beta_3 \mathrm{BME}_{i,t} + \beta_4 \mathrm{BIND}_{i,t} + \beta_5 \mathrm{BFR}_{i,t} + \beta_6 \mathrm{BFD}_{i,t} + \beta_7 \mathrm{FSIZ}_{i,t} + \beta_8 \mathrm{LEV}_{i,t} + \beta_9 \mathrm{LIQ}_{i,t} + \beta_{10} YEAR + \varepsilon_{i,t} \quad (3)$$

Table 2
Definition of the variables (authors' elaboration).

Variable	Definition
Dependent variables	–
R&D expenditure	The logarithm value of R&D expenses
R&D intensity	R&D expenses scaled by assets in total (represented as a ratio)
Independent variables	–
Tobin's Q	Debt (long-term) + market capitalization scaled by the book value of assets in total (represented as a ratio)
Return on equity	Net income scaled by equity of the shareholders (represented as a ratio)
Control variables	–
Board size	Number of board of directors
Board meetings	Number of board of directors' annual meetings
Board independence	Number of independent members in the board
Board female representation	Number of female directors scaled by board size (represented as a ratio)
Board foreign directors	Number of foreign directors scaled by board size (represented as a ratio)
Firm size	The logarithm value of assets in total
Firm leverage	Measured by debit ratio
Firm liquidity	Measured by current ratio

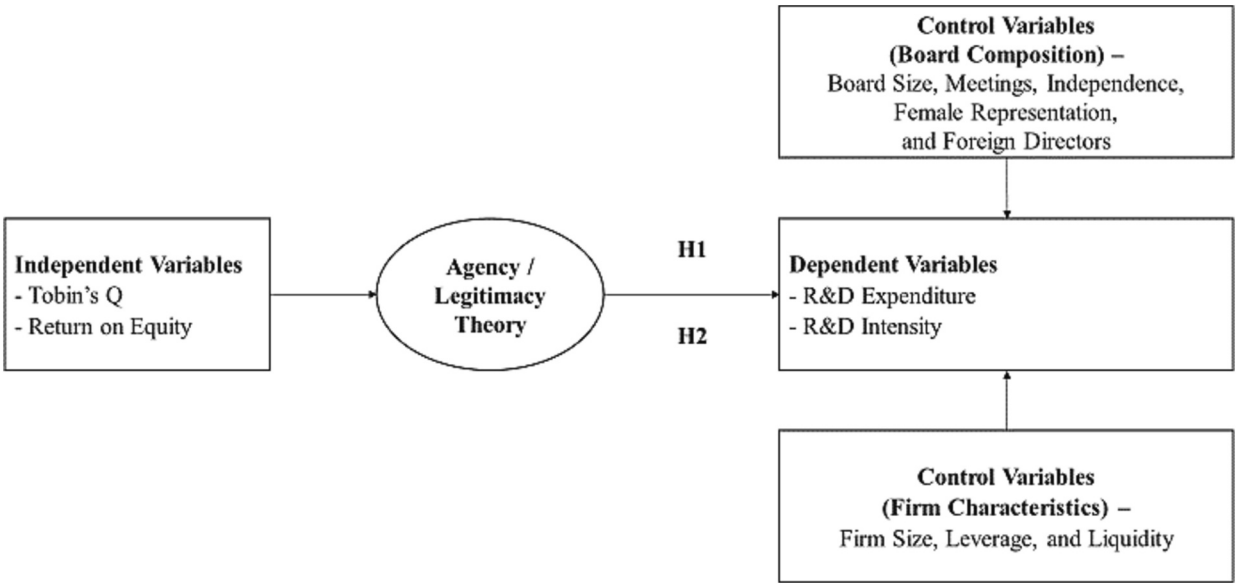

Fig. 1. The model under investigation (authors' elaboration).

$$R\&DI_{i,t} = \beta_0 + \beta_1 ROE_{i,t} + \beta_2 BSIZ_{i,t} + \beta_3 \mathrm{BME}_{i,t} + \beta_4 \mathrm{BIND}_{i,t} + \beta_5 \mathrm{BFR}_{i,t} + \beta_6 \mathrm{BFD}_{i,t} + \beta_7 \mathrm{FSIZ}_{i,t} + \beta_8 \mathrm{LEV}_{i,t} + \beta_9 \mathrm{LIQ}_{i,t} + \beta_{10} YEAR + \varepsilon_{i,t} \quad (4)$$

R&DE and R&DI refer to the dependent variables R&DE and R&DI, respectively. TQ and ROE refer to the independent variables as financial and economic performance indicators: Tobin's Q and return on equity.

Concerning the control variables, the board composition includes the board size (BSIZ), meetings (BME), independence (BIND), female representation (BFR), and the presence of foreign directors (BFD). The firm characteristics encompass the firm size (FSIZ), leverage (LEV), and liquidity (LIQ).

4. Empirical results

4.1. Descriptive statistics and correlation analysis

Table 3 presents the descriptive statistics of the study variables. The logarithm value of R&DE has a mean of 2.70, with a standard deviation of 1.13, while the mean of R&DI is 0.17, with a standard deviation of 0.09.

In terms of financial performance, the means of TQ and ROE are 1.22 and 0.46, respectively. This evidence indicates that the sample is profitable according to the market indicator.

The BSIZ mean is 7.31, while on average 0.51 of the board members are independent, and 0.25 are females. Finally, Table 3 also shows that the mean FSIZ, as the log of total assets, is 9.91, with a standard deviation of 1.12 (naturally, all other values are consistently reported).

We used a stepwise correlation analysis to determine the correlations among the model's variables. As Table 4 shows, the correlation coefficients between R&DE and R&DI on one side, and TQ and ROE on the other side, are positive and significant; at the same

Table 3
Summary statistics (authors' calculation).

Var.	Mean	Median	St. dev.	Min.	Max.
R&DE	2.70	2.51	1.13	0.00	4.91
R&DI	0.17	0.20	0.09	0.00	0.26
TQ	1.22	1.32	1.87	−0.45	4.45
ROE	0.46	0.55	0.41	−0.86	1.98
BSIZ	7.31	6.71	4.51	4.00	14.00
BME	9.11	10.41	3.71	3.00	12.00
BIND	0.51	0.49	0.21	0.15	1.00
BFR	0.25	0.28	0.13	0.00	0.67
BFD	0.31	0.35	0.29	0.00	0.77
FSIZ	9.91	8.71	1.12	2.31	13.31
LEV	0.67	0.77	0.71	0.00	0.97
LIQ	1.12	1.27	0.99	0.11	4.67

Table 4
Stepwise correlation (authors' calculation).

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. R&DE	1.000											
2. R&DI	0.181	1.000										
3. TQ	0.133**	0.266*	1.000									
4. ROE	0.147	0.187*	0.135*	1.000								
5. BSIZ	0.100	0.177*	0.131*	0.240*	1.000							
6. BME	0.131*	0.140*	0.124	0.130*	0.250	1.000						
7. BIND	0.150	0.137	0.135*	0.152*	0.292	0.177*	1.000					
8. BFR	0.188*	0.283	0.230*	0.218*	0.217	0.139	0.153	1.000				
9. BFD	0.135	0.152	0.149*	0.186*	0.155	0.197	0.138	0.163*	1.000			
10. FSIZ	0.139	0.136	0.103	0.146*	0.238	0.229*	−0.149*	0.170	0.133*	1.000		
11. LEV	0.155*	0.131*	0.121	0.107	0.112	−0.180*	0.156	0.161**	−0.198*	0.186*	1.000	
12. LIQ	0.110	0.238	0.183*	0.235*	−0.129	−0.111	−0.139	0.293*	0.160	−0.146*	−0.221**	1.000

NB *, ** show significance at the 0.05 and 0.01 level, respectively.

time, in general, the coefficient of the correlations among all the variables is very small (less than 0.30), without showing any multicollinearity issues.

4.2. Regression results and discussion

Table 5 shows the results for the relationships between the innovation management measurements and the corporate performance measurements employed in this study. Concerning the market indicator of financial performance (TQ), we found that the coefficient of R&DE and R&DI is positive at the 1 % significance level, which seems to provide reasonable support for accepting H1a and H2a.

However, in regard to the accounting indicator (ROE), the related models show only some association for R&DE, with a weak significance level (at 10 %) for R&DI, which does not seem to provide reasonable support for accepting H1b and probably offers only some support for barely accepting H2b.

4.3. Robustness tests

Statistically, endogeneity problems may exist. To address this possibility, we performed additional tests and used the generalized method of moments (GMM) model for the R&DI models (since R&DE data are factual and not proxy figures); more specifically, we expanded Equations No. 3 and No. 4 by adding the lag value of R&DI (L.R&DI) as an additional independent variable, as follows.

$$R\&DI_{i,t} = \beta_0 + \beta_1 L.R\&DI_{i,t} + \beta_2 TQ_{i,t} + \beta_3 BSIZ_{i,t} + \beta_4 \mathrm{BME}_{i,t} + \beta_5 \mathrm{BIND}_{i,t} + \beta_6 \mathrm{BFR}_{i,t} + \beta_7 \mathrm{BFD}_{i,t} + \beta_8 \mathrm{FSIZ}_{i,t} + \beta_9 \mathrm{LEV}_{i,t} + \beta_{10} \mathrm{LIQ}_{i,t} + \beta_{11} YEAR + \varepsilon_{i,t} \quad (5)$$

$$R\&DI_{i,t} = \beta_0 + \beta_1 L.R\&DI_{i,t} + \beta_2 ROE_{i,t} + \beta_3 BSIZ_{i,t} + \beta_4 \mathrm{BME}_{i,t} + \beta_5 \mathrm{BIND}_{i,t} + \beta_6 \mathrm{BFR}_{i,t} + \beta_7 \mathrm{BFD}_{i,t} + \beta_8 \mathrm{FSIZ}_{i,t} + \beta_9 \mathrm{LEV}_{i,t} + \beta_{10} \mathrm{LIQ}_{i,t} + \beta_{11} YEAR + \varepsilon_{i,t} \quad (6)$$

Table 6 shows the regression results for the GMM; the coefficients of TQ and ROE are positive and significant. Overall, the baseline findings seem to be consistent and robust, indicating that an endogeneity problem is not likely, while the results show better significance levels.

5. Implications

This study has provided evidence for the existence of potential relationships between financial (when measured considering TQ) and innovation performance (when evaluated in terms of innovation expenditure and innovation intensity), at least in the area under investigation, i.e., with all the potential limitations that have been mentioned above. Similar relationships cannot be proved from a statistical point of view when considering economic (and not financial) performance (when assessed with the ROE). The consequent implications, at the theoretical and practical levels, must therefore be highlighted.

Table 5
Results of the relationship between innovation measurements and corporate performance measurements ($N = 6636$) (authors' calculation).

	(1)	(2)	(3)	(4)
Variables	R&DE and TQ	R&DE and ROE	R&DI and TQ	R&DI and ROE
TQ	0.144***	–	0.156***	–
	[1.591]	–	[1.150]	–
ROE	–	0.343	–	0.171*
	–	[1.321]	–	[1.621]
BSIZ	0.015	0.025	0.022***	0.015*
	[1.041]	[1.114]	[1.913]	[1.831]
BME	0.351**	0.364	0.361**	0.315
	[1.141]	[1.903]	[1.451]	[1.254]
BIND	0.009	0.002	0.004	0.005
	[0.213]	[0.265]	[0.342]	[0.224]
BFR	0.063	0.224	0.031	0.039
	[2.030]	[1.240]	[1.061]	[1.333]
BFD	0.326***	0.242**	0.114***	0.123***
	[0.964]	[0.444]	[0.681]	[0.855]
FSIZ	0.186***	1.551**	0.126***	0.177*
	[1.521]	[1.218]	[0.811]	[0.976]
LEV	−0.320***	−0.905**	−0.668***	−0.397***
	[−1.703]	[−1.735]	[−1.977]	[−1.326]
LIQ	−0.505***	−0.379	−0.422***	−0.518***
	[−1.410]	[−0.631]	[−0.725]	[−1.231]
Industry and year	Yes	Yes	Yes	Yes
Adj. R2	0.393	0.220	0.464	0.255

NB *, **, *** denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively.

Table 6
GMM robustness test results (authors' calculation).

	(5)	(6)
Variables	R&DI and TQ	R&DI and ROE
L.R&DI	0.131***	0.151**
	[1.351]	[1.412]
TQ	0.121**	–
	[1.233]	–
ROE	–	0.171*
	–	[1.541]
BSIZ	0.016**	0.013*
	[1.412]	[1.512]
BME	0.211*	0.235
	[1.311]	[1.421]
BIND	0.003	0.002
	[0.242]	[0.194]
BFR	0.021	0.029
	[1.151]	[1.221]
BFD	0.134**	0.113**
	[0.421]	[0.715]
FSIZ	0.117**	0.194
	[0.711]	[0.613]
LEV	−0.412**	−0.277*
	[−1.752]	[−1.225]
LIQ	−0.361**	−0.421**
	[−0.625]	[−0.973]
Industry and year	Yes	Yes
Adj. R2	0.374	0.215

NB *, **, *** denote a two-tailed *p*-value of less than 0.10, 0.05, and 0.01, respectively.

From a scientific point of view, a potential syllogism seems to be emerging. In fact, a relationship between corporate and innovation performance is likely to exist, and it is apparently evident when using financial indicators (the companies under investigation are listed firms), while it is somehow not discernable when employing accounting indicators (the ROE is calculated from the balance sheets of the companies, listed or not).

Therefore, at least according to the methodology of this research, there are likely elements in the financial evaluations (of the market) that refer to resources that are not considered (or are included in a different way) in the accounting evaluations. In this vein, it seems evident that the effects of the contribution of the sampled companies' intellectual capital to their innovation performance are somehow perceived on the financial market, but they are not completely included – and sometimes they cannot be incorporated – in the accounting appreciation of their economic (and not financial) performance.

From a managerial point of view, this evidence (i.e., the underrated contribution of the intellectual capital from an accounting point of view) could provide support for better refining goals, strategies, and methodologies for adequately assessing the innovation management and its consequent performance. This necessity/opportunity is naturally evident for the company in general, to better highlight its real economic outcome, but it could have an effect for all the involved stakeholders; for example, for better appreciating the management-by-objectives compensation policies.

At the same time, with the financial indicators emerging as the most probable "communicators" of corporate innovation performance, it seems relevant to ask for more attention so that companies can better operate in terms of financial marketing and communication. In this respect, it is indispensable to analyze and develop appropriate methodologies, techniques, and tools for the innovative opportunities of the accounting operations connected to innovation management, for example, in relation to the expenses related to make the corporate innovations protected (e.g., patents) and/or protectable (e.g., advertising).

6. Limitations

The most relevant constraints for the large validity/reliability of this investigation concern two main aspects, namely the countries considered (China, Hong Kong, Malaysia, Singapore, South Korea, and Thailand) and the period of investigation. In both cases, future studies may support the augmentation of the relevance of the impact of this research, by providing evidence from other countries (to be selected with respect to the scope of analysis) and for larger time series (to be opportunely considered in the light not only of COVID-19, but also of the potential consequences to be ascribed to the increasing instability deriving from the war in Ukraine at the political, military, economic, industrial, and commercial levels).

In fact, another relevant limit of this research concerns the potential differences that may arise at the cultural level, i.e., in terms of cross-cultural management, whose problematics have not been investigated in this study to avoid the potential dispersion, from a conceptual point of view, of the main issues under analysis. The choice of the six countries (emerging Asian economies) may provide some support to limiting the huge impact of the cultural management issues, but it should be highlighted that, although similar, the six countries under analysis naturally possess different cultures, and future research should contribute to develop these aspects, for

example, by adopting the six dimensions of the Hofstede model.

Consequently, another possible limitation of this research could involve the potential verticalizations of analysis, i.e., with reference to a specific country (e.g., investigating only China, and then only Hong Kong, and then only Malaysia, and so on, eventually considering the abovementioned issues in terms of cross cultural management) and/or to a specific industry (in which it is natural that different internal and external strengths/weaknesses may exist) (Allred and Swan, 2005; Xu et al., 2021). In regard to this study, this level of detail has not been considered in order to better concentrate on the overall scope of analysis, and that is why it may present an interesting avenue for future research.

7. Conclusion

The transformation that characterized the global economy before the COVID-19 pandemic was mainly due to the unstoppable progress of technology, which is increasingly considered to be the basis of business innovation. During and after the most critical period of the pandemic, the demand for innovation was even more increased, with technology providing opportunities to overcome some of the pandemic limits, pushing the enterprises of each sector to innovate even more.

However, innovation is not useful on its own, and it must be able to contribute to the overall value of the business. At the same time, it is fundamental to explore, detect, and analyze the relationship between innovation and performance, and then between performance and innovation, with the aim of understanding if there is a virtuous connection that naturally feeds both sides of business development.

This study has provided evidence that financial indicators (TQ), more than accounting ones (ROE), are valid antecedents for predicting future innovation expenditure, and not necessarily for the consequent innovation intensity. In this vein, future studies, which may be more detailed in the analysis of the intensity dimension of innovation dynamics and even more focused on the potential relationships between innovation expenditure and intensity, could be useful to better highlight how the business transformation in progress could find solid roots in the economic and financial fundamentals of a single enterprise.

Declaration of competing interest

The Authors declare that the paper is compliant with ethical standards and that they have no conflicts of interest.

Data availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Matteo Rossi is an Associate Professor of Corporate Finance at the University of Sannio, Benevento (Italy), where he received the PhD degree in Management, and an Adjunct Professor of Advanced Corporate Finance at LUISS, Rome (Italy). He is the Editor-in-Chief for the International Journal of Managerial and Financial Accounting and for the International Journal of Behavioral Accounting and Finance. mrossi@unisannio.it.

Ghassan H. Mardini obtained his PhD from the University of Dundee (Scotland). Currently, he is a Faculty Member (Associate Professor) of the College of Business and Economics at the Qatar University (Qatar). His research interests are financial accounting, carbon accounting, international accounting standards, corporate governance, auditing, intellectual capital, and accounting education. ghassan.mardini@qu.edu.qa.

Niki Kyriakidou is a Senior Lecturer in Human Resource Management at the Leeds Business School of the Leeds Beckett University (UK). She is also the PhD Programme Leader and the Research Training Coordinator. She holds a BA Hons in Political Sciences and Public Administration from the University of Athens and has obtained a Master and PhD in Human Resource Management from the University of Leeds. She is also the Research Chair of the International Human Resource Management

Research Committee of the European and Mediterranean Business Institute. Her scientific interests revolve around Graduate Employment, Intercultural Leadership, Human Resource Development, Cross Cultural Management, Career Development and Soft Skills. n.kyriakidou@leedsbeckett.ac.uk.

Giuseppe Festa is an Associate Professor of Management at the Department of Economics and Statistics of the University of Salerno (Italy). He holds a PhD in Economics and Management of Public Organizations from the University of Salerno, where he is the Scientific Director of the Postgraduate Course in Wine Business and the Scientific Director of the Research Laboratory on "Food & Wine Communication and Reputation Management". He is the Chairman of the Euromed Research Interest Committee on Wine Business. His research interests mainly focus on wine business, information systems, corporate venture capital, and healthcare management. Giuseppe Festa is the corresponding author and can be contacted at: gfesta@unisa.it.