

Managerial ability and intellectual capital disclosure

MA and IC
disclosure

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Received 22 November 2020

Revised 18 April 2021

18 September 2021

Accepted 24 September 2021

Abstract

Purpose – While prior research in the area of intellectual capital (IC) disclosure has mainly focused on firm, board and audit committee characteristics, there is little research on whether managerial characteristics are associated with IC disclosure. This study aims to examine the relationship between managerial ability (MA) and the extent of IC disclosure.

Design/methodology/approach – The study sample comprises 1,098 firm-year observations of Iranian listed firms during 2012–2017. This study uses the checklist developed by Li *et al.* (2008) and adopts a content analysis approach and calculates the IC disclosure index in 62 dimensions within three categories: human capital, structural capital and relational capital. To measure MA, this study uses the managerial ability score (MA-Score) developed by Demerjian *et al.* (2012) for Iranian firms.

Findings – The results show that MA is significantly and negatively associated with the overall extent of IC disclosure and all the three components of IC (human capital, structural capital and relational capital). Further analysis shows that the interaction between MA and firm performance is positive and significant, suggesting that the negative relationship between MA and IC disclosure is less pronounced for high-performing firms. This study addresses the potential endogeneity issue by using the propensity score matching approach. The findings are also robust to the alternative measure of MA.

Originality/value – This study contributes to both the MA literature and the IC disclosure literature. To the best of the authors' knowledge, this study is the first to provide empirical evidence on the relationship between MA and IC disclosure.

Keywords Managerial ability, Corporate reporting, Intellectual capital disclosure, Agency conflicts, Corporate governance, Emerging market

Paper type Research paper

1. Introduction

Companies have been generating value not only from securities and financial assets but also from intangible assets, such as the skills of employees (human capital), technological innovation and breakthroughs (structural capital) and relationships with customers (direct relational capital), all of which are forms of potential intellectual capital (IC) (Su, 2014; Cruz-González *et al.*, 2014; Rossi *et al.*, 2021). The existing literature suggests that IC plays a significant role in improving the efficiency of both capital and labor markets (Petty and Guthrie, 2000; Bismuth and Tojo, 2008) and increasing the performance and wealth of organizations (Dumay and Roslender, 2013; Muttakin *et al.*, 2015). Some studies have benefited from stakeholder theory to highlight the usefulness of IC information disclosure and argues that it can reduce the asymmetric information and increases accountability

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Asian Review of Accounting
Emerald Publishing Limited
1321-7348
DOI 10.1108/ARA-11-2020-0180

(Yi and Davey, 2010; Mangena *et al.*, 2014; Nadeem, 2020). Moreover, the nondisclosure of IC information may lead to the higher cost of equity, increased earnings uncertainty and more significant distortions in earnings forecasts (Barus and Siregar, 2014; Boujelbene and Affes, 2013; Orens *et al.*, 2013; Kristandl and Bontis, 2007). Therefore, if firms disclose IC information, stakeholders' ability to evaluate the firm's capacity in terms of long-term value creation will be increased. However, the disclosure of IC information is voluntary, and an integrated IC reporting system in which (individual) investors can make better decisions about investments has not yet been developed.

Research on IC disclosure has mostly focused on firm-level and board/audit committee characteristics (e.g. Li *et al.*, 2008; Hidalgo *et al.*, 2011; Li *et al.*, 2012; Haji, 2015). However, evidence on whether top managers' characteristics are associated with IC disclosure is limited. This study extends the current literature by examining whether managerial ability (MA) (described as a manager's relative efficiency and capacity to convert resources into revenue) is associated with the extent of IC disclosure in an emerging market (Iran). We also examine the relationship between MA and the extent of IC disclosure in the three components of IC: human capital, structural capital and relational capital.

Upper echelons theory suggests that differences in managers' values and cognitive styles lead to their distinct decisions (Hambrick and Mason, 1984), particularly in complex situations (Bamber *et al.*, 2010). This theory explains that top managers' characteristics affect financial and nonfinancial outcomes (Hambrick and Mason, 1984; Hambrick, 2007). Therefore, we expect that MA as an important managerial characteristic (Demerjian *et al.*, 2013) will affect the disclosure of nonfinancial information. Prior studies indicate that MA has a positive effect on firm performance and the quality of disclosed information (e.g. Holcomb *et al.*, 2009; Demerjian *et al.*, 2013; Chen and Chen, 2020; Hasan, 2020). Since IC disclosure is crucial to create firm value (Nadeem, 2020), able managers may disclose IC information to signal their firms' good performance and sustainable competitive advantages.

However, in emerging markets such as Iran, where there are not strong monitoring mechanisms (both in the firm and capital market levels) (Oradi, 2021), agency problems would be more severe, and managers' personal goals might be in conflict with stakeholders' interests (Jensen and Meckling, 1976). In particular, top managers in Iran face fewer limitations and have greater discretion as to how much information they disclose to stakeholders compared with their counterparts in developed countries with effective monitoring systems (Oradi *et al.*, 2020). Thus, they might decrease the level of disclosures to protect their own benefits, resulting in lower IC information disclosure. Furthermore, top managers in such an environment are less likely to be concerned about firm-specific risk and are more likely to participate in a value-destroying operation.

We use a unique hand-collected dataset of firms listed on the Tehran Stock Exchange (TSE) over the time window 2012–2017. Based on a content analysis, we calculate the IC disclosure index in 62 dimensions within three categories: human capital, structural capital and relational capital disclosure (Li *et al.*, 2008). To measure MA, we use the managerial ability score (MA-Score) developed by Demerjian *et al.* (2012). Using 1,098 firm-year observations, we find that MA is significantly and negatively associated with the overall IC disclosure and all the three components of IC (human, structural and relational capital). The results are robust to the endogeneity test and the alternative measure of MA. Moreover, additional analysis shows that the negative relationship between MA and IC disclosure is less pronounced for firms with high profitability. In particular, the results of this study demonstrate that MA plays a major role in corporate reporting processes in an emerging market.

This study contributes to the literature on both MA and IC disclosure in several ways. First, this is the first study to investigate the relationship between MA and IC disclosure, and thus, this study adds to the extant literature. Second, this study provides a better

understanding of how MA affects the level of corporate disclosures in an emerging economy context. Our findings are consistent with principal-agent and proprietary cost theories, according to which MA might not serve as a useful internal governance mechanism in an emerging market such as Iran. Further analyses show that, consistent with agency theory, higher profitability can mitigate the negative impact of MA on IC disclosure, suggesting that lower agency costs can improve the level of disclosures by top managers. Third, most studies on IC disclosure have concentrated on developed countries such as the USA and the UK, where ownership structure is more diffused, and thus, governance structures enjoy ongoing oversight. Therefore, this study is one of the earliest attempts in the context of an emerging economy. Finally, IC information disclosure is of crucial importance to market participants because it shows a firm's true value and transparency level. Therefore, our study informs participants in Iran's capital market and other similar emerging markets about the role of managerial characteristics in IC disclosure.

The remainder of this paper is organized as follows. [Section 2](#) reviews related literature and discusses the institutional characteristics of Iran, and then develops the research hypothesis. [Section 3](#) presents the research design, including the sample selection procedure, the measurement of the dependent and primary independent variables and the model specification. [Section 4](#) reports empirical results, including main results, robustness tests and additional analyses. Finally, [Section 5](#) concludes the paper.

2. Literature review, institutional context and hypothesis development

2.1 Literature review

Today, IC plays a crucial role in enhancing the value of organizations in knowledge-based economies ([Edvinsson, 2013](#)). The success of organizations is related to their ability to extract value from their IC to gain maximum organizational benefits ([Muttakin et al., 2015](#)). In particular, IC information as one of the critical items of nonfinancial information plays an essential role in stakeholders' decisions ([Li et al., 2008](#)) and reveals the actual value of a firm via identifying new or hidden relations among different types of assets ([Haji, 2015](#)). Accordingly, the release of IC information has attracted attention from academics, regulators and stock market participants ([Li et al., 2012](#)). However, there is still no explicit regulation on IC reporting, and therefore, IC-related information is voluntarily disclosed ([Dumay and Cai, 2014](#)). This inconsistency causes difficulties for investors in evaluating firms, resulting in a lower amount of information concerning the value of IC investments. Accordingly, enhancing IC disclosures may result in a lower degree of information asymmetry between managers and investors and lead to a more accurate firm valuation ([Holland, 2003](#); [Li et al., 2012](#)). Prior literature suggests that a greater degree of IC information disclosure leads to a lower cost of capital ([Kristandl and Bontis, 2007](#); [Garanina and Dumay, 2017](#); [Salvi et al., 2020](#)) and increased stock market value ([Bismuth and Tojo, 2008](#)). Previous studies have also documented the determining factors of IC disclosure such as firm-specific characteristics (size, performance, complexity, etc.) (e.g. [Striukova et al., 2008](#); [Maaloul and Zéghal, 2015](#); [Goebel, 2019](#); [Sriram, 2020](#)) and corporate governance structure (board and audit committee characteristics) (e.g. [Cerbioni and Parbonetti, 2007](#); [Li et al., 2012](#); [Muttakin et al., 2015](#); [Haji, 2015](#); [Tejedo-Romero et al., 2017](#); [Nadeem, 2020](#)). Nevertheless, there is limited research on the impact of managerial characteristics on voluntary IC disclosure.

MA as an essential managerial characteristic mostly stems from a manager's knowledge of the market, corporate plans and technology ([Boeker, 1989](#); [Kor, 2003](#)). Capable managers are better at understanding technological and market dynamics, forecasting the product market accurately, investing in high profitable projects and managing employees compared with their counterparts ([Demerjian et al., 2012](#)). High-ability managers may gain more accurate information about investment opportunities, allowing them to make informed investment

decisions with a higher chance of success (Hasan, 2020). Since more able managers have a greater knowledge of the drivers of firm performance, they can better respond to economic pressures and the competitive market (Cui *et al.*, 2019; Hui and Matsunaga, 2015; Barrena-Martínez *et al.*, 2019), better utilize organizational resources (Demerjian *et al.*, 2013), have a higher capability to deal with environmental uncertainty and grasp favorable investment opportunities (Yuan *et al.*, 2017). Therefore, able managers are more likely to adopt innovative strategies, which may affect their risk-taking and interpretation of and response to environmental conditions (Tang *et al.*, 2015; Chen *et al.*, 2015; Yung and Chen, 2018). Extensive research in the fields of management, accounting and finance investigates the consequences of MA. For example, Demerjian *et al.* (2013) show that earnings quality is influenced by managerial abilities, and more able managers, who are highly knowledgeable about technology and operations, have greater abilities to forecast earnings. Furthermore, higher-ability managers are linked to a higher level of earnings smoothing (Demerjian *et al.*, 2020). Baik *et al.* (2011) find that MA is positively associated with corporate social responsibility, suggesting that managers with higher ability have more influence on firms' corporate social responsibility (CSR) performance. Koester *et al.* (2017) report that there is a significant relationship between managerial abilities and corporate tax avoidance activities. Chemmanur and Paeglis (2005) find that high-ability managers can improve firm performance because they may choose more profitable projects using initial public offering (IPO) proceeds. The findings of these studies mainly support upper echelons theory suggesting that MA affects corporate performance and reporting decisions (Hambrick and Mason, 1984; Hambrick, 2007).

2.2 Institutional context and hypothesis development

Although prior literature indicates that firms with able managers experience higher-quality disclosures and better performance, we argue that the consequences of able managers can be different depending on a country's institutional background, in our case, Iran. Similar to other emerging markets, the corporate sector in Iran is characterized by high ownership concentration, insufficient laws and regulations and relatively weak investor protection (Mashayekhi and Bazaz, 2008; Hesarzadeh and Rajabalizadeh, 2019), which leads to corporate governance failure in listed companies (Oradi *et al.*, 2021). Moreover, managers in Iranian firms experience fewer limitations and have lower compensation incentives than managers in developed countries with appropriate corporate governance practices. Thus, they have more freedom to play according to their characteristics and preferences, which affects the level of information disclosure. Agency theory states that managers may make decisions that help them pursue their own interests and ignore those of shareholders (Jensen and Meckling, 1976). According to this theory, potential conflicts of interests between managers and shareholders are generally due to the inability of owners to monitor managers effectively (Cerbioni and Parbonetti, 2007). Prior literature suggests that voluntary disclosures help to reduce information asymmetries and consequently agency conflicts, and weak corporate governance practices dissuade managers from disclosing IC information (e.g. Cerbioni and Parbonetti, 2007; Li *et al.*, 2012; Haji, 2015). In other words, weak corporate governance practices are the fundamental cause of managers' destructive behavior. Thus, in Iranian firms, the absence of strong monitoring mechanisms capable of protecting the interests of shareholders may induce able managers to disclose a lower degree of IC information so as to maximize their own benefits. Based on the above arguments, the research hypothesis is stated as follows:

- H1.* MA is negatively associated with the extent of IC information disclosure in the Iranian context.

We acknowledge that MA may be associated with a higher level of IC disclosure. For example, managers with higher abilities may have a tendency to disclose more IC information

with the intention of displaying their better performance. In this regard, [Hesarzadeh and Bazrafshan \(2019\)](#) show that firms with able CEOs are less likely to receive comment letters from the Securities and Exchange Organization of Iran, especially when the level of agency conflicts is low and the quality of corporate governance is high.

3. Research design

3.1 Sample selection

The research sample comprises nonfinancial firms listed on the TSE over the period from 2012 to 2017. All the required data are manually extracted from the comprehensive database of the Securities and Exchange Organization of Iran [\[1\]](#) (CODAL). We exclude delisted firms and firm-years with missing data required for running research models. Ultimately, after excluding the delisted firms and missing data, the final research sample consists of a cross-sectional time-series data set, including 1,098 firm-year observations from 183 firms (a balanced panel _ 6 years *183 firms). [Table 1](#) presents the sampling procedure and the sample breakdown by industry.

3.2 Measurement of IC disclosure

Following previous studies (e.g. [Li et al., 2012](#)), we use the content analysis approach and the checklist developed by [Li et al. \(2008\)](#) to measure the extent of IC disclosure. [Li et al. \(2008\)](#) developed a comprehensive list of IC information, including 61 disclosure items that fall into human capital, structural capital and relational capital categories (see [Table 2](#)). Notably, unlike other IC disclosure checklists presented in previous studies (e.g. [Bukh et al., 2005](#)), the mentioned checklist is more relevant to the Iranian environment and has been used in previous studies in Iran ([Rahmani et al., 2014](#)). Most of the prior IC disclosure research has used binary coding, which indicates the existence or nonexistence of IC items, to measure IC disclosure (e.g. [Petty and Guthrie, 2000](#); [Li et al., 2008](#); [Garanina and Dumay, 2017](#); [Nadeem,](#)

Panel A. Sample selection procedure

Description	Observations
Number of nonfinancial firms observations for the period 2012–2017	1,554
Less: firms that are not continuously	(97)
Less: missing data	(359)
Final sample	1,098

Panel B. Sample firm break down by industry

Industry	No. of firm-year observations	% Sample
Car	168	15.30
Nonmetallic minerals	48	4.37
Cement	96	8.74
Basic metals	108	9.84
Tile	42	3.83
Tire	36	3.28
Machinery	84	7.65
Chemical products	78	7.10
Food	78	7.10
Drug	132	12.02
Metallic minerals	42	3.83
Others	186	16.94
Total	1,098	100.00

Table 1.
Sample selection and
industry breakdown

Panel A. Variables names, measures and source of information

Variable acronym	Measure	Source
<i>Dependent variable</i>		
IC disclosure index	IC disclosure index based on Li et al. (2008) . The overall IC disclosure index (IC) is computed as the number of format items disclosed in the annual report divided by 61. The overall disclosure index is split into its three components: Human capital disclosure (HIC), structural capital disclosure (SIC) and relational capital disclosure (RIC)	Annual reports (AR)
<i>Independent variable</i>		
MA	Managerial ability-score from Demerjian et al. (2012)	AR
<i>Control variables</i>		
FSIZE	Natural logarithm of the client's total assets	AR
LEV	Total debt scaled by lagged total assets	AR
PROFITABILITY	Net income after tax divided by the total assets	AR
LNAGE	The natural logarithm of number of years the firm is establishment	AR
BOARDSIZE	The number of directors on the board of directors	AR
BOARDIND	The percentage of independent directors on the board of directors	AR
BOARDGD	1 if there is a female member on the board, otherwise 0	AR
FAMILY	The percentage of the firm's shares held by family members	AR
CONOWN	The percentage of a firm's outstanding shares that are owned by the largest shareholder	AR
<i>Additional variables</i>		
MA-Rank	The decile rank (by industry and year) of managerial ability	AR
MA dummy	1 if the managerial ability is higher than median and 0 otherwise	AR

Panel B. IC disclosure items

Human capital	Structural capital	Relational capital
1. Number of employees	1. Intellectual property	1. Customers
2. Employee age	2. Process	2. Market presence
3. Employee diversity	3. Management philosophy	3. Customer relationships
4. Employee equality	4. Corporate culture	4. Customer acquisition
5. Employee relationship	5. Organization flexibility	5. Customer retention
6. Employee education	6. Organization structure	6. Customer training and education
7. Skills/know-how/expertise/knowledge	7. Organization learning	7. Customer involvement
8. Employee work-related competences	8. Research and development	8. Company image/reputation
9. Employee work-related knowledge	9. Innovation	9. Company awards
10. Employee attitudes/behavior	10. Technology	10. Public relation
11. Employee commitments	11. Financial dealings	11. Diffusion and networking
12. Employee motivation	12. Customer support function	12. Brands
13. Employee productivity	13. Knowledge-based infrastructure	13. Distribution channels
14. Employee training	14. Quality management and improvement	14. Relationship with suppliers
15. Vocational qualifications	15. Accreditations (certificate)	15. Business collaboration
16. Employee development	16. Overall infrastructure/capability	16. Business agreements

Table 2.
Variables definitions
and research
instrument

(continued)

Panel B. IC disclosure items		
Human capital	Structural capital	Relational capital
17. Employee flexibility	17. Networking	17. Favorite contract
18. Entrepreneurial spirit	18. Distribution network	18. Research collaboration
19. Employee capabilities		19. Marketing
20. Employee teamwork		20. Relationship with stakeholders
21. Employee involvement with community		21. Market leadership
22. Other employee features		

Source(s): [Li et al. \(2008\)](#)

Table 2.

2020). We read through the annual reports (including financial statements and the board's reports) and manually extract the scores of firms' IC disclosure (1 if the firm discloses each item of the checklist, 0 otherwise). Finally, the score of IC disclosure for each firm is calculated by dividing the sum of disclosure scores by the total number of IC disclosure items. For each firm, we create four disclosure indices to capture the overall IC (IC), human capital (HIC), structural capital (SIC) and relational capital (RIC) disclosure. Regarding the collection of IC-related data, it should be noted that, at first, one of the researchers reviewed the financial statements and the board's reports of firms and carried out the process of the score assignment. Then, to enhance the reliability of the collected data, the other researcher randomly reviewed some of the financial statements and the board's reports of firms and checked the accuracy of the collected data. Furthermore, following [Li et al. \(2012\)](#), we compute Krippendorff's alpha ([1980](#)), which shows that the independent scores (not tabulated) are above 80%, and the content analysis is highly reliable.

3.3 Measurement of managerial ability

We expect more able managers to maximize resource efficiency and generate higher revenue. The efficiency with which managers produce revenues is an intuitively appealing criterion for evaluating managers as it is the overriding objective of profit-maximizing firms ([Demerjian et al., 2012](#)). To measure MA, we use the approach of [Demerjian et al. \(2012\)](#) to generate our MA-Score for our sample of Iranian firms. To this end, we adopt a two-step procedure to measure MA. In the first step, using data envelopment analysis (DEA), a nonlinear optimization procedure for evaluating the decision-making efficiency, we estimate total firm efficiency by solving an optimization model where sales are the output, and there are seven input variables: (1) property, plant and equipment; (2) operating lease; (3) research and development costs; (4) purchased goodwill; (5) other intangible assets; (6) cost of goods sold and (7) selling, general and administrative expenses. By doing this, we can identify firms that generate the highest level of revenue from given inputs. In the second step, we estimate MA from the firm efficiency measure. As the latter reflects both firm-level and manager-specific efficiency drivers, we follow [Demerjian et al. \(2012\)](#) method at the second phase by estimating for each industry a regression of firm efficiency on six firm characteristics that affect firm efficiency: firm size, firm market share, cash availability, firm age, business segment concentration and foreign operations. The residual from this regression is the MA-Score. It shows managers' ability to transform corporate resources into revenues compared with their industry counterparts. In the robustness tests, we use the decile rank (by industry and year) of MA-Sources as an alternative measure of MA ([Demerjian et al., 2012, 2013; Huang and Sun, 2017; Hesarzadeh and Bazrafshan, 2019; Hasan, 2020](#)).

3.4 Model specification

The research hypothesis is tested using the following ordinary least squares (OLS) model:

$$\begin{aligned} IC_{it} = & \alpha_0 + \alpha_1 MA_{it} + \alpha_2 FSIZE_{it} + \alpha_3 LEV_{it} + \alpha_4 PROFITABILITY_{it} \\ & + \alpha_5 LNAGE_{it} + \alpha_6 BOARDSIZE_{it} + \alpha_7 BOARDIND_{it} + \alpha_8 BOARDGD_{it} \\ & + \alpha_9 FAMILY_{it} + \alpha_{10} CONOWN_{it} + INDUSTRY + YEAR + \varepsilon_{it} \end{aligned}$$

The dependent variable is IC, as the measure of the extent of IC disclosure. The main variable of interest is MA, as captured by the MA-Score. We control for several determinants of IC disclosure identified by prior research (e.g. [Li et al., 2008](#); [Cerbioni and Parbonetti, 2007](#); [Li et al., 2012](#); [Haji, 2015](#); [Nadeem, 2020](#)). First, we control for firm characteristics including firm size (FSIZE), leverage (LEV), return on assets (PROFITABILITY) and firm age (LNAGE). We also control for firms' corporate governance factors and ownership structures, including board size (BOARDSIZE), board independence (BOARDIND), board gender diversity (BOARDGD), family ownership (FAMILY) and concentration ownership (CONOWN). Finally, we include industry (INDUSTRY) and year (YEAR) dummies in the regression to control for industry and year effects. [Table 2](#) provides the definitions for variables used in this paper.

4. Empirical results

4.1 Descriptive analysis and correlations

[Table 3](#) provides descriptive statistics. The mean IC disclosure index (IC) is 37.6% in a range between 15.8 and 64.2%. These findings are consistent with previous studies (e.g. [Bozzolan et al., 2003](#); [Striukova et al., 2008](#); [Li et al., 2012](#); [Nadeem, 2020](#)) and demonstrate that IC information is not extensively disclosed in the firms' annual reports. Among IC items, the mean human capital disclosure item (HIC) is 39.9%, which is significantly greater than the mean structural capital disclosure item (SIC) and the mean relational capital disclosure item (RIC) (35.2 and 34.4%, respectively). Also, [Table 3](#) shows that the mean value of MA is -0.005 , which is close to those reported in prior studies in the Iranian context ([Hesarzadeh and Bazrafshan, 2019](#)).

Regarding the control variables, the mean (median) values of firm size (FSIZE) and leverage (LEV) are 14.320 (14.055) and 59.2% (59%), respectively. Additionally, the means (medians) of return on assets (PROFITABILITY) and firm age (LNAGE) are 10.2% (9.2%)

Variable	N	Mean	Median	Std. dev.	Max.	Min.
IC	1,098	0.376	0.361	0.099	0.642	0.158
HIC	1,098	0.399	0.412	0.127	0.680	0.143
SIC	1,098	0.352	0.330	0.127	0.719	0.170
RIC	1,098	0.344	0.328	0.131	0.686	0.102
MA	1,098	-0.005	-0.020	0.180	0.559	-0.381
FSIZE	1,098	14.320	14.055	1.578	19.010	11.253
LEV	1,098	0.592	0.590	0.225	1.411	0.120
PROFITABILITY	1,098	0.102	0.092	0.135	0.514	-0.258
LNAGE	1,098	3.582	3.690	0.391	4.140	2.641
BOARDSIZE	1,098	5.034	5.000	0.260	7.000	5.000
BOARDIND	1,098	0.678	0.600	0.190	1.000	0.200
BOARDGD	1,098	0.070	0.000	0.255	1.000	0.000
FAMILY	1,098	0.059	0.000	0.165	0.791	0.000
CONOWN	1,098	0.726	0.771	0.187	0.982	0.145

Table 3.
Descriptive statistics

Note(s): This table presents summary statistics of variables used in main analyses. See [Table 1](#) for variable definitions

and 3.582 (3.690), respectively. The average board size (BOARDSIZE) is approximately 5.03 members, and 67.8% of directors are independent (BOARDIND). The mean board gender diversity (BOARDGD) in the sampled firms is 7.0%. With regard to ownership structure, the results show that the mean percentages of family ownership (FAMILY) and ownership concentration (CONOWN) are 5.9 and 72.6%, respectively. The mean control variables are generally consistent with the previous studies in the Iranian context (Hesarzadeh *et al.*, 2019; Oradi and Izadi, 2019; Hesarzadeh and Rajabalizadeh, 2019; Oradi *et al.*, 2020).

Table 4 reports Pearson correlations among the variables. A significant negative correlation between MA and IC provides initial evidence that MA might have negative effects on IC disclosure. Regarding control variables, IC is positively correlated with FSIZE, LEV and CONOWN and negatively correlated with BOARDSIZE, BOARDIND and FAMILY (all significant at $p < 0.01$). As each of the IC disclosure items (HIC, SIC, and RIC) is separately used in regression analyses, the high correlation among them does not raise concern regarding the potential effect of multicollinearity. To further check for the possibility of multicollinearity among the variables included in our models, we calculate the variance inflation factors (VIFs). The results (unreported) demonstrate that the highest VIF is below 2.5, suggesting that multicollinearity is not a problem in our data.

4.2 Regression results

Table 5 presents the results of the relationship between MA and IC disclosure. Model 1 reports the results of the overall IC disclosure (IC) model, and Models 2, 3 and 4 report the results for the individual components of IC disclosure (namely HIC, SIC and RIC). The results of Column 1 show that MA is significantly and negatively associated with the overall IC disclosure (coefficient -0.043 with t -statistic -2.72), suggesting that MA significantly reduces IC. Thus, H1 regarding the relationship between MA and IC disclosure is supported. In economic terms, a 1% increase in MA results in a 0.04% decrease in IC disclosure. Regarding the individual components of IC disclosure, the results of Columns 2–4 of Table 5 indicate that MA is significantly and negatively associated with HIC, SIC and RIC.

With regard to control variables, we find that firm size (FSIZE), leverage (LEV), return on assets (PROFITABILITY) and ownership concentration (CONOWN) are significantly and positively associated with the overall IC disclosure and all the three IC disclosure components, while board size (BOARDSIZE) is significantly and negatively associated with the overall IC disclosure (IC), HIC and RIC, and family ownership (FAMILY) provides mixed results. These findings are generally consistent with previous studies on corporate governance and IC disclosure (e.g. Cerbioni and Parbonetti, 2007; Li *et al.*, 2012; Haji, 2015).

4.3 Interaction between managerial ability and firm performance

Table 5 suggests that better-performing firms are more likely to disclose IC information. Thus, we investigate the moderating effect of profitability (PROFITABILITY) on the relationship between MA and IC disclosure. The IC and profitability relation can be defined based on the resource-based theory, according to which IC increases profitability and positively affects firm performance (Cuozzo *et al.*, 2017). The resource-based theory suggests that utilizing tangible and intangible assets improves firm performance (Alfraih, 2018). Previous studies find a significant positive relationship between IC and profitability (Cheng *et al.*, 2010; Mention and Bontis, 2013; Jordao and Almeida, 2017). Altogether, we expect the negative relationship between MA and IC disclosure to be less pronounced for better-performing firms. We include an interaction term (MA*PROFITABILITY) in our main model and report the results in Table 6. Consistent with our prediction, the coefficient on MA*PROFITABILITY is positive and significant (at the 5% level), showing that the MA-IC relation is less pronounced for firms with high levels of profitability.

Table 4.
Correlation analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
(1) IC	1.00							
(2) HIC	0.71***	1.00						
(3) SIC	0.81***	0.31***	1.00					
(4) RIC	0.76***	0.28***	0.54***	1.00				
(5) MA	-0.06*	-0.05*	-0.04	-0.05*	1.00			
(6) FSIZE	0.30***	0.21***	0.25***	0.22***	-0.01	1.00		
(7) LEV	0.21***	0.06**	0.19***	0.25***	-0.02	0.07**	1.00	
(8) PROFITABILITY	0.01	0.08***	-0.01	-0.05*	0.10***	0.10***	-0.61***	1.00
(9) LNAGE	-0.01	-0.06**	0.04	-0.01	-0.01	-0.03	-0.03	-0.08***
(10) BOARDSIZE	-0.11***	-0.06**	-0.14***	-0.06**	-0.00	0.07**	-0.05*	0.00
(11) BOARDIND	-0.10***	-0.02	-0.10***	-0.11***	-0.01	-0.01	-0.24***	0.19***
(12) BOARDGD	-0.02	-0.00	-0.00	-0.04	0.02	-0.03	-0.05*	0.09***
(13) FAMILY	-0.13***	-0.02	-0.10***	-0.19***	0.01	-0.24***	-0.08**	-0.03
(14) CONOWN	0.17***	0.11***	0.16***	0.12***	0.00	0.12***	0.12***	0.12***
Variables								
(9) LNAGE	1.00							
(10) BOARDSIZE	-0.04		1.00					
(11) BOARDIND	-0.10***		0.09***	1.00				
(12) BOARDGD	0.06**		0.15***	0.05*	1.00			
(13) FAMILY	0.03		0.02	-0.06**	0.05*	1.00		
(14) CONOWN	-0.09		-0.12***	-0.01	-0.02	-0.13***	1.00	1.00

Note(s): *, **, *** Significant at p -levels of less than 0.10, 0.05, and 0.01, respectively. See Table 1 for variable definitions

	Model 1 IC	Model 2 HIC	Model 3 SIC	Model 4 RIC	MA and IC disclosure
MA	−0.043*** (−2.72)	−0.051** (−2.29)	−0.039* (−1.93)	−0.039* (−1.77)	Table 5. Regression results: IC disclosure at both overall and component levels
FSIZE	0.017*** (9.28)	0.016*** (6.11)	0.014*** (5.96)	0.020*** (7.93)	
LEV	0.094*** (5.55)	0.068*** (2.90)	0.109*** (5.17)	0.106*** (4.55)	
PROFITABILITY	0.105*** (3.48)	0.127*** (2.99)	0.092** (2.42)	0.089** (2.14)	
LNAGE	−0.003 (−0.47)	−0.022** (−2.32)	−0.004 (−0.47)	0.013 (1.38)	
BOARDSIZE	−0.035*** (−3.43)	−0.030** (−2.09)	−0.010 (−0.84)	−0.064*** (−4.48)	
BOARDIND	−0.014 (−0.95)	0.010 (0.49)	−0.002 (−0.11)	−0.043** (−2.12)	
BOARDGD	0.005 (0.51)	0.006 (0.41)	−0.007 (−0.60)	0.016 (1.14)	
FAMILY	−0.026 (−1.58)	0.046* (1.93)	−0.107*** (−5.05)	−0.039* (−1.70)	
CONOWN	0.048*** (3.16)	0.038* (1.77)	0.041** (2.12)	0.063*** (2.98)	
CONSTANT	0.224*** (3.37)	0.312*** (3.35)	0.119 (1.44)	0.258*** (2.82)	
Industry effects	Yes	Yes	Yes	Yes	
Year effects	Yes	Yes	Yes	Yes	
Adj. R^2	0.247	0.110	0.280	0.189	
F (p -value)	14.34 (0.000)	6.04 (0.000)	16.84 (0.000)	10.47 (0.000)	
Observations	1,098	1,098	1,098	1,098	
Note(s): This table reports the results of the impact of managerial ability on intellectual capital disclosure. See Table 1 for variable definitions. Absolute value of t-statistics in parentheses *, ** and *** Significant at p-levels of less than 0.10, 0.05 and 0.01, respectively					

4.4 Robustness analyses

4.4.1 Endogeneity test. The endogeneity issue, mainly in the empirical corporate governance research (Dittmar and Mahrt-Smith, 2007; Bhagat and Bolton, 2008), occurs when the explanatory variables and the error term are correlated in the regression model, leading to biased and inconsistent parameter estimates. Studies including those of Yermack (1996) and Himmelberg *et al.* (1999) carry out a fixed-effects panel specification to reduce estimation concerns linked to endogeneity. Supposing that the unobservable characteristics are fixed over time for a specific firm, the researcher can employ a fixed-effects panel model to obtain

Dependent variable = IC	Coefficient	t -statistic
MA	−0.068***	−3.47
PROFITABILITY	0.111***	3.64
MA*PROFITABILITY	0.221**	2.17
FSIZE	0.017***	9.41
LEV	0.095***	5.65
LNAGE	−0.003	0.53
BOARDSIZE	−0.036***	3.47
BOARDIND	−0.012	−0.85
BOARDGD	0.005	0.55
FAMILY	−0.026	−1.55
CONOWN	0.048***	3.11
CONSTANT	0.221***	3.33
Industry effects		Yes
Year effects		Yes
Adj. R^2		0.249
F (p -value)		14.05 (0.000)
Observations		1,098

Table 6. Interaction between managerial ability and firm performance (PROFITABILITY). See Table 1 for variable definitions
*, ** and *** Significant at p -levels of less than 0.10, 0.05 and 0.01, respectively

consistent parameter estimates robust to unobservable heterogeneity. However, fixed-effects panel specifications only generate consistent parameter estimates under the assumption of strict exogeneity (Petersen, 2009). Therefore, we adopt another solution for dealing with endogeneity, i.e. propensity score matching (PSM), which has been used in several recent accounting studies to illustrate the sensitivity of previous multiple regression findings (Armstrong *et al.*, 2010, 2012; Lawrence *et al.*, 2011; Minutti-Meza, 2013). These studies highlight the effectiveness of pairing techniques in addressing concerns about structural issues in the underlying data, minimal overlap and nonlinear relations between variables that may compromise the validity of the estimates of average treatment effects in multiple regression models.

To implement the PSM approach, we first estimate the probability of selecting an able manager by employing probit regression of the MA_{dummy} variable against the determinants of IC disclosure. We then match, without replacement, a high-ability manager with a low-ability manager based on the closest fitted value (within 3%) taken from the first stage of probit estimation. In this case, firms with able managers (treated group) and firms without able managers (control group) should be similar in terms of IC disclosure determinants. The results in Panel A of Table 7 indicate that treated and control firms are statistically similar in variables known to affect IC disclosure. Next, we estimate Model 1 using the matched sample. The results in Panel B of Table 7 indicate that $MA_{matched}$ is significantly and negatively associated with IC at the 5% level. These findings are consistent with our main results and suggest that the possibility of endogenous relationships between MA and IC disclosure is faint.

4.4.2 Alternative measure of managerial ability. In the robustness test, we follow prior research in using the decile rank (by industry and year) of MA as an alternative specification of MA (Demerjian *et al.*, 2012, 2013; Huang and Sun, 2017; Hesarzadeh and Bazrafshan, 2019). The results of Table 8 show that the coefficient of the alternative proxy for MA (MA-RANK) is negative and significant, which indicates the robustness of our previous findings.

5. Discussion

Although there are no requirements regarding IC disclosure, firms can disclose IC information for different reasons such as facilitating the prediction of their future status, determining their intrinsic value, improving their status to utilize financing, mitigating information asymmetry and reducing the cost of capital and agency costs. However, agency theory suggests that corporate owners' and management's goals do not perfectly align. As a result, managers may be involved in opportunistic activities for personal gains (Verrecchia, 1983; Dye, 1985; Mishra, 2014). In particular, agency conflicts in a less developed corporate governance environment such as Iran are intensified, which increases the potential for managerial wrongdoing (e.g. Fan and Wong, 2005); thus, qualified managers may minimize voluntary IC disclosures to serve their own interests. Also, by reducing intellectual property disclosure, capable managers in a weak corporate governance environment can misuse information related to intangible assets and make transactions based on this information without informing other investors. Consistent with the above arguments, our primary analysis shows that more capable managers reduce IC disclosure in the Iranian information environment, and a negative and significant relationship is observed between these two variables.

In addition, we examine the effect of firm performance on the relationship between MA and IC disclosure for further investigation. We find that firms with better financial performance experience a positive and significant relationship between MA and IC disclosure. It is argued that firms with better performance (more profitable) have more effective corporate governance mechanisms (Battisti *et al.*, 2021), and therefore, managers cannot work toward opportunistic goals. This causes managers to strive for corporate goals and signal good corporate performance to the market through more voluntary disclosure (Wolk *et al.*, 2012).

Panel A. One to one matched sample			
	Treatment (<i>N</i> = 119)	Control (<i>N</i> = 119)	<i>p</i> -value
FSIZE	14.247	14.316	0.740
LEV	0.586	0.595	0.576
PROFITABILITY	0.096	0.083	0.474
LNAGE	3.578	3.613	0.369
BOARDSIZE	5.050	5.033	0.652
BOARDIND	0.688	0.690	0.930
BOARDGD	0.043	0.065	0.250
FAMILY	0.046	0.066	0.305
CONOWN	0.694	0.701	0.784
PSCORE	0.480	0.480	1.000

Panel B. Regression results with propensity score matched samples			
Dependent variable = IC	Coefficient		<i>t</i> -statistic
MA _{matched}	−0.070**		−1.98
FSIZE	0.016***		3.76
LEV	0.095**		2.33
PROFITABILITY	0.085		1.18
LNAGE	−0.012		−0.78
BOARDSIZE	−0.020		−0.94
BOARDIND	−0.021		−0.61
BOARDGD	−0.001		−0.05
FAMILY	−0.068		−1.64
CONOWN	0.075**		2.22
CONSTANT	0.223		1.46
Industry effects		Yes	
Year effects		Yes	
Adj. <i>R</i> ²		0.251	
<i>F</i> (<i>p</i> -value)		3.96 (0.000)	
Observations		238	

Note(s): This table reports the results of endogeneity test. See Table 1 for variable definitions

*, ** and *** Significant at *p*-levels of less than 0.10, 0.05 and 0.01, respectively

Table 7.
Endogeneity test

6. Conclusion

The voluntary disclosure of IC might be an essential tool that allows top managers to mask or overstate firm performance. Scholars link MA to firm performance outcomes and find a positive relationship between MA and firm performance. However, there is limited research on the relationship between MA and the disclosure of IC information. Using a sample of Iranian listed firms for the period 2012–2017, we find that MA is significantly and negatively associated with the overall IC disclosure and all the three components of IC (human, structural and relational capital). Our main results remain unchanged after performing several robustness analyses. Further analysis indicates that the interaction between MA and firm performance is positive and significant, showing that the negative relationship between MA and IC disclosure is less pronounced for high-performing firms.

Showing that MA is negatively associated with IC disclosure, this study contributes to the growing literature stream linking MA to corporate disclosures. Specifically, we provide evidence that capable managers increase information asymmetry as they reduce the disclosure of IC information. However, we document that MA may increase the disclosure of IC information for firms with high profitability levels. Our results demonstrate the significance of managerial characteristics in disclosing IC information, through which market participants can be informed of a firm's true value and transparency extent. Future studies

ARA	Dependent variable = IC		
	Coefficient	t-statistic	
	MA-RANK	−0.015*	−1.75
	FSIZE	0.017***	9.22
	LEV	0.093***	5.48
	PROFITABILITY	0.100***	3.30
	LNAGE	−0.003	−0.49
	BOARDSIZE	−0.036***	−3.46
	BOARDIND	−0.013	−0.89
	BOARDGD	0.005	0.51
	FAMILY	−0.027	−1.63
	CONOWN	0.049***	3.19
	CONSTANT	0.233***	3.48
	Industry effects	Yes	
	Year effects	Yes	
	Adj. R-squared	0.244	
	F (p-value)	14.13 (0.000)	
	Observations	1,098	

Table 8. Alternative measure of managerial ability

Note(s): This table illustrates the analyses of alternative measures of managerial ability. See Table 1 for variable definitions
 *, ** and *** Significant at p-levels of less than 0.10, 0.05 and 0.01, respectively

are encouraged to explore additional key aspects that may influence the relationship between MA and IC disclosure. Future research can also examine the effects of managers’ individual characteristics, such as materialism or narcissism, on IC disclosure.

There are two major limitations in this study, therefore, the findings presented herein should be interpreted with caution. The first is the MA measure based on the MA-Score developed by Demerjian *et al.* (2012), which is the most widely used in prior literature. This is an approximate measure of management performance, and we cannot rule out idiosyncratic abnormal performance reflecting in this measure. The second limitation concerns the measure of IC disclosure, which is extracted from a firm’s disclosure by the meta-analyzing method in this study and other studies, may not reflect all aspects of IC disclosure.

Note

1. www.Codal.ir

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