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State-Linked Political Exposure and Intellectual Capital Investment: The Moderating Role of Managerial Ability

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Abstract

This study examined the association between state-linked political exposure and intellectual capital investment, with particular attention to the moderating role of managerial ability. Drawing on research on political uncertainty, political connections, and state ownership, it considers firms' exposure to state influence through government ownership and dependence on long-term debt in Iran's state-influenced capital market. The analysis used an unbalanced panel of 156 non-financial firms listed on the Tehran Stock Exchange between 2013 and 2024. The hypotheses were tested with two-way fixed-effects panel regressions, one-year-lagged explanatory variables, and firm-clustered standard errors. The results indicated a negative association between state-linked political exposure and intellectual capital investment. Managerial ability positively moderated this relationship: the negative association is weaker among firms with more able managers. These findings suggested that managerial ability acts as an internal organizational capability through which firms can sustain long-term investment in intangible assets despite state-linked institutional constraints. The study added to the literature by examining how managerial capabilities may mitigate the adverse association between structural exposure to state influence and the allocation of resources to intellectual capital. The findings had implications for corporate managers and policymakers in Iran and other state-influenced emerging markets.

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1. Introduction

Intellectual capital investment, including expenditures on employee development, research and development, organizational systems, innovation, and relational capabilities, supports firms' efforts to sustain long-term competitiveness. However, such investment is particularly sensitive to external constraints because it is intangible, difficult to value, associated with delayed returns, and exposed to a high risk of failure (Sydler et al., 2014; Hoang and Tran, 2022). Unlike investment in physical assets, expenditures that create intellectual capital can often be postponed or reduced without immediately disrupting current operations. They are therefore especially vulnerable when firms face financing constraints, institutional intervention, or pressure to prioritize short-term stability. In state-influenced economies, government ownership, political intervention, and state-linked financing channels may consequently shape firms' willingness and ability to allocate resources to intellectual-capital-creating activities (Arshad et al., 2023).

Iran offers a relevant institutional setting in which to examine this issue. Corporate decisions in Iran are influenced by extensive government involvement, sanctions, exchange-rate volatility, inflationary pressures, policy instability, and a financial system in which state-linked ownership and financing channels remain important. In this environment, firms differ in their structural exposure to state influence. The study terms this condition state-linked political exposure, captured through government ownership and dependence on long-term debt. The construct is distinct from macro-level political risk, which reflects broad uncertainty arising from policy changes, sanctions, government instability, or geopolitical developments. It also differs from conventional political connectedness, which generally refers to personal, professional, or familial ties between political actors and firms' managers, directors, or shareholders. Instead, this study examines firm-level exposure to state influence through ownership and financing channels.

State-linked exposure can bring benefits as well as constraints. Firms connected to the state may obtain preferential access to financing, government support, or institutional protection. At the same time, they may experience greater policy intervention, reduced managerial autonomy, politically influenced resource allocation, and pressure to pursue non-commercial or short-term objectives (Fan et al., 2007; Lin et al., 2020; Tihanyi et al., 2019). These constraints are especially relevant to intellectual capital investment. Expenditures on training, innovation, organizational development, and relational capital typically produce few immediately observable outcomes and cannot easily be used as collateral. Consequently, state-linked owners or creditors that prioritize liquidity, employment preservation, politically desirable projects, or short-term financial stability may encourage firms to redirect resources away from long-term knowledge-based investment. Although state influence may have both positive and negative consequences, this study focuses specifically on whether its constraining dimension is associated with lower intellectual capital investment.

Research on investment under uncertainty lends support to this argument. Julio and Yook (2012), Banerjee and Dutta (2022), and Hoang and Tran (2022) show that political uncertainty and policy instability can reduce or delay long-term corporate investment by increasing financing costs, weakening managerial confidence, and encouraging firms to postpone difficult-to-reverse decisions. Choi et al. (2022) similarly report that firm-level political risk can reduce capital investment, although firms may use political strategies to mitigate part of this effect. These studies help explain why politically influenced institutional conditions can discourage long-term investment. However, they generally focus on broad political risk, policy uncertainty, or aggregate capital investment rather than on structural exposure to state influence through government ownership and debt dependence. They also do not specifically examine investment in intellectual-capital-creating activities. A related body of evidence comes from research on state ownership and political connections. Prior studies show that relationships with the state may improve access to finance and institutional support, but may also

weaken strategic flexibility, introduce non-market objectives, and increase political intervention in corporate decisions (Faccio, 2006; Shleifer, 1998; Fan et al., 2007; Lin et al., 2020). Most of this literature concentrates on firm value, financing access, governance quality, or operating performance. Much less is known about whether state-linked exposure influences the initial allocation of resources to intangible and knowledge-based investment. The distinction matters because intellectual capital investment is not merely an outcome of firm performance; it is a strategic resource-allocation decision that determines whether firms build human, structural, relational, and innovation capabilities over time.

Firms facing similar state-linked pressures, however, need not respond in the same way. External institutional constraints shape the investment environment, but their effect depends partly on firms' internal capacity to interpret those constraints, reorganize resources, and protect strategically important expenditures. This variation draws attention to managerial ability as a potential influence on firms' responses. Managerial ability refers to managers' competence in processing information, identifying opportunities, coordinating resources, and generating superior outcomes from the assets available to the firm (Demerjian et al., 2012; Sualeh Khattak et al., 2024). Capable managers may respond more effectively to state-linked constraints by allocating scarce resources efficiently, adapting financing and operating plans, improving internal controls, and preserving investments that generate long-term value.

The Resource-Based View offers one explanation for the moderating role of managerial ability. From this perspective, managerial ability represents a valuable internal capability that enables firms to deploy financial, human, and organizational resources more effectively under adverse external conditions. This capability is particularly important for intellectual capital investment because such expenditures are difficult to value, produce delayed returns, and are often among the first activities to be reduced during periods of constraint. High-ability managers may better distinguish essential intellectual capital projects from less productive expenditures, sequence projects according to strategic value, identify alternative funding sources, and integrate intangible investment with current operating priorities. In this way, managerial ability may help firms preserve investment in employee knowledge, innovation, organizational systems, and external relationships even when state-linked pressures restrict strategic discretion.

Agency Theory offers a complementary account. State-linked ownership and financing may create agency conflicts when politically influential owners, creditors, or institutions pursue objectives that differ from long-term value creation. These pressures may encourage managers to redirect resources toward visible, short-term, or politically desirable activities. Intellectual capital investment is particularly exposed to such conflicts because its benefits are uncertain, difficult to monitor, and not immediately reflected in accounting performance. More capable managers can mitigate these problems by improving information quality, strengthening internal controls, communicating the expected value of intangible expenditures, and providing more credible justification for their continuation. Managerial ability should therefore weaken, rather than eliminate, the negative association between state-linked political exposure and intellectual capital investment.

Existing research sheds some light on these relationships but leaves important questions unresolved. Rajabalizadeh and Oradi (2022) examine managerial ability and intellectual capital disclosure, while Huynh et al. (2024) and Kweh et al. (2025) provide related evidence on managerial ability under politically uncertain conditions. Wali Ullah et al. (2024) show that managerial ability can help firms reduce exposure to external risks through more efficient resource utilization, and Feng and Mohd Saleh (2024) emphasize the role of managerial competence in strengthening risk management and internal control. Nevertheless, these studies do not jointly examine whether managerial ability protects intellectual capital investment from the constraints associated with

structural state-linked exposure in Iran.

Three related gaps therefore remain. First, the political risk and policy uncertainty literature primarily examines macro-level uncertainty or broad corporate investment rather than firm-level exposure to state influence through ownership and financing channels. Second, the state ownership and political connections literature mainly focuses on performance, financing, governance, or firm value, with limited attention to long-term intangible investment decisions. Third, the intellectual capital literature has largely examined the performance, market-value, or risk consequences of intellectual capital, rather than the institutional conditions that affect firms' willingness and capacity to invest in its creation. The interaction between state-linked exposure, managerial ability, and intellectual capital investment therefore remains insufficiently understood, particularly in Iran's state-influenced capital market.

To address these gaps, this study examines whether firm-level state-linked political exposure, captured through government ownership and long-term debt dependence, is negatively associated with intellectual capital investment. It further investigates whether managerial ability weakens this negative association. The study therefore seeks to answer two questions: Is state-linked political exposure negatively associated with intellectual capital investment? Does managerial ability mitigate this relationship?

The study makes three contributions. First, it extends the state ownership and political influence literature by shifting attention from conventional outcomes, such as firm performance, financing access, and market value, to the allocation of resources to long-term intangible investment. Second, it contributes to the intellectual capital literature by identifying an institutional constraint that may affect the creation of intellectual capital rather than merely its subsequent outcomes. Third, it contributes to the managerial ability literature by showing how managerial competence may function as an internal buffering capability that protects difficult-to-value intangible investment under state-linked institutional pressures. These contributions are particularly relevant to Iran and comparable emerging markets in which government ownership, state-influenced financing, and institutional instability jointly shape corporate investment decisions.

The remainder of the paper proceeds as follows. Section 2 reviews the related literature and develops the hypotheses. Section 3 describes the data, variable measurement, and empirical models. Section 4 presents the empirical results and robustness checks. Section 5 concludes by discussing the findings, implications, limitations, and directions for future research.

2. Research background

2.1. State-Linked political exposure and intellectual capital investment

Previous empirical research identifies political and institutional conditions as determinants of corporate investment, particularly when investments are long-term, difficult to reverse, and associated with uncertain returns. Political uncertainty, policy instability, sanctions, and government intervention can increase financing costs, weaken managerial confidence, and encourage firms to postpone or reduce strategic investment commitments (Hoang and Tran, 2022; Banerjee and Dutta, 2022). These constraints may be especially consequential for intellectual capital investment because expenditures on employee development, research and development, organizational systems, and relational capabilities generate delayed and difficult-to-observe benefits. Consequently, such expenditures may be more vulnerable than tangible investments to short-term financial pressures and externally imposed resource-allocation priorities.

Evidence from research on investment under uncertainty generally supports a negative relationship between politically influenced uncertainty and corporate investment. Hoang and Tran (2022) and Banerjee and Dutta (2022) show that economic policy uncertainty and political risk can discourage

corporate investment by increasing uncertainty surrounding future returns and policy conditions. Choi et al. (2022) similarly find that firm-level political risk reduces capital investment, although firms may partially mitigate this effect through political strategies. Wang et al. (2024) report that higher geopolitical risk is associated with a substantial decline in firm-level investment. These findings suggest that politically influenced conditions can constrain firms' willingness to commit resources to long-term projects. However, these studies primarily examine broad political risk, policy uncertainty, or aggregate capital investment and therefore do not directly address intellectual capital investment or the structural state-linked exposure examined in this study.

Another strand of research examines how state ownership and political connections relate to corporate resource allocation. Relationships with the state may provide firms with preferential access to financing, government support, and institutional protection. At the same time, they may introduce non-market objectives, increase political intervention, and reduce firms' strategic autonomy (Fan et al., 2007; Lin et al., 2020; Tihanyi et al., 2019). These competing effects imply that state influence creates both potential benefits and constraints. Nevertheless, the constraining effects may be particularly important for intellectual capital investment because knowledge-based expenditures are difficult to value, cannot generally be pledged as collateral, and may be reduced without immediately interrupting current operations. Firms exposed to government ownership and state-influenced financing may therefore face greater pressure to prioritize liquidity, employment preservation, politically desirable projects, or other short-term objectives over investment in innovation and intangible capabilities.

These questions are particularly relevant in Iran's institutional environment. Government involvement, international sanctions, inflation, exchange-rate volatility, and state-shaped financing channels jointly influence firms' investment opportunities and resource-allocation decisions. In the Iranian context, Fazlzadeh (2017) demonstrates that intellectual capital components are relevant to investor assessments and investment decisions among firms listed on the Tehran Stock Exchange, highlighting the economic importance of knowledge-based resources in Iran's capital market. However, this study focuses on how investors evaluate intellectual capital-related information rather than on the institutional factors that influence firms' allocation of resources to intellectual capital creation. Similarly, while Wijayanti and Iswari (2020) and Zaighum et al. (2024) provide evidence concerning the risk and economic implications of intellectual capital, their studies focus mainly on the consequences of intellectual capital rather than on the barriers to investment in its creation. The present study therefore shifts attention from the outcomes of intellectual capital to the institutional conditions that influence firms' initial investment decisions.

Prior research therefore suggests that political uncertainty and state influence can restrict long-term corporate investment, while the characteristics of intellectual capital make it particularly vulnerable to politically directed resource reallocation. Yet existing studies have not directly examined whether firms that are simultaneously characterized by higher government ownership and greater dependence on long-term debt invest less in intellectual-capital-creating activities. In Iran's state-influenced capital market, this joint exposure may reduce managerial discretion and strengthen pressure to allocate resources toward short-term or non-commercial priorities. Therefore, the constraining effects of state-linked exposure are expected to outweigh its potential financing benefits with respect to intellectual capital investment. This reasoning leads to the first hypothesis:

H1: State-linked political exposure is negatively associated with intellectual capital investment.

2.2. The moderating role of managerial ability in the relationship between state-linked political exposure and intellectual capital investment

The effect of state-linked political exposure on intellectual capital investment may depend on firms' internal managerial capabilities. Although government ownership, dependence on state-influenced financing, and policy intervention can restrict strategic discretion and redirect resources toward short-term or non-commercial objectives, firms do not necessarily respond to these pressures in the same way. High-ability managers are generally better able to interpret external institutional constraints, allocate scarce resources efficiently, maintain strategic flexibility, and protect investments that create long-term value (Ghavamipour et al., 2025; Adarkwah and Benito, 2023; Bao and Cardoza, 2023). Managerial ability may therefore serve as an internal capability that determines the extent to which state-linked pressures translate into reductions in intellectual capital investment.

The Resource-Based View offers a theoretical foundation for this moderating relationship. From this perspective, managerial ability represents a valuable internal capability that enables firms to deploy and reconfigure financial, human, and organizational resources under adverse external conditions (Barney, 1991). This capability is particularly important for intellectual capital investment because expenditures on employee development, research and development, organizational systems, and relational capabilities generate delayed, uncertain, and difficult-to-observe returns. Unlike many tangible investments, these expenditures can often be reduced or postponed without immediately interrupting current operations. They are therefore especially vulnerable when state-linked owners or creditors pressure firms to preserve liquidity, achieve visible short-term outcomes, or redirect resources toward politically desirable objectives.

High-ability managers may protect intellectual-capital-creating expenditures through several resource-allocation mechanisms. They may identify which intangible projects are most strategically important, rank projects according to their expected long-term value, redesign operating budgets, and integrate intellectual capital investment with firms' immediate operational priorities. They may also identify alternative financing sources or implement projects in stages, thereby reducing the likelihood that valuable expenditures on training, innovation, organizational development, and stakeholder relationships will be completely eliminated during periods of institutional or financial pressure. Managerial ability can thus help firms preserve knowledge-based investments even when state-linked exposure limits available resources and managerial discretion.

Agency Theory provides a complementary explanation for this relationship (Jensen and Meckling, 1976). State-linked owners, creditors, or other influential institutions may pursue political, social, or short-term financial objectives that differ from long-term firm value creation. Intellectual capital investment is especially exposed to such agency-related pressures because its benefits are difficult to monitor, are not immediately reflected in accounting results, and cannot generally be pledged as collateral. Consequently, politically influential stakeholders may prefer visible projects with immediate outcomes over investments in employee knowledge, research and development, internal systems, or external relationships.

Capable managers may reduce these agency-related constraints by improving information quality, strengthening internal reporting and monitoring systems, and communicating the expected strategic benefits of intangible investment more credibly to owners, creditors, and other stakeholders. By quantifying expected benefits, specifying project milestones, and demonstrating the long-term consequences of reducing intellectual capital expenditures, high-ability managers can provide stronger justification for maintaining these investments. Improved transparency and internal control may therefore reduce information asymmetry and make it less likely that intellectual capital budgets will be displaced by short-term or non-commercial priorities.

Managerial ability may consequently weaken the negative association between state-linked political exposure and intellectual capital investment through three related channels. First, capable managers can allocate scarce resources more efficiently and preserve projects with the highest

strategic value. Second, they can reduce information asymmetry and improve the credibility of intellectual capital investment proposals. Third, they can strengthen risk management and organizational adaptability, enabling firms to respond to policy intervention, financing constraints, and institutional uncertainty without immediately reducing long-term knowledge-based expenditures (Wali Ullah et al., 2024; Feng and Mohd Saleh, 2024; Wang, 2023). These mechanisms connect managerial competence directly to the protection of intangible investment rather than merely to general firm performance.

The available empirical evidence offers some support for this argument. Huynh et al. (2024) and Kweh et al. (2025) suggest that managerial ability can mitigate the adverse consequences of political risk for intellectual capital investment in particular institutional and firm settings.

The effect of managerial ability may nevertheless differ across institutional and organizational settings. Rajabalizadeh and Oradi (2022), for example, report that managerial ability is negatively associated with intellectual capital disclosure across human, structural, and relational capital components, although this association weakens among high-performing firms. This finding indicates that the consequences of managerial ability may depend on reporting incentives, firm conditions, and institutional pressures. It does not, however, directly address whether capable managers preserve actual investment in intellectual-capital-creating activities under state-linked constraints. The present study therefore focuses on resource allocation rather than disclosure outcomes.

In Iran's institutional setting, intellectual capital investment is particularly vulnerable to state-linked pressures because it produces few immediately observable outputs, cannot usually serve as collateral, and may be reduced without disrupting current operations. Employee training, R&D, organizational development, and relational investment may consequently become likely targets when politically influenced owners or creditors demand short-term stability or the reallocation of resources. High-ability managers are better positioned to quantify the strategic value of these expenditures, communicate their expected benefits, sequence projects according to their importance, and obtain organizational or financial support for their continuation. Managerial ability is therefore expected to reduce the extent to which state-linked political exposure translates into cuts in intellectual capital investment. The second hypothesis follows:

H2: Managerial ability moderates the relationship between state-linked political exposure and intellectual capital investment, such that higher managerial ability weakens the negative association between state-linked political exposure and intellectual capital investment.

3. Materials and methods

This study employs an applied, descriptive-correlational design based on ex-post facto data. The statistical population includes all non-financial firms listed on the Tehran Stock Exchange (TSE) from 2013 to 2024.

Firms were selected purposively to ensure data availability and comparability. Specifically, (i) financial institutions were excluded due to their distinct regulatory frameworks, reporting standards, and capital structures that limit comparability with non-financial firms; (ii) firms with missing data on key variables were removed, as the construction of intellectual capital investment, state-linked political exposure, managerial ability, and control variables requires complete financial information; and (iii) firms with fewer than three consecutive years of observations were excluded to support reliable panel estimation and lagged variable analysis.

The resulting sample is an unbalanced panel of 156 firms and 1,716 firm-year observations. Because the 2013–2024 period includes major macroeconomic and political shocks, particularly the

intensification of sanctions, exchange-rate volatility, inflationary pressure, and policy instability after 2018, this study does not rely only on year fixed effects to assess time-period concerns. Beyond the year fixed effects included in the main models, sub-period analyses are conducted for 2013–2017 and 2018–2024 to examine whether the main findings remain stable across different macroeconomic and institutional conditions. These sub-period tests are interpreted as stability and sensitivity analyses rather than as a causal separation of macroeconomic shocks from ownership-structure effects.

All regressions were performed using EViews 13 and Stata 12 with firm-clustered standard errors. Continuous variables were winsorized at the 1st and 99th percentiles.

3.1. Models used to test the hypotheses

We estimate the following baseline panel regression models to test the hypotheses:

$$ICI_{i,t} = \alpha_0 + \beta_1 STATE_EXPOSURE_{i,t-1} + \sum \partial_K CONTROLS_{i,t-1} + FirmFE + YearFE + \varepsilon_{i,t} \quad (1)$$

$$\mathrm{ICI_{i,t}} = \mathrm{a_0} + \beta_1 STATE_EXPOSURE_{i,t-1} + \beta_2\,\mathrm{MA_{i,t-1}} + \beta_3\,(\mathrm{STATE_EXPOSURE_{i,t-1}} \times \mathrm{MA_{i,t-1}}) + \sum \delta_k\,\mathrm{Controls_{i,t-1}} + FirmFE + YearFE + \varepsilon_{i,t} \quad (2)$$

where ICI_{i}, t denotes intellectual capital investment for firm i in year t, as defined in Section 3.2. $STATE_EXPOSURE_{\mathrm{i}}, t_{-1}$ is the lagged state-linked political exposure variable, and MA_{i}, t_{-1} represents lagged managerial ability. The interaction term $\mathrm{S}TATE_EXPOSURE_{\mathrm{i}}, t_{-1} \times MA_{\mathrm{i}}, t_{-1}$ tests whether managerial ability moderates the association between state-linked political exposure and intellectual capital investment. Controls include firm size, leverage, profitability, cash holdings, sales growth, stock return, institutional ownership, board size, CEO duality, and firm age. Firm age is included as an additional control to reduce omitted-variable concerns, because older and younger firms may differ in accumulated intangible resources, disclosure practices, ownership structure, and exposure to state influence.

In the baseline models, firm size is measured as the natural logarithm of total assets, which is widely used in corporate finance research. However, because book assets may be affected by inflationary conditions and accounting revaluations in Iran, the robustness analysis also re-estimates the main models using the natural logarithm of sales as an alternative firm-size measure. Firm and year fixed effects are included to control for unobserved time-invariant firm characteristics and common macroeconomic shocks. Industry fixed effects are not separately included in the firm fixed-effects specification because they are absorbed by firm fixed effects. Because this study does not use an instrumental variable, natural experiment, or exogenous shock, the empirical design does not establish causal identification. To reduce endogeneity concerns, the explanatory variables are lagged by one year, firm fixed effects are included to control for time-invariant unobserved firm characteristics, and year fixed effects are included to control for common macroeconomic shocks. Standard errors are clustered at the firm level to account for heteroskedasticity and within-firm serial correlation. Nevertheless, these procedures do not fully eliminate the possibility of reverse causality or time-varying omitted variables. Accordingly, the results are interpreted as conditional associations rather than causal effects.

Several diagnostic tests were conducted to assess the regression specifications. Multicollinearity was examined using the correlation matrix and variance inflation factors (VIFs); all pairwise correlations were below 0.70 and all VIF values were below 3.5, indicating no serious multicollinearity concern. Heteroskedasticity and within-firm serial correlation were addressed by using firm-clustered standard errors. In addition, the normality of residuals was tested using the

Jarque-Bera test, which showed no significant deviation from normality. Outliers were controlled by winsorizing all continuous variables at the 1st and 99th percentiles. The diagnostic results indicate that the classical regression assumptions are reasonably satisfied.

The main independent variable is STATE_EXPOSURE. This variable is not a measure of political risk in the broad macroeconomic sense and should not be interpreted as a conventional political-connection measure based on managers' or directors' political backgrounds. Instead, it captures firm-level exposure to state influence through two structural channels in Iran's state-influenced economy: government ownership and long-term debt dependence. Following the political connectedness and state-influence literature (Fan et al., 2007; Lin et al., 2015), $STATE_EXPOSURE_{i,t_{-1}}$ equals one if both of the following conditions hold in year t−1: (i) the firm's long-term debt-to-total-debt ratio exceeds the annual cross-sectional sample median, and (ii) the firm's government ownership percentage exceeds the annual sample median; otherwise, it equals zero.

Annual median thresholds are used to classify firms relative to the cross-sectional distribution in each year. This approach reduces the influence of secular changes, inflation-related shifts in financial structure, and extreme observations over the 2013–2024 period. The approach is also useful in the Iranian capital market, where government ownership and debt structure may be highly skewed across firms. This measure should be interpreted as a firm-level proxy for exposure to state influence through ownership and financing channels, not as a direct proxy for aggregate political risk or as a conventional political-connection measure. Following common practice in corporate finance and state ownership studies when dealing with skewed distributions (e.g., Fan et al., 2007; Lin et al., 2015), we use the annual sample median as the cutoff point to identify firms with relatively high government ownership and long-term debt dependence. In the Iranian context, firms with greater state-linked exposure may simultaneously benefit from government support and face greater policy intervention, politically influenced financing, and reduced strategic flexibility. Because STATE_EXPOSURE is constructed using both government ownership and long-term debt dependence, it is important to ensure that the results are not driven by the specific binary classification used in the baseline model. Although long-term debt dependence may reflect greater reliance on state-influenced financing channels in Iran's bank-centered and state-influenced financial system, it may also capture general capital-structure differences across firms. We acknowledge that the annual median threshold is not the only possible classification rule and that it may raise concerns regarding firms located close to the cutoff and the loss of information from dichotomizing continuous variables. Accordingly, to reduce concerns about measurement validity, we conduct additional robustness tests using alternative measures of state-linked exposure. These include government ownership as a continuous variable, a government-ownership dummy based on the annual sample median, a specification that separately includes government ownership, long-term debt dependence, and their interaction, a continuous interaction between government ownership and long-term debt dependence, a stricter 75th percentile-based dummy, and an OR-condition dummy. In addition, we examine the stability of the baseline classification using a transition matrix. These analyses help assess whether the results are sensitive to the median-based binary construction of STATE_EXPOSURE.

Managerial ability (MA) is estimated using the two-stage procedure proposed by Demerjian et al. (2012). In the first stage, data envelopment analysis (DEA) under variable returns to scale is used to estimate firm efficiency within each industry-year. Sales revenue is treated as the output, while cost of goods sold, selling/general/administrative expenses, net property, plant and equipment, and other intangible-related inputs, including operating leases, lagged R&D expenses, goodwill, and other intangible assets where available, are used as inputs. Because some financial-statement items required in the original Demerjian et al. (2012) specification are not consistently disclosed in the Iranian capital market, the managerial ability estimation is based on the set of input variables that are consistently

available across the sample. Observations with insufficient data for estimating DEA efficiency are excluded. This approach facilitates comparisons across firms and reduces measurement error arising from inconsistent disclosure of certain managerial ability input variables.

In the second stage, DEA efficiency scores are regressed on firm-specific characteristics to separate managerial ability from firm-level structural characteristics. To clarify the estimation procedure, the second-stage regression used to obtain managerial ability is specified as follows:

$$Firm\ Efficiency_{i},t = \gamma_0 + \gamma_1\ SIZE_{i},t + \gamma_2\ Market\ Share_{i},t + \gamma_3\ Positive\ FCF_{i},t + \gamma_4\ Firm\ Age_{i},t + \gamma_5\ Business\ Segments_{i},t + \gamma_6\ Foreign\ Operations_{i},t + Industry\ FE + Year\ FE + \nu_{i},t$$

where $FirmEfficiency_{i},t$ is the DEA efficiency score for firm i in year t, $SIZE_{i},t$ is firm size, Market Share$_{i}$, t captures the firm's market share, Positive FCF_{i},t is an indicator variable equal to one for firms with positive free cash flow and zero otherwise, $Firm\ Age_{i},t$ is firm age, Business Segments$_{i}$, t captures business complexity, and Foreign Operations$_{i}$, t indicates foreign operations, where such information is available. $IndustryFE$ and $YearFE$ represent industry and year fixed effects, respectively. The residual ν_{i}, t from this regression is used as the managerial ability score. Therefore, managerial ability is defined as:

$MA_{i}, t = \nu_{i}, t$

Although the Demerjian et al. (2012) method is widely used in accounting and finance research, its application in Iran requires caution because sales revenue may be affected by inflation, sanctions, exchange-rate fluctuations, and other macroeconomic shocks. In this study, sales revenue is used only as the output in the first-stage DEA model and is not directly interpreted as managerial ability. Managerial ability is measured as the residual from the second-stage regression after controlling for observable firm characteristics, industry effects, and year effects. Accordingly, the measure captures the portion of firm efficiency that remains unexplained by these observable factors. Because macroeconomic shocks may nevertheless affect reported sales and financial-statement variables, the managerial ability measure should be interpreted as a proxy rather than a perfect measure of managerial talent.

A higher residual indicates that the firm achieves higher efficiency than expected based on its observable firm characteristics and therefore reflects higher managerial ability. Variable definitions are provided in Table 1.

3.2. Intellectual capital investment measure

We estimate intellectual capital investment using an expenditure-based accumulation approach adapted from the adjusted residual income framework developed by Sydler et al. (2014), because intellectual capital is not directly reported as a separate asset in firms' financial statements. Following this framework, intellectual-capital-creating expenditures in year t, denoted as IE t, are defined as the sum of labor expenses, research and development expenses, and advertising expenses:

Table 1 .Variable definitions

Variable category	Full variable name	Abbreviation	Definition / Measurement	Reference / Source
Dependent variable	Intellectual capital investment	ICI	Intellectual capital investment scaled by lagged total assets. Intellectual capital investment is estimated using IC-creating expenditures, including labor expenses, R&D expenses, and advertising expenses, with accumulation and amortization assumptions described in Section 3.2.	Sydler et al. (2014)

Main independent variable	State-linked political exposure	STATE_EXPOSURE	A binary variable equal to one if both the firm's long-term debt-to-total-debt ratio and government ownership percentage are above the annual sample median, and zero otherwise. This variable captures firm-level exposure to state influence through government ownership and debt dependence.	Adapted from Fan et al. (2007) and Lin et al. (2015)
Moderator	Managerial ability	MA	The residual from the second-stage regression in the Demerjian et al. (2012) procedure, after regressing DEA-based firm efficiency on observable firm characteristics. Higher residual values indicate higher managerial ability.	Demerjian et al. (2012)
Control variable	Firm size	SIZE	Natural logarithm of total assets. As a robustness check, the natural logarithm of sales is used as an alternative firm-size measure.	Fama and French (1992); Rajan and Zingales (1995)
Control variable	Firm age	AGE	Natural logarithm of one plus the number of years since the firm's establishment. If establishment year is unavailable, the number of years since listing on the Tehran Stock Exchange is used.	Fama and French (2001); Coad et al. (2013)
Control variable	Leverage	LEV	Total debt divided by total assets.	Rajan and Zingales (1995)
Control variable	Profitability	PROF	Net income or total earnings divided by total assets.	Fama and French (1992); Rajan and Zingales (1995)
Control variable	Cash holdings	CASH	Cash and marketable securities scaled by lagged total assets.	Opler et al. (1999)
Control variable	Sales growth	GROWTH	Annual growth rate of total sales.	Fama and French (1992); Rajan and Zingales (1995)
Control variable	Stock return	RETURN	Buy-and-hold stock return over the fiscal year.	Fama and French (1992)
Control variable	Institutional ownership	INST_OWN	Percentage of shares owned by institutional investors.	Bushee (1998)
Control variable	Board size	BOARD	Natural logarithm of the number of directors on the board.	Yermack (1996)
Control variable	CEO duality	CEO_DUAL	A binary variable equal to one if the CEO also serves as board chair, and zero otherwise.	Finkelstein and D'Aveni (1994); Yermack (1996)

Note: STATE_EXPOSURE captures firm-level exposure to state influence through government ownership and debt dependence. It should not be interpreted as a direct measure of macro-level political risk or as a conventional political-connection measure based on managers' or directors' political backgrounds. Binary variables include STATE_EXPOSURE and CEO_DUAL. AGE is included as an additional control variable to reduce omitted-variable concerns related to differences between younger and older firms.

(3)

$$IE_t = HE_t + RE_t + AE_t$$

where HE t represents labor expenses, RE t represents research and development expenses, and AE t represents advertising expenses. These expenditures are treated as investments that contribute to the creation of intellectual capital rather than as purely current-period expenses. The stock of intellectual capital is estimated recursively as follows:

(4)

$IC_t = \alpha IE_t + (1-\delta) IC_{t-1}$

where IC t is the estimated intellectual capital stock at the end of year t, α is the accumulation rate, and δ is the amortization rate. The accumulation rate captures the proportion of current intellectual-capital-creating expenditures that is capitalized into intellectual capital, while the amortization rate captures the annual depreciation or obsolescence of the intellectual capital stock.

Following Sydler et al. (2014), α and δ are conceptually firm- or context-specific parameters rather than universal constants. In the original framework, they are inferred empirically from the relationship among market value, book value, earnings, and intellectual-capital-related expenditures. We carefully considered estimating these parameters directly for the Iranian sample. However, reliable implementation of this procedure requires consistent firm-year disclosure of R&D, advertising, and other intellectual-capital-related expenditures, together with sufficiently stable accounting and market-value data. In the Iranian capital market, R&D and advertising expenditures are not disclosed consistently across firms and years and are frequently aggregated within broader operating-expense categories. In addition, chronic inflation, exchange-rate volatility, accounting revaluations, sanctions-related shocks, and abrupt changes in market valuations may materially affect book values, earnings, and market capitalization. Under these conditions, a direct nonlinear estimation of α and δ may generate unstable estimates that reflect disclosure inconsistencies and macroeconomic distortions rather than the underlying accumulation and obsolescence of intellectual capital. Accordingly, the baseline specification uses α=0.84 as a transparent benchmark accumulation rate and δ=0.10 as a conservative benchmark amortization rate. These parameters are not presented as estimates calibrated specifically to the Iranian market. Rather, they provide a reproducible baseline against which alternative parameter assumptions can be evaluated.

To limit dependence on any single parameterization and address potential measurement error, we reconstruct the intellectual capital stock using alternative accumulation rates of α=0.75 and α=1.00, as well as alternative amortization rates of δ=0.05, δ=0.15, and δ=0.20. These alternatives encompass both lower and higher accumulation and obsolescence assumptions relative to the baseline values. The estimated signs, statistical significance, and substantive interpretation of the main coefficients remain qualitatively unchanged across these specifications. Therefore, the study's conclusions do not depend on the specific choice of α=0.84 and δ=0.10. Nevertheless, the absence of empirically estimated Iran-specific parameters remains a measurement limitation and is acknowledged accordingly.

The main dependent variable, denoted as ICI_i, t, is calculated as the estimated intellectual capital stock scaled by lagged total assets:

(5)

$$ICI_t = \frac{IC_{i,t}}{TA_{i,t-1}}$$

where TA_i, t_{-1} denotes lagged total assets. Therefore, ICI_i, t should be interpreted as an investment-based measure of intellectual capital intensity, rather than as the current-year level of intellectual-capital-related expenditures alone. Scaling by lagged total assets reduces firm-size effects and improves comparability across firms. Because ICI_i, t is right-skewed and some observations are close to zero, we also use the following transformation as a robustness check:

(6)

$LNICI_{I,t} = \ln(1+ICI_{I,t})$

This transformation reduces skewness and avoids losing observations with very small or zero values. As an additional robustness check, we also estimate the models using Pulic's (2000) Value Added Intellectual Coefficient (VAIC) as a complementary intellectual capital efficiency proxy. VAIC is not treated as an equivalent substitute for the investment-based ICI measure because it

captures the efficiency with which intellectual and physical resources generate value rather than the amount of resources committed to intellectual capital creation. It is therefore used only as supplementary evidence on the robustness of the main conclusions. Data on labor expenses, R&D expenses, and advertising expenses are collected from annual financial statements and accompanying explanatory notes. When these items are separately disclosed, the reported values are used directly. When R&D or advertising expenses are not separately disclosed, observations are treated as missing unless the financial statements explicitly report zero expenditure. This conservative treatment avoids equating non-disclosure with zero investment and reduces downward measurement bias in intellectual-capital-creating expenditures. It also explains why direct estimation of the accumulation and amortization parameters is not sufficiently reliable with the available data.

4. Results and discussion

4.1. Descriptive statistics

Table 2 summarizes the descriptive statistics for the main variables. The initial sample includes 156 non-financial firms listed on the Tehran Stock Exchange over the 2013–2024 period, yielding a potential maximum of 1,872 firm-year observations. After applying the exclusion criteria and removing observations with missing data for the core variables, the final unbalanced panel consists of 1,716 firm-year observations. This reduction reflects the exclusion of observations with unavailable data required to construct intellectual capital investment, state-linked political exposure, managerial ability, and control variables. Because missing data may not be entirely random, potential sample-selection concerns are acknowledged and further considered in the robustness analysis. Given that the sample period includes major macroeconomic and institutional shocks, particularly after 2018, the stability of the main regression results across pre- and post-2018 sub-periods is further examined in the robustness analysis.

Table 2. Descriptive statistics for the research variables

Variable	Abbreviation	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
Intellectual capital investment	ICI	0.004	0.003	0.003	0.000	0.015	1.279	4.380
State-linked political exposure	STATE_EXPOSURE	0.422	0.000	0.494	0.000	1.000	0.312	1.097
Managerial ability	MA	0.012	0.008	0.029	-0.145	0.218	1.042	5.671
Firm size	SIZE	15.883	15.595	1.808	12.450	22.049	0.766	3.395
Firm age	AGE	2.944	2.996	0.514	1.099	4.007	-0.382	2.791
Leverage	LEV	0.598	0.607	0.287	0.066	1.805	0.489	4.171
Profitability	PROF	0.114	0.096	0.148	-0.368	0.566	-0.056	4.514
Cash holdings	CASH	0.041	0.031	0.039	0.001	0.235	2.700	11.724
Sales growth	GROWTH	0.374	0.366	0.379	-0.577	2.260	0.779	6.372
Stock return	RETURN	0.729	0.238	1.367	-0.668	6.844	1.987	7.125
Institutional ownership	INST_OWN	54.547	67.835	30.588	0.000	93.850	-0.724	2.072
Board size	BOARD	2.060	2.079	0.265	1.609	2.708	0.420	2.780
CEO duality	CEO_DUAL	0.166	0.000	0.373	0.000	1.000	1.788	4.200

Notes: STATE_EXPOSURE and CEO_DUAL are binary variables. For binary variables, the mean represents the proportion of observations equal to one. As a result, the mean value of STATE_EXPOSURE indicates that 42.2% of firm-year observations are classified as state-linked exposed, while the mean value of CEO_DUAL indicates that 16.6% of firm-year observations have CEO duality. STATE_EXPOSURE captures firm-level exposure to state influence through government ownership and long-term debt dependence. It should not be interpreted as a direct measure of macro-level political risk or as a conventional political-connection measure based on managers' or directors' political backgrounds. MA is the continuous managerial ability score estimated using the Demerjian et al. (2012) procedure. SIZE represents the

natural logarithm of total assets. AGE represents the natural logarithm of one plus firm age. BOARD represents the natural logarithm of the number of directors on the board and is reported consistently in logarithmic form in the descriptive statistics, correlation matrix, and regression models. All continuous variables are winsorized at the 1st and 99th percentiles.

Table 2 reports the descriptive statistics for the main variables, including mean, median, standard deviation, minimum, maximum, skewness, and kurtosis. The mean value of ICI is 0.004, indicating that intellectual capital investment is relatively low compared with lagged total assets. The positive skewness of ICI suggests a right-tailed distribution, driven by a small number of firms with relatively high intellectual capital investment. STATE_EXPOSURE has a mean of 0.422, indicating that approximately 42.2% of firm-year observations are classified as state-linked politically exposed based on government ownership and debt dependence. This variable is interpreted as a firm-level proxy for exposure to state influence through government ownership and long-term debt dependence, not as a direct measure of macro-level political risk or as a conventional political-connection measure. Managerial ability has a mean of 0.012 and a median of 0.008, with moderate positive skewness, indicating variation in managerial efficiency across firms. Leverage and profitability indicate moderate financial leverage and operating performance across the sample. Cash holdings remain relatively low on average, while stock returns and sales growth show greater dispersion, which is common in emerging capital markets. Most variables exhibit positive skewness and excess kurtosis, supporting the use of winsorization, firm fixed effects, year fixed effects, and firm-clustered standard errors in the regression analyses.

Table 3 reports the Pearson correlation matrix for the main variables. Pairwise correlations are generally low to moderate. The correlation between STATE_EXPOSURE and ICI is negative and statistically significant, providing preliminary evidence that firms with greater state-linked political exposure tend to have lower intellectual capital investment. By contrast, this correlation is descriptive and should not be interpreted as causal evidence. The correlation between STATE_EXPOSURE and SIZE is positive, suggesting that larger firms are more likely to be classified as state-linked politically exposed. This is consistent with the possibility that larger firms have stronger ties to state-influenced financing channels or government ownership structures. The correlation between MA and ICI is positive and significant, suggesting that firms with higher managerial ability tend to invest more in intellectual capital. However, the correlation between STATE_EXPOSURE and MA is weak, indicating that the two constructs capture different dimensions of firm characteristics. BOARD, measured as the natural logarithm of the number of directors on the board, shows low to moderate correlations with the other variables, indicating that it does not create multicollinearity concerns. The sign difference between the bivariate correlation and multivariate fixed-effects coefficient suggests that the profitability ICI relationship is sensitive to firm-level unobserved heterogeneity and other controls. Overall, the correlation coefficients do not indicate severe multicollinearity, as none exceed the conventional threshold of 0.70. This conclusion is further supported by VIF values below 3.5 in the main regression models.

Table 3. Pearson correlation matrix

VARIABLE	ICI	STATE_EXPOSURE	MA	SIZE	AGE	LEV	PROF	CASH	GROWTH	RETURN	INST_OWN	BOARD	CEO_DUAL
ICI	1.000												
STATE_EXPOSURE	-0.128***	1.000											
MA	0.182***	-0.048*	1.000										

SIZE	0.075*	0.352***	0.215**	1.00									
AGE	-0.061*	0.214***	-0.074*	0.286***	1.00								
LEV	-0.245***	0.148**	-0.102*	0.398***	0.176**	1.000							
PROF	0.210***	-0.065*	0.168**	0.285***	-0.096*	-0.320**	1.000						
CASH	0.092*	-0.038	0.075	-0.145**	-0.058	-0.210**	0.312***	1.000					
GROWTH	0.135**	0.022	0.098*	0.065	-0.118**	-0.088*	0.420***	0.180**	1.000				
RETURN	0.068	-0.015	0.142**	0.110*	-0.049	-0.095*	0.255***	0.065	0.310***	1.000			
INST_OWN	0.105*	0.220***	0.080	0.450***	0.241***	0.185**	-0.075*	-0.120*	-0.045	0.032	1.000		
BOARD	-0.038	0.160**	0.052	0.305***	0.154**	0.198**	-0.091*	-0.060	0.026	-0.013	0.267***	1.000	
CEO_DUAL	-0.055	0.085*	-0.032	0.120*	0.102*	0.095*	-0.045	-0.028	-0.018	-0.010	0.065	0.198**	1.00

Notes: Pearson correlation coefficients are reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. STATE_EXPOSURE captures firm-level exposure to state influence through government ownership and long-term debt dependence. It should not be interpreted as a direct measure of macro-level political risk or as a conventional political-connection measure based on managers' or directors' political backgrounds. SIZE represents the natural logarithm of total assets. AGE represents the natural logarithm of one plus firm age. BOARD represents the natural logarithm of the number of directors on the board. Correlations with absolute values greater than 0.70 would indicate potential multicollinearity concerns. No correlation coefficient exceeds this threshold. Variance Inflation Factors (VIFs) from both the baseline and moderation regression models are all below 3.5, confirming no severe multicollinearity, including in the model with MA and the interaction term STATE_EXPOSURE × MA.

4.2. Analysis of final models and hypothesis testing

4.2.1. Association between state-linked political exposure and intellectual capital investment

Table 4 reports the results of estimating Model (1), which examines the relationship between state-linked political exposure (STATE_EXPOSURE) and intellectual capital investment (ICI), controlling for firm-level characteristics, including firm age, firm fixed effects, and year fixed effects. Standard errors are clustered at the firm level. Industry fixed effects are not separately reported because they are absorbed by firm fixed effects.

Table 4. Regression results, baseline model: state-linked political exposure and intellectual capital investment

Variable	Coefficient	T-statistic	P-value
STATE_EXPOSURE	-0.001	-2.670	0.008***
FIRM SIZE	0.000	0.320	0.749
FIRM AGE	-0.000	-1.790	0.075*
LEVERAGE	-0.007	-4.980	0.000***
PROFITABILITY	-0.010	-3.890	0.000***
CASH HOLDINGS	0.001	0.720	0.472
SALES GROWTH	0.001	1.800	0.073*
STOCK RETURN	-0.000	-0.660	0.510
INSTITUTIONAL OWNERSHIP	0.000	1.540	0.124
BOARD SIZE	-0.000	-0.350	0.727
CEO DUALITY	-0.000	-0.770	0.442
C	0.009	2.040	0.042**
R^2	0.350		
ADJUSTED R^2	0.289		
F-STATISTIC	6.681		0.000***

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered by firm. Firm and year fixed effects are included but not reported. STATE_EXPOSURE is a firm-level proxy that captures exposure to state influence through government ownership and long-term debt dependence in Iran's state-influenced capital market. It should not be interpreted as a direct measure of aggregate political risk or as a conventional political-connection measure based on managers' or directors' political backgrounds.

The coefficient on STATE_EXPOSURE is negative and statistically significant ($\beta = -0.0011$, $t = -2.67$, $p = 0.008$), supporting Hypothesis 1. This result indicates a significant negative association between state-linked political exposure and intellectual capital investment after controlling for firm age and other firm-level characteristics. Economically, firms classified as state-linked politically exposed invest approximately 0.11 percentage points less in intellectual capital relative to lagged total assets than non-exposed firms. Given the low sample mean of ICI (0.004), this reduction represents approximately 27.5% of the average level of intellectual capital investment, suggesting that the association is economically meaningful. Importantly, this result should be interpreted specifically in relation to firm-level state-linked exposure through government ownership and debt dependence, rather than as evidence on aggregate political risk.

Among the control variables, leverage has a negative and statistically significant coefficient ($p < 0.01$), indicating that firms with higher debt burdens tend to invest less in intellectual capital. Profitability also has a negative and statistically significant coefficient ($p < 0.01$). This coefficient should be interpreted cautiously because profitability is included as a control variable rather than as the main variable of interest. One possible explanation is that more profitable firms may already possess accumulated intangible capabilities or may operate in more mature industries with lower demand for additional IC-creating expenditures. Another plausible explanation is that intellectual-capital-creating expenditures, such as R&D, advertising, and employee-related expenses, may reduce short-term accounting profitability while generating benefits over a longer horizon. Accordingly, the negative profitability coefficient may partly reflect a short-term accounting trade-off or potential reverse-causality concern. Because the present empirical design does not establish causal identification, this coefficient is interpreted as a conditional association rather than as evidence of a causal profitability–ICI relationship. Firm age is negative and marginally significant ($p < 0.10$), indicating that older firms may invest slightly less in intellectual-capital-creating activities than younger firms. Sales growth is positive and marginally significant ($p < 0.10$), suggesting that growing firms may have stronger incentives to invest in intangible assets. Institutional ownership is positive but statistically insignificant, and its economic magnitude is small. Firm size, cash holdings, stock return, board size, and CEO duality are statistically insignificant.

The model is statistically significant overall ($F = 6.681$, $p < 0.001$), with an R^2 of 0.350 and an adjusted R^2 of 0.289. The adjusted R^2 indicates moderate explanatory power, which is reasonable given that intellectual capital investment is influenced by several difficult-to-observe factors, including firm strategy, disclosure practices, managerial preferences, industry-specific innovation opportunities, and institutional constraints. Because the objective of this study is to examine conditional associations rather than to build a predictive model, the main inference is based on the sign, statistical significance, economic magnitude, and robustness of the key coefficients across alternative specifications. Because the model is estimated using panel fixed effects and firm-clustered standard errors, the Durbin-Watson statistic is not reported as the primary diagnostic for serial correlation. Serial correlation concerns are addressed through firm-clustered standard errors and additional robustness checks.

These findings are consistent with the general argument in the investment-under-uncertainty literature that institutional pressures and government intervention can discourage long-term and less reversible investment decisions. However, the empirical evidence in this study should be interpreted specifically in relation to firm-level state-linked exposure through government ownership and debt dependence in Iran's state-influenced capital market, rather than as evidence on aggregate political risk or conventional political connections. Although state-linked firms may theoretically receive advantages such as preferential access to financing, government support, or protection, the present study does not directly test these potential benefits or the full duality of state influence. Instead, the empirical analysis focuses on one specific outcome: intellectual capital investment. Accordingly, the findings should be interpreted as evidence that the constraining aspect of state-linked exposure is relevant for intellectual capital investment, rather than as a complete assessment of all potential benefits and costs of state influence. In addition, Iran's broader institutional environment, including sanctions, currency volatility, and abrupt policy changes, may intensify the constraints faced by state-linked firms. Accordingly, the negative coefficient on STATE_EXPOSURE is interpreted as evidence that firm-level exposure to state influence through government ownership and debt dependence is associated with lower intellectual capital investment, rather than as causal evidence on the effect of aggregate political risk on intangible investment.

4.2.2. Moderating role of managerial ability

Table 5 reports the results of the moderation model, which examines whether managerial ability moderates the relationship between state-linked political exposure and intellectual capital investment. Following the reviewer's concern regarding the simultaneous use of complementary managerial-ability dummy variables, the revised model uses the continuous managerial ability score and a single interaction term between state-linked political exposure and managerial ability. The model includes firm-level control variables, including firm age, firm fixed effects, and year fixed effects. Standard errors are clustered at the firm level.

Table 5. Regression results – moderating role of managerial ability

Variable	Coefficient	T-Statistic	P-Value
STATE_EXPOSURE	-0.002	-3.421	0.001***
MA	0.016	2.462	0.015**
STATE_EXPOSURE × MA	0.005	2.344	0.020**
BOARD	-0.000	-0.584	0.560
CASH HOLDINGS	0.001	0.372	0.711
CEO DUALITY	0.000	0.589	0.557
FIRM SIZE	0.000	0.061	0.951
FIRM AGE	-0.000	-1.836	0.068*
INSTITUTIONAL OWNERSHIP	0.000	0.521	0.603
LEVERAGE	-0.008	-6.512	0.000***
PROFITABILITY	-0.011	-5.104	0.000***
SALES GROWTH	0.000	1.284	0.201
STOCK RETURN	-0.000	-0.672	0.503
C	0.011	2.978	0.003***
R^2	0.363		
ADJUSTED R^2	0.301		
F-STATISTIC	6.812		0.000***

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Continuous variables

are winsorized at the 1st and 99th percentiles. Standard errors are clustered at the firm level. Firm and year fixed effects are included but not reported. STATE_EXPOSURE is a firm-level proxy that captures exposure to state influence through government ownership and long-term debt dependence in Iran's state-influenced capital market. It should not be interpreted as a direct measure of aggregate political risk or as a conventional political-connection measure based on managers' or directors' political backgrounds. MA is the continuous managerial ability score estimated using the Demerjian et al. (2012) procedure.

Table 5 presents the results of the revised moderation model, in which managerial ability is measured as a continuous variable and interacted with STATE_EXPOSURE. This specification addresses the concern that using separate high- and low-managerial-ability dummy interactions may create redundancy and misleading interpretation. The revised model, as a result, tests moderation through a single interaction term, STATE_EXPOSURE × MA. The model also controls for firm age to reduce omitted-variable concerns related to differences between younger and older firms. The coefficient on STATE_EXPOSURE is negative and statistically significant ($\beta = -0.0022$, $t = -3.421$, $p < 0.01$), indicating that, when managerial ability is held constant, firms with greater state-linked political exposure tend to invest less in intellectual capital. This result is consistent with the baseline findings and supports the argument that exposure to state influence through government ownership and debt dependence is associated with lower intellectual capital investment. The coefficient on managerial ability is positive and statistically significant ($\beta = 0.0169$, $t = 2.462$, $p < 0.05$), suggesting that firms led by more capable managers tend to maintain higher levels of intellectual capital investment. Most importantly, the interaction term STATE_EXPOSURE × MA is positive and statistically significant ($\beta = 0.0050$, $t = 2.344$, $p < 0.05$). This result indicates that managerial ability weakens the negative association between state-linked political exposure and intellectual capital investment. In other words, the marginal association between STATE_EXPOSURE and ICI is conditional on the level of managerial ability and can be expressed as:

$$\frac{\partial\, ICI}{\partial STATE_EXPOSURE} = \beta_1 + \beta_3\, MA$$

where β_1 is the coefficient on STATE_EXPOSURE and β_3 is the coefficient on the interaction term. Because β_1 is negative and β_3 is positive, the negative association between state-linked political exposure and intellectual capital investment becomes less severe as managerial ability increases. This supports Hypothesis 2. Economically, this finding suggests that managerial ability acts as an internal mitigating mechanism under politically influenced institutional conditions. Firms exposed to state influence may face policy intervention, politically shaped financing constraints, reduced strategic flexibility, or pressure to prioritize short-term objectives. Instead, high-ability managers appear better able to preserve investment in intellectual capital despite these constraints. Therefore, the results do not imply that managerial ability eliminates the negative association between state-linked political exposure and intellectual capital investment; rather, they show that managerial ability attenuates this negative association. Among the control variables, leverage remains negative and statistically significant, indicating that more highly leveraged firms invest less in intellectual capital. Profitability is also negative and significant, suggesting that more profitable firms in this sample may already possess accumulated intangible capabilities or may operate in more mature industries with lower demand for additional IC-creating expenditures. Firm age is negative and marginally significant, suggesting that older firms may invest slightly less in intellectual-capital-creating activities than younger firms. Other control variables, including firm size, cash holdings, stock return, institutional ownership, board, and CEO duality, are not statistically significant in the moderation model. Overall, the results in Table 5 provide evidence that managerial ability moderates the association between state-linked political exposure and intellectual capital investment, even after controlling for firm age. Consistent with the revised empirical specification, the moderation effect is interpreted through the

continuous managerial ability score and the marginal effect of STATE_EXPOSURE, rather than through separate and complementary high- and low-managerial-ability dummy variables.

4.3. Robustness checks

4.3.1. Stability of STATE_EXPOSURE classification

To examine whether the annual median-based construction of STATE_EXPOSURE creates artificial year-to-year reclassification, we construct a transition matrix comparing each firm's exposure status in year t−1 with its status in year t. This analysis evaluates whether firms remain in the same exposure category over time or frequently switch between exposed and non-exposed status due to small changes around the annual median thresholds.

Table 6. Transition matrix for STATE_EXPOSURE classification

STATE_EXPOSURE in year t−1	STATE_EXPOSURE = 0 in year t	STATE_EXPOSURE = 1 in year t	Total
0	720	160	880
1	110	530	640
Total	830	690	1,520

Notes: This table reports the year-to-year transition matrix for STATE_EXPOSURE classification. STATE_EXPOSURE equals one if both government ownership and long-term debt dependence are above their annual sample medians, and zero otherwise. The transition matrix is based only on consecutive firm-year observations for which STATE_EXPOSURE is available in both year t−1 and year t. Firm-year pairs with missing or non-consecutive observations are excluded from this transition analysis. The stability rate is calculated as (N0→0 + N1→1) / Total.

The transition matrix shows that 82.2% of firm-year transitions remain in the same STATE_EXPOSURE classification across consecutive years. Specifically, 720 observations remain non-exposed and 530 observations remain exposed from year t−1 to year t. This suggests that the annual median-based classification is reasonably stable over time and is not driven primarily by artificial year-to-year reclassification around the median thresholds. By contrast, some transitions from 0 to 1 and from 1 to 0 are observed, which is expected because the measure is based on time-varying government ownership and long-term debt-dependence conditions.

4.3.2. Alternative constructions of STATE_EXPOSURE

To address concerns regarding the measurement validity of the baseline STATE_EXPOSURE variable, we conduct robustness checks using alternative constructions of state-linked political exposure. The baseline measure classifies a firm as state-linked politically exposed when both its government ownership percentage and long-term debt-to-total-debt ratio are above their annual sample medians. Nevertheless, although this measure captures the joint presence of state ownership and debt dependence, it may raise two concerns. First, firms close to the annual median may be reclassified from one year to the next due to small changes around the cutoff. Second, converting continuous variables into a binary indicator may reduce information and statistical power. Accordingly, Table 7 reports several alternative specifications to examine whether the baseline findings are driven by the specific median-based binary construction of STATE_EXPOSURE.

The first specification replaces STATE_EXPOSURE with government ownership as a continuous variable. The second specification uses a government-ownership dummy equal to one if a firm's government ownership percentage is above the annual sample median, and zero otherwise. The third specification separates the two components of the baseline measure by including government

ownership, long-term debt dependence, and their interaction. The fourth specification uses the continuous interaction between government ownership and long-term debt dependence to preserve information on the intensity of state-linked exposure. The fifth specification uses a stricter dummy variable based on the 75th percentile thresholds of both government ownership and long-term debt dependence. The sixth specification uses an OR-condition dummy that equals one if either government ownership or long-term debt dependence exceeds its annual median. The baseline AND-condition is used because the study aims to identify firms that are simultaneously exposed to state influence through both ownership and financing channels. This stricter definition reduces the likelihood of classifying firms as state-linked solely because they have high long-term debt dependence but little state ownership, or because they have minor government ownership without meaningful dependence on state-influenced financing channels. However, because an OR-condition captures a broader form of exposure and may classify firms as state-linked when either channel is present, we include the OR-condition dummy as an additional robustness test.

Table 7. Robustness tests using alternative constructions of STATE_EXPOSURE

Variable	Continuous Government Ownership	Government Ownership Dummy	Separate Components	Continuous Interaction	75th Percentile Dummy	OR-condition Dummy
Government ownership	−0.000**	—	−0.000*	—	—	—
	(−2.210)	—	(−1.840)	—	—	—
Government ownership dummy	—	−0.001**	—	—	—	—
	—	(−2.360)	—	—	—	—
Long-term debt dependence	—	—	−0.000	—	—	—
	—	—	(−1.180)	—	—	—
Government ownership × Long-term debt dependence	—	—	−0.000**	−0.000**	—	—
	—	—	(−2.070)	(−2.150)	—	—
STATE_EXPOSURE_P75	—	—	—	—	−0.001**	—
	—	—	—	—	(−2.420)	—
STATE_EXPOSURE_OR	—	—	—	—	—	−0.000**
	—	—	—	—	—	(−2.060)
firm age	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-clustered standard errors	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,716	1,716	1,716	1,716	1,716	1,716
R^2	0.348	0.351	0.356	0.354	0.359	0.350
Adjusted R^2	0.289	0.291	0.295	0.293	0.297	0.290
F-statistic	6.612***	6.704***	6.758***	6.731***	6.845***	6.689***

Notes: This table reports robustness checks using alternative constructions of state-linked political exposure. The dependent variable is intellectual capital investment scaled by lagged total assets. The first specification uses government ownership as a continuous variable. The second specification uses a government-ownership dummy equal to one if a firm's government ownership percentage is above the annual sample median, and zero otherwise. The third specification separates the two components of the baseline STATE_EXPOSURE variable by including government ownership, long-term debt dependence, and their interaction. The fourth specification uses the continuous interaction between government ownership and long-term debt dependence to preserve information from the underlying continuous variables. The fifth specification uses STATE_EXPOSURE_P75, a stricter dummy equal to one if both government ownership and long-term debt dependence exceed their annual 75th percentile thresholds. The sixth specification uses STATE_EXPOSURE_OR, a dummy equal to one if either government ownership or long-term debt dependence exceeds its annual median. Controls include firm size, leverage, profitability, cash holdings, sales growth, stock return, institutional ownership, board, and CEO duality. Firm and year fixed effects are included but not reported. Standard errors are clustered at the firm level. t-

statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

The results in Table 7 are generally consistent with the baseline findings. Government ownership is negatively associated with intellectual capital investment when measured both as a continuous variable and as a dummy variable. In the separate-components specification, long-term debt dependence alone is negative but not statistically significant, whereas the interaction between government ownership and long-term debt dependence is negative and statistically significant. This pattern suggests that long-term debt dependence is not intended to represent state-linked exposure by itself. Rather, it becomes relevant when combined with government ownership, because the theoretical construct in this study refers to joint exposure through both ownership and financing channels. Therefore, the baseline AND-condition is not based on the assumption that each component must independently predict intellectual capital investment. Instead, it is designed to identify firms that are simultaneously connected to the state through ownership and dependent on long-term financing channels that may be shaped by state influence. The significant interaction term supports this joint-exposure interpretation. More importantly, the continuous interaction specification remains negative, suggesting that the intensity of state-linked exposure matters even when information from the underlying continuous variables is preserved. The 75th percentile-based dummy is also negative, indicating that the findings are not driven only by firms located close to the median thresholds. The OR-condition dummy produces qualitatively similar results, suggesting that the findings are not dependent solely on the baseline AND-condition. Overall, these robustness checks indicate that the main findings are not solely driven by artificial classification volatility or by the loss of information from dichotomizing continuous variables. Instead, the results remain consistent when state-linked exposure is measured using alternative ownership-based, component-based, continuous, and threshold-based specifications after controlling for firm age and other firm-level characteristics.

4.3.3. Alternative intellectual capital investment measures

To examine whether the main findings are sensitive to the measurement of intellectual capital, the moderation model is re-estimated using alternative intellectual capital investment and efficiency measures. First, we use ln(1+ICI) to reduce the influence of skewness and retain observations with very small or zero values. Second, we reconstruct ICI using alternative accumulation rates, $\alpha = 0.75$ and $\alpha = 1.00$, and alternative amortization rates, $\delta = 0.05$, $\delta = 0.15$, and $\delta = 0.20$, relative to the baseline assumptions of $\alpha = 0.84$ and $\delta = 0.10$. Third, we use VAIC as a complementary intellectual capital efficiency measure rather than a direct measure of intellectual capital investment. Table 8 shows that the coefficient on STATE_EXPOSURE remains negative, while the interaction term STATE_EXPOSURE × MA remains positive. For the ICI-based specifications, the results remain statistically significant and consistent across alternative transformations and alternative accumulation and amortization assumptions. In the VAIC specification, the coefficient on STATE_EXPOSURE remains negative but is significant only at the 10% level. This weaker significance is not unexpected because VAIC captures intellectual capital efficiency and value-added creation rather than direct intellectual capital investment. Accordingly, the VAIC result is interpreted as complementary and broadly consistent evidence, rather than as equally strong robustness evidence. Overall, the main findings are primarily supported by the ICI-based measures, while the VAIC specification provides weaker supplementary evidence. Accordingly, potential measurement sensitivity cannot be fully ruled out, especially when intellectual capital is proxied by an efficiency-based measure rather than by investment-based measures.

Table 8. Robustness checks using alternative intellectual capital investment and efficiency measures

VARIABLE	ln(1+ICI)	α = 0.75	α = 1.00	δ = 0.05	δ = 0.15	δ = 0.20	VAIC
STATE_EXPOSURE	-0.002**	-0.001**	-0.001***	-0.001**	-0.001***	-0.001***	-0.015*
	(-2.450)	(-2.280)	(-2.910)	(-2.360)	(-2.740)	(-2.800)	(-1.820)
MA	0.015**	0.014**	0.018**	0.016**	0.017**	0.018**	0.102**
	(2.310)	(2.220)	(2.490)	(2.380)	(2.510)	(2.560)	(2.140)
STATE_EXPOSURE × MA	0.004**	0.004**	0.005**	0.004**	0.005**	0.005**	0.031*
	(2.180)	(2.070)	(2.410)	(2.200)	(2.360)	(2.440)	(1.760)
firm age	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-clustered SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,716	1,716	1,716	1,716	1,716	1,716	1,716
R^2	0.361	0.352	0.363	0.354	0.358	0.360	0.327
Adjusted R^2	0.301	0.292	0.303	0.294	0.298	0.300	0.265
F-statistic	6.92***	6.71***	6.98***	6.74***	6.83***	6.87***	5.94***

Notes: This table reports robustness checks using alternative intellectual capital investment and efficiency measures. The dependent variable in the first column is the natural logarithm of one plus intellectual capital investment, LN(1+ICI). The columns α = 0.75 and α = 1.00 reconstruct intellectual capital investment using alternative accumulation rates. The columns δ = 0.05, δ = 0.15, and δ = 0.20 reconstruct intellectual capital investment using alternative amortization rates. In each sensitivity specification, only the parameter reported in the column heading is changed, while the remaining parameters are kept at the baseline values of α = 0.84 and δ = 0.10. VAIC is included as a complementary intellectual capital efficiency measure and should not be interpreted as an equivalent substitute for the investment-based ICI measure. All models include the same control variables as the baseline model, firm fixed effects, year fixed effects, and firm-clustered standard errors. t-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9. Sub-period analysis before and after 2018

VARIABLE	BASELINE MODEL 2013–2017	BASELINE MODEL 2018–2024	MODERATION MODEL 2013–2017	MODERATION MODEL 2018–2024
STATE_EXPOSURE	-0.000*	-0.001***	-0.001**	-0.002***
	(-1.780)	(-3.120)	(-2.080)	(-3.550)
MA	—	—	0.012*	0.019**
	—	—	(1.720)	(2.510)
STATE_EXPOSURE × MA	—	—	0.003*	0.006**
	—	—	(1.680)	(2.360)
FIRM SIZE	0.000	0.000	0.000	0.000
	(0.240)	(0.410)	(0.150)	(0.340)
FIRM AGE	-0.000	-0.000*	-0.000	-0.000*
	(-1.310)	(-1.860)	(-1.450)	(-1.940)
LEVERAGE	-0.006***	-0.008***	-0.007***	-0.008***
	(-3.360)	(-5.010)	(-3.640)	(-5.820)
PROFITABILITY	-0.009***	-0.011***	-0.010***	-0.012***
	(-2.870)	(-4.460)	(-3.090)	(-4.910)
CASH HOLDINGS	0.001	0.001	0.000	0.001
	(0.390)	(0.650)	(0.360)	(0.690)
SALES GROWTH	0.000	0.001*	0.000	0.000
	(1.160)	(1.720)	(0.880)	(1.280)
STOCK RETURN	-0.000	-0.000	-0.000	-0.000
	(-0.360)	(-0.730)	(-0.320)	(-0.650)
INSTITUTIONAL OWNERSHIP	0.000	0.000	0.000	0.000
	(0.680)	(1.420)	(0.360)	(0.710)
BOARD	-0.000	-0.000	-0.000	-0.000
	(-0.200)	(-0.490)	(-0.350)	(-0.590)
CEO DUALITY	-0.000	-0.000	0.000	0.000
	(-0.430)	(-0.840)	(0.330)	(0.630)

C	0.008* (1.790)	0.009** (2.220)	0.010** (2.270)	0.012*** (3.120)
FIRM FIXED EFFECTS	Yes	Yes	Yes	Yes
YEAR FIXED EFFECTS	Yes	Yes	Yes	Yes
FIRM-CLUSTERED SE	Yes	Yes	Yes	Yes
OBSERVATIONS	715	1,001	715	1,001
R^2	0.321	0.376	0.334	0.390
ADJUSTED R^2	0.253	0.317	0.266	0.332
F-STATISTIC	5.216***	6.901***	5.421***	7.102***

Notes: This table reports the sub-period sensitivity analysis before and after 2018. The dependent variable is intellectual capital investment (ICI) scaled by lagged total assets. The pre-2018 period covers 2013–2017, while the post-2018 period covers 2018–2024. The baseline model includes STATE_EXPOSURE and the full set of firm-level control variables. The moderation model includes STATE_EXPOSURE, managerial ability (MA), the interaction term STATE_EXPOSURE × MA, and the same control variables. Control variables include firm size, leverage, profitability, cash holdings, sales growth, stock return, institutional ownership, board, and CEO duality. Firm and year fixed effects are included in all specifications but are not reported. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

4.3.4. Sub-period analysis before and after 2018

To address concerns that the estimated association may be affected by major macroeconomic and political shocks during the sample period, we conduct a sub-period analysis before and after 2018. The year 2018 is used as a practical breakpoint because it marks a period of intensified sanctions, exchange-rate volatility, inflationary pressure, and policy instability in Iran. Although year fixed effects control for shocks common to all firms in a given year, they may not fully capture structural differences in the estimated association across distinct macroeconomic regimes. Therefore, we re-estimate the baseline and moderation models separately for 2013–2017 and 2018–2024. This test should be interpreted as a stability and sensitivity analysis rather than a causal identification strategy.

Table 10. Robustness Check Using an Alternative Firm Size Measure

VARIABLE	Baseline Model Using ln(Sales)	Moderation Model Using ln(Sales)
STATE_EXPOSURE	−0.001*** (−2.610)	−0.002*** (−3.280)
MA	— —	0.016** (2.390)
STATE_EXPOSURE × MA	— —	0.004** (2.250)
SIZE_SALES	0.000 (0.340)	0.000 (0.220)
Firm age	Yes	Yes
Other controls	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Firm-clustered standard errors	Yes	Yes
Observations	1,716	1,716
R^2	0.342	0.356
Adjusted R^2	0.283	0.295
F-statistic	6.54***	6.67***

Notes: This table reports robustness results using the natural logarithm of sales as an alternative measure of firm size. The dependent variable is intellectual capital investment scaled by lagged total assets. The baseline model includes STATE_EXPOSURE and the full set of firm-level controls. The moderation model includes STATE_EXPOSURE, MA,

the interaction term STATE_EXPOSURE × MA, and the same firm-level controls. Firm-level controls include firm age, leverage, profitability, cash holdings, sales growth, stock return, institutional ownership, board size, and CEO duality. Firm and year fixed effects are included in all specifications but are not reported. Standard errors are clustered at the firm level. t-statistics are reported in parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9 reports the results of the sub-period analysis. The baseline model is estimated separately for the pre-2018 and post-2018 periods, and the moderation model is also re-estimated for both sub-periods. This allows us to examine whether the negative association between STATE_EXPOSURE and ICI, as well as the moderating role of managerial ability, remains stable across different macroeconomic conditions.

Table 9 reports the sub-period sensitivity analysis before and after 2018. The results show that STATE_EXPOSURE remains negatively associated with ICI in both sub-periods, while the magnitude and significance of the coefficient are stronger during 2018–2024. This suggests that the negative association between state-linked exposure and intellectual capital investment became more pronounced under intensified sanctions, exchange-rate volatility, and policy instability after 2018. The moderation results also show that MA is positively associated with ICI and that the interaction term STATE_EXPOSURE × MA remains positive, particularly in the post-2018 period. These findings support the stability of the main results and suggest that managerial ability plays a stronger mitigating role under heightened macroeconomic and institutional pressure.

4.3.5. Alternative firm size measure

To address the concern that book assets may be affected by inflationary conditions and accounting revaluations in Iran, we re-estimate the baseline and moderation models using the natural logarithm of sales instead of the natural logarithm of total assets as the firm-size control. The baseline specification retains the natural logarithm of total assets because it is widely used in corporate finance research, while this robustness test examines whether the main results are sensitive to the measurement of firm size. The results remain qualitatively unchanged. STATE_EXPOSURE remains negatively associated with ICI, and the interaction term STATE_EXPOSURE × MA remains positive and statistically significant. These findings indicate that the main conclusions are not driven by the use of book assets as the firm-size proxy.

5. Discussion

5.1. State-Linked political exposure and intellectual capital investment

The results provide strong support for Hypothesis 1, showing a statistically significant and economically meaningful negative association between state-linked political exposure and intellectual capital investment ($\beta = -0.0011$, $p = 0.008$). Firms classified as state-linked invest approximately 27.5% less in intellectual capital relative to the sample mean. This finding aligns with the investment-under-uncertainty framework (Julio and Yook, 2012; Banerjee and Dutta, 2022), which posits that institutional pressures and government intervention increase perceived risks and reduce managerial discretion over long-term, irreversible investments.

In Iran's state-influenced capital market, the constraining effects of government ownership and dependence on long-term debt appear to dominate any potential benefits from preferential financing or state support. Government ownership often introduces bureaucratic oversight, policy-driven resource allocation, and reduced strategic autonomy, while reliance on long-term debt channels primarily from state-owned banks further limits managerial flexibility in allocating resources to high-risk, intangible projects. These results are consistent with international evidence on political connections and state ownership (Fan et al., 2007; Lin et al., 2020; Tihanyi et al., 2019), yet extend

this literature by focusing on a firm-level structural measure of exposure rather than personal political ties or macro-level uncertainty. Importantly, the negative relationship remains robust across multiple alternative specifications of state-linked exposure, sub-period analyses (pre- and post-2018), and different measures of intellectual capital investment. This robustness strengthens confidence that the observed pattern reflects genuine institutional constraints rather than measurement artifacts.

5.2. The moderating role of managerial ability

The findings strongly support Hypothesis 2. The positive and significant interaction term between state-linked political exposure and managerial ability ($\beta = 0.0050$, $p = 0.020$) indicates that higher managerial ability meaningfully attenuates the negative effect of state exposure on intellectual capital investment. This result is particularly pronounced in the post-2018 period, characterized by intensified sanctions and macroeconomic volatility. This moderating effect is theoretically grounded in upper echelons theory and the resource-based view. High-ability managers, as measured by the Demerjian et al. (2012) residual approach, possess superior information-processing capabilities, resource allocation efficiency, and risk management skills. These competencies enable them to better navigate institutional pressures, protect strategic investments in human, structural, and innovation capital, and maintain long-term value creation even under constrained conditions. The finding complements recent studies (e.g., Huynh et al., 2024) while highlighting the amplified importance of managerial talent in highly state-dominated emerging economies.

6. Conclusion

This study investigated the relationship between state-linked political exposure measured through government ownership and long-term debt dependence and intellectual capital investment among non-financial firms listed on the Tehran Stock Exchange from 2013 to 2024. The findings indicated that state-linked political exposure is negatively associated with intellectual capital investment. Since the study relies on observational panel data, these findings should be interpreted as conditional associations rather than causal effects. Managerial ability significantly weakens this negative relationship, suggesting that managerial competence functions as an internal organizational capability that helps firms preserve long-term intangible investment under state-linked institutional constraints.

6.1. Theoretical contributions

First, the study introduced and validated a firm-level structural proxy for state influence that is conceptually distinct from both aggregate political risk and conventional political connections based on personal ties. By combining government ownership and long-term debt dependence, the proposed measure captures firms' structural exposure to state influence through ownership and financing channels rather than broad political uncertainty.

Second, the study extended the intellectual capital literature by shifting attention from performance outcomes to the institutional drivers and barriers that influence firms' initial allocation of resources to intellectual-capital-creating activities. The distinction matters because intellectual capital investment is a strategic resource-allocation decision rather than merely an outcome of firm performance.

Third, the study contributed to the managerial ability literature by demonstrating its buffering role against external institutional pressures in a highly state-influenced emerging-market context. Drawing on the Resource-Based View and Agency Theory, the findings suggested that capable managers can protect intangible investment by prioritizing strategically valuable projects, improving the credibility of investment proposals, reducing information asymmetry, and adapting resource-

allocation decisions to institutional and financing constraints.

6.2. Practical implications

For corporate managers, the findings underscored the strategic value of recruiting and developing high-ability managerial teams. In environments characterized by strong state influence, managerial competence is particularly important for sustaining long-term investment in employee development, innovation, organizational systems, and relational capabilities. Boards of directors should therefore consider managerial ability as a determinant of operating efficiency and a capability for protecting long-term intangible investment when evaluating executive appointments and succession decisions, particularly in state-linked firms.

For policymakers and regulators in Iran and comparable institutional settings, the findings suggest several practical measures:

- Require more disaggregated disclosure of intellectual-capital-related expenditures, including R&D, employee training, advertising, software development, and other innovation-related costs, in the notes to financial statements.
- Improve transparency regarding the source, terms, and institutional origin of long-term financing facilities so that dependence on state-influenced credit channels can be distinguished from ordinary corporate borrowing.
- Develop reporting guidelines that distinguish direct government ownership from indirect or quasi-governmental ownership through pension funds, public foundations, state-affiliated investment companies, and other institutional entities.
- Design incentive mechanisms that encourage state-owned and state-influenced firms to maintain knowledge-based investment during periods of financial pressure rather than reallocating resources exclusively toward short-term or politically aligned objectives.
- Encourage inflation-adjusted and more comparable reporting of intellectual-capital-related expenditures to reduce measurement distortions caused by chronic inflation and exchange-rate volatility.

6.3. Limitations

Several limitations should be acknowledged. First, although lagged explanatory variables, firm and year fixed effects, firm-clustered standard errors, and extensive robustness tests are employed, the observational nature of the data does not permit strong causal inference. Reverse causality and time-varying omitted variables may therefore remain.

Second, intellectual capital investment is estimated using financial-statement data that are subject to disclosure limitations in the Iranian capital market. R&D and advertising expenditures are not consistently reported as separate items across firms and years, and non-disclosure cannot always be distinguished from the absence of expenditure. This limitation may introduce measurement error into the construction of intellectual-capital-creating expenditures.

Third, the accumulation and amortization parameters used to construct intellectual capital stock are benchmark assumptions rather than parameters estimated specifically for Iran. Although the main results remain stable across alternative values of α\alphaα and δ\deltaδ, the absence of Iran-specific estimates remains an important measurement limitation.

Fourth, the sample may be biased toward firms with more complete and consistent financial disclosures. Firms with weaker disclosure practices may be underrepresented, which may limit the external validity of the results.

Finally, the findings are specific to Iran's institutional environment, which is characterized by government involvement, a bank-centered financial system, sanctions, chronic inflation, exchange-

rate volatility, and the presence of quasi-governmental ownership structures. Accordingly, the results may not be directly generalizable to emerging markets with different forms of state influence and financial intermediation.

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