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The influence of intellectual capital on organizational performance

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Abstract

Intellectual capital is by far the most important factor in enhancing organizational performance. Companies require skilled workers who have the know-how, skills, experience, as well as the ability to bring new ideas for the success of the business. The contemporary economy is a knowledge-based economy, which means that information, knowledge, and other intangible assets are considered to be more valuable than physical commodities. The present research is aimed at investigating the connection between intellectual capital and organizational performance among the business sectors of Türkiye. The current research uses the current dataset of the business sectors of Turkey from 2009 to 2021. The Autoregressive Distributive Lag technique, which provides robust results on short-time period dataset, is employed to investigate this association. The present research differs from past studies in that it uses secondary data in analyzing the effect of human capital component of IC on firm performance, hence the originality of this research. Past research has widely examined the association of intellectual capital (IC) and firm performance with primary data. The major results of the present research show the importance of debt and equity finance in raising organizational performance. The results also show that long-term liability and intellectual capital reduce firm profitability. The present research gives crucial policy recommendations that are vital for policy making.

Keywords Intellectual capital, Capital structure, Organizational performance

Introduction

In the twenty-first century, the creative performance of a firm is dependent on its ability to effectively manage its information and intellectual capital (IC), both of which are critical areas for most organizations, especially for knowledge-intensive businesses. Obtaining and sustaining excellent performance is the objective of all organizations, including those whose ultimate objective is not to always generate profit. Uncertainty and dynamism in competitive markets compel businesses to reevaluate

their strategies to acquire sustainable competitive advantages, [41]. Owning or developing distinctive capabilities that are difficult to replicate is key to gaining and retaining an advantage over competitors. IC has been defined in various research, but of great importance is the definition given in the research of Kaplan and Norton [37], who described IC as the intangible assets of a firm, responsible for fostering the performance of an organization toward attaining high profits. Furthermore, Nerdrum and Erikson [48] postulated that IC includes the complementary capacities of individuals which are responsible for generating added value for the purpose of wealth creation. The major components of IC are relational, human, and structural capital [1, 5, 7], (just to mention a few). Other elements of IC, spiritual capital and social capital are presented (see, for instance, [1, 26], respectively). While there are many components of IC, human capital (HC) is considered as the most crucial one. Nerdrum and Erikson [48] allude that IC notion is developed within the

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frameworks of HC and that IC is a special case of HC. HC is a company's primary source of such assets because it is predicated on the competence of its personnel, [43]. IC is widely acknowledged as not only one of a company's most important assets, but also one of its most crucial strategic assets. Investing in the development of HC can yield positive results for business outcomes.

In a knowledge-based economy, information and expertise are more highly valued than money and materials. Reason being, the value of IC remains constant regardless of how much it is used, [58]. One disadvantage of traditional reporting systems is that they do not include IC. According to Chen et al. [16], "*it is vital for a learning organization to identify its IC.*" The current knowledge-based perspective held suggests that management of the company's knowledge assets may have a substantial impact on the performance of the business. A combination of tangible and intangible resources is required to improve business performance, according to the resource-based theory, which is another tenet of this school of thought. The imperative nature of the knowledge economy can be traced back to the widespread recognition, which emerged over the course of the preceding decade, of the Internet of Things (IoT) as a critical factor that propels economic development and innovation. Intellectual capital can provide a long-term competitive edge [50]. Although it is difficult to quantify IC as a significant intangible resource, its significance is unquestionable. The majority of studies on IC and the connection between it and business performance have been conducted in corporate settings in western countries. In accordance with past studies, the results strongly support that organizational performance is greatly impacted by capital structure. Doorasamy. [21] found that management ownership reduces the relationship between debt and organizational performance and intense managerial ownership strongly impact the organizational performance. A company's capital structure in economically or financially developed countries positively impacts its success. Abdullah and Tursoy [2] found that leverage boosts a company's success. The ability to manage a company affects productivity, investment decisions, remuneration, and company performance. As supported by the pecking order theory, high-ability CEOs improve company performance, [59]. However, Intellectual Capital is also vital to improving organization performance. Intellectual capital enhances an organization's competence and capability. Those employees who are well-equipped, for instance, can impart their knowledge to others, thereby enhancing the organization's performance. Intellectual capital links social capital and organizational performance, [51].

The present research is aimed at ascertaining the importance of major element of IC, human capital, on

the performance of firms. The present research differs from past studies in that it uses secondary data in analyzing the effect of human capital component of IC on firm performance, hence the originality of this research. Past research that has been widely done to examine the association of IC and firm performance has used primary data [1, 15, 49], (just to mention a few), and hence, this research seeks to extend the growing body of the literature by considering secondary data. The present research also includes leverage ratio to proxy debt finance and shareholder equity to total assets ratio to proxy equity finance, as well as long-term liability to total liability ratio as a control indicator. Debt and equity finance have been ascertained as the major factors that promote firm performance, hence should be included to ensure robust outcomes are obtained. The present research uses the data of all business seventeen sectors of Turkey, for the period 2009 to 2021. We also employ the Autoregressive Distributive Lag (ARDL) technique which gives robust outcomes on short time series data [54]. The present research seeks to answer the following research questions: does human capital component of IC promotes organizational performance? What is the effect of debt and equity finance on organizational performance of Turkish business sector? What is the role of long-term liability to total liability ratio on organizational performance? The limitations of the present research are that it only specifies human capital to proxy IC, leaving out the other IC components, such as relational/social and structural capital, and it also uses the combined dataset of all sectors in Turkiye, hence producing results that may not be generalized to some specific sectors. The research does not include return on equity and stock price to proxy firm performance as provided in past research, due to unavailability of data. We also use short time series data from 2009 to 2021 due to unavailability of data in years prior to 2009 for the financial ratios employed; however, the ARDL technique which gives robust and reliable results on short time series data is used; hence, the reliability of the outcomes presented. Moreover, the number of workers with at least a bachelor's degree is used to proxy intellectual capital, leaving out other proxies of intellectual capital due to the unavailability of data for those proxies. However, human capital remains the main factor that represents intellectual capital, following the postulations of a Hamadamin and Atan [28], "Intellectual capital is the collection of abilities, knowledge, and skills essential to execute work that provides economic value for the organization."

Literature review

Theories of capital structure

In the 1950s, Merton Miller and Franco Modigliani performed the first extensive research on the correlation

between a company's value and its financial setup. After publishing their theory in 1958, it became the cornerstone of modern corporate finance. Franco Modigliani and Merton Miller claim that in a market with no friction and perfect competition, whether a corporation funds investment by issuing shares or loans is unimportant. In 1958, Modigliani and Miller demonstrated a negligible correlation between capital outlay and financial leverage, and in 1966, they demonstrated a complete lack of data supporting the impact of either a dividend or leverage policy applied to the function of convex capital cost. There are, in fact, several circumstances in which financial choices affect the firm's worth. Of course, there is opposition concerning the theorem of Modigliani–Miller (MM). Studies by Lee [39], Weston [61], Pinegar and Lease [55], Masulis [42] show that an increase in the value of a financial lever causes a capital increase. Miller [49] wanted to find solutions to the empirical challenges but failed in doing so. It is challenging to test the MM theorem on actual data, according to Myers [44], despite various attempts to do so.

Businesses, according to the capital structure trade-off theory [10, 39], should consider the costs of borrowing money alongside other factors, such as tax incentives and the costs of going bankrupt, before settling on a capital structure. Trade-off theory indicates that there is a goal that optimizes the firm's worth. The presence of a goal, a central tenet of the theory, requires that any leverage discrepancy be reduced or eliminated. It is a fundamental tenet of trade-off theories that businesses should strive for value maximization and that deviation from this path would result in significant costs. As a result, deviations will be eliminated progressively over time. The body of research currently in existence broadly affirms the existence of long-run goal leverage. The classic trade-off theory of capital structure has been criticized most for predicting a positive link between profitability and leverage, which is in direct opposition to known empirical evidence. Capital structure changes are rare because, as the dynamic trade-off hypothesis states, firms will allow leverage to deviate from the objective as long as the costs of making the necessary adjustments (transactional and contractual fees) are higher than the benefits of bringing the structure back in line with its intended purpose [27, 41].

Ideas about capital structure, including the pecking order hypothesis, have been examined across many countries over the last three decades. In the pecking order theory [45], enterprises will favor internal funding sources over external ones if they require funding and will predict a hierarchy in funding. The pecking order theory states that when faced with several funding choices, businesses would choose those with the lowest

financing costs [46–58]. When a company is under severe financial duress and has no choice but to issue stock, only then will it issue this "most costly" of securities. Research conducted in the United States and the United Kingdom by Hovakimian et al. [31] found that smaller, riskier businesses, those with more growth potential and lower leverage, and less successful firms favored equity financing over debt. Using a cross section of successful companies, Shyam-Sunder and Myers [57] provide evidence in favor of the pecking order idea. De Jong et al. [20] expansion of Shyam-Sunder and Myers' [57] model distinguishes between the effects of budget surpluses, typical deficits, and massive deficits. But they find that the approach doesn't work for small enterprises, where the asymmetry of information is most likely to arise. They come across some proof of a hierarchy among large organizations. Additionally, they find that the model has lost some of its predictive power over time. The pecking order hypothesis has been challenged by other studies. A hierarchy in choosing companies for an Initial Public Offering (IPO) was not seen by Helwege and Liang [30]. Some evidence of corporate pecking orders is found by Frank and Goyal [26]; however, the evidence is weak. When compared to the pecking order model, Fama and French [24] find that equity difficulties are far more frequent than one may expect.

A perfect capital structure can be achieved, following the agency cost hypothesis, by reducing the costs brought on by manager-owner disagreements. According to Jensen and Meckling [36], the leverage level can be used to monitor managers and incentivize them to follow the company's aims rather than their own. The only constraint on the manager's excesses in pursuing the company's overall goals is the addition of additional debt to the company's funding. If more debt is taken on, the process of debt servicing and liquidation, which may eventually result in manager job losses, will result in cost savings that will enhance efficiency and eventually lead to higher performance. Examining how changes in capital structure affect a company's bottom line is the focus of this research. According to the Agency Cost Theory, higher leverage reduces agency costs and increases efficiency. According to agency theory, individuals are opportunistic, meaning they always seek to further their interests [11]. There is no guarantee that agents will always behave in the best interests of the principal as a result.

Baker and Wurgler's [8] "market timing hypothesis" asserts that companies' executives can predict when their stock will be overvalued and undervalued and use this knowledge to make strategic decisions about when to issue and repurchase shares. As market timing theory would have it, issuers with unlimited funds and the value

of their equities are poor predictors of post-announcement stock performance. To test the market timing hypothesis, Elliott et al. [23] used an earnings-based valuation model and found that stock market mispricing had a large impact on investors' portfolio allocation decisions. In addition, there is evidence that management often repurchases shares when their price drops (e.g., [33]). The worldwide timing of markets has not been well studied. Henderson, Jegadeesh and Weisbach [29] find evidence of market timing in stock and debt issuances for most countries in their analysis. Bruinshoofd and De Haan [13] examine this hypothesis by analyzing data from 45,000 company locations in the US, UK, and 8 European nations. They determine that market timing effects have an insignificant impact on the capital structure of European businesses and are unique to information and communication technology (ICT) companies during the ICT boom.

Intellectual capital and firm performance

Numerous researchers have explored various facets of human capital. "Intellectual capital is the collection of abilities, knowledge, and skills essential to execute work that provides economic value for the organization," as defined by Hamadamin and Atan [28]. Performance of an organization places a premium on human capital as one of its most important resources. Aman-Ullah et al. [4] found that there is a considerable and positive correlation between human capital capacity, human capital skills, and human capital knowledge and the overall success of a company. Creative leadership has a moderating influence on the relationship between human capital knowledge and organizational performance. Following a comprehensive classification of the notion, Aman-Ullah et al. [4] concluded that employees' knowledge, creativity, competence, and experience are crucial elements of human capital.

A company can generate value and keep a competitive edge so long as it learns how to effectively manage its intellectual capital. The research conducted by Huang and Huang [32] reveals that external capabilities (market knowledge, relationships), as well as internal capabilities (innovation), have a favorable impact on the organizational performance of businesses. According to the findings of their study, the authors indicated that companies that want to improve their performance should work on developing both their internal capabilities (such as research and development) and their external capabilities (e.g., through partnerships or joint ventures). Also, they find that the ability to come up with new ideas is the single most important factor in both intellectual capital and the performance of an organization. Organizational competitive advantage

relies on the effectiveness of its human capital, which is directly tied to the quality of its intellectual capital, [22]. Ur Rehman et al. [60] state that the operational and market performance of Islamic banks is significantly influenced by all three components of intellectual capital efficiency (ICE): structural capital efficiency (SCE), human capital efficiency (HCE), and relational capital efficiency (RCE). This finding demonstrates the significance of ICE in enhancing the efficiency of IBs. However, research indicates that HCE has a corrosive effect on IB performance. Furthermore, structural capital, human capital, and relational capital are the components or elements of IC. They are used to proxy IC, see the researches of Augusto Felicio et al. [7]; Andreeva and Garanina [5], Nerdrum and Erikson [48], Abdullah and Sofian [1], Youndt and Snell [62], Adekühle Suraj and Bontis [3]; Asiaei and Jusoh [6], Cheng et al. [15]; Komnencic and Pokrajcic [30]. Other studies such as Youndt and Snell [62] add a fourth component of IC, that is, social capital, while Abdullah and Sofian [1] added spiritual capital. Therefore, this means that any of these components are used to represent IC. Nerdrum and Erikson [48] postulated that IC is a special case of human capital and that its theories are an extension of human capital theories.

Activities related to corporate social responsibility (CSR) often comprise employee welfare and business ethics in a variety of forms. These activities, which help employees perform better, are beneficial to human resource management. These activities also assist businesses in attracting individuals with higher levels of qualification and expertise [27]. Initiatives aimed at strengthening a company's CSR assist businesses to improve their human capital by increasing the loyalty and dedication of their employees, which in turn helps these businesses achieve competitive advantages over their rivals. Shahzad et al. [56]'s research shows that CSR is linked to firms' levels of intellectual capital, which in turn affects their profitability. CSR and financial success are linked in indirect ways, with intellectual capital efficiency playing a mediating role. The crucial role that social capital plays in influencing the efficiency of corporate operations is still underappreciated. Organizations operate similarly to social groupings in that they bring people together. When it is integrated into organizational processes, organizational social capital is seen as a resource of the utmost importance, since it is closely related to the relationships between organization members. There is little evidence of a direct relationship between social capital and organizational performance, nor between creative activities and performance [51]; however, intellectual capital serves as a crucial link between social capital and organizational performance.

Capital structure and firm performance

A proper capital structure is essential for the innovation and performance of a company. It is possible that the introduction of new processes or products, which result from investments in innovation, will have an impact on the degree to which an organization is competitive, on the growth of the business, or on the extension of the firm into current markets. Although the capital structure may not directly affect the firm's performance, it does affect innovation to a considerable extent. If small or medium-sized businesses (SMEs) desire to have improved firm performance, the study by Cuevas-Vargas et al. [17] suggests that they should enhance their degree of innovation. When management has a significant stake in the company, the correlation between capital structure and lifespan is likely to weaken. Because the function of debt in corporate governance is contingent on how governance is conducted, this is more likely to be accepted. Management ownership mitigates the association between debt and organizational performance, according to research by Doorasamy [21]. Study discovered that the relationship is negative (or positive) in the presence of intense managerial ownership.

Several studies have shown that a company's capital structure in economically or financially developed countries positively affects the company's overall success. Abdullah and Tursoy [2], who conducted research on the topic in Germany eventually offered data demonstrating that there is a significantly beneficial association between a company's leverage and its success. Capital structure seems to positively correlate with business success, and possible causes include the tax advantages and the lower costs of issuing debt relative to the expenses of issuing stock. Convergence of components is another viable reason for this correlation. The capacity to manage a company is significant in creating, advancing, and obtaining success for the company, which may be assessed by productivity, investment decisions, remuneration, and the overall performance of the company. Management ability has a substantial impact on the performance of a company, more precisely, high-ability CEOs are associated with favorable performance [59]. CEOs that have an elevated level of managerial ability can recognize potential risks, opportunities, and advantages over their competitors. The results of the study by Ting et al. [59] show that the pecking order theory about how corporations make decisions, such as about capital structure and corporate financial performance, backs up management skill. Even though short-term debt is usually used to fund working capital, a portion of it is often used to finance a company's long-term assets. Debts that have a maturity date that is less than one year away are considered short-term. According to Boshnak's, [12], study a company's

financial performance (return on equity) and market performance (in terms of Tobin's Q) are unaffected by its debt levels, but its operational performance (return on assets) is significantly hampered by all types of debt.

Methodology and data

Model specification and data collection

The present research follows the trade-off and pecking order theories of capital structure in modeling organizational performance [14], (Myers [46]). The trade-off and pecking order theories highlighted the significance of debt and equity finance, and hence, these factors are crucial to be included in the model of the present research. Leverage ratio which is the ratio between total liabilities to total assets and is used to proxy debt finance, while shareholder equity to total assets ratio is used to proxy equity finance. Moreover, due to the aim of the present research, we employ intellectual capital in modeling organizational performance. The past research presented intellectual capital as vital for the success of a business [4, 23, 28, 57, 61] and hence is crucial to be ascertained in the present study. We also employ long-term debt to total debt as a control indicator, following the study of Abdullah and Tursoy [2] to ensure robust outcomes are presented. Therefore, the present study's model is present as follows:

$$OP = f(CS, IC) \quad (1)$$

where OP is organizational performance, CS is capital structure, and IC is the intellectual capital. Following the model specification in Eq. 1, we provide the mathematical model of the research in Eq. 2 as follows:

$$OP_t = \beta_0 + \beta_1 IC_t + \beta_2 LLTL_t + \beta_3 SETA_t + \beta_4 TLTA_t \quad (2)$$

where OP is organizational performance and is proxied by return on assets (ROA) and operating margin (OM). IC is intellectual capital, LLTL is the long-term liability to total liability ratio, SETA is the shareholder equity to total assets ratio, and TLTA is the total liabilities to total assets ratio and is the leverage ratio. β_0 is the constant term and β_1 to β_4 are the coefficient parameters of the explanatory indicators.

The data of all the indicators used in the present research are yearly data from 2009 to 2021; hence, each indicator has thirteen observations. Data of the indicators for the years prior to are not available; hence, the quest to use longer time period dataset could not be attained. The data of the ratios, ROA, OM, LLTL, SETA and TLTA, used in this study are obtained from the official website of the Central Bank of Turkiye, <https://www.tcmb.gov.tr>, and since yearly data are used in this research value of the fourth quarter of these variables

is adopted to represent its yearly values, while intellectual capital is obtained from the World Bank database, <https://www.data.worldbank.org>. The data of the ratios, ROA, OM, LLTL, SETA and TLTA are the combined dataset for all seventeen sectors of Turkiye. The present research only uses data from the Central Bank of Turkiye because it is the one which provides combined dataset of all sectors, hence is the right site to collect data which meets the objectives of the research. Return on assets and operating margin are the dependent variables of the model. Return on assets is the profitability ratio and is calculated by dividing net income with total assets. Operating margin is obtained by dividing operating profit with net sales. Intellectual capital in the present research is proxied by the total number of skilled or educated workers employed by a company. This research uses the total number of people who have attained a bachelor's degree or equivalent to represent intellectual capital. Of course, the measurement used to proxy intellectual capital in this research is limited. According to Nerdrum and Erikson [48], intellectual capital is as a result of either formal education or informal on the job training. However, human capital is by far the most important one, Hamadamin and Atan [28], and measuring other intangible assets such as skills of workers is somewhat difficult; hence, we use the proxy of human capital to represent intellectual capital. Intellectual capital notion is developed within the framework of human capital Nerdrum and Erikson [48]; hence, human capital is the main measure or component of intellectual capital. Youndt and Snell [62] define the two components of intellectual capital, human capital—as the knowledge skills and experiences, and structural capital—as empowerment, embodiment and supportive infrastructure of human capital. From the definition of these two components of intellectual capital we see that human capital is an inevitable and essential factor of intellectual capital. Due to that reason our research uses human capital measures to proxy intellectual capital. Moreover, the present research differs from past research

in that it uses secondary data and the data of other components of intellectual capital such as structural, relational and social capital is unavailable; hence, we stick to human capital. The leverage ratio shows how much debt finance is used to finance the assets of a company and is the ratio between total liabilities and total assets. Shareholder equity to total assets ratio shows the fraction of a company's assets that are financed by the shareholder's equity and is the ratio between total equity and total assets. Long-term liability to total liability shows the fraction of total debt that is long-term and is a ratio of long-term liability and total liability. The higher the ratio the more the company depends on long-term debt and vice versa. Table 1 presents a summary of the factors used in the present research.

Method

The present research starts by using the Phillips Peron (PP), together with the Augmented Dickey–Fuller (ADF) techniques for the purpose of checking the test of unit root. These techniques are used to ascertain the factors order of integration, which is used to identify the most appropriate method to use. Moreover, the present research uses the ARDL technique which is strong in short time series datasets [54]. The ARDL technique works with factors whose order of integration are either zero or one or mixture of both [48, 53–55]. The ARDL technique is crucial because it presents both the short-run and long-run outcomes, yet the long-run outcomes are important in providing policies (for review check, [9, 18, 19]). The bounds techniques are also employed to ascertain the presence of levels relationship which assist in ascertaining the presents of a long-run association of a model. Many studies have also recommended the ARDL technique and it has been widely used in research because it presents robust outcomes [35, 36]. The statistical representations given in Eqs. 3 and 4 are for the ARDL technique employed in the present research.

Table 1 Summary of variables

Variable	Abbreviation	Type	Measurement	Source
Return on Assets	ROA	Dependent	Net income / Total assets	Central Bank of Turkiye
Operating margin	OM	Dependent	Operating Profit / Net Sales (%)	Central Bank of Turkiye
Intellectual Capital	IC	Independent	Number of people with degree	World Bank
Leverage	TLTA	Independent	Total liability / total assets (%)	Central Bank of Turkiye
Long-term liability to total liability	LLTL	Independent	Long-term liability / total liability (%)	Central Bank of Turkiye
Shareholders Equity to Total Assets	SETA	Independent	Shareholders Equity / Total Assets (%)	Central Bank of Turkiye

$$\begin{aligned} \Delta ROA_t = & \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta ROA_{t-i} \\ & + \sum_{i=1}^q \beta_{2i} \Delta IC_{t-i} + \sum_{i=1}^q \beta_{3i} \Delta LLTL_{t-i} + \sum_{i=1}^q \beta_{4i} \Delta SETA_{t-i} + \sum_{i=1}^q \beta_{5i} \Delta TLTA_{t-i} \\ & + \beta_{6i} ROA_{t-1} + \beta_{7i} IC_{t-1} + \beta_{8i} LLTL_{t-1} + \beta_{9i} SETA_{t-1} + \beta_{10i} TLTA_{t-1} \\ & + \beta_{11i} ECT_{t-1} + et \end{aligned} \tag{3}$$

$$\begin{aligned} \Delta OM_t = & \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta OM_{t-i} \\ & + \sum_{i=1}^q \beta_{2i} \Delta IC_{t-i} + \sum_{i=1}^q \beta_{3i} \Delta LLTL_{t-i} + \sum_{i=1}^q \beta_{4i} \Delta SETA_{t-i} + \sum_{i=1}^q \beta_{5i} \Delta TLTA_{t-i} \\ & + \beta_{6i} OM_{t-1} + \beta_{7i} IC_{t-1} + \beta_{8i} LLTL_{t-1} + \beta_{9i} SETA_{t-1} + \beta_{10i} TLTA_{t-1} \\ & + \beta_{11i} ECT_{t-1} + et \end{aligned} \tag{4}$$

In Eqs. 3 and 4, β_0 is the constant term, β_1 to β_5 are the short-run coefficient parameters of the ARDL technique, β_6 to β_{10} are the long-run coefficient parameters, β_{11} is the coefficient parameter of the Error Correction Term (ECT) of the error correction model (ECM) and Δ represents the operator of first-difference. The present research checks for study outcomes robustness by checking residual normality, heteroskedasticity, serial

correlation and checking if the model is specified in the correct functional form.

Results

We begin by providing the outcomes of the descriptive statistics in Table 2. The findings of the descriptive statistics are crucial in ascertaining the characteristics of all the factors included in this research. The total number

Table 2 Descriptive statistics results

	IC	LLTL	OM	ROA	SETA	TLTA
Mean	62.81846	27.45940	6.537630	2.269570	35.30186	64.72595
Median	63.01000	28.83299	6.161197	2.273000	34.83981	65.19031
Std. Dev	4.536775	4.797661	1.131233	0.609541	6.269755	6.216672
Observations	13	13	13	13	13	13

Table 3 Results of unit root test

	ADF				PP			
	Level		First-Difference		Level		First-Difference	
	t-Statistics	P value	t-Statistics	P value	t-Statistics	P value	t-Statistics	P value
IC	1.8242	0.9986	-3.1849**	0.0493	5.3851	1.0000	-3.7917**	0.0189
LLTL	-1.9087	0.3168	-4.3684***	0.0077	-1.4954	0.5014	-4.3113***	0.0084
ROA	1.1332	0.9993	-5.2959***	0.0100	-3.7782*	0.0577	-30.0517***	0.0001
TLTA	-1.3664	0.5587	-6.1412***	0.0006	-0.6737	0.8173	-6.1412***	0.0006
OM	1.7875	0.9987	-6.0778***	0.0007	0.2378	0.9627	-5.9723***	0.0008
SETA	-1.3379	0.5718	-6.3625***	0.0005	-0.6765	0.8165	-6.3624***	0.0005

*is 10% significant level; ** is 5% significant level; *** is 1% significant level. ADF represents Augmented Dickey–Fuller test; PP represents Phillips Peron test

of observations of each variable employed in the present research is thirteen, because the data included are from 2009 to 2021. The mean, standard deviation, and median values of the indicators: intellectual capital, operating margin, gross margin, long-term liability to total liabilities, return on assets, short-term liability to total liability and total liability to total assets ratios are given, see Table 2.

In Table 3 of the present research, the outcomes of the unit root are given. The ADF and PP techniques of testing unit root are employed in the present research. Testing for unit root is essential in ascertaining if factors are stationary at level or at first difference. This helps in ascertaining the indicator’s order of integration. Ascertaining the factor’s order of integration helps in identifying the most suitable method to use in examining the model specified. The outcomes of the unit root presented in Table 3 of the PP and ADF techniques show that all the factors in this research are integrated of order one. Thus, the present study uses the ARDL technique which accepts factors that have either 0 or 1 order of integration, also considering the short time frame of the dataset employed. ARDL techniques give robust outcomes on short time datasets.

The present study also checks for the presence of a long-run association among the factors specified in the model. The bounds technique of ARDL is used to ascertain the presence of a long-run association among the model factors. The F- and t-Statistic outcomes of the bounds technique for the two models, one when ROA is

dependent indicator and another when operating margin is dependent indicator, are presented in Table 4 and show that a significant long-run association exists. The absolute values (ignoring the negative sign) of both the F- and t-Statistics are greater than the lower and upper bounds, for instance, in the case where ROA is dependent series, 43.73 and 11.34 are greater than 2.26 lower bound and 3.48 upper bound, and 1.95 lower bound and 3.6 upper bound, respectively. The findings are significant at 5% level. Therefore, both long-run and short-run coefficients of the ARDL technique are specified, together with the ECM.

The outcomes of the residual diagnostic tests are provided in Table 5 of this present research. The normality test is evaluated by using the Jarque–Bera technique, serial correlation is tested by using the Breusch–Godfrey technique, and the heteroskedasticity test is tested by using the Breusch–Pagan–Godfrey. The RAMSEY reset test is also employed to examine if the models are correctly specified. The findings of the residual tests in Table 5 present that the models residuals are normally distributed, homogenous and have no serial correlation issues, except for the first model which shows significant serial correlation at 5%. However, this is not sufficient to deter the attainment of robust outcomes, since no heteroskedasticity issues and normality are observed. The outcomes of the RAMSEY reset technique also show that the models are correctly specified. Therefore, the study findings are robust and reliable.

The CUSUM and CUSUM of squares test of stability in Figs. 1, 2, 3 and 4 show that the model is presented in a correct functional form, except for the CUSUM of squares in Fig. 2 whose graph slightly deviates from the 5% significant band. However, the RAMSEY RESET outcomes in Table 5 show that the correct functional form is given, and the CUSUM graph shows that the model residuals are stable, and hence, the outcomes can be trusted.

The present research presents the outcomes of the ARDL technique in Table 6. Short- and long-run outcomes for both models when ROA is dependent variable and operating margin is dependent variable are

Table 4 ARDL bounds test results

Test Statistic	Value	Signif	I(0)	I(1)
<i>ROA Dependent variable</i>				
F-statistic	43.7299	5%	2.26	3.48
t-statistic	− 11.3426	5%	− 1.95	− 3.6
<i>OM Dependent variable</i>				
F-statistic	8.8959	5%	2.26	3.48
t-statistic	− 2.2504	5%	− 1.95	− 3.6

Table 5 Residual diagnostic test results

	Normality test	Serial Correlation	Heteroskedasticity	RAMSEY RESET
<i>ROA Dependent variable</i>				
F-Statistic	0.5226	10.5679**	1.2310	1.2988
P value	0.7701	0.0253	0.4190	0.3061
<i>OM Dependent variable</i>				
F-Statistic	0.4422	0.1447	0.7690	0.2412
P value	0.8016	0.8696	0.6256	0.6442

*is 10% significant level; ** is 5% significant level; *** is 1% significant level

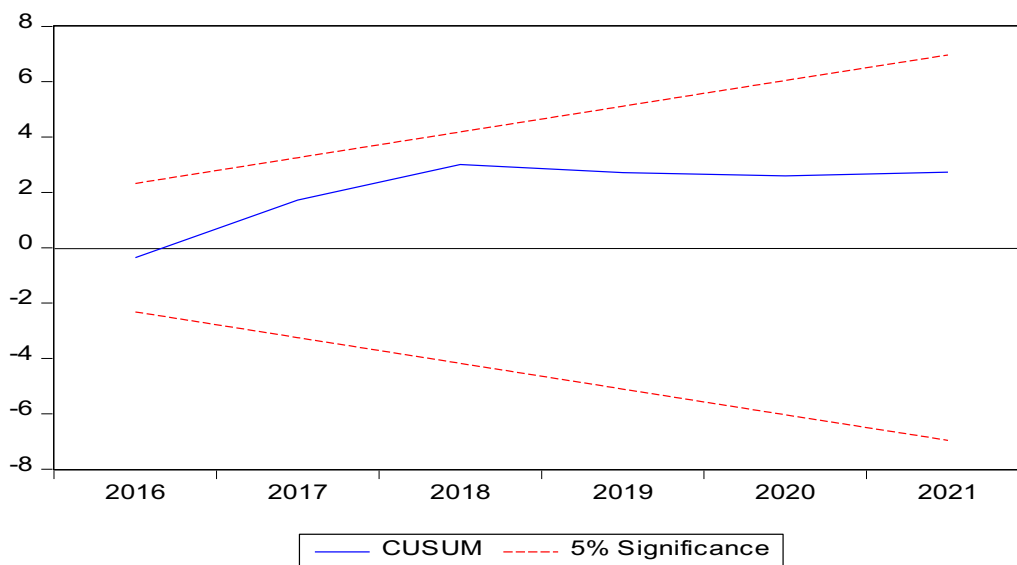


Fig. 1 CUSUM test of stability (ROA Dependent variable)

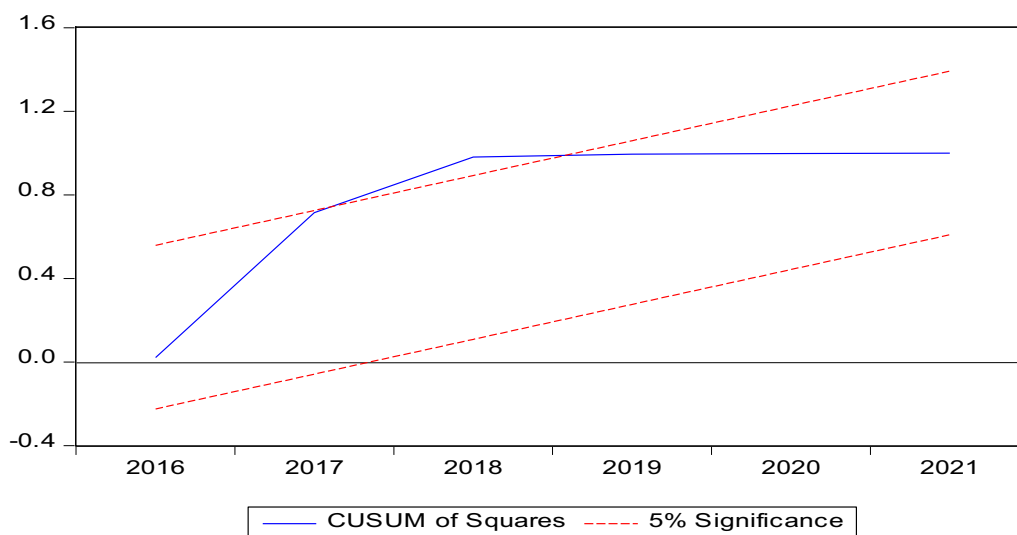


Fig. 2 CUSUM of square test of stability (ROA Dependent variable)

given. It is observed that intellectual capital exhibits for a significant negative effect of ROA in the sectors of Turkiye, both in the long- and short-run. The findings show that rise in intellectual capital by one unit significantly decreases ROA by 0.4938 units in the long-run and by 0.7217 units in the short-run. These outcomes indicate that organization performance among the seventeen sectors of Turkiye is discouraged by an improvement in intellectual capital. This shows that, in order to improve organizational performance through raising ROA in Turkiye, intellectual capital should be minimized. Investing more in intellectual capital causes the company's

profitability to drop. This is explained by the high salary levels required by highly qualified personnel. Total liability to total assets and shareholder equity to total assets ratios positively impacts on ROA of the seventeen business sectors of Turkiye in both short- and long-run. The coefficient values of these ratios are positive implying a positive link to exist, but this is not significant. A rise in shareholder equity to total assets ratio by 1-unit results in a rise in ROA by 0.5593 units and 0.7508 units in both long- and short-run, respectively. Moreover, a rise in total liability to total assets ratio by 1-unit results in a rise in ROA by 0.2558 units and 0.3434 units in both long- and

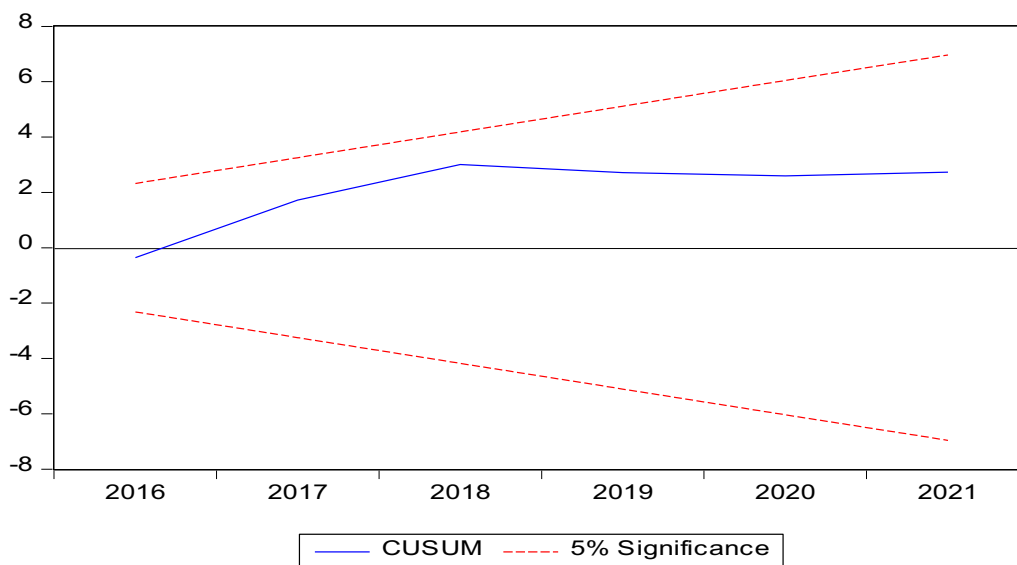


Fig. 3 CUSUM test of stability (OM Dependent variable)

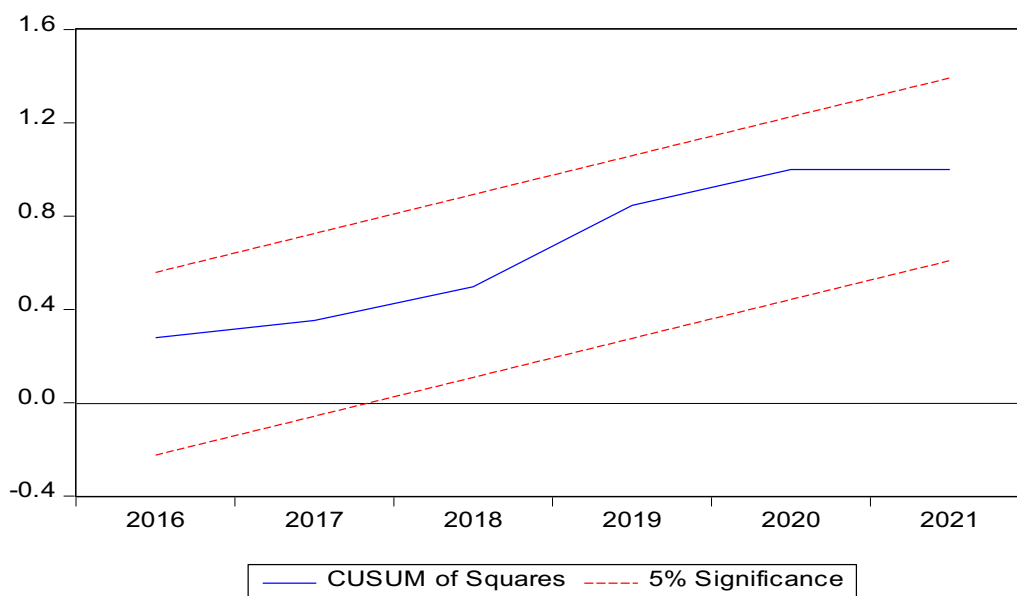


Fig. 4 CUSUM of square test of stability (OM Dependent variable)

short-run, respectively. These findings are significant at 1%, indicating that shareholder equity to total assets ratio and total liability to total assets ratio are fundamental in improving organizational performance. This shows the importance of equity and liabilities in improving the performance of an organization. The long- and short-run outcomes in Table 6 show that equity is more important than liabilities in improving company profitability. Thus, more equity should be used to improve company profitability, than liabilities. The outcomes in Table 6 also show

that long-term liability to total liability does not significantly impact ROA in both long- and short-run, among the business sectors of Turkiye.

Now talking of the second model where operating margin is the dependent variable, long-term liability to total liability is observed to negatively affect operating margin. A rise in long-term liability to total liability by one unit causes operating margin to fall by 1.4123 units and 0.4975 units in both long- and short-run, respectively. Therefore, a rise in long-term liabilities more

Table 6 ARDL test results

ROA Dependent variable				OM Dependent variable			
	Coefficient	t-Statistic	P value		Coefficient	t-Statistic	P value
Long-run estimations				Long-run estimations			
IC	-0.4938	-5.3888***	0.0017	IC	-0.2836	-0.8656	0.4200
LLTL	-0.0875	-1.1556	0.2918	LLTL	-1.4123	-2.0539*	0.0858
SETA	0.5593	5.2073***	0.0020	SETA	-0.1096	-0.2589	0.8044
TLTA	0.2558	6.1782***	0.0008	TLTA	1.0216	2.5415**	0.0440
Short-run estimations				Short-run estimations			
ECT(-1)*	-1.3423	-19.0897***	0.0000	ECT(-1)*	-0.5862	-8.6101***	0.0001
ROA(-1)	-0.3423	-2.8927**	0.0276	OM(-1)	0.4138	1.5888	0.1632
IC	0.0589	0.3676	0.7258	IC	-0.1663	-0.7996	0.4544
IC(-1)	-0.7217	-3.9492***	0.0075	LLTL	-0.3304	-1.5221	0.1788
LLTL	-0.1175	-1.1373	0.2988	LLTL(-1)	-0.4975	-3.0218**	0.0233
SETA	0.7508	6.2076***	0.0008	SETA	-0.0642	-0.2721	0.7947
TLTA	0.3434	6.6567***	0.0006	TLTA	0.5988	4.3369***	0.0049

*is 10% significant level; ** is 5% significant level; *** is 1% significant level

than a rise in total liabilities harms the performance of an organization. This shows that excessive use of long-term liabilities in financing the business activities of Turkey damages the profitability of the companies. As a result, long-term liabilities should be minimized in funding business activities. In addition, total liabilities to total assets ratio give a significant positive impact on operating margin among the business sectors of Turkey. A rise in the leverage ratio by one unit causes operating margin to rise by 1.0216 and 0.5988 units as per the long- and short-run outcomes in Table 5, respectively. These outcomes show the importance of leverage in promoting organizational performance of companies in the sectors of Turkey. Therefore, debt finance is crucial in enhancing firm performance. Intellectual capital and shareholder equity to total assets ratio do not significantly impacts operating margin among the business sectors of Turkey. The ECT of the models is negative as well as significant, presenting the presence of a long-run association of the models. These findings support the outcomes of the bounds test technique in Table 4.

Discussion

The current research is crucial in answering the research questions outlined in the introduction section. Firstly, the outcomes of the present research show that, among the business sectors of Turkey, intellectual capital reduces organizational performance. Both the long-run and short-run outcomes of the ARDL technique concur that intellectual capital reduces firm performance. These findings show that the excessive use of intellectual capital in a bid to rise firm profitability tends to backfires by actually decreasing ROA, a measure of firm profitability. At the

same time, intellectual capital does not impact operating margin another proxy of firm performance employed in the research. Past research indicated the importance of intellectual capital in raising firm output [4, 23, 28, 57, 61]. Educated personnel are the brains of the organization, they are the entrepreneurs, innovators and managers of a firm. However, the present research shows that, inasmuch as educated personnel are crucial for the survival of a company, excessively employing only skilled workers reduces firm profitability. This is so because high skilled and educated workers demand high salaries which in turn reduces company profitability. Therefore, companies need to strike a balance between hiring skilled workers and unskilled ones. Tasks that can be done by unskilled personnel should be left in the hands of them, while those tasks which requires brains can be channeled to the skilled personnel. Another reason for the negative or no effect of intellectual capital on firm performance, in the present research, is that we used a combined dataset of all sectors. If analyzed separately, some sectors might present a positive effect, while others may present a no or negative effect; hence in this research, the results of sectors with a negative effect of intellectual capital on firm performance might have overpowered those with positive effect. Moreover, Kaplan and Norton [37] presented that intellectual capital, such as knowledge, does not directly impact firm performance (for instance, profit and revenue), rather it is indirectly linked with performance. Therefore, the present research examines a direct link between the two, hence the reason for the insignificant findings. In addition, most past research which observed a positive link between intellectual capital and firm performance used primary data (Andreeva and Erikson

[50]), [1, 15], (just to mention a few), but this present research uses secondary data, hence the reason for the differences in the findings. The type of data used and the methodologies used are different, and thus, different findings may be observed.

In addition to that, the present research presents shareholder equity to total assets and leverage as the major drivers that are responsible for enhancing organizational performance. The findings presented in this research show the importance of equity and debt finance in enhancing the profitability of a company. These postulations support the postulations of past research [14], (Myers [46]), which emphasized the importance of both debt and equity finance in promoting company performance. Both equity and debt finance are crucial and should be used if the profitability of business sectors of Turkey is to be enhanced. The present findings show that equity finance has a greater impact on raising company profitability among the Turkish business sectors compared to debt finance. However, this does not support the postulations of the pecking order theory which alludes that companies need to use retained earnings first, then debt finance and lastly equity finance. Debt finance is preferred over equity finance because of its tax advantage (Myers [46]). The reason behind the importance of equity finance over debt finance in this research is due to the bankruptcy and agency cost problems associated with the use of debt finance (Myers [46]). The present study also shows the importance of leverage ratio in raising operating margin, hence supporting the tax advantage of debt finance in promoting firm performance.

Conclusion

The present research seeks to understand the link between capital structure, and intellectual capital, with organizational performance of all sectors in Turkey by employing the ARDL technique. It is crucial to the growing body of the literature and adds theoretically by showing the importance of debt and equity finance in enhancing organizational performance among the business sectors of Turkey. The study shows how leverage ratio is crucial in improving both return on assets and operating margin of companies. This supports the trade-off theory and the pecking order theory which shows the importance of debt finance because of its tax advantage. Interest paid on tax is not charged for tax and hence is preferred over debt finance which is charged for tax. Moreover, the present research shows that equity finance promotes return on assets more than debt finance. This is because of the bankruptcy and agency costs associated with debt finance, hence making equity finance less risk to the business. The negative effect of intellectual

capital on return on assets and the no significant effect on operating margin can be explained by the high salaries demanded by skilled personnel. Therefore, a balance should be sought between employing skilled and unskilled personnel among the business sectors in Turkey. Blue collar jobs should be left in the hands of less skilled workers, while those tasks requiring high skills and knowledge should be done by skilled personnel. Thus, it is crucial to strike a balance between employing skilled and less skilled workers in a company if organizational performance is to be attained. The policy recommendations of this research are given as follows: debt and equity finance (mixed financing) should be encouraged, long-term liabilities should be minimized and a balance between employing skilled and less skilled workers is essential for the success of the business sectors in Turkey. However, it must be noted that the present research findings are limited because dataset of all sectors is used, while investigating sectors separately might yield varying results across sectors, hence future studies should examine these sectors separately to produce policies that are specific to each sector.

Abbreviations

ADF	Augmented Dickey–Fuller
ARDL	Autoregressive distributive lag
CEO	Chief executive officer
CSR	Corporate social responsibility
CS	Capital structure
ECM	Error correction model
ECT	Error correction term
HCE	Human capital efficiency
ICT	Information and communication technology
IC	Intellectual capital
ICE	Intellectual capital efficiency
LLTL	Long-term liability to total liability ratio
MM	Modigliani and Miller proposition
OM	Operating margin
OP	Organizational performance
PP	Phillips Peron
RCE	Relational capital efficiency
ROA	Return on assets
SETA	Shareholder equity to total assets ratio
SMEs	Small or medium-sized businesses
SCE	Structural capital efficiency
TLTA	Total liabilities to total assets ratio and the leverage ratio
UK	United Kingdom
US	United States

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Author contributions

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Declarations

Ethics approval and consent to participate

Not Applicable.

Consent for publication

The authors guarantee that this manuscript has not been previously published in other journals and is not under consideration by other journals. The authors also guarantee that this manuscript is original and is their own work.

Competing interests

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