

INTANGIBLE ASSETS AND RESOURCE ALLOCATION: INSIGHTS FROM EUROPEAN COMPANIES

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Abstract

This study aims to explore the nexus between CEO-Chair duality, leverage, and investments in intangible assets within the realm of energy companies listed in the European Union (EU) using multi-theoretical lenses. Robust regression is employed to analyse the panel dataset. Energy companies listed in the European Union are analysed for the period 2011-2020. Findings reveal that leverage and CEO-Chair duality exert a positive influence on investments in intangible assets. By separating the roles of CEO and Chairman and adopting appropriate leverage levels, firms can enhance their ability to invest in intangible assets, fostering innovation and improving their competitive position in the market. The results offer valuable insights for academic researchers, practitioners in the electricity and gas industry and investors, aiding in informed decision-making and resource allocation strategies.

Keywords

intangible assets, leverage, duality, European companies.

JEL Classification

O34, E22, C33

Introduction

Following significant advancements in information technology during the 1990s, intangible assets have gained momentum in the academic discourse. The so-called new economy challenged the status quo, and intangibles outcompeted physical assets in many industries. Even traditional, capital-intensive industries, owe part of their development to the emergence of the knowledge economy. Widely recognized as a fundamental driver of value creation (Cañibano, 2018; Mironiuc et al., 2020), firm performance (Haji & Ghazali, 2018) and overall economic growth (Corrado et al., 2018; European Commission, 2017; Lee & Kwon, 2021), intangibles have been high on the agenda of accounting, finance and management scholars, not to mention the lively interest shown by professional bodies and standard setters. Consequently, intangible

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assets are found at the confluence of several disciplines, thereby accounting for the diverse terminology encountered in literature. Management researchers commonly employ the term „intellectual capital” when referring to these resources without physical substance, while accounting scholars favour the term „intangible assets” (Garanina et al., 2021). Several terms („intangibles”, „intangible assets”, „knowledge assets”, „intellectual capital”, „intangible capital”, „intellectual assets”, „intangible resources”, and „knowledge resources”) are used interchangeably and even ambiguously, as literature takes a broader perspective on intangibles compared to standards (Steenkamp & Kashyap, 2010). The resource-based view theory (RBV) posits that valuable, rare, hard-to-imitate and non-substitutable resources are paramount for attaining a sustainable competitive advantage (Barney, 1991). More or less direct, this theory suggests that intangibles hold the potential to contribute to superior financial performance compared to their tangible counterparts (Dženopoljac et al., 2019). This assertion holds particular significance within knowledge-intensive industries such as pharmaceutical or IT.

In view of their importance for both companies and nations (Yallwe & Buscemi, 2014), intangibles have been at the core of a plethora of both theoretical and empirical works (Corrado et al., 2018). Official data reveal that the last two decades are characterized by a gradual shift from traditional investments to investments in intangible assets (European Commission, 2017). This shift can be attributed to the recognized efficacy of intangible assets in sustaining a company’s competitive advantage (Ocak & Findik, 2019). Previous studies show that the allocation of resources towards tangible and intangible assets is influenced by a number of factors, including firm characteristics, corporate governance attributes and macroeconomic conditions (Yang et al., 2018). However, investments in intangible assets within the electricity and gas industry have been largely overlooked (Dženopoljac et al., 2019). The aim of this study is to empirically scrutinise the interrelationships between CEO-Chair duality, leverage, and investments in intangible assets within the electricity and gas industry. The investigation focuses on energy firms that are publicly listed on stock exchanges within the EU and spans a decade (2011-2020).

The industry’s complexity (Karaeva et al., 2022), reliance on intangible assets, diverse governance practices, and economic significance collectively make it an ideal research milieu to scrutinize the impact of CEO-Chair duality and leverage on intangible assets. Researchers have hitherto focused on knowledge-based industries (Dženopoljac et al., 2019). The recent concerns for energy transition and environmental degradation (Satrovic & Adedoyin, 2023) coupled with the significant societal implications (Robu et al., 2023) make the electricity and gas industry a highly intriguing research context.

The paper’s contribution to the scholarly discourse is twofold. Firstly, we contribute with additional pieces to the growing literature on corporate governance, resource allocation and investments in intangible assets by providing further insights and evidence. Secondly, diverging from earlier research, which focuses on traditional knowledge-intensive companies, this paper examines the intangible investments of

energy companies. The study addresses the scant evidence pertaining to the impact of CEO-Chair duality on the intangible capital of firms.

The subsequent parts of this research are organized as follows. Empirical expectations are developed in Section 2. Next section outlines the research methodology, encompassing details about the data source, variable definitions, and statistical methods employed. Section 4 delves into the results of the descriptive statistics and regression analysis. Some overarching conclusions are drawn in the final section.

1. Review of the scientific literature

Investment decisions are shaped by different firm-specific and institutional factors. Understanding the dynamics between CEO-Chair duality, leverage and intangible assets can help energy firms optimize their resource allocation strategies and enhance their competitive advantage, thereby accomplishing their managerial goals.

Intangibles and challenges of financing

The peculiarities of intangible assets partially account for the reluctance of companies to invest in such assets and the lack of acknowledgement of their long-run potential. Many intangible assets are characterized by partial excludability as rights are not clearly defined thereby exposing firms to free-riding issues (European Commission, 2017). As far as R&D projects are concerned, it is often considered that the societal gains surpass the corporate or private benefits (Lamberova, 2021). Roos et al. (2005) emphasize that „a relationship can be usurped, a brand can be emulated, and a patent can be innovated around using the information filed in the original patent”. Consequently, preventing others from deriving benefits from intangibles often proves problematic (Andriessen, 2004).

Some intangibles (particularly R&D) exhibit inherent risks and entail substantial costs owing to the fact that many prototypes do not enter the commercialization phase. Taking risks and venturing into uncharted territory also means that the approved products, launched on the marketplace, do not necessarily yield a positive return (Hesarsorkh et al., 2021). Not only do intangibles yield time-lagged and uncertain results, but they are also less visible to the public (Lamberova, 2021). This explains why innovation is typically seen as an exemplar of „Knightian uncertainty” which cannot be readily quantified using conventional models (Mazzucato & Tancioni, 2013).

Given that companies know a priori that others can take advantage of their intangible assets, the feasibility of investing in such assets becomes a legitimate concern. This apprehension is further compounded by the fact that such investments imply numerous resource-consuming activities, there are no concrete rewards, results are seen in the long run and the costs involved are nothing to be neglected, as we have already discussed. In this respect, Ocaik and Findik (2019) scrutinize publicly traded companies on Borsa Istanbul from 2005 to 2013 and find that these strategic resources provide a sustainable competitive advantage as they are less susceptible to replication by competitors.

Furthermore, according to Carp et al. (2020), the insufficient commitment of firms towards investments in research and development (R&D) has the potential to impede their capacity to attain long-term growth objectives. Notwithstanding their potential of creating long-term value, intangibles are often overlooked in financial reports as evidenced by studies highlighting limited levels of disclosure (Mironiuc et al., 2020). The characteristics of intangibles discussed earlier, coupled with difficulties to pledge as collateral, make intangibles more difficult to finance as compared to their tangible counterparts (Yallwe & Buscemi, 2014).

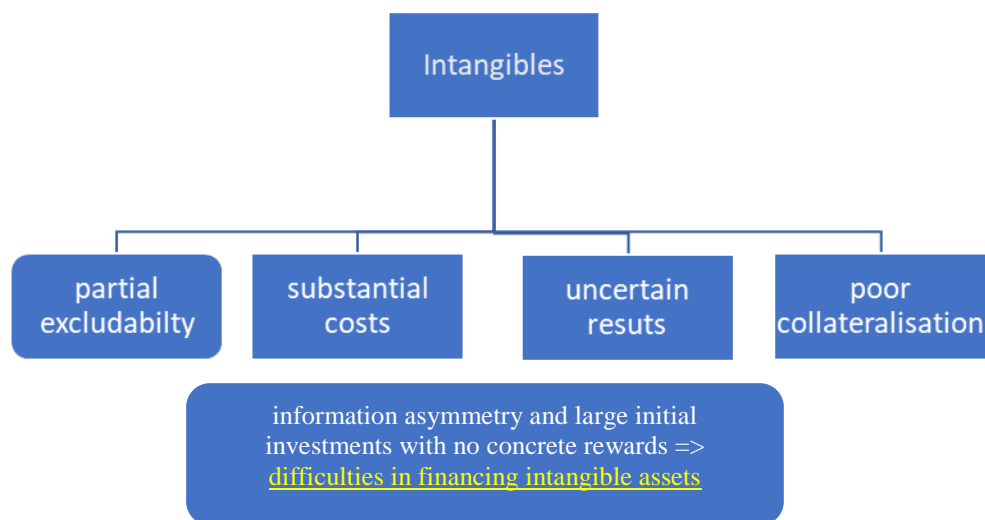


Figure no. 1: Difficulties in financing intangible assets

The availability of financial resources shapes corporate investment behaviour related to innovative projects, as highlighted by Lai et al. (2015). Leverage is considered a double-edged sword as companies „are able to earn profits only when the return is greater than the cost of capital” (Bhatia & Aggarwal, 2018). Huian and Mironiuc (2023) contend that higher levels of leverage introduce greater risk to the firm, resulting in negative consequences for its market value and the decision-making autonomy of managers is affected. Drawing upon survey data collected from a large sample of Chilean companies, Álvarez and Crespi (2015) discover that financial constraints act as a barrier to innovation. This result is borne out by the study of Mohnen et al. (2008), which analyses the effect of financial hurdles on the decision-making of Dutch firms regarding the abandonment, premature cessation, significant deceleration, or non-commencement of innovative projects.

CEO-Chair duality and intangibles - conceptual lens and expectations

A visual inspection of figure no 2 provides insight into the significance of corporate governance on a firm’s intangible assets, as evidenced by one of the salient clusters (i.e.

detriment of shareholders (Dorata & Petra, 2008). This theory has its roots in the pioneering work of Adam Smith, who noted in 1776 that „the directors of such companies, however, being the managers rather of other people’s money than of their own, it cannot well be expected that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own.” (Smith, 1976). The agency theory advocates for the independence of the board of directors and the separation of the two roles (Assenga et al., 2018).

Despite the potential for managerial abuse and sub-optimal decisions, such a negative interpretation of duality has been challenged, engendering an alternative theory known as the stewardship theory (Lee & Ko, 2022). The latter posits that unified leadership enhances organizational efficiency (Lam & Lee, 2008). In other words, the stewardship theory rejects the underlying hypothesis of divergent interests put forth by the agency theory (Saygili et al., 2021), portraying managers as reliable stewards (Abels & Martelli, 2013). Following this view, the administrator is motivated and satisfied by the success of the firm. The blending of positions is seen as a mechanism that enables the efficient exploitation of firm-specific information, mitigating information asymmetry between the CEO and the Chairman (Lee & Ko, 2022). However, empirical studies yield inconclusive results. Based on these findings, it is expected that CEO-Chair duality will influence the nexus between intangible assets and investments.

A strand of governance research suggests that CEO-Chair duality fosters intangible investments. Using a longitudinal dataset consisting of Chinese listed firms during 2007-2010, Zhu and Huang (2014) explore the link between investor sentiment and corporate R&D investment and provide evidence that a consolidated leadership facilitates rational investment decisions and resource allocation towards R&D projects (Zhu & Huang, 2014). Li and Yang (2019) discover that increased authority granted through duality empowers managers to take risks and invest in exploring emerging technologies while vigilant monitoring may inhibit CEOs, compelling them to adopt a more cautious approach towards risk. Other studies highlight the beneficial effects of CEO-Chair duality on corporate performance (Ni et al., 2020).

Conversely, other studies indicate an inverse nexus between CEO-Chair duality and intangible investments (Herrmann et al., 2010; Lin et al., 2023). For example, AlHares et al. (2020) analyse 200 firms on Forbes Global 2000 and reveal that better-governed firms tend to exhibit lower levels of risk-taking (captured by R&D intensity). Herrmann et al. (2010) substantiate the same idea, providing evidence that CEO-Chair duality is adversely related to R&D intensity in US-based international firms. The inverse relationship between duality and R&D investment is further borne out by the recent research of Lin et al. (2023) who explores a panel dataset (2008–2016) of more than 500 family firms. Additionally, it is observed that firm age acts as a moderator, mitigating the adverse nexus between CEO-Chair duality and investments in intangible assets. As Lin et. al (2023) underscore, the presence of CEO-Chair duality curtails the inclination of CEOs to engage in risk-taking behaviours by virtue of managers’ concerns about preserving their reputation. Other studies prove that CEO duality diminishes earnings quality (Alves, 2021), leads to sales activity manipulation (Nuanpradit, 2019) and exerts

a negative influence on firm performance (proxied by ROA and ROE) (Assenga et al., 2018), which makes separation of roles highly recommended to enhance board independence and transparency. Kim and Buchanan (2008) posit that organizations featuring CEO duality exhibit notably diminished propensities for undertaking risks, reflecting managerial preferences for reduced risk exposure. Their findings are based on a sample of 290 U.S. companies. Kouaib and Jarboui (2016) report that CEO profile is related to cutting R&D expenditures. Some investors also advocate for non-duality because „the separation provides some oversight. Otherwise, the CEO is his own boss.” (Sun, 2019).

The results of these studies shed light on the role of corporate governance structures and leverage in the decision-making processes surrounding investments in intangibles. Further research in this area is crucial for understanding the nuanced dynamics between leverage, CEO-Chair duality and the allocation of resources towards intangible assets. Therefore, we aim to test the following two hypotheses:

H1: Leverage is negatively associated with investments in intangible assets.

H2: CEO-Chair duality exerts an influence on investments in intangible assets.

2. Research methodology

Sample and variables

The investigation is based on a panel dataset comprising EU-listed companies operating within the energy sector, specifically focusing on the energy and gas industry, and covers a decade (2011-2020). This extended time span has been selected to provide a sufficiently broad period that enables capturing both short-term fluctuations and enduring patterns, facilitating a comprehensive assessment of the industry’s intangible assets investments. Firm-level data was retrieved from the ORBIS database, supplemented by information obtained from corporate annual reports, particularly pertaining to the executive director and chairman of the board.

In order to reduce variations and enhance comparability, a natural log transformation is applied to certain variables including intangible assets, fixed assets, market value, and the number of employees. Additionally, congruent with prior research (Duru et al., 2016; Kouaib & Jarboui, 2016), all variables are winsorised at the top and bottom 1% of the distribution to alleviate the effect of outliers.

The study aims to explore the influence of two explanatory variables, namely leverage and CEO-Chair duality, on the investment behaviour of energy companies in relation to intangible assets. These factors are considered to play a role in shaping the decision-making process regarding the allocation of resources to intangible assets within the electricity and gas industry. Intangible assets serve as a dependent variable. Intangible assets are to be understood herein in the traditional sense of International Accounting Standard 38 (IAS 38), encompassing non-monetary and identifiable resources that lack physical embodiment but provide future benefits for the company.

The empirical model employed in this study also incorporates a set of commonly utilized control variables to account for their potential impact on the relationship under scrutiny and to enhance the robustness of the findings. Specifically, the company's performance is verified (Herrmann et al., 2010; Oware & Appiah, 2022), which is captured by market value, as well as tangibility (Kao & Chen, 2020), which is proxied by fixed assets. Additionally, company size is considered by examining the number of employees (Herrmann et al., 2010; Mohnen et al., 2008) as larger companies typically allocate greater financial resources to innovation activities compared to their smaller counterparts (Oware & Appiah, 2022; Yang et al., 2014).

Robust regression

Robust regression analysis is conducted to test the hypotheses. Despite the prevalence of robust estimators in linear regression analysis, little heed has been paid to their application in panel data analysis, where the presence of atypical observations (outliers) is more prevalent. Following this line of reasoning, Bramati and Croux (2007) assert the necessity of employing robust estimators in panel data analysis. M-estimation is used here, an extension of the maximum likelihood method (Susanti et al., 2014). To curb the disparities, natural log transformation is applied to several variables. We use the following model to explore the link between leverage, CEO-Chair duality and the allocation of resources towards intangible assets:

$$\ln IA = \beta_0 + \beta_1 LEV + \beta_2 CEOD + \beta_3 \ln Empl + \beta_4 \ln MV + \beta_5 \ln FA + \varepsilon \quad (1)$$

where IA denotes the dependent variable – intangibles assets reported by a firm; β_0 – intercept; LEV refers to leverage, computed as the firm's debt divided by total assets; CEOD is a dummy variable indicating whether a firm is characterised by duality (CEO simultaneously wears the hat of the chair of the board); Empl refers to the number of employees; MV is the market value and FA indicate a firm's fixed assets, and ε – the error term. Intangible assets, the number of employees, market value and fixed assets are in natural logarithm values.

To complement the baseline analysis, fuzzy Cognitive Maps (FCMs) and scenario-based analysis are also employed. FCMs are graphical representations, emerged as an alternative tool for representing and exploring the intricate behaviour of systems. They are employed in the study for their simulation and prediction capabilities (Salmeron, 2009).

3. Results and discussions

Descriptive statistics and correlation analysis

Table no. 1 displays the summary statistics for all the variables employed in the research. It is worth highlighting that within the sample of EU-listed companies, 43.57% (58 out of 133 firms) have a Chairman who concurrently serves as the CEO, while in the majority (56.43%) of the firms, there exists a separation between the roles

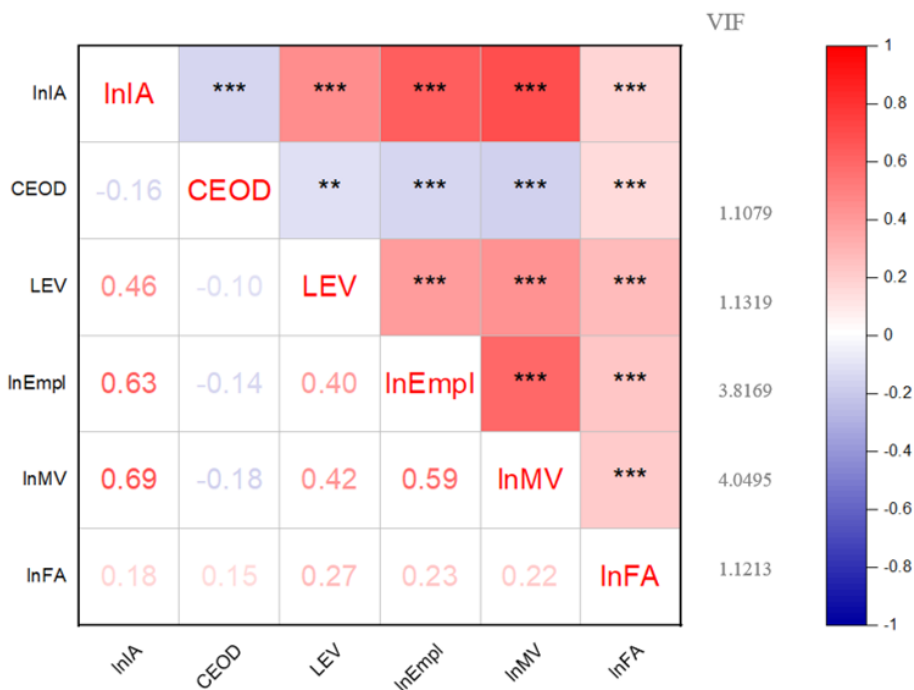
of CEO and Chairman. For comparative purposes, it is noteworthy to mention that this percentage is similar to that reported for American companies (50% according to Duru et al., 2016; analysed timespan 1997–2011) and Chinese companies in 2003 (41% according to Lam & Lee, 2008). However, it surpasses the corresponding figure for Pakistani companies (17% as reported by Naseem et al., 2020, covering the period 2009–2015). It is also observed that firms in our sample own an average of 1,640,778 th euro intangibles and an average enterprise value of 6,635,434 th euro (values before winsorisation).

Table no. 1 Descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Obs.
IA (ln)	10.0344	10.1331	17.2296	0.0000	4.0120	958
LEV	0.5661	0.6157	1.3392	0.0005	0.2687	1073
CEOD	0.4355	0.0000	1.0000	0.0000	0.4960	1201
Empl (ln)	6.5184	6.3578	11.9833	0.6931	2.7516	892
MV (ln)	13.0445	12.9855	18.2725	6.6587	2.7819	940
FA (ln)	3.4594	2.9554	12.8352	0.0011	2.2868	958

Figure no. 3 illustrates the correlation coefficients and variance inflation factor (VIF) for the analysed variables. The results reveal a positive and significant correlation between intangible assets and the independent variables, namely leverage, firm size (quantified by the number of employees), performance (captured by market value), and tangibility (proxied by fixed assets). However, intangibles exhibit a negative and significant correlation with CEO-Chair duality. The highest coefficient among the explanatory variables is 0.59, which indicates moderate correlation. Additionally, the VIF test is conducted to evaluate the level of correlation among the variables. VIF values fall below the threshold of 5 proposed by Studenmund (2016), suggesting the absence of multicollinearity. Hence, it can be inferred that the model is devoid of multicollinearity issues.

Figure no. 3: Correlation matrix and VIF



<=0.05 ** p<=0.01 *** p<=0.001

Regression analysis

This section is devoted to the comprehensive examination and interpretation of the findings that emerged from the regression analysis in light of the relevant literature and the hypotheses stated earlier. The outcomes of this research are listed below (table no. 2).

Table no. 2. Robust regression

	M-estimation	S-estimation	MM-estimation
LEV	0.2515*** (0.0755)	0.3996*** (0.0801)	0.2507*** (0.0756)
CEOD	0.1271*** (0.0356)	0.1587*** (0.0378)	0.1266*** (0.0357)
Empl (ln)	0.2423*** (0.0117)	0.2702*** (0.0124)	0.2426*** (0.0117)
MV (ln)	0.8073*** (0.0125)	0.7909*** (0.0132)	0.8071*** (0.0125)

FA (ln)	-1.0026*** (0.0079)	-1.0102*** (0.0084)	-1.0020*** (0.0079)
Obs.	677	677	677
R ²	0.7795	0.8989	0.7841
Adj. R ²	0.7778	0.8982	0.7824

Note: * p < 0.10; ** p < 0.05; *** p < 0.01; Huber Type; Standard error in parenthesis.

It is noted that the first hypothesis, though *prima facie* compelling and well substantiated, is refuted by empirical evidence. Leverage is positively associated with investments in intangible assets, contrary to our initial expectations and previous literature suggesting that financial constraints hinder innovation (Mohnen et al., 2008; Álvarez & Crespi, 2015). This result, although counterintuitive, could conceivably be explained by the higher-quality management practices of the sampled companies. Using a panel dataset of Turkish firms, analysed between 1992–2015, a recent study demonstrates that organizations characterized by superior management quality exhibit enhanced benefits from innovation when coupled with higher levels of leverage (Nemlioglu & Mallick, 2021). On the other hand, considering the fact that 43.57% of the companies have a Chairman who also assumes the role of the CEO, which can potentially give rise to agency problems, the utilization of debt for financing intangible assets appears to be less inappropriate. In this line, Cumming (2005) concludes that the mix of financing instruments mitigates the costs stemming from different agency problems. Furthermore, this study scrutinises the behaviour of companies in relation to investments in identifiable intangible assets, as defined by IAS 38. Admittedly, some intangibles lack collateral value, as we have extensively discussed in the literature review section. However, it should be noted that capitalised assets can potentially serve as collateral (Zambon et al., 2020). As highlighted by the work of Lim et al. (2020), „identifiable intangible assets may support debt because they are separately identifiable, valuable, and potentially collateralizable, and are instrumental in generating cash flows”.

Turning to the second hypothesis, it is observed that the robust regression analysis uncovers a positive nexus between CEO-Chair duality and intangible assets. Although there is no consensus in the literature on the influence of CEO-Chair duality on intangibles, this result is unexpected as it runs contrary to the negative association reflected by the correlation analysis. Despite the disadvantages of CEO-Chair duality, postulated by the agency theory, it is observed that the blending of positions is beneficial to a firm’s investments in intangibles. The reduced information asymmetry associated with CEO-Chair duality provides fertile ground for investments in intangibles, while vigilant monitoring may lead CEOs to exercise caution and prioritize risk mitigation over risk-taking behaviour. These findings are consistent with the conclusions drawn by Zhu and Huang (2014), who demonstrate that a consolidated leadership facilitates rational investment decisions and resource allocation towards R&D projects. Although it is widely acknowledged that investments in intangible assets typically yield long-term benefits (Mazzucato & Tancioni, 2013; OECD, 2021) that

may not align with the objectives of managers (Abels & Martelli 2013; Li & Yang, 2019), Li and Yang (2019) also reveal that increased authority granted through duality empowers managers to take risks and invest in exploring emerging technologies. On the other hand, our findings clearly run contrary to the body of literature positing that wearing two hats diminishes the board's capacity to efficiently oversee managerial activities (Duru et al., 2016), as advocated by the precepts of the agency theory.

Finally, it is noted that the control variables exert a substantial impact on intangible assets investment. To be specific, the number of employees and the market value of the firm are positively related to investments in intangibles, validating our expectations. This, in turn, confirms that large and profitable firms devote more resources towards intangible asset investments, supporting previous evidence (Oware & Appiah, 2022). As far as fixed assets are concerned, a perusal of Table 2 shows that tangibility is adversely associated with investments in intangibles. This result is also compatible with evidence found by Kao and Chen (2020) and further supports the idea that firms characterized by a higher level of tangible assets tend to allocate fewer resources towards investments in intangible assets.

The empirical outcomes showcased in this section demonstrate robustness when subjected to different specifications of the regression models. For prudence's sake, besides M-estimation, S-estimation and MM-estimation are also employed to verify the consistency and reliability of the findings. There are no perceptible changes in the magnitude and significance of the coefficients (table no. 2). It can be concluded that the results are generally consonant with the baseline findings.

Scenario-based analysis

Knowing that real-world situations are not static (Salmeron, 2009), this paper seeks to supplement the regression analysis with „what-if” scenarios. Firstly, based on the results that emerged from the statistical analysis, a fuzzy cognitive map was created (figure no. 4). FCMs are considered „simplified mathematical models of belief systems” used to understand system dynamics (Gray et al., 2012) and are graphically represented as a collection of nodes (variables) linked by edges (illustrative of the direction of influence).

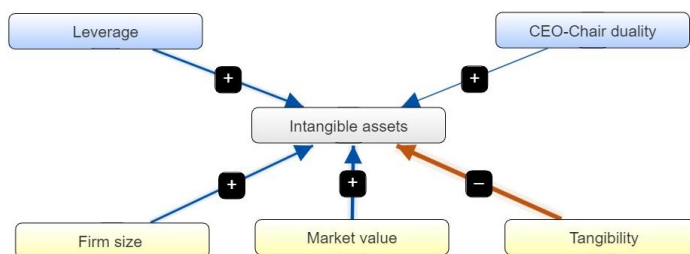


Figure no. 4: Fuzzy cognitive map

Secondly, variations of 10% were simulated for the present study (figure no. 5). As we can discern, 6 scenarios were conducted (a-f). According to scenario (a), to achieve a 4% rise in intangibles, firms need to increase LEV and CEOD by 10%. Scenario (b) exhibits that a decline in intangibles by 1% is expected if LEV decreases by 10%, while CEOD increases by 10%. Incrementing LEV, CEOD, EMPL and MV by 10% results in a rise of 14% in intangibles, as shown by scenario (c). Scenario (d) considers all variables included in the study. An increase of 10% of these factors leads to an upsurge of 4% in intangibles. Scenario (e) assumes that LEV and CEOD increase by 10%, while MV exhibits a slump of 10%, thereby resulting a downturn of 4% in intangible assets. Lastly, scenario (f) shows that a 1% rise in intangibles is observed if LEV and CEOD increase by 10%, while EMPL decreases by 10%.

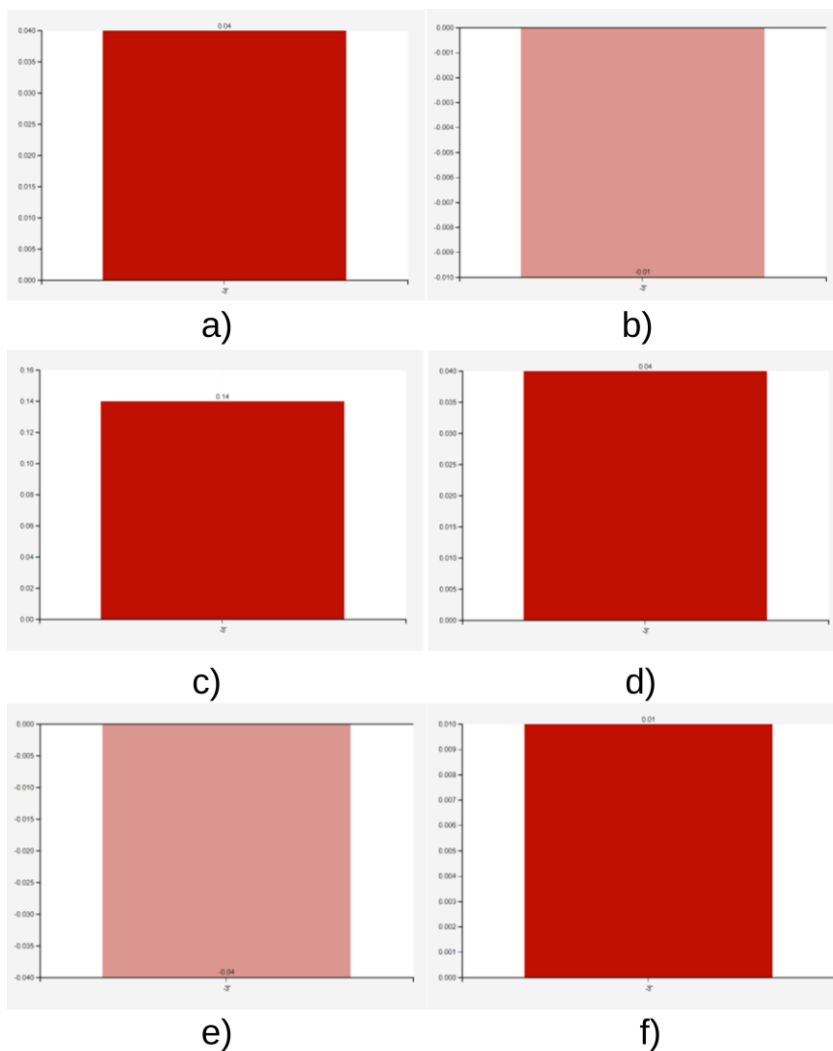


Figure no. 5: „What-if” scenarios

Conclusions

As mentioned above, the epicentre of our approach lies in understanding whether there is an association between leverage, CEO-Chair duality and investments in intangible assets. These findings hold particular significance given that the electricity and gas industry’s influence extends beyond economic considerations, as it significantly impacts public welfare and environmental sustainability. Taken together, the outcomes demonstrate that leverage and CEO-Chair duality are positively related to intangibles.

The study at hand carries several implications for the existing body of research and practice, as well as broader ramifications for economic growth, productivity, and competitiveness. For firms, the outcomes of this research have practical implications for decision-making regarding financing and leadership structures. Gaining insight into the interplay between duality, leverage, and intangible assets can assist energy companies in refining their resource allocation strategies and strengthening their competitive position. The results suggest that companies with higher leverage may actually benefit from increased investments in intangible assets. Furthermore, the direct relationship between CEO-Chair duality and intangible assets highlights the importance of a unified leadership to enhance risk-taking propensity and encourage investments in intangibles. Managers can use these findings, *inter alia*, to reassess their leadership structures and governance practices, potentially leading to improved performance and innovation outcomes. By delving into the conditions under which firms are prone to invest in intangible assets, policymakers and stakeholders can develop strategies to promote innovation. The results of this research also hold the potential to offer valuable insights to investors during the process of deliberating on investment decisions within a company.

The shortcomings of this research are primarily related to the lack of complete information pertaining to intangible resources. Ferdaous and Rahman (2019) argue that conservative accounting treatment prescribed by international organizations results in inappropriate presentation of intangibles in the financial statements. Future research could also take into account macro-economic conditions and other CEO characteristics (such as cultural milieu, tenure, education, age and gender), susceptible to impact investments in intangibles.

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