INTELLECTUAL CAPITAL EFFICIENCY, FAMILY MANAGEMENT AND PROFITABILITY: AN EXPLORATORY STUDY OF SPANISH FIRMS

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Workshop: WORKSHOP 3. EMPRESA FAMILIAR Y PYMES
Abstract

Is the achieving of intellectual capital efficiency important to obtain greater firm’s profitability? How does family management change this relationship? Using a longitudinal analysis of 6,132 observations, 438 firms during the period from 2000-2013, and controlling for endogeneity, this paper addresses these questions. After confirming that those firms that achieve greater efficiency from their intangible resources (human and structural) also obtain greater performance, this study attempts to analyse the moderating role of family management on that relationship. The results suggest that the postulates of resources-based and knowledge-based theories, adequately explains the study issue. Particularly, the results suggest that greater intangible resources efficiency is a key factor that allow to the firm achieve and maintain competitive advantages, obtaining greater performance. Additionally, findings also suggest that family management moderating role can be a double-edged sword depending on the type of intangible resources. On the base of the SEW perspective, findings suggest that dysfunctional and conflictive human relationships can make family managed firms unable to use their human capital efficiency in achieving greater performance while their focus on SEW preservation can make stronger the impact of structural capital efficiency on performance. All of these results taken together give new explanation to help to resolve the mixed findings in prior literature on the influence of family management on performance.

1. Introduction

In the new global economy, intellectual capital (henceforth, IC) has become a central issue for academicians and practitioners. The impetus for this interest is a series of challenges in the knowledge-based business environment that motive a firms to invest in IC, given that IC has become a major driver for a firm to obtain superior performance (Youndt, Subramaniam & Snell, 2004; Marr, Schiuma & Neely, 2004). In the so-called knowledge-based economy, tangible resources have been rendered as merely insufficient for building and maintaining competitive advantage. A new competitive dynamic is appearing (Roos, Bainbridge & Jacobsen, 2001; Marr & Chatzkel, 2004), in which firms give increasingly importance to intangible resources and capabilities (that is, its IC) when they face competitors, recognizing that new knowledge and its effective implementation are key factors in achieving and maintaining competitive advantages (Cohen & Kaimenakis, 2007). The IC of an organization is located in its
relationships, structures and people, and adds value to the organization by creating and maintaining creativity, innovations, information technology, interpersonal activities and competitive advantage (Edvinsson & Malone, 1997; Teece, 1998). Extensive academic literature has stressed the strategic importance of leveraging and managing IC for reaching performance targets and maintaining high levels of competitiveness. Such an importance of IC has been especially echoed by the recent shift in the strategic management thinking, represented by the resource-based and knowledge-based views, which consider strategic resources and assets related to knowledge as the main sources for creating and maintaining competitive advantage (Barney, 1991; Grant, 1996).

In this context, IC has emerged as a concept of increased importance for managers and researchers who are interested in knowing whether the IC is being efficiently utilized by the companies to achieve better profitability. Despite this recognition of the critical role of IC much remains to be understood about its role in the value creation process itself (Schiuma & Lerro, 2008) and its effects on corporate performance (Mention, 2012). In this sense, a number of empirical studies have attempted to link IC with profitability, but results are mixed. So, previous studies find significant impact of IC on profitability (Chen, Cheng & Hwang, 2005; Chu, Chan & Wu, 2011; Rahman, 2012) while other studies have failed to explain why some firms, despite having experienced top management teams and employees, sophisticated organizational processes and information systems, and close connections with customers and suppliers, are still unable to obtain a better financial performance (Kujansivu & Lönnqvist, 2007; Yu, Ng, Wong, Chu & Chan, 2010; Maditinos, Chatzoudes, Tsairidis & Theriou, 2011; Purohit & Tandon, 2015). Moreover, the relationship between IC and profitability has usually been examined drawing on perceptions rather than facts. Studies frequently utilize a survey instrument to measure IC instead of using more objective instruments (e.g. Cohen & Kaimenakis, 2007; Cabrita & Bontis, 2008).

Even when firms show similar levels of IC, they differ in their efficiency turning them into performance. To fill this gap our study introduces the moderating role of family management. The family involvement in the management of the firm strengthen family-focused objectives and increase the common ground between the firm and the family (Revilla, Pérez-Nuño & Nieto, 2016) and influence on how resources are organized and disposed (Sirmon & Hitt, 2003). Therefore, family management, defined as the active involvement in firm management of the controlling family for all those firms that are family owned, is likely to promote unique resources and also the preservation of the SEW, becoming the point of reference of decision-making (Gomez-Mejia, Haynes, Núñez-Nickel, Jacobson, K. & Moyano-Fuentes, 2007). Thus, we pose that family management
moderate the effects of IC on performance by introducing particular handling of resources and taking into account non-financial goals in their decisions. Taking into consideration the prior reasoning, our work addresses the following research questions: Does IC efficiency have significant impact on profitability? How does human capital efficiency affect firm profitability? How does structural capital efficiency influence profitability? Does family management moderate the expected positive influence of human and structural capital efficiency on the existence of profitability? To address these research objectives, we conduct empirical study with different econometric models covering the hypotheses using a panel data sample of 6,132 paired firm-year observations from Spanish manufacturing firms in the period of 2000 to 2013. Data are obtained from the Survey on Business Strategies. Our findings are consistent with the resources-based and knowledge-based theories. We found evidence showing that IC efficiency and its components (human and structural capital) have a significantly positive impact on profitability of Spanish companies. Moreover, the moderating role of family management on the relationship between structural capital efficiency and performance is positive and significant.

This study has a twofold contribution. Firstly, the findings of this study lead to a better understanding of the effect of IC efficiency on profitability by distinguishing between the effects of human and structural capital efficiency. In this way, it sheds light on the conflicting views from studies addressing the effects of IC on profitability. As a replacement for the subjective measurements of IC usually used, we utilize the Value Added Intellectual Coefficient (henceforth, VAICTM) to measure the efficiency of IC (Pulic, 1998). This uses publicly available and reliable data from financial statements, minimizing potential data subjectivity, and its output is useful and informative to all stakeholders, being utilized for benchmarking purposes across firms or industries (Firer & Williams, 2003). Secondly, we contribute to the literature in family firms, focusing on the effects of family management on the relationship between IC efficiency and performance. Many researchers have analysed the effects of family management on performance (Mazzi, 2011; Basco, 2013). We extend such literature by studying the joint effects of IC efficiency, distinguishing between human capital and structural capital efficiency, and family management on performance. We draw on the SEW perspective to show how family management can positively affect the relationship between structural capital efficiency and performance.

The remainder of this paper is organized as follows. Section 2 describes both prior theoretical literature and empirical studies related to impact of IC and its components on financial performance (profitability) using the VAICTM model and the moderating role of family management on these relations. Based on this review, this section includes
hypotheses development. Section 3 presents the methodology followed by this research, describing the sample, measures of the variables, as well as the two-step GMM system used. Section 4 discusses the empirical results obtained. Finally, conclusions are presented in section 5.

2. Literature review and development of hypotheses

2.1. The influence of intellectual capital efficiency on company's profitability

Issues of IC and financial performance have increasingly attracted the attention of researchers, policy makers, regulatory bodies and investors both from developed and emerging countries (Marr et al., 2004; Mention, 2012). IC, also known as intangible resources and capabilities or knowledge assets, has been a subject of study since the early 1990s (Marr & Chatzkel, 2004). According to the resource-based view of the firm, building a sustainable competitive advantage to maintaining above-average profitability requires a company to create and maintain strategic resources (Peteraf, 1993; Amit & Schoemaker, 1993). These resources must meet four attributes: valuable, rare, inimitable or imperfectly imitable and non-substitutable (Barney, 1991). According to this theoretical model, knowledge is perceived as a firm’s main resource (Spender & Grant, 1996) and fulfils all the required attributes proposed by Barney (1991). This idea led to the extension of the knowledge-based view of the firm, with scholars claiming that how a firm creates, transfers and uses its knowledge impacts its performance and therefore its ability to compete within an industry (Grant, 1996; Nonaka, 1994). In the context of the knowledge-based view of the firm, assets related to knowledge that are perceived as key drivers for a sustainable competitive advantage are often referred to as IC, or intangible assets (Sydler, Haefliger & Pruksa, 2014). Following resource-based and knowledge-based theories, Riahi-Belkaoui (2003) and Chen et al. (2005) stated that organizations with a higher degree of IC will display higher market values. It implies that IC is an important resource in generating competitive advantage; hence, it should contribute to firms' performance. This assumption is also shared by Youndt et al. (2004) who stated that IC intensive companies are more competitive than other companies are, therefore, more successful. Summarizing prior literature (e.g., Edvinsson & Malone, 1997; Stewart, 1997; Sveiby, 1997), we conclude that IC may be defined as knowledge-related intangible assets embedded in an organization that include intellectual competences, intellectual property, and intellectual resources. Notwithstanding the variety of definitions of IC, it is often represented as consisting of three basic and strongly interrelated components: human,
structural and relational capital (Edvinsson & Malone, 1997; Marr & Roos, 2005). Human capital is defined as the knowledge, skills, experience and abilities residing with and utilized by individuals (Roos et al., 2001). Structural capital is the institutionalized knowledge and codified experience residing within and utilized through databases, patents, manuals, structures, systems, and processes (Youndt et al., 2004). Structural capital also embraces corporate culture and management philosophy, which provide a framework to guide and interpret actions in the firm (Mention, 2012). Relational capital is broadly defined as all resources linked to the external relationships of the firm with their stakeholders (e.g. customers, suppliers, investors, and the rest of society) (Marr et al., 2004; Cabrita & Bontis, 2008). Originally, this form of capital was part of structural capital (Edvinsson & Malone, 1997). However, it later emerged as a distinctive form of capital, primarily focused on relationships with customers, thus becoming referred to as customer capital. The concept was later extended to cover all the various external connections of the firms and was accordingly renamed relational capital.

Among the 42 methods of measurement summarized by Sveiby (2010), in this paper we use the VAICTM proposed by Pulic (1998), which divides IC into human capital and structural capital (comprising items originally developed to reflect organizational capital and relational capital). Instead of directly measuring IC, Pulic (2000) advocates that a firm’s market value is created by capital employed and IC. Under Pulic’s VAICTM model, the efficiency of firms’ inputs; physical and financial, human and structural capital are measured. The VAICTM model provides an objective, standardized and verifiable measurement of IC efficiency based on data collected from financial statements. The VAICTM has been widely used to examine the impact of IC efficiency on financial performance, in particular on profitability. These studies have been conducted in different countries (Australia, United Kingdom, Finland, Slovenia, Italy, Greece, Japan, China, South Africa, Malaysia, India) and across industries (primarily focused on knowledge intensive sectors, such as ICT (Information and communication technology) and software, pharmaceutical, manufacturing, firms listed on stock exchanges, and more recently, banking and financial sector).

In general, the majority of the empirical studies confirm the existence of a positive and significant relationship between IC efficiency and profitability of companies, but several of those, especially in developing economies did not reach the same conclusion.

Regarding the studies conducted in the developed economies, Zhang, Nai-Ping and Yu-Sheng (2006) and Chu et al. (2011) found that IC efficiency (measured using the VAICTM) significantly influences Chinese company’s profitability (measured by ROA). This result is in line with that obtained by Zéghal and Maaloul (2010) in the United Kingdom. Also in the case of UK, Rahman (2012) confirmed that greater IC efficiency leads to better
financial performance (ROA). However, not all studies show a statistically significant positive relationship between VAIC™ and profitability of the company. These include analysis conducted by Kujansivu and Lönnqvist (2007) on a sample of 20,000 Finnish companies and by Chan (2009) on Hong Kong Stock Exchange. In this line, Clarke, Seng and Whiting (2011) concluded that profitability of Australian companies was mostly affected by financial and physical capital, and less by IC.

Regarding the studies of IC efficiency and its relationship with firm’s profitability in emerging economies, the empirical findings are also mixed. Most of researchers cannot determine strong positive correlation between the IC and the corporate performance. In this sense, it should be noted that role of the IC in emerging economies is not as visible in a developed economies. For example, Firer and Williams (2003) and Puhorit and Tandon (2015) failed to support any relationship between the IC efficiency and profitability of South African and Indian companies, respectively. These authors conclude that physical capital remains the most significant underlying resource of corporate performance. Similarly, Gan and Saleh (2008) also indicated that physical capital efficiency is the most significant variable related to profitability in Malaysia. Thus, these studies conclude that firms place greater importance on physical capital over IC. In contrast, some studies found evidence to support the relationship between IC and financial performance. In this sense, Phusavat, Comepa, Sitko-Lutek and Ooi (2011) clearly identified that IC efficiency contributes positively to return on assets (ROA) of large manufacturing firms in Thailand. Similarly, Chen et al. (2005) find evidence that Taiwanese companies with better IC efficiency obtain a higher degree of profitability (measured by ROA) in the current and following years. For the same country, Shiu (2006) also demonstrates a strong positive relationship between VAIC™ and ROA. This result is in line with those obtained by Ting and Lean (2009) and Muhammad and Ismail (2009) in the case of Malaysia, Makki and Lodhi (2009) in Pakistan, Mehralian, Rajabzadeh, Sadeh and Rasekh (2012) in Iran, and Nimtrakoon (2015) for a sample of 213 technological firms listed on five ASEAN stock exchanges (Indonesia, Malaysia, Philippines, Singapore and Thailand). Also, it should be noted that in the case of India, the research conducted by Ghosh and Mondal (2009), Pal and Soriya (2012), Vishnu and Gupta (2014) and Kamath (2015) found that VAIC™ had a significant effect on profitability. These studies have important implications for developing economies and it further strengthens the underlying importance of IC as a major driver of corporate and national growth.

Regarding the research conducted in the case of European emerging economies, we can notice the studies conducted by Javornik, Tekavcic and Marc (2012) in the case of Slovenia, Kommenic and Pokrajcic (2012) in Serbia and Bryl and Truskolaski (2015) in
Poland. These studies provide empirical evidence that VAIC™ has a positive and statistically significant effect on ROA. However, most studies failed to validate hypotheses that VAIC™ has positive and significant impact on profitability. Thus, the studies of Puntiño (2009) and Celenza and Rossi (2014) in the case of Italy, Díez, Ochoa, Prieto and Santidrián, (2010) in Spain, Maditinos et al. (2011) in the case of Greece, Morariu (2014) in Romania, concluded that there was no clear relationship between IC efficiency and profitability measures. In the same line, the results of researches conducted in Serbia (Janošević & Dženopoljac, 2011; Janošević, Dženopoljac & Tepavac, 2012; Janošević & Dženopoljac & Bontis, 2013; Janošević & Dženopoljac, 2014) revealed that IC’s impact on profitability is either small or insignificant. Overall, these studies showed that physical capital was the main predictor of profitability (ROA). Finally, moving to another continent, Villegas, Hernández and Salazar (2017) confirmed that VAIC™ has a positive impact on financial profitability (measured by ROA) on a sample of Mexican listed companies.

From this literature review undertaken, it is observed that while on theoretical level, distinguished authors argue that IC is the main value driver of all companies and therefore IC investment allows the firm to enhance its financial performance (Riahi-Belkaoui, 2003; Youndt et al., 2004; Marr et al., 2004; Chen et al., 2005), the empirical evidence is inconclusive and far from achieving a solid scientific consensus. These mixed results prompt the researchers to investigate the relationship between IC efficiency and firm performance. In our paper, the performance is defined by profitability, an expression of the ability of invested capital to earn a certain level of profit. In this way, our study proposes for examination the following hypothesis:

**Hypothesis 1: There is a positive relationship between Intellectual Capital Efficiency and profitability (ROA).**

Additionally, prior studies have found that different components of IC have a greater impact on firm performance than others (e.g. Chan, 2009; Ting & Lean, 2009; Maditinos et al., 2011; Kamath, 2015). Therefore, this paper analyses the effects of human capital efficiency (HCE) and structural capital efficiency (SCE) on profitability.

**The influence of human capital efficiency on company’s profitability**

A comprehensive review of theoretical literature (including economic human capital theory, resource-based theories, human resource management, organizational learning and knowledge management) shows that human capital is considered the most
important asset of an organization (Mention, 2012). Having brilliant, motivated, and experienced human capital should be the base for having better financial performance (Roos et al., 2001). Also, at the empirical level, the influence of human capital efficiency (HCE) on the profitability of firms has been widely investigated through VAICTM model. Almost all research confirms the central role of human capital, as it positively affects profitability. For example, for baking and financial sector, Mavridis (2004), Goh (2005) and Joshi, Cahill and Sidhu (2013) found that Japanese, Malaysian and Australian banks respectively, with the greatest profitability were those who were most efficient in the use of their human capital. Additionally, using a sample of 213 technology firms listed on five ASEAN stock exchanges (Indonesia, Malaysia, Philippines, Singapore and Thailand) and 32 companies listed on the Mexican Stock Exchange, Nimtrakoon (2015) and Villegas et al. (2017) respectively, found that HCE had a greater influence on profitability (ROA). In line with their results are those obtained by Kamath (2008) in the case of Indian pharmaceutical sector and Maditinos et al. (2011) in the case of Greek companies, as they revealed that companies’ profitability was only significantly associated with the HCE. On the other hand, some studies revealed that HCE positively affects ROA (Kommenic & Pokrajčić, 2012; Janošević & Dženopoljac (2015) in their studies on a sample of Serbian companies, and Bryl and Truskolaski (2015) on a sample of Polish listed companies). So, all these studies conclude that investment on human capital is more returnable as compare to physical and structural capital. Likewise, Janošević and Dženopoljac (2012a) confirmed that ROA is under significant impact of human and structural capital in 300 Serbian top performing companies in terms of export in 2011. Similarly, the findings of Phusavat et al. (2011) on large manufacturing firms in Thailand and Calisir, Gumsuoy, Bayraktaroglu and Deniz (2010) on listed companies on the Istambul Stock Exchange (Turkey) indicated that HCE affects positively ROA. In a similar vein, Ting and Lean (2009) found that HCE have significant positive effect on profitability (as measured by ROA) of Malaysian banks. Similar results are obtained by Kamath (2015) on a sample of 30 Indian firms from across various manufacturing and service sector. This author indicated that HCE had a greater influence on profitability. Thus, all these empirical researches conclude that HCE is the most significant variable (compared to structural and physical capital) and it has positive and significant association with profitability of the firms. As a result, companies must conduct a substantive investment on human capital to upgrade the stock of HC through employee training and knowledge sharing in order to improve their profitability. While the research mentioned above found positive relationships, surprisingly some studies found results contrary to expectations. For example, the results obtained by Yu et al. (2010) in the case of Hong Kong found negative correlations between HCE and the
financial indicators (ROA), showing that the efficiency with which a firm can use its human resources impacts negatively on firm performance. Similarly, another study of Purohit and Tandon (2015) proved that HCE had a negative relationship with ROA in high-tech and pharmaceutical companies in India.

Finally, some other studies find no evidence of a significant relationship between HCE and profitability. For example, Bontis et al. (2013) pointed out that human capital was undervalued and not exploited effectively in Serbian banking sector. So, HCE does not influence profitability. Similarly, Firer and Williams (2003) and Díez et al. (2010) did not find any strong association between the efficient use of human capital and firms’ profitability defined as return on assets (ROA) in South Africa and Spain, respectively. Likewise, Janošević and Dženopoljac (2012b) pointed out that HCE has a weak influence on ROA to Serbian companies with the highest trade rates on the Belgrade Stock Exchange (BELEX).

So, in this situation of contradictory support, it is logical to check empirically whether HC has direct relationship with firm’s profitability or not? Hence, this study proposed the following hypothesis:

\[
\text{Hypothesis 2: There is a positive relationship between Human Capital Efficiency and profitability (ROA)}
\]

**The influence of structural capital efficiency on company’s profitability**

Literature has also paid attention to the link between structural capital efficiency (SCE) and performance in terms of profitability. SCE can be seen as the foundation stone of an organization in the knowledge age because it creates the tools and architecture for maintaining, forming, reinforcing, and transferring knowledge along the business activities (Cabrita & Bontis, 2008). If the organizational culture, rules, procedures and system are weak, well motivated employee capabilities would not be able to add value to the firm. However, if a company has efficient systems, database, patents, trademarks, routines and procedures (as part of the structural capital), then higher IC efficiency might be attained (Teece, 1998; Bontis, Chua, Keow & Richardson, 2000; Mehalian et al., 2012) and therefore greater profitability (Shiu, 2006; Tan, Plowman & Hancock, 2007).

However, the effect of SCE on profitability is challenging, as some studies find a positive relationship (e.g. Chan, 2009; Chu et al., 2011; Clarke et al., 2011; Bontis et al., 2013; Bryl & Truskolaski, 2015, etc.), while others observe a negative relationship (e.g. Purohit & Tandon, 2015; Kamath, 2015, etc.). Likewise, the results obtained by Kamath (2008), Díez et al. (2010), Maditinos et al. (2011) and Janošević and Dženopoljac (2014, 2015)
revealed that SCE failed to show any significant empirical impact on the firms’ performance in terms of profitability. Firstly, it is interesting to note that study of Chan (2009) revealed that only SCE has a statistically significant and positive relationship with profitability measures (ROA). In the same line, Janošević and Dženopoljac (2012b) suggested that among IC components, SCE has the most significant impact on ROA. These findings are consistent with those obtained by Janošević and Dženopoljac (2012a), Vishnu and Gupta (2014) and Villegas et al. (2017), so they confirmed that ROA was under significant impact of SCE. While, Firer & Williams (2003) showed only a moderately positive association between the SCE and profitability.

Given the various results obtained in the former studies and considering the importance of empirical verification, further studies are necessary for supporting and explaining the relationship between SCE and profitability. Accordingly, this paper will attempt to empirically verify the following hypothesis:

**Hypothesis 3: There is a positive relationship between Structural Capital Efficiency and profitability (ROA)**

2.2. The moderating role of family management in the relationship between intellectual capital efficiency and profitability

Whilst direct relationships between IC and financial performance have been widely examined in prior VAIC™ research, this study explores another relationship – a moderating effect of family management

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Socioemotional issue (SEW) alludes to non-financial aspects of the firm meeting the family’s affective needs, namely identity, ability to exercise family influence, and the perpetuation of the family dynasty (Gomez-Mejia et al., 2007; Berrone, Cruz, Gomez-Mejia & Larraza Kintana, 2010). The preservation of the SEW becomes the point of reference of family decision-making and family firms consent to taking risks of inadequate performance (Gomez-Mejia et al., 2007). As a consequence, family managers evaluate their own decisions based on non-financial goals in order to maximize the family’s SEW (Zellweger, Kellermanns, Chrisman & Chua, 2012). Family managers tend to generate or keep specific jobs for family members to continue family dynasty (Gomez-Mejia et al., 2007) or preserve family dysfunctional and conflictive
relationships (Berrone, Cruz & Gomez-Mejia 2012). Family-managed firms are willing to suffer from restrictions in quality and quantity of human resources (Simon & Hitt, 2003), from potential entrenchment of top managers and unqualified human capital (Gomez-Mejia, Nuñez-Nickel & Gutierrez, 2001; Villalonga & Amit, 2006), or nepotism (Perez-Gonzalez, 2006), because they make decisions not driven mainly by financial goals but by the preservation of socioemotional endowment (Berrone, et al., 2010).

However, the particular focus of family-managed businesses on preserving SEW can also lead to greater performance of human resources. Families are often featured by a wide range of positive emotions, namely warmth, commitment, tenderness, friendship, love or consolation, among others, which penetrate the firm impacting on the particular family manager’s behaviour (Gomez-Mejia, et al., 2007; Baron, 2008). Particular motivation, cooperation, or even own family language (Tagiuri & Davis, 1996; Collins & Smith, 2006) collaborate on both the achievement of non-financial and financial goals. Therefore, the consent by family management of free riding, perquisites or privileges, among others, in order to preserve family SEW, can weaken the relationship between Human Capital Efficiency and performance. But, peculiar emotional attachment can also stimulate both SEW and financial goals, strengthen the link between Human Capital Efficiency and performance. The net effect is thus ambiguous. Based on the above arguments, we make the following hypotheses.

Hypothesis 4a1: Family management involvement moderates negatively the relationship between Human Capital Efficiency and performance.
Hypothesis 4a2: Family management involvement moderates positively the relationship between Human Capital Efficiency and performance.

Structural Capital Efficiency, Performance and Family Management

The control exerted by family managers over strategic decisions (Schulze, Lubatkin & Dino, 2003), as it is an integral part of the SEW (Zellweger et al., 2012), is also likely to influence on the relationship between Structural Capital Efficiency and Performance. Family managers usually promote a higher identification of the family with the firm, which not only exert an important impact on human resources, as we have seen above, but also to the infrastructure, processes, databases of the business or the organization image. For instance, family management will tend to perpetuate a favourable family image (Sharma & Manikuti, 2005) because any reputation failure might be devastating for the firm and the family (Westhead, Cowling & Howorth, 2001). Family managers will preserve family’s heritage and tradition (Casson, 1999) regarding organization
philosophy, in order to save dynastic succession (Zellweger & Astrachan, 2008). They own particular firm-specific knowledge (Donnelley, 1964) and collaborate to generate collective corporate culture (Arregle, Hitt, Simons & Very, 2007). Thus, they are also likely to cultivate a higher efficiency in the techniques, procedures and programs—process capital—to improve the quality of the services and products they provide (Carrigan & Buckley, 2008; Teal, Upton & Seaman, 2003). Furthermore, they will attempt to protect intellectual properties—innovation capital, such as patents, copyrights and trademarks, because of their long term planning horizons (Miller, Le Breton-Miller & Scholnick, 2008) and their vision of the firm as a long term investment for descendants (Berrone et al., 2010). In summary, family-managed firms appear to provide higher performance from their specific structural capital (organizational, process and innovation capital).

Previous literature has confirmed that family management enhance the learning from environment and external networks (Zahra, 2012) for improving performance. Family managers tend to engender long-standing and strong social bonds across generations with stakeholders and the community (Miller & Le Breton-Miller, 2005; Berrone, et al., 2012). The exchange of new ideas and information (Classen, Carree, Van Gils & Peters, 2014; Liach & Nordqvist, 2010) with close networks and stakeholders will contribute to the achievement of higher levels of performance. In short, the search of non-financial goals and the stimulation of trust-based and long-term ties with stakeholders (Berrone et al., 2012) make family management to intensify the positive relationship between Structural Capital Efficiency and performance.

Hypothesis 4b: Family management involvement moderates positively the relationship between Structural Capital Efficiency and performance.

The theoretical model and the proposed hypotheses are presented in Fig. 1.

**Fig. 1.** Family influence, Intellectual Capital Efficiency, and firm performance.
3. Methodology

3.1. Sample

The source of data comprising this sample is the Survey on Business Strategies (ESEE), administered by the State Partnership of Manufacturing Equity (SEPI) foundation, from the Spanish Ministry of Industry. After removing some firms because of missing, incomplete or outliers data, financial information and data on family management involvement were collected from the ESEE database. Our sample includes 438 small and medium manufacture firms for the period 2000-2013, which results in a balanced panel data of 6,132 firm-year observations. Table 1 provides a description of the sample selection process (Panel A) and the sample description (Panel B).

The quality of the data is guaranteed by the fact that they come from a public agency, following a process that ensures the representativeness of the population. Additionally, we test the representativeness of the sample from a statistical point of view. The maximum error for a finite population has been tested resulting in a small error (e=4.49%, α=0.95) and leading to the conclusion that sample is representative of population.

The proportion of family managed firms on the sample is around 55% against the 44.90% of non-family managed firms. Panel B shows that a high proportion of firms comes from metal products (14.38%) and foodstuffs and snuff (10.96%) sub-industrial although a twenty sub-industries form the manufacture industry are represented on the sample.

Table 1. Sample selection and description

<table>
<thead>
<tr>
<th>Panel A. Sample selection process</th>
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<tr>
<td>ESEE panel of manufacturing firms (2013)</td>
<td>5,304 firms</td>
</tr>
<tr>
<td>Firms with and incomplete or missing data and outliers for the study variables</td>
<td>(4,866 firms)</td>
</tr>
<tr>
<td>Initial sample from ESEE</td>
<td>438</td>
</tr>
<tr>
<td>Years</td>
<td>2000-2013</td>
</tr>
<tr>
<td>Observations</td>
<td>6,132</td>
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<tr>
<th>Panel B. Sample description</th>
<th>N</th>
<th>%</th>
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<tbody>
<tr>
<td>Family managed</td>
<td>3379</td>
<td>55.10%</td>
</tr>
<tr>
<td>Non family managed</td>
<td>2753</td>
<td>44.90%</td>
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In order to test the research hypotheses, we follow previous studies in the research area of IC taking as proxy of the firm financial performance\(^1\) the return of assets ratio (ROA= operating income to total assets) (see among others, Firer & Williams, 2003; Kommenic & Pokrajčić, 2012; Maditinos, et al., 2011).

\(^1\) Due to our sample includes non listed firms, market to book ratio has been omitted and other measures based on market values.

<table>
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<th>N</th>
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<tr>
<td>224</td>
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<td>672</td>
<td>10.96%</td>
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<td>154</td>
<td>2.51%</td>
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<tr>
<td>420</td>
<td>6.85%</td>
</tr>
<tr>
<td>98</td>
<td>1.60%</td>
</tr>
<tr>
<td>140</td>
<td>2.28%</td>
</tr>
<tr>
<td>336</td>
<td>5.48%</td>
</tr>
<tr>
<td>196</td>
<td>3.20%</td>
</tr>
<tr>
<td>490</td>
<td>7.99%</td>
</tr>
<tr>
<td>490</td>
<td>7.99%</td>
</tr>
<tr>
<td>238</td>
<td>3.88%</td>
</tr>
<tr>
<td>210</td>
<td>3.42%</td>
</tr>
<tr>
<td>882</td>
<td>14.38%</td>
</tr>
<tr>
<td>406</td>
<td>6.62%</td>
</tr>
<tr>
<td>84</td>
<td>1.37%</td>
</tr>
<tr>
<td>266</td>
<td>4.34%</td>
</tr>
<tr>
<td>392</td>
<td>6.39%</td>
</tr>
<tr>
<td>126</td>
<td>2.05%</td>
</tr>
<tr>
<td>182</td>
<td>2.97%</td>
</tr>
<tr>
<td>126</td>
<td>2.05%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6132</strong></td>
</tr>
</tbody>
</table>

3.2. Measures

3.2.1. Dependent variable

As independent variable, we took the Intellectual Capital Efficiency (henceforth, ICE). We used a holistic approach to IC proposed by Pulic (1998, 2000, 2004) and based on the efficiency of the firm to create additional value, the Value Added Intellectual Coefficient (VAICT\(^{TM}\)). According to that model, the ICE is the sum of: (1) HCE (Human Capital Efficiency) indicates the amount of value added generated per one monetary unit invested in human resources (employees); and, (2) SCE (Structural Capital Efficiency) may be express as the amount of value added generated by the structural capital of the firm. Although previous studies have used different methods to measure intangibles (for a review, see Sveiby, 2010), there isn’t consensus about the best option. VAICT\(^{TM}\) has
been use by a wide number of studies as proxy of ICE (e.g. Chen, et al., 2005; Manzaneque, Ramírez & Diéguez-Soto, 2017), due to multiples advantages (for a review see Chan, 2009), highlighting among others the following: (1) it capture the new value creation by both tangible and intangible assets of the firm; 2) it allows to measure the IC efficiency through its two components (human and structural capital); 3) it can be easily applied to unlisted and small and medium firms because its calculation is possible through the public information of the financial statements; 4) the VAIC measure is objective, verifiable and comparable, since the data used come from audited and standardized accounting information; and, 5) it has been widely adopted by researchers on the IC and corporate performance field of study and it is recognize as a standardized and integrated measure which allow comparison among different contexts of study.

Pulic (1998) proposes ICE as:

\[ \text{ICE} = \text{Human Capital Efficiency (HCE)} + \text{Structural Capital Efficiency (SCE)} \]

In the analyses, \( \text{ICE} \) is split into, HCE and SCE.

HCE is calculated as the ratio of total value added by the resources of the firm to total salaries and wages spent by the firm (HC). The value added (VA) is calculated by using information in the annual report by adding the operating profits, total employee expenses, depreciation, and amortization.

SCE is calculated as the ratio of value added less total salary and wage costs for firm capital (VA- HC) to total value added (VA).

We consider this measure to be most appropriate because captures the new value created by the firm’s investment into intellectual resources.

As moderator we used family management involvement. According to the above literature review, family firms have a particular vision of the firm (Chua, Chrisman & Sharma, 1999) and differ from other kind of firms in perceptions of management practices (Poza, Hanlon & Kishida, 2004). In order to test our hypothesis about the influence of family management involvement on the relationship between ICE and firm performance, we build a binary measure of family firm management involvement operationalized as 1 if there is family members or relatives who occupy top managerial position, and 0 otherwise. Similar measures of family managed firms have been used by previous studies such as Block (2012), Block, Miller, Jaskiewicz and Spiegel (2013) and Sirmon, Arregle, Hitt and Webb (2008), among others.

### 3.2.3. Control variables
First we control for firm size measure as the natural logarithm of the book value of total assets. Previous literature suggests that the ability of the firm to achieve greater performance depend on the firm size (Riahi-Belkaoui, 2003). We also control for leverage measures as the ratio of the firm’s debt to total assets. Theoretical and practical perspectives provide opposing arguments regarding the impact of leverage on performance. According to Jensen and Meckling (1976) and Myers (1977) higher level of leverage is linked to “moral hazard problems” between shareholders and debtholders because of the different interest between them. So, shareholders could take actions in their own benefit at the expense of debtholders, as an example, investing in riskier project because they have limited liability in case of bankruptcy (Jensen & Meckling, 1976) or underinvest because probability of project could benefit the debtholders, as demonstrated by Myers (1977). As a result, greater level of leverage exerts a negative impact on firm performance. Contrarily, two different arguments point in an opposite direction. Firstly, if borrowers control managers, it should reduce “free cash-flow” at the disposal of managers (Jensen, 1986), providing incentives to a better perform of them. Secondly, debt could be a signal of those firms select by borrowers because of their higher quality and information transparency (Ross, 1977). Therefore, that point suggests that the highest leverage firms achieve greater performance. Finally, we control for two specific characteristics of the firm, industry and territorial context. According to Tan, et al. (2007) the relationship between IC and financial performance differed across industries. Therefore, we control the specificities of the industry, including dummy variables for each sector of the industry (see Table 1 for more details). Additionally, we control for territorial specificities including dummy variables for seven Spanish territorial subdivisions according to the Nomenclature des Unités Territoriales Statistiques (NUTS1) specified by the European Union (2015) because social, legal and cultural characteristics could influence the profitability of the firm.

### 3.3. Methodology

In order to deal with the unobservable heterogeneity associated with fixed firm effects and possible endogeneity linked to dynamic panel data, (dynamic endogeneity, simultaneity and unobserved heterogeneity) the coefficients are estimated using two-step system GMM (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998) estimator. Different variants of the following model of panel data have been estimated:
\[ \text{ROA}_{it} = \alpha + k\text{ROA}_{it-\alpha} + \beta \text{IC}_{it} + \delta \text{CV}_{it} + \theta \text{D}_{it} + \eta_i + \varepsilon_{it}, \quad t=2000-2013 \]

where ROA is return of assets ratio, IC is the ICE for the business i in the period t (IC is split into human capital efficiency and structural capital efficiency) and CV are the control variables (firm size and leverage). D includes year, industry and territorial specificities dummies. The instrument used in the two-step system GMM estimation are: differenced equations: \( \text{ROA}_{t-2}, \text{IC}_{t-2}, \Delta \text{D}_{it} \); level equations: \( \Delta \text{ROA}_{t-2}, \Delta \text{IC}_{t-2}, \Delta \text{ROA}_{t-3}, \Delta \text{IC}_{t-3}, \text{D}_{it} \). Take into account the temporal persistence of performance, including in the model the first lag of the dependent variable. Year, industry and territorial specificities are treated as exogenous variables. To test the validity of the model specification two different test have been used. First, Hansen test of over-identification examines the lack of correlation between the instruments and the error term. Second, AR(1) and AR(2) are tests for first and second-order correlation in the first-differenced residuals (under the null of no serial correlation). The presence of first order autocorrelation does not invalidate the results, however we expect no second order correlation.

### 4. Empirical results

Table 2 (Panel A) provides some descriptive statistics of the variables. The average of performance is around 11.4%. Particularly, according to the test of difference of means (Panel B), family managed firms appear to be more profitable than non-family managed firms (11.8% against 10.9%; T-Tests: -1.798; p<0.1). Regarding ICE, the results show that non-family managed firms have more ICE than family managed firms (1.843 against 1.800; T-Tests: 3.421; p<0.01). The same circumstance happens regarding human capital efficiency (1.577 against 1.548; T-Tests: 3.418; p<0.01) and structural capital efficiency (0.299 against 0.284; T-Tests: 3.418; p<0.01). Finally, average firm size is higher in non-family managed firms (17.307 against 15.532; T-Tests: 32.258; p<0.01) while leverage is relatively similar in both cases (0.422 against 0.429; T-Tests: -1.021; p>0.10).

Pearson correlations are reported in table 2 (Panel C). All bivariate correlations do not exceed 0.302 (in bold correlation between independent variables). Variance inflation factor (VIF) values are below of 2.5, level suggested as warning for multicollinearity problem according to previous studies (see among other Hair, Anderson, Tatham & Black, 1998). According to both correlation test, multicollinearity concern appear not to be a serious problem in our models.
Table 2. Descriptive statistics and correlation matrix

Panel A. Descriptive statistics

<table>
<thead>
<tr>
<th>Sample (438 firms/6,132 observations)</th>
<th>Mean</th>
<th>Median</th>
<th>25%</th>
<th>75%</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>0.114</td>
<td>0.100</td>
<td>0.038</td>
<td>0.169</td>
<td>0.142</td>
</tr>
<tr>
<td>Intellectual capital efficiency</td>
<td>1.819</td>
<td>1.670</td>
<td>1.268</td>
<td>2.206</td>
<td>0.992</td>
</tr>
<tr>
<td>Human capital efficiency</td>
<td>1.561</td>
<td>1.389</td>
<td>1.143</td>
<td>1.771</td>
<td>0.757</td>
</tr>
<tr>
<td>Structural capital efficiency</td>
<td>0.291</td>
<td>0.280</td>
<td>0.125</td>
<td>0.435</td>
<td>0.207</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.426</td>
<td>0.420</td>
<td>0.226</td>
<td>0.616</td>
<td>0.251</td>
</tr>
</tbody>
</table>

Panel B. Mean differences family/non-family managed firms

<table>
<thead>
<tr>
<th></th>
<th>Family managed firms</th>
<th>Non-Family managed firms</th>
<th>T-Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>0.118</td>
<td>0.109</td>
<td>-1.798*</td>
</tr>
<tr>
<td>Intellectual capital efficiency</td>
<td>1.800</td>
<td>1.843</td>
<td>3.421***</td>
</tr>
<tr>
<td>Human capital efficiency</td>
<td>1.548</td>
<td>1.577</td>
<td>3.418***</td>
</tr>
<tr>
<td>Structural capital efficiency</td>
<td>0.284</td>
<td>0.299</td>
<td>3.437***</td>
</tr>
<tr>
<td>Firm size</td>
<td>15.532</td>
<td>17.307</td>
<td>32.258***</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.429</td>
<td>0.422</td>
<td>-1.021</td>
</tr>
</tbody>
</table>

Panel C. Correlation matrix
The set of regression results testing the direct effect of Intellectual Capital Efficiency (Human Capital Efficiency and Structural Capital Efficiency) is reported in Table 3. Year, industry and territorial specificities dummy variables are included in all models to capture the potential impact on ROA across all of these particular characteristics of the firm.

Table 3. Intellectual resources productivity → Firm performance → Dynamic Panel-Data Estimation, Two Step System GMM.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance_1 (β₁)</td>
<td>0.094**</td>
<td>0.098***</td>
<td>0.071**</td>
</tr>
<tr>
<td></td>
<td>(0.042)</td>
<td>(0.036)</td>
<td>(0.037)</td>
</tr>
<tr>
<td>Intellectual Capital efficiency (β₂)</td>
<td>0.121***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human capital efficiency (β₂₁)</td>
<td></td>
<td>0.129**</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.052)</td>
<td></td>
</tr>
<tr>
<td>Structural capital efficiency (β₂₂)</td>
<td></td>
<td></td>
<td>0.748***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.281)</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size (ln)</td>
<td>-0.015</td>
<td>-0.012</td>
<td>-0.101</td>
</tr>
<tr>
<td></td>
<td>(0.044)</td>
<td>(0.035)</td>
<td>(0.075)</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.237</td>
<td>0.343</td>
<td>0.233</td>
</tr>
<tr>
<td></td>
<td>(0.392)</td>
<td>(0.371)</td>
<td>(0.355)</td>
</tr>
<tr>
<td>Constant and time effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Territorial specificities</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hansen test of over identification</td>
<td>18.41</td>
<td>17.13</td>
<td>13.68</td>
</tr>
<tr>
<td></td>
<td>(10)</td>
<td>(10)</td>
<td>(10)</td>
</tr>
<tr>
<td>AR1 (p-value)</td>
<td>-3.41***</td>
<td>-3.79***</td>
<td>-3.50***</td>
</tr>
<tr>
<td></td>
<td>(10)</td>
<td>(10)</td>
<td>(10)</td>
</tr>
<tr>
<td>AR2 (p-value)</td>
<td>0.94</td>
<td>1.18</td>
<td>-0.28</td>
</tr>
<tr>
<td>Number of firms</td>
<td>438</td>
<td>438</td>
<td>438</td>
</tr>
</tbody>
</table>
In this table, we report results from dynamic panel-data estimation with two-step system GMM of the model:

$$\text{ROA}_{it} = \alpha + k \text{ROA}_{it-1} + \beta_1 \text{IC}_{it} + \delta \text{CV}_{it} + \theta \text{D}_{it} + \eta_i + \epsilon_{it}, \quad t=2000-2013$$

$\text{ROA}_{it}$ is return of assets ratio, $\text{IC}_{it}$ is the intellectual capital efficiency for the business $I$ in the period $t$ (IC is split into human capital efficiency and structural capital efficiency) and $\text{CV}_{it}$ are the control variables (firm size and leverage). $\text{D}_{it}$ includes year, industry and territorial specificities dummies. The results are based on a sample of 443 firms and the covered period is 2000-2013. Standard error is reported in parentheses. *, **, *** respectively, indicate significance levels at 10%, 5%, and 1%. In bold, significant coefficients. AR(1) and AR(2) are tests for first and second-order correlation in the first-differenced residuals (under the null of no serial correlation). The Hansen test of over-identification is under the null hypothesis of zero correlation between the instruments and the error term. That is rejection of the null casts doubt on the validity instruments. The instrument used in the two-step system GMM estimation are: differenced equations: $\Delta \text{ROA}_{t-2}$, $\Delta \text{IC}_{t-2}$, $\Delta \text{D}_{it}$; level equations: $\Delta \text{ROA}_{t-3}$, $\Delta \text{IC}_{t-3}$, $\Delta \text{D}_{it}$. Variables are defined above.

The hypothesis H1 suggests that ICE has positive impact on profitability. Specifically, our results clearly indicate that firms with better ICE yield greater return on assets ($\beta_2 = 0.121$, $p<0.01$). In conclusion, the obtained results show that ICE has a positive correlation with ROA. It proves that ICE is an important factor that increases the profitability of business enterprises. Hence, H1 is supported, which is consistent with the research conclusions drawn by Chen et al. (2005), Phusavat et al. (2011), Clarke et al. (2011), Kommenic and Pokrajčić (2012), Rahman (2012), Javornik et al. (2012) and Bryl and Truskolaski (2015). Based on the arguments of previous literature, the results show that greater capabilities or knowledge assets efficiency is an important resource of profitability, which is in line with the postulates of resource-based and knowledge-based theories.

In hypothesis H2, it is suggested that Human Capital Efficiency would have positive impact on profitability presented by ROA. Specifically, the results show that Human Capital Efficiency is significantly correlated with ROA ($\beta_{2a} = 0.129$, $p<0.05$). This means that when companies used efficiently their human capital they recorded a higher ROA. This results suggests that firms in Spain should recruit and retain employees equipped with high calibre ability as well as to upgrade their managerial skills in order generate higher firms’ profitability. These findings significantly support H2, concluding that Human Capital Efficiency exerts significant impact in improving the ROA. This result is in line with previous studies such as Kamath (2008), Yu et al. (2010), Kommenic and Pokrajčić (2012), Bryl and Truskolaski (2015) and Janošević and Dženopoljac (2015).

The third hypothesis regarding a positive relationship between Structural Capital Efficiency and profitability is strongly statistically supported. Concerning H3, the results...
show that ROA is positively influenced by SCE ($\beta_{2b} = 0.748$, $p<0.01$). These findings confirming that firms with greater *Structural Capital Efficiency* tend to have better return on assets. Thus, the findings significantly support H3, concluding that firms with better *Structural Capital Efficiency* yield greater profitability. These results are consistent with the research conclusions drawn by Chan (2009), Janošević and Dženopoljac (2012b), Bontis et al. (2013) and Bryl and Truskolaski (2015).

**Table 4.** Intellectual resources productivity $\rightarrow$ Firm performance $\rightarrow$ Family firms→Dynamic Panel-Data Estimation, Two Step System GMM.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance_1 ($\beta_1$)</td>
<td>0.080 (0.049)</td>
<td>0.087* (0.049)</td>
<td>0.091** (0.037)</td>
<td>0.097** (0.038)</td>
<td>0.046 (0.039)</td>
<td>0.029 (0.050)</td>
</tr>
<tr>
<td>Intellectual Capital efficiency ($\beta_2$)</td>
<td>0.135** (0.059)</td>
<td>-0.021 (0.082)</td>
<td>0.118*** (0.043)</td>
<td>-0.036 (0.120)</td>
<td>0.849*** (0.258)</td>
<td>0.079 (0.373)</td>
</tr>
<tr>
<td>Human capital efficiency ($\beta_{2a}$)</td>
<td>0.318** (0.151)</td>
<td>0.593*** (0.229)</td>
<td>-0.366** (0.169)</td>
<td>0.734*** (0.279)</td>
<td>-0.400** (0.209)</td>
<td>-0.525*** (0.205)</td>
</tr>
<tr>
<td>Structural capital efficiency ($\beta_{2b}$)</td>
<td>0.324** (0.145)</td>
<td>0.397 (0.251)</td>
<td>1.501** (0.786)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family management involvement ($\beta_3$)</td>
<td>-0.037 (0.058)</td>
<td>0.001 (0.144)</td>
<td>-0.031 (0.043)</td>
<td>-0.011 (0.067)</td>
<td>-0.154 (0.102)</td>
<td>-0.194 (0.139)</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size (ln)</td>
<td>0.667* (0.404)</td>
<td>0.282 (0.569)</td>
<td>0.788** (0.414)</td>
<td>0.483 (0.478)</td>
<td>0.658 (0.565)</td>
<td>0.437 (0.467)</td>
</tr>
<tr>
<td>Leverage</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Constant and time effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Territorial specificities</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hansen test of over identification (p-value)</td>
<td>11.73 (9)</td>
<td>3.21 (8)</td>
<td>11.25 (9)</td>
<td>3.85 (8)</td>
<td>7.02 (9)</td>
<td>2.79 (8)</td>
</tr>
</tbody>
</table>
AR1 (p-value) | -3.84*** | -3.18*** | -4.59*** | -3.14*** | -4.16*** | -3.36***
---|---|---|---|---|---|---
AR2 (p-value) | 0.50 | -0.97 | 0.51 | 0.07 | 0.95 | -1.41
Number of firms | 438 | 438 | 438 | 438 | 438 | 438
Number of observations | 5694 | 5694 | 5694 | 5694 | 5694 | 5694
No. Instruments | 49 | 49 | 49 | 49 | 49 | 49

Table 4 presents the results of regression models of table 3 adding the family-management involvement dummy variable and the interactions between family-management dummy and the variables representatives of ICE (Intellectual Capital Efficiency, Human Capital Efficiency and Structural Capital Efficiency). First, the coefficient of Family Management Involvement is negative and statistically significant ($p<0.05$) in all regressions. That is consistent with previous studies, which points that family managed firms are less profitable than non-family managed firms. As we discussed above, the preservation of socioemotional endowment leads to family managers to make decision not driven mainly by financial goal (Berrone et al., 2010). Our results appear support that assertion.

In addition, we test the moderator role of family management on the relationship between ICE and performance. The results show that the coefficient of Family management involvement * Intellectual Capital Efficiency is positive and significant ($\beta_4 = 0.324$, $p<0.05$). This finding supports the argument that although family firms management could impact negatively on the profitability, they are better at transfer the efficiency of intangible resources to greater performance. But, are this true for each type of intangible resources? To answer this question, we run models 4 to 6 by splitting the variable Intellectual Capital Efficiency into Human Capital Efficiency and Structural Capital Efficiency.
The results of model 4 show that the coefficient of *Family management involvement* * Human Capital Efficiency is positive but not significant ($\beta_{4a} = 0.397$, $p>0.10$). Hypothesis 4a1 and 4a2 are not supported. Finally, the result of model 6 show that the coefficient of *Family management involvement* * Structural Capital Efficiency is positive and significant ($\beta_{4b} = 1.501$, $p<0.05$), supporting hypothesis 4b. Both results confirm that socio-emotional issues appear do not influence in how the efficiency of the human resources contributes to create greater performance on family managed firms. However, the results confirm the existence of family management effect on the relationship between Structural Capital Efficiency and performance. This finding supports the argument that, family-managed firms are better into transform greater efficiency of organizational, process and innovation capital into greater performance.

5. Discussion and conclusions

According to resource-based and knowledge-based theories, firms gain competitive advantage and attain superior performance by controlling both its tangible and intangible assets (Riahi-Belkaoui, 2003). The IC embodies intangible value drivers and for that reason, it has an increasingly important role in achieving high business performance (Kommenic & Pokrajčić, 2012). In addition, it is believed that investors will place a higher value for firms with greater IC (Firer & Williams, 2003). As such, it is expected that IC plays an important role in enhancing both corporate value and financial performance (Chen et al., 2005). However, the inconclusive results from prior empirical studies suggest the need to conduct more research on the role of IC. Using VAIC™ model developed by Pulic (1998), this paper empirically examines the relationship between IC efficiency and profitability using a sample of manufacturing companies in Spain for the period 2000 to 2013. In order to assess this relationship, three main hypotheses are tested. These research hypotheses are developed in accordance to both theoretical literature and previous research in the field of IC.

The study results give strong empirical support for the all hypotheses. Our findings reveal that both *Intellectual Capital Efficiency* (as measured by VAIC™) and its components (*Human Capital Efficiency* and *Structural Capital Efficiency*) have a significantly positive impact on profitability (measured by ROA) of Spanish companies over time. It means that Spanish companies are capable of significantly increasing their profitability using efficiently their human and structural capital. This is in line with the results of prior empirical research about the relationship between ICE and financial performance (Chen et al., 2005; Shiu, 2006; Tan et al., 2007; Chan, 2009; Phusavat et al., 2011; Clarke et al., 2011; Kommenic & Pokrajčić, 2012; Bryl & Truskolaski, 2015).
Our findings also confirm that family management impacts on firm behaviour and performance (De Massis, Kotlar, Chua, & Chrisman, 2014). We make evident the moderating role of family management in the relationship between ICE and performance. Specifically, we demonstrate that family management make stronger the impact of structural capital efficiency on performance. Our results may thus help resolve the mixed findings in prior literature on the influence of ICE on performance, which do not account for the crucial role of family management in the former relationship. We argue that family management from SEW perspective can be a double-edged sword when impacting on the influence of human capital efficiency on performance. The family managing of human resources, from SEW perspective, may produce advantages and disadvantages. Thus, the pursuit of SEW may generate free riding or hiring family staff regardless their merit, but also may raise emotional attachment and its positive consequences. As a consequence, we have not been able to confirm a significant moderating role of family management. However, financial and non-financial objectives seem to be aligned when analysing the role of family management in the relationship between structural capital efficiency and performance. Family managers incentive the identification of the family with the firm, the preservation of tradition and heritage, the firm-specific knowledge and collective corporate culture or long-standing alliances across generations with stakeholders and the community. Consequently, the pursuit of SEW by family managers usually accords with financial objectives, so family management is associated with the achievement of better levels of performance from structural capital efficiency.

From an academic perspective, this study contributes to the literature on IC in many ways. Firstly, this paper provides empirical evidence to support the relationship between Intellectual Capital Efficiency and firms’ profitability (ROA) by using data from Spanish manufacturing companies. Such outcome confirms the resource-based and knowledge-based theories, which emphasize the significant role of IC in creating value. Secondly, this study enriches IC literature with new empirical evidence and provides a basis for comparison with the results of the studies conducted in other countries. Thirdly, the value of this paper is the enrichment of the literature with another investigation that follows the value-added intellectual coefficient methodology (VAIC™) for the measurement of IC. Finally, given that this is the first empirical study conducted in Spain testing the relationship between ICE, family management and profitability it may serve as a platform for conducting future research on the IC problem area.

Regarding practical implications, the results of this study suggest that it is important that Spanish firms use human and structural capital efficiently to generate higher profitability (with a higher return on assets). As a result, companies must conduct a substantive investment on human capital to enhance employee capability, attitude and satisfaction.
through employee training and knowledge sharing in order to improve their profitability. Regarding structural capital, Spanish firms should establish and maintain a positive organizational culture, develop the management control systems and a strong IT system to support internal business processes. Moreover, firms may attempt to develop close relationships with their stakeholders to enhance their structural capital. Accordingly, our results can influence the awareness raising about the significance of IC for corporate performance, which in time may result in recognizing the need for the implementation of some of the IC management and measuring models and methods. This paper provides a tool for managers to assess the company’s IC using easy accessible data (VAICTM) and to benchmark against the best competitors in their competition environment. Thus, our results may give managers an insight to better utilize and manage IC resource available in their firms in order to improve competitive advantage and ultimately firm performance. Moreover, VAICTM method can be an important tool for many decision makers to integrate IC in their decision process. Additionally, investors may use IC efficiency as a means to assess firms’ ability to create value through IC. Policy makers should intensify their initiatives in order to encourage greater acceptance and understanding of the concept of IC and the development of its related assets. Overall, our results corroborate the initiatives of Spanish government in promoting knowledge-based economy. Putting continuous emphasis on IC investment is necessary for sustainable growth and better corporate performance. Finally, family management should be promoted by academics and practitioners in family firms to obtain larger performance levels from similar structural capital efficiency.

Limitations and Implications for Future Research

Despite the contributions of this empirical research, this study has a number of limitations that might benefit from further research. Firstly, this study analyses the relationship between ICE and profitability in the single social, economic and political Spanish context. The inclusion of other countries could enable research into the relevance of the geopolitical context. Hence, it would be interesting in the future to carry out cross-national IC research in European countries in order to gain more insightful information on IC efficiency of these countries. Moreover, this study focuses on profitability and it neglects other kinds of financial performance such as productivity and market valuation, which deserve to be investigated in the future. Thirdly, the study uses the VAICTM as a proxy for IC efficiency. The measurement of IC is a complex matter and is still a much-debated issue in the IC literature. Further research is needed in this area to identify a model that can correctly measure IC efficiency in firms. Finally, institutional environment can impact on the moderating role of family management (Liu, Yang & Zhang, 2012). Our sample,
however, did not allow us to further analyse this issue. Hence, future research may investigate whether the conclusions of this study can be the same in other contexts.
References


