

THE IMPACT OF DIGITALIZATION ON THE INTERNATIONALIZATION PROPENSITY OF ITALIAN FAMILY FIRMS

Fabio Quarato^{*}, Marco Pini^{**}, Edoardo Positano^{***}

^{*} Corresponding author, Department of Management and Technology, Università Bocconi, Milan, Italy

Contact details: Università Bocconi, Via Roentgen, 1, 20136 Milan, Italy

^{**} Unioncamere (Italian Union of Chambers of Commerce), Rome, Italy

^{***} Università Bocconi, Milan, Italy



Abstract

How to cite this paper: Quarato, F., Pini, M., & Positano, E. (2020). The impact of digitalization on the internationalization propensity of Italian family firms. *Corporate Ownership & Control*, 17(3), 92-107.

<http://doi.org/10.22495/cocv17i3art7>

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ISSN Online: 1810-3057

ISSN Print: 1727-9232

Received: 07.02.2020

Accepted: 26.03.2020

JEL Classification: D22, F10, G32, O32

DOI: 10.22495/cocv17i3art7

Although the role of innovation and digitalization represents critical factors to succeed in the international context, there is a lack of empirical evidence on how they impact on the international propensity of family firms. We address this gap investigating to which extent family firms adopt digitalization tools and their effect on export-orientation, as well as whether the innovation can play a boosting role for family decision-makers. Based on a survey of 2,500 Italian firms carried out in 2015 by Italian Chambers of Commerce, we find that family firms face more difficulties in undertaking digital transformation decisions, since they can weaken family SEW endowment but digitalization solutions enable the international propensity of family firms, bridging the gap with their non-family counterparts. These results advance the current debate on risk preferences of family firms, taking into account firm conditions, in terms of digitalization and innovation equipment, under which family owners make strategic decisions.

Keywords: Digitalization, Family Firms, Internationalization, Innovation

Authors' individual contribution: Conceptualization - M.P. and F.Q.; Methodology - M.P.; Validation - E.P.; Formal Analysis - M.P. and E.P.; Investigation - F.Q.; Data Curation - M.P.; Writing - F.Q. and M.P.; Visualization - E.P.; Supervision - F.Q.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

Digitalization is the new paradigm of the Fourth industrial revolution (Schwab, 2017) that marks a discontinuous technology. The implementation of digital technologies is shaping new business models and this is one of the most important challenges to be addressed to pursue international strategies (Chen & Kim, 2018; Watson, Weaven, Perkins, Sardana, & Palmatier, 2018), which implies great opportunities and tremendous implementation threats (Bankewitz, Åberg, & Teuchert, 2016).

Over recent years, an increasing number of studies have investigated the advantages of digitalization on the economic system (Evangelista, Guerrieri, & Meliciani, 2014). It is fully recognized that digitalization is a driver of competitiveness,

fostering new technological manufacturing based on intelligence, communication and networking (Lasi, Fettke, Kemper, Feld, & Hoffmann, 2014; for a literature review, see, Oztemel & Gursev, 2018). In the global competition, all these elements revealed determinant for firm's internationalization (Díaz-Chao, Sainz-González, & Torrent-Sellens, 2015), since digitalization reduces transactional costs, information asymmetries, and favors the relationship and integration in the international value chains (De Marchi, Di Maria, & Gereffi, 2018).

Although turning into a digital and innovative structure is the natural evolution of the global economic context (Joensuu-Salo, Sorama, Viljamaa, & Varamäki, 2018), recent research suggests that the presence of a controlling family in the ownership could substantially shape these strategic choices.

Their unparalleled features compared to other ownership structures are attracting increasing scholarly attention in the international business debate (Arregle, Hitt, & Mari, 2019; Eddleston, Sarathy, & Banalieva, 2019; Xu, Hitt, & Miller, 2020) as their conservative and less risk-taking behaviors (Gómez-Mejía, Haynes, Nuñez-Nickel, Jacobson, & Moyano-Fuentes, 2007; Miller & Le Breton-Miller, 2006; Nieto, Santamaria, & Fernandez, 2015), may affect the implementation of digital technologies, the technological process, as well as the decision to export (Pukall & Calabrò, 2014; Santulli, Torchia, Calabrò, & Gallucci, 2019).

On the international side, recent studies have shown that the ownership structure may influence the extent to which the family firm goes international (Calabrò, Torchia, Pukall, & Mussolino, 2013; Sciascia, Mazzola, Astrachan, & Pieper, 2012), as well as how they internationalize (Boellis, Mariotti, Minichilli, & Piscitello, 2016; Pongelli, Caroli, & Cucculelli, 2016; Sestu & Majocchi, 2020; Xu et al., 2020). Indeed, according to Gómez-Mejía, Cruz, Berrone, and De Castro (2011), family firms are less willing to undertake technological innovative strategies to preserve SEW endowment as more financially risky decisions could lead to a reduction of family's influence over strategic choices. Other scholars argue that family firms are more reluctant to pursue international strategies because they are more focused on their local markets (Hennart, Majocchi, & Forlani, 2019), given their conservative and risk-averse attitude (Calabrò & Mussolini, 2013).

Despite the relevance of the topic, there are very few empirical studies examining how digital tools interact with innovation activities (Rachinger, Rauter, Müller, Vorraber, & Schirgi, 2019) and international strategies (Hagsten & Kotnik, 2017; Pickernell, Jones, Thompson, & Packham, 2016), and those on the adoption of discontinuous technologies show still unclear results (König, Schulte, & Enders, 2012).

This is surprising, considering that digitalization is revolutionizing the firm behavior and it plays more and more a crucial role in their value proposition (Bankewitz et al., 2016) and, as a consequence, on their financial performance (Chen & Kim, 2018; Watson et al., 2018). Thus, we address the abovementioned gaps by investigating the following research questions: are family firms more or less digitalized than the non-family ones? Is the digital investments' propensity enhanced by the level of innovation? Are family firms more or less likely to export, according to their level of digitalization? Based on a survey of 2,500 Italian firms carried out by Unioncamere (Italian Union of Chambers of Commerce), empirical evidence confirms our contention that family firms are less digitalized than their counterparts are, but innovation processes can help to bridge the distance. We also find that family firms have a lower likelihood to internationalize their companies, but under the effect of digitalization practices, they are more likely to overcome the international gap.

This paper contributes to the current literature in a twofold way. Our study contributes to the debate on family firms' internationalization by accepting the need to focus on family firms' heterogeneity (Arregle et al., 2019; Arregle, Duran,

Hitt, & van Essen, 2017; Xu et al., 2020). Specifically, we provide theoretical and empirical evidence to show that different level of digitalization practices can differently influence their international behaviors. Secondly, the research identifies the trigger factors, i.e. innovation and digitalization that enable family firms to accelerate the process of internationalization. Indeed, in line with the previous literature, the study asserts that family firms are less internationalized than non-family ones (Calabrò & Mussolino, 2013; Graves & Thomas, 2006; Hennart et al., 2019; Marchisio, Mazzola, Sciascia, Miles, & Astrachan, 2010), adding a first empirical explanation on the reasons behind this gap.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

2.1. Family firms, innovation, and digitalization

Digitalization undermines the critical success factors by redefining the competitive rules of the market, giving the opportunity to both new players and incumbents to disrupt the value chain, enter new sectors and create innovative business models (Frank, Mendes, Ayala, & Ghezzi, 2019; Rachinger et al., 2019), thus entering into the framework of discontinuous technologies (Hill & Rothaermel, 2003).

Digitalization is a set of evolving practices consisting in adopting new digital technologies in daily organizational life, which identifies the agility as a critical component for the strategic renewal of company's business model, organization and culture (Warner & Wäger, 2019; Frank et al., 2019; Rachinger et al., 2019). For the aforementioned reasons, digitalization not only affects the adoption of technological tools but addresses the people and the company's culture to establish a radical change in the firm. In this respect, Kane, Palmer, Phillips, and Kiron (2015, p. 38) used the concept of business digital maturity: "an ideal organization transformed by digital technologies and capabilities that improve processes, engage talent across the organization, and drive new and value-generating business models".

In the field of family firms, it is possible to analyse the strategic decisions and the aptitude of family leaders towards digital technologies through the lens of SEW, which refers to non-financial aspects of the firm, comprising family's affective needs, such as the satisfaction of psychological needs of belonging and identification in the company (Gómez-Mejía et al., 2007). According to Gómez-Mejía, Makri, and Kintana (2010), family firms diversify internationally less than non-family firms, since this can lead to weakening SEW elements by decreasing family's influence over decision-making and control. Applying the SEW perspective to technology diversification (Gómez-Mejía et al., 2011), family firms tend to avoid technological diversification, even if this reduces firm risk. Indeed, technology diversification is likely to pose a hazard to SEW because it entails greater uncertainty and delegation to non-family members with the capacity to exert some influence and control over the strategic direction of the firm.

König, Kammerlander, and Enders (2013) have identified two barriers for discontinuous technology adoption, which are the levels of formalization and the rigid mental models. Formalization relates to the extent of the process standardization and bureaucratic procedures that can lead to a plain reaction to the stimulus of the external environment. The long-term perspective of family firms should lower the levels of organizational formalization (König et al., 2013), even though high levels of formalization are incompatible with the SEW endowment and with the emotional ties inherent to family firms (Gómez-Mejía et al., 2011). On the other side, the rigid mental model refers to the inability of recognizing discontinuous technology by focusing on “local development”, leading to difficulties in adapting to changes in the market; with regard to family firms, they are less willing to involve external actors in their decision-making processes, who have a crucial role in decreasing mental model rigidity (König et al., 2013). Thus, higher is the family influence lower will be the speed of recognition of discontinuous technology.

Also, Cravotta and Grottke (2019) observed that family firms have difficulties in implementing digital transformation, due to limited financial and managerial resources, regional roots, and hierarchical structure. Thus, we can affirm that family firms are more reluctant to adopt digital technologies due to their limited pool of resources, the uncertainty in terms of return of investment connected with this type of technology, and their risk-aversion, since implementing digital innovations imply to revolutionize extensively and radically the business. Thus, we state the following hypothesis:

Hypothesis 1 (H1): Family firms tend to be less digitalized than non-family firms.

To fully understand the potential of digitalization, we have to take into account also the role of innovation, since many scholars underlined the strong relationship between these two factors (recently, Ferreira, J. J., Fernandes, & Ferreira, F. A. F., 2019; Lyytinen, Yoo, & Boland, 2016). First of all, some scholars (Frank et al., 2019; Parida, Sjödin, & Reim, 2019; Rachinger et al., 2019; Sjödin, Parida, & Lindström, 2017; Story, Raddats, Burton, Zolkiewski, & Baines, 2017) identify a link between business model innovation, which it is the complex network of company's stakeholders, and digitalization. Thus, the more organized the business model, the more value will be created for digital transformation (Nambisan, Wright, & Feldman, 2019). Secondly, Ferreira et al. (2019) stated that innovation and digitalization are interconnected and both contribute to increasing the firm's competitiveness in a market perspective. Finally, Lyytinen et al. (2016) described the process of innovation and digitalization as circular, since digitalization leads to innovation that in turn, gives rise to digitalized innovative products. Thus, since the major part of scholars highlighted a positive relationship between innovation and digitalization, we can conclude that:

Hypothesis 2 (H2): Innovative companies are more likely to be digitalized.

The need for innovations is crucial for any type of companies, but especially for family firms, which dominate worldwide (La Porta, Lopez-de-Silanes, &

Shleifer, 1999) and assume different innovative behavior. The literature among innovation and family firms provided so far mixed results (Calabrò, Vecchiari, Gast, Campopiano, De Massis, & Kraus, 2019). Some studies suggest that family firms are less innovative than non-family firms (Block, 2012; Chen & Hsu, 2009), while others suggest the opposite (Muñoz Bullón & Sánchez-Bueno, 2011). Overall, the scholars agree on the fact that family firms could initially be reluctant to engage in innovations (Dieleman, 2018). However, when family firms decide to adopt innovative practices, they are more able to understand and maximize the potential benefits coming from new technologies compared to their non-family counterparts (König et al., 2013). Duran, Kammerlander, van Essen, and Zellweger (2016) have reinforced these findings through a meta-analysis of 108 studies on 42 countries, which demonstrated that despite family firms invest less on innovations than non-family firms; their conversion rate is much more significant.

As reported by Cucculelli, Le Breton-Miller, and Miller (2016), family firms are more prone to introduce incremental innovation rather than radical ones, due to their conservative nature (Ratten & Tajeddini, 2017). Indeed, family firms can leverage existing skills and relationships, as they are already accustomed to their main features (Cucculelli et al., 2016). Thus, by launching incremental product innovations, they can exploit available technological capabilities, current clients and market knowledge.

On the one hand, Gómez-Mejía et al. (2007) state that family firms are more engaged in entrepreneurial and innovative activities, thanks to the desire to transfer the company to the next generation (Miller & Le Breton-Miller, 2005; Miller & Le Breton-Miller, 2006), reciprocal altruism (Corbetta & Salvato, 2004; Eddleston & Kellermanns, 2007), informal sharing of knowledge (Zahra, 2012), and the social capital generated by families (Arregle, Hitt, Sirmon, & Very, 2007). Moreover, family firms are less likely to cut innovation investment, given that they are less bounded to financial performances and are more willing to follow long-term value creation strategies (Quarato, 2017).

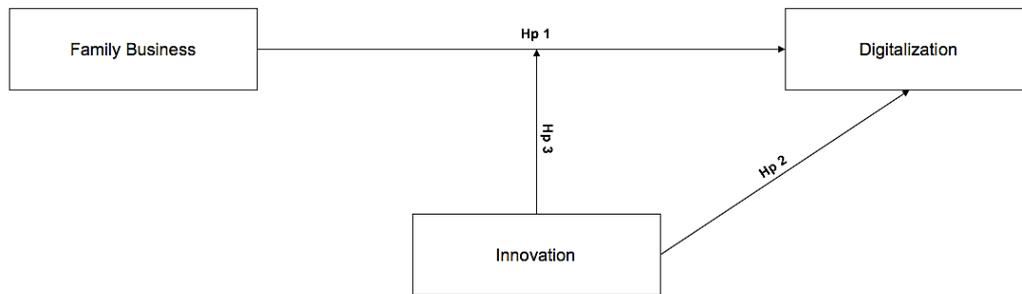
Thus, thanks to their innovative driven approach, family firms are more willing to undertake growth strategies (e.g. digitalization), and innovations represent a crucial factor for family firm competitiveness and long-term survival even if they invest fewer resources in R&D and radically innovate with a lower likelihood (Nieto et al., 2015).

Under these lenses, the innovation can facilitate the digital technologies adoption, since many scholars underlined the strong relationship between these two factors (recently, Ferreira et al., 2019; Lyytinen et al., 2016). Thus, although family firms have difficulties in implementing innovation activities, once undertaken these activities, they are more able to capitalize on them and maximize their benefits (Matzler, Veider, Hautz, & Stadler, 2015). Thus, we can argue that:

Hypothesis 3 (H3): Innovations in family firms exert a positive impact on the company's digitalization.

Figure 1 summarizes the first part of the research model.

Figure 1. The first part of the research model



2.2. Family firms and internationalization

There is a stream of research within the international business literature suggesting that the firm ownership structure affects its strategic decisions (Filatotchev, Strange, Piesse, & Lien, 2007; Filatotchev, Stephan, & Jindra, 2008; George, Wiklund, & Zahra, 2005; Majocchi & Strange, 2012), and the specific influence of family ownership has received increasing attention from scholars due to its distinguishing features (Boellis et al., 2016; Calabrò et al., 2013; Sciascia et al., 2012).

Despite the literature on family firms' internationalization is enriching, the findings are still inconsistent (Pukall & Calabrò, 2014). Many studies found a lower export propensity of family firms (Fernández & Nieto, 2006; Graves & Thomas, 2006; D'Angelo, Majocchi, & Buck, 2016), in contrast to others underlining the opposite result (Carr & Bateman, 2009; Zahra, 2003; for Italy, Minetti, Murro, & Zhu, 2015); while still, others found no differences (Arregle et al., 2017, for the results of a meta-analysis).

Specifically, factors affecting positively the export propensity of family firms are essentially their long-term orientation (Claver, Rienda, & Quer, 2009; Miller & Le Breton-Miller, 2005) and their faster speed of decision-making. In particular, long-term orientation can help to create trust relationship abroad, and strengthen the business in the long run. Nevertheless, this argument has been recognized rather inconclusive by Pukall and Calabrò (2014). With regard to the speed of decision making, since global competition entails a rapid reaction to the new opportunities in the market, the "family's innovator dilemma" could somehow make this faster speed not fully confirmed.

Factors negatively influencing the export propensity of family firms appear more substantial. Indeed, an extensive body of research has recently outlined the specific, idiosyncratic features of family business (Gómez-Mejía et al., 2007; Berrone, Cruz, & Gómez-Mejía, 2012). Several shortcomings – including, among others, the limited availability of financial resources, an attitude to avoid risk and emphasis to preserve control – make international export particularly challenging for family firms (Hennart et al., 2019; Kontinen & Ojala, 2010a; Pukall & Calabrò, 2014). Moreover, Graves and Thomas (2006) identified a consistent gap of managerial capabilities between family and non-family firms that increases with higher levels of internationalization.

Indeed, family firms are less willing to accept outside managers (Verbeke & Kano, 2012), also due to the fear of losing control. The power delegation to non-family managers reduces the authority of the family or at least places constraints on their influence (Gómez-Mejía et al., 2010; Gómez-Mejía et al., 2007; Schulze, Lubatkin, & Dino, 2003). This perspective is also in line with SEW (Gómez-Mejía et al., 2007), as the strategic choice to invest abroad is likely to be a threat to SEW preservation. Indeed, the choice to address new markets implies the need for additional management skills, often not available within the family circle.

Even in cases where the family principal has substantial international experience, international diversification is associated with increased information asymmetries and coordination costs, both of which would pull family decision-makers in the direction of hiring non-family managers and share with them part of the company's decision-making processes. The hiring of external managers could lead to a loss of family control because family principals will have fewer opportunities to perform effective monitoring on non-family executives in distant locations. Furthermore, the involvement of external managers can create a divergence of objectives in the strategic process of the company, which may further erode the foundations of SEW (Berrone et al., 2012).

In short, the choice to grow internationally may require skills and resources by outsiders, and family businesses are less willing than non-family counterparts to accept external vision and perspectives due to the consequent loss of control on strategic decisions (Schulze et al., 2003). Thus, we state that:

Hypothesis 4 (H4): Family firms are less likely to export than non-family firms.

2.3. Digitalization and internationalization

Digitalization is shaping a new manufacturing environment composed of product, intelligence, communication, and networking. According to industrial management literature, digitalization of manufacturing represents a phenomenon of intelligent connected machines that information and digital technologies power (Lerch & Gotsch, 2015; Parida, Sjödin, Lenka, & Wincent, 2015).

These elements are determinant for the competitiveness since nowadays the global competition requires fast adaptation of production to the ever-changing market requests, reached only

through advanced technological manufacturing. Thus, digitalization represents an important driver of the firm's internationalization providing new perspectives and opportunities. From the close relationship between digitalization and internationalization was born the neologism of Internetization (Bell, Deans, Ibbotson, & Sinkovics, 2001; Etemad, Wilkinson, & Dana, 2010), which gives additional emphasis on every technological tool undertaken to penetrate faster and more efficiently foreign markets.

The literature recognizes the positive synergies existing between internationalization and digital transformation. In particular, digitalization can foster export activities reducing the transaction costs (Lohrke, Franklin, & Frownfelter-Lohrke, 2006; Kontinen & Ojala, 2010b) linked to environmental uncertainties and information asymmetries (Bell & Loane, 2010; Sinkovics, N., Sinkovics, R. R., & "Bryan" Jean, 2013). Moreover, digitalization favors the relationship and the integration between business partners, suppliers, customers and internal stakeholders (Liu, Prajogo, & Oke, 2016) creating an interactive platform (Parida et al., 2015), reducing distances and entry-related costs (Liu et al., 2016) as well as fostering high levels of international integration of communication, information and manufacturing technologies (De Marchi et al., 2018).

Moreover, digitalization allows firms to reduce costs and investments while expanding abroad (Gestrin & Staudt, 2018), helping to identify and to exploit market opportunities worldwide in an easier, rapid and more efficient way (Chen & Kim, 2018, Watson et al., 2018). Furthermore, according to Kongmanila and Takahashi (2009), digitalization can be a tool to raise and support strong export competitiveness, which can turn to viable export performance. Thus, in line with all the arguments above explained, we can suppose that:

Hypothesis 5 (H5): The more firm is digitalized the greater the likelihood that the firm exports.

Although in literature there are several studies which analyze the positive effects of different digital

technologies on firm's export propensity (Cassetta, Monarca, Dileo, Di Berardino, & Pini, 2019; Hagsten & Kotnik, 2017), there are very few studies aimed at understand how the intensity of the digitalization affects the export activities, especially in the field of family firms. Among the few who dealt with this theme in the field of family firms are Gallo and Sveen (1991), who argued the inadequate level of technology is the principal obstacle towards the internationalization of family firms.

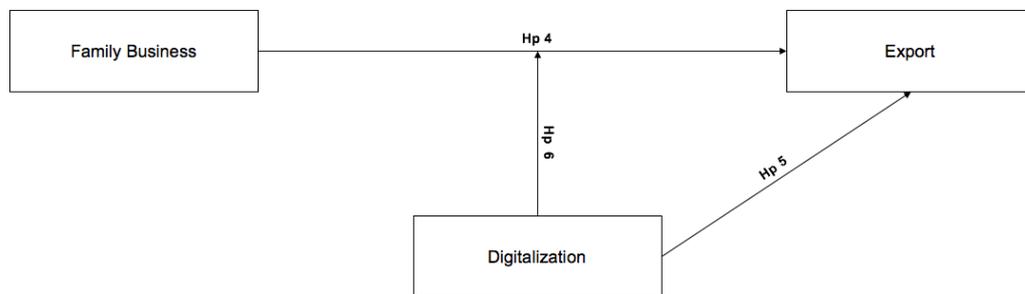
Digitalization is pivotal in creating and keeping the family's business network abroad through connectivity and information availability by enhancing communications, satisfaction, commitment and trust among parties (Sigala, 2007; Wilden, Gudergan, Nielsen, & Lings, 2013). Indeed, in line with Mathews and Healy (2007), especially for local firms (i.e. SMEs and family firms), the internet is a legitimacy tool used as a reference point for suppliers, customers, and potential partners and positively influences brand awareness, equity, and reputation in international environments. Moreover, family firms will be not subject to the obstacle of silo mentality, since they adopt a long-term vision that aims to include all aspects of the value chains and management functions, thus this context is highly favourable to make the most of digital investments.

At a glance, digitalization helps family firms in an international perspective to reduce barriers to entry and risks (e.g., financial and managerial restrictions), to facilitate international operations, and to enhance firms' performances abroad by providing easier information availability, faster communication, and a high-quality business network. In line with our findings, we can conclude that:

Hypothesis 6 (H6): Digitalization in family firms positively affects their likelihood of export.

Figure 2 summarizes the second part of the research model.

Figure 2. The second part of the research model



3. DATA AND EMPIRICAL MODEL

3.1. The sample

The data source is a survey carried out by Unioncamere (Italian Union of Chambers of

Commerce) in 2015 (CATI Method) referring to a statistically representative sample of 2,500 Italian firms with at least one employee. Collected data include information about the issues of ownership, workforce characteristics, innovation, internationalization; more detailed information is

gathered for the digitalization topic focusing on the different types of digital technologies, including also the issue of the digital skills.

The distribution of the sample among different sectors is the following: 209 firms in agriculture; 573 firms in the manufacturing sector; 374 firms in the construction sector; 480 firms in the trade sector; 375 firms distributed among hotels and restaurants (including also other similar activities such as a coffee bar); 505 firms in other services. Concerning the firm size, the majority of firms (68%) are micro-enterprises (1-9 employees), small enterprises (10-49 employees) make up 19% of the sample, while the remaining 13% are medium and large enterprises (50+ employees). Regarding the age of companies, the average is 26 years, while the distribution (according to Cucculelli, Mannarino, Pupo, & Ricotta, 2014) is as follows: mature firms (20-40 years) represent 42%, whereas young firms (1-19 years) cover 41% of the sample and old firms (40+ years) are only 18%. From a geographical perspective, almost a half of firms are located in the Northern Italy (more than 40% by adding North-West and North-East), while a quarter in the Center (25%), and around one-third in the South.

From an ownership and governance perspective, the sample is characterized by a predominance of family firms: 83% of the sample (2,085 firms) is a family firm, namely a firm owned and managed by family members, while 17% of the sample (431 firms) is composed by non-family firms. In the non-family cluster are included three types of firms: firms owned by a controlling family but managed by external managers (208 firms); firms owned by outsiders but managed by family members (25 firms) and firms that are owned and managed by people not belonging to a family (198 firms). Looking at the digital side, around half of firms declare to have a website (46%) and to use a system of electronic supply chain management (51%), one fifth have a social network, while 3% use a platform of e-commerce to boost sales and only 2% of firms adopt cloud computing. Moreover, 7% of firms have ICT professionals and 2% organized training courses on digital skills.

Overall, companies in our sample own between one and two digital tools. These results can be justified by the prevalence of small firms in the sample, which show low technology uptake rates. In Table 1, there is the distribution of family and non-family firms according to the digital tools used.

Table 1. Distribution of family and non-family firms according to digital tools

Digital tools	Tot. usage	Tot. usage%	Family firms usage	Family firms usage %	Non-fam. firms usage	Non-fam. firms usage %
Website	1151	46%	874	42%	277	64%
Social network	508	20%	394	19%	114	26%
E-commerce	81	3%	55	3%	26	6%
E-SCM	1293	51%	1059	51%	234	54%
Cloud computing	51	2%	37	2%	14	3%
Digital skills	168	7%	130	6%	38	9%
Digital training	51	2%	34	2%	17	4%
None of the above	846	34%	760	36%	86	20%
	Tot. firms	2516	Family firms	2085	Non-fam. firms	431

With regard to human capital, 7% of firms employed people with digital skills (e.g., information technology, software development, multimedia techniques, web design) or organized training courses focused on digital trends (2% of firms). Nonetheless, more than 30% of firms employed people with a university degree and the graduate's presence is around 10% in these firms. As regard to the innovative performance, 29% of firms have introduced at least one innovation for the 3 year-period 2013-2015, with a prevalence of process innovation (16%) and product innovation (14%), followed by organizational (8%) and marketing innovation (6%). Furthermore, comparing the 2,085 family firms with their non-family counterparts (431 firms) the latter show in each innovative field a higher percentage of adoption, with an average gap of 5%.

3.2. Variables description

According to the research model, we introduced two dependent variables, owing to the construction of two econometric models. Firm's digitalization was measured taking into account different aspects in line with studies conducted both at the institutional (European Commission, 2017) and the academic level (Joensuu-Salo et al., 2018). In particular, we measured the digitalization constructing a discrete

variable (*Digitalization*) ranging from 0 to 7 based on the digital behaviors pursued by the firm (see Table 1): 1) website; 2) social network; 3) e-commerce; 4) electronic supply-chain management (E-SCM); 5) cloud computing; 6) employment of ICT professionals (Digital skills); 7) training courses on digital skills (Digital training).

Firm's internationalization refers to a dummy variable (*Export*) taking value 1 if the firm exports in line with several studies (Hagsten & Kotnik, 2017; for the Italian case, Cassetta et al., 2019; Minetti et al., 2015).

Concerning family firms, there are several criteria to measure family control and influence (Berrone et al., 2012). In our study *Family* is a variable that takes value 1 if the firm is owned and managed by an individual or a family entity (Litz, 1995; Zahra, 2003; Gómez-Mejía et al., 2010).

Our measure for *Innovation*, a binary variable, is equal to 1 if the firm carried out at least one type of innovation between the different types of innovation according to OECD and Eurostat (2005): product innovation; process innovation; organizational innovation; marketing innovation.

Concerning control variables, several research underlined that a firm's age may influence the internationalization (Majocchi, Bacchiocchi, & Mayrhofer, 2005). Following the literature on family firms, internationalization and innovation for the

Italian case (Pini, 2019; Cucculelli et al., 2016; Minetti et al., 2015), we included the variable *Age* indicating the number of years since inception. As skills are an important prerequisite to manage digital technologies (Schneider, 2018) as well as to enter in foreign markets (Bernard & Jensen, 2004), we took into account the *Human capital* using the share of graduated employees.

We considered also the financial and asset position of the firm including a dummy variable (*Capital strength*) equal to one if the firm considers its financial situation well balanced and its asset

solid. Finally, we control for some firm's characteristics: *Size*, which is a continuous variable indicating the number of employees (Fernández & Nieto, 2006; Cucculelli et al., 2016); *Geographical location* including four area fixed effects (*North-West*, *North-East*, *Center*, and *South*); economic sector including *Industry* dummy variables (agriculture, manufacturing, construction, trade, hotels and restaurants, other services), according to ATECO 2007 classification of economic activities (the Italian version of the NACE Rev.2 European classification).

Table 2. Description of variables

<i>Variable</i>	<i>Definition</i>
<i>Export</i>	Dummy variable equal to 1 if the firm exports.
<i>Digitalization</i>	Discrete variable ranging from 0 to 7 depending on digital behavior pursued by the firm: 1) website; 2) social network; 3) e-commerce; 4) electronic supply-chain management (E-SCM); 5) cloud computing; 6) employment of ICT professionals; 7) training courses on digital skills.
<i>Family</i>	Dummy variable equal to 1 if the firm is owned and managed by an individual or a family entity.
<i>Innovation</i>	Dummy variable equal to 1 if the firm introduced innovation in 2013-2015.
<i>Human capital</i>	Continuous variable: share of graduated employees.
<i>Capital strength</i>	Dummy variable equal to 1 if the firm considers its financial situation well balanced and its asset solid.
<i>Age</i>	Continuous variable: numbers of years since inception.
<i>Size</i>	Continuous variable: number of employees.
<i>North-West</i>	Dummy variable equal to 1 if the firm is located in the North-West.
<i>North-East</i>	Dummy variable equal to 1 if the firm is located in the North-East.
<i>Center</i>	Dummy variable equal to 1 if the firm is located in the Center.
<i>South</i>	Dummy variable equal to 1 if the firm is located in the South.
<i>Industry</i>	Dummy variables equal to 1 if the firm belongs to one of the following sectors: 1) agriculture; 2) manufacturing; 3) construction; 4) trade; 5) hotels and restaurants; 6) other services.

Table 3 below displays correlation among variables and Table 4 shows descriptive statistics for the dependent, independent and control variables. As it is possible to notice, the models do not suffer from multicollinearity, since no values exceed the

threshold represented by 0.4. Multicollinearity problems are excluded since all values of Variance Inflation Factor are less than 10. Values greater than 10 indicate a multicollinearity problem (Yoo, Mayberry, Bae, Singh, He, & Lillard, 2014).

Table 3. Correlation matrix

	<i>1.</i>	<i>2.</i>	<i>3.</i>	<i>4.</i>	<i>5.</i>	<i>6.</i>	<i>7.</i>	<i>8.</i>
<i>1. Export</i>	1.000							
<i>2. Digitalization</i>	0.282	1.000						
<i>3. Family</i>	-0.104	-0.160	1.000					
<i>4. Innovation</i>	0.287	0.315	-0.093	1.000				
<i>5. Human capital</i>	0.015	0.153	-0.032	0.075	1.000			
<i>6. Capital strength</i>	0.075	0.082	-0.073	0.088	0.096	1.000		
<i>7. Age</i>	0.163	0.028	-0.091	0.032	-0.060	-0.017	1.000	
<i>8. Size</i>	0.195	0.205	-0.260	0.124	0.038	0.052	0.115	1.000

Table 4. Summary statistics

	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Digitalization	1.312	1.233	0	7
Export	0.120	0.326	0	1
Family	0.829	0.377	0	1
Innovation	0.286	0.452	0	1
Human capital	9.735	22.370	0	100
Capital strength	0.762	0.426	0	1
Age	25.658	13.068	5	117
Size	20.369	63.284	1	2,000
North-West	0.218	0.413	0	1
North-East	0.212	0.409	0	1
Center	0.251	0.434	0	1
South	0.319	0.466	0	1
Agriculture	0.083	0.276	0	1
Manufacturing	0.228	0.419	0	1
Construction	0.149	0.356	0	1
Trade	0.191	0.393	0	1
Hotels and restaurants	0.149	0.356	0	1
Other services	0.201	0.401	0	1

3.3. Methods

The research model consists of two parts, highlighting the file rouge between digitalization and internationalization in Italian family firms. In the first part, we aim to test the effects of family involvement and innovation on digitalization. We opted for an OLS (ordinary least squares) method because the dependent variable (*Digitalization*) takes more possible values. Analytically:

$$Y_i = F_i + I_i + S_i + \varepsilon_i \quad (1)$$

where Y_i is a discrete variable that measures the degree of firm's digitalization (*Digitalization*) ranging from 0 (no-digitalization) to 7 (max digitalization). The independent variables are: F_i that indicates if the firm is a family-owned firm; I_i indicates if the firm carried out innovation activities (*Innovation*); S_i is a vector including the other independent variables relating to firm's characteristics (*Human capital, Capital strength, Age, Size, Geographical location, Industry*). ε_i is the

$$P(Y_i = 1 | F_i, D_i, S_i) = P(\beta_0 + \beta_1 F_i + \beta_2 D_i + \beta_3 S_i + \varepsilon_i > 0) = \Phi(\beta_0 + \beta_1 F_i + \beta_2 D_i + \beta_3 S_i) \quad (2)$$

where Y_i represents the probability that the firm i exports (*Export*). The independent variables are *Family* (F_i), *Digitalization* (D_i), and control variables (S_i) included in Eq. (1). Φ is a standard normal cumulative distribution function, taking only values strictly between zero and one for all values of the parameters and the independent variables. Thus, this ensures that the estimated response probabilities are between zero and one $0 < \Phi(z) < 1$. Finally, ε_i is the normally distributed random error with zero mean and constant variance $N(0, \sigma^2)$, that captures any other unknown factor.

As probit is a non-linear model, the coefficients do not correspond to marginal effects (they indicate the change of z-values, whose effects on the probability are not linear), as in linear regression. So, to quantify the effects on the probability success $P(Y = 1)$, we calculated the marginal effects: they indicate "the effect on conditional mean of Y of a change in one regressor, say, x_j " (Cameron & Trivedi, 2010, p. 343). We used the average marginal effects (AME). Any conclusion regarding causality is limited when working on a cross-section analysis.

4. RESULTS

4.1. Family firms, innovation, and digitalization

As stated previously, through the OLS method we aim at testing the digitalization level (the dependent variable ranges from 0 to 7) given a specific set of independent variables. The results are reported in Table 5.

The first model is only composed of control variables. We find a positive and significant effect ($p < 0.01$) on the adoption of digital technologies exerted by several factors: human capital, size and macro-regional breakdowns of Northern Italy (North-West and North-East).

error term that captures any other unknown factor affecting the firm's digitalization.

In the second part of the model, we test whether family businesses have a higher propensity to export, considering the effect of digitalization. In this case, since the dependent variable is dichotomous, taking value 1 if the firm exports and 0 if the firm does not export, we used a binary model. Binary response models allow overcoming the two most important disadvantages of the linear probability models: 1) the fitted probabilities can be less than zero or greater than one; 2) the partial effect of any independent variable is constant (Wooldridge, 2010, 2016). To capture the binary effect of the dependent variable is possible to use the logit or probit models. Even though they are almost interchangeable, the probit implies a normal distribution of errors, while the logit a standard logistic distribution of errors; nevertheless in econometrics probit models is more popular because economists prefer the normality assumption for ε (Wooldridge, 2016). Thus, we used the following probit model:

In Model 2, we add the variable *Family* to test the impact of family firms on digital transformation. As it is possible to notice from Table 5, the family business is significant (p -value < 0.01) and is negatively correlated to digitalization (β is equal to -0.276). Thus, $H1$ is accepted.

In Model 3, by plugging innovation, we aimed at looking at the consequences of innovation adoption on the company's digitalization. In line with recent studies (Ferreira et al., 2019; Lyytinen et al., 2016), we find a positive and significant ($p < 0.01$) relationship between innovation and digitalization, confirmed also by the high magnitude of the coefficient (0.742). Therefore, $H2$ is accepted.

In Model 4, we investigate the effect of the interaction between innovation and family business on digitalization. As hypothesized, the interaction (*Family*Innovation*) is positive and significant ($\beta = 0.341$; p -value < 0.05), meaning that innovation in family companies can boost the process of digitalization, while the impact of a family firm considered on its own (*Family*) continues to have a negative influence on digitalization level ($\beta = -0.352$; $p < 0.01$). Thus, $H3$ is accepted. The four models are overall statistically significant ($p < 0.01$ related to F-statistics). Finally, including variables concerning family, innovation, and the related interaction, the variation explained by the covariates increases: the R^2 moves from 8.9% in Model 1 to 16.7% in Model 4.

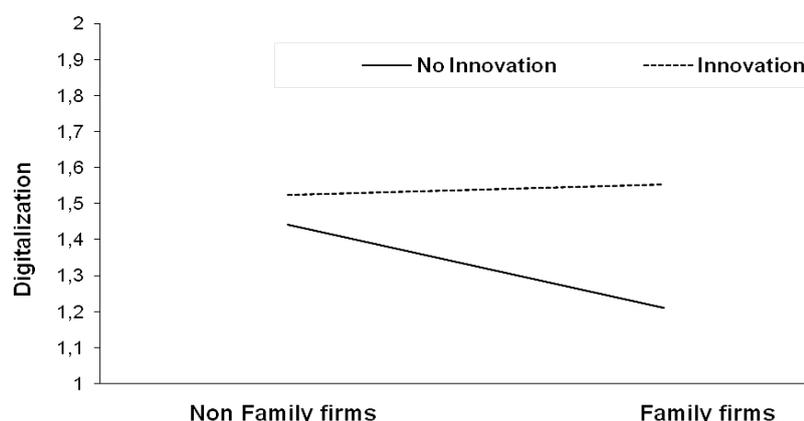
To gain better insights into how *Innovation* moderates the relation between *Family* and *Digitalization*, we plotted the moderating effect in Figure 3. Even though family firms are less likely to digitalize compared to non-family firms, in the presence of innovations the effect of family ownership on digitalization improves, meaning that family innovative companies tend to digitalize more likely, closing the gap with non-family firms.

Table 5. Family firms, innovation, and digitalization

	Digitalization (1)	Digitalization (2)	Digitalization (3)	Digitalization (4)
Family		-0.276*** (0.072)	-0.232*** (0.070)	-0.352*** (0.080)
Innovation			0.742*** (0.058)	0.470*** (0.025)
Family*Innovation				0.341** (0.139)
Human capital	0.009*** (0.001)	0.009*** (0.001)	0.008*** (0.001)	0.008*** (0.001)
Capital strength	0.122** (0.057)	0.104* (0.056)	0.060 (0.053)	0.062 (0.054)
Age	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Size	0.004*** (0.001)	0.004*** (0.001)	0.003*** (0.001)	0.003*** (0.001)
North-West	0.267*** (0.068)	0.248*** (0.068)	0.167** (0.066)	0.171*** (0.065)
North-East	0.228*** (0.071)	0.218*** (0.071)	0.168** (0.067)	0.168** (0.067)
Center	0.115* (0.066)	0.109 (0.066)	0.055 (0.065)	0.067 (0.065)
Industry	Y	Y	Y	Y
Constant	0.867*** (0.157)	1.143*** (0.174)	0.942*** (0.164)	1.038*** (0.169)
Obs.	2,285	2,285	2,285	2,285
R ²	0.089	0.095	0.164	0.167
F-statistic	12.32***	14.36***	27.35***	26.50***

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 3. The moderating effect of innovation on the relationship between family firm and digitalization



4.2. Family firms, digitalization, and internationalization

In the second part of the research model, we study the internationalization propensity through a probit model. The results are shown in Table 6. In Model 1, we insert only control variables. The results show a significant ($p < 0.01$) and positive impact of a firm's age: the more the age increases, the greater the likelihood that the firm exports. The size is another critical factor positively and significantly ($p < 0.01$) affecting the firm's export propensity.

Also, the location plays an important role for firm's internationalization: the coefficient on *North-East* and *North-East* are positive and significant at 1%, confirming that a good domestic environment in terms of knowledge-based assets, infrastructure and technology, more present in the north of Italy, positively affects the firm's

performance. Even the coefficient on the *Center* is positive but with a lower significance level ($p < 0.05$ which becomes < 0.10 in Models 3 and 4). Moreover, we find a positive effect - with an intermediate significance level ($p < 0.05$ in Model 1 and $p < 0.10$ in Model 2) - of the capital strength, supporting the idea that a firm that can rely on a solid financial basis is more prompted to export (Minetti et al., 2015). Finally, in line with several scholars (Bernard & Jensen, 2004), human capital is a factor that positively and significantly ($p < 0.05$ in Models 1 and 2) influences the export propensity: the more the share of graduated employees raises, the greater the likelihood that the firm exports.

In Model 2, the variable *Family* has been added to test the relationship between family ownership and export propensity. Family firms are 4.8% less likely to export than non-family firms ($p < 0.01$). The results are in line with the literature (Kontinen & Ojala, 2010a; Fernández & Nieto, 2013; Pukall &

Calabrò, 2014; Liang, Wang, & Cui, 2014). Therefore, H5 is accepted.

The Model 3 includes the digitalization level (a discrete variable ranging from 0 to 7 based on the digital behaviors) and shows that digital tools have a significant ($p < 0.01$) and positive impact on firm's internationalization: a higher point of digitalization level increases the likelihood of export by 4.9%. This is consistent with the findings in the literature concerning the influence of digital technologies on export propensity (Cassetta et al., 2019; Hagsten & Kotnik, 2017). Therefore, H5 is accepted.

In Model 4, we test the interaction between *Family* and *Digitalization*, finding that the digitalization fosters the export propensity of family firms: the more family firm is digitalized, the greater the likelihood that it exports. The coefficient of the interaction (*Family*Digitalization*) is positive and significant ($\beta = 0.032$; $p\text{-value} < 0.01$), while the coefficient of the variable *Family* continues to be negative with the same significance level ($p < 0.01$). Thus, H6 is accepted.

Table 6. Family firms, digitalization, and internationalization

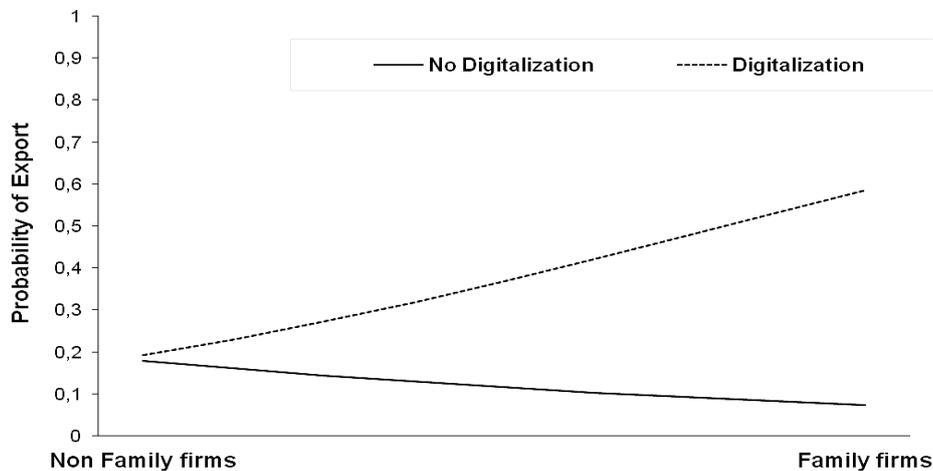
	<i>Export (1)</i>	<i>Export (2)</i>	<i>Export (3)</i>	<i>Export (4)</i>
<i>Family</i>		-0.048*** (0.015)	-0.040*** (0.014)	-0.102*** (0.022)
<i>Digitalization</i>			0.049*** (0.004)	0.024*** (0.008)
<i>Family*Digitalization</i>				0.032*** (0.009)
<i>Human capital</i>	0.001** (0.000)	0.001** (0.000)	0.000 (0.000)	0.000 (0.000)
<i>Capital strength</i>	0.034** (0.016)	0.031* (0.016)	0.022 (0.015)	0.023 (0.015)
<i>Age</i>	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.002)	0.001*** (0.000)
<i>Size</i>	0.001*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
<i>North-West</i>	0.101*** (0.017)	0.096*** (0.017)	0.080*** (0.016)	0.079*** (0.016)
<i>North-East</i>	0.079*** (0.016)	0.078*** (0.017)	0.063*** (0.016)	0.062*** (0.016)
<i>Center</i>	0.033** (0.016)	0.032** (0.016)	0.029* (0.015)	0.027* (0.015)
<i>Industry</i>	Y	Y	Y	Y
Obs.	2,285	2,285	2,285	2,285
Pseudo R ²	0.267	0.273	0.340	0.345
Wald chi-square	256.84***	261.59***	337.75***	329.72***

Note: The table displays marginal effects (AME) of the probit model. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 4 depicts the interaction effect: a higher level of digitalization exerts a positive effect on the export propensity, but this effect has a greater impact on the family business than in non-family business. Digitalized family firms will export with a

much higher likelihood compared to non-family firms. This evidence can be also detected in the distance between the two curves, which is pronounced for family firms, while negligible for non-family ones.

Figure 4. The moderating effect of digitalization on the relationship between family firms and export propensity



5. DISCUSSION

Many recent studies have investigated the role and the impact of family businesses on strategic choices, helping to understand the different risk propensities of family decision-makers (Berrone et al., 2012; Gómez-Mejía et al., 2007, 2010). Our research aims to extend this field of research by investigating the heterogeneity within family firms, focusing on some characteristics that may foster their level of internationalization.

Starting from a sample of 2,516 firms, we have developed two econometric methods to test our hypotheses. Initially, through an ordinary least squares regression, we found that family firms are significantly less digitalized than non-family firms. Nevertheless, if we consider innovation, our results reveal that when the family firms innovate, they become more digitalized. Thus, we have been able to demonstrate that family firms have a lower aptitude towards digital tools since this can lead to reducing family's influence and control undermining SEW elements (Gómez-Mejía et al., 2010). Higher levels of digitalization may jeopardize SEW, because it requires greater delegation of decision-making processes to outside managers and the ability to attract managerial talent with specialized skills and expertise, often not available within the boundary of the family. Notwithstanding this, innovative family firms are more likely to adopt digital technologies as they are more willing to pursue long-term value creation strategies (Tsao & Lien, 2013; Miller & Le Breton-Miller, 2005).

Moreover, through a probit model, we found that family firms are significantly less likely to export than non-family firms, in line with theoretical arguments of risk aversion propensity of family firms. We argued that family firms may prefer to avoid internationalization strategies to protect their SEW endowment. From this point of view, higher levels of international diversification may jeopardize SEW because it requires a greater delegation of decision-making processes to outside managers and the ability to attract managerial talent with specialized skills and expertise, not available within the family domain. These deficiencies may force family firms to hire external managers with specialized knowledge in host countries.

We extend this understanding by investigating the heterogeneity of family firms, and we find that digitalization tends to reverse family preferences in internationalization choices. Indeed, once we consider the digitalization, we obtain that the more family firms are digitalized, the greater the probability of exporting. Thus, we showed that family firms are more reluctant in undertaking the internationalization process since they are more risk-averse (Patel & Christman, 2014) and can rely on limited financial and managerial resources (Graves & Thomas, 2006; Marchisio et al., 2010). Despite this, once they adopt digital tools they internationalize more compared to their non-family counterparts. In a nutshell, in a family firm context, innovation and digitalization act as enablers for the process of digitalization and internationalization respectively.

These findings are in line with König et al. (2013), and Duran et al. (2016), who state that nonetheless, family firms are less likely to recognize and adopt digital and innovative technologies, once

adopted they are more prompted to capitalize and achieve the greatest benefits thanks to their lower levels of formalization, bureaucracy, and political resistance and intrinsic characteristics (i.e. long-term orientation and continuity-focused approach) compared to capital market-oriented firms.

The paper advances international business research. First, the literature shows still unclear findings on whether family firms are more or less export-oriented than the non-family ones, while there is a lack of studies aimed at understanding the reasons behind this gap. Thus, this study offers a fine-grained view of why family firms export less, and how they can improve their propensity. While previous research has mostly focused on the role of ownership structure (Arregle et al., 2019; Calabrò & Mussolino, 2013; Marchisio et al., 2010; Graves & Thomas, 2006), this study suggests instead that digital tools represent one strategic choice through which family firms can enhance firm exporting. Indeed, the reasons for the lower internationalization of family firms can be, at least partially, traced in the lower propensity towards digitalization, and our results show that family firms are significantly less digitalized than non-family firms. Thus, this study contributes to international business research by expanding knowledge on the role of digitalization for enhancing international propensity with specific regard to family firms. Moreover, to fully understand the sources of success in international business strategies, scholars need to focus not only on ownership and management but also on the joint effect (i.e. interaction effects) of ownership structures and digital tools.

Moreover, this research also contributes to the family firm literature. Our approach allows explaining the heterogeneity in the family firm behaviors and their different results in terms of internationalization strategies, finding new evidence in the family business field. In particular, the study shows how previous inconclusive findings (Gómez-Mejía et al., 2011) can be explained, at least partially, by exploring family firms' heterogeneity. Adopting a contingency approach, we need to take into consideration other conditions under which family owners make strategic decisions. While in steady-state situations, it is more likely that family firms prefer to avoid taking a risk (e.g., going abroad) they would change their propensity when the firm is equipped with digital tools.

6. CONCLUSION

We find that family firms face more difficulties in undertaking digital transformation decisions, since this can lead to revolutionize extensively and radically their business and, consequently, weakening their SEW endowment and decreasing family's influence over decision-making and control. Thus, we confirm that family firms are more risk-averse and less prompted to pursue internationalization strategies but, at the same time, we find that digitalization fosters the international propensity of family firms, bridging the gap with their non-family counterparts. These results advance the current debate on risk preferences of family firms (Patel & Chrisman, 2014; Gómez-Mejía et al., 2014) taking into account firm conditions, both in terms of digitalization and innovation

equipment, under which family owners make strategic decisions.

The paper includes some limitations that could be acknowledged and some suggestions for further research. First, the cross-section analysis does not allow deepening the cause-effect mechanism. Future research may use more waves' surveys to study if the estimated effects are stable over-time, as well as to deepen the cause-effect between the factors using a panel data analysis. Second, we do not consider the export intensity (e.g., foreign sales on total turnover), as well as other more structured measures of internationalization, such as Foreign Direct Investments. Future studies should try to investigate

these aspects to have a more comprehensive view of family firms' internationalization processes. Furthermore, we did not disaggregate the different types of innovations (i.e. product, process, organization, and marketing), but we consider them as a unique set. Future research could test separately the impact of every single component on the digitalization behavior. Last, the study focuses only on Italian enterprises, and our results cannot be extended to other countries. Thus, it could be interesting to carry out a cross-country analysis to extend the validity of these results, for instance, at the European level.

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