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

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/cocv173art7
Copyright © 2020 The Authors
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0).

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 a firm’s internationalization (Diaz-Chao, Sainz-Gonzalez, & 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; Eddeleston, Sarathy, & Banaleeva, 2019; Xu, Hitt, & Miller, 2020) as their conservative and less risk-taking behaviors (Gómez-Mejía, Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007; Miller & Le Breton-Miller, 2006; Nieto, Santamaría, & 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, & Mussolin, 2013; Sciascia, Mazzola, Astrachan, & Pieper, 2012), as well as how they internationalize (Boellis, Mariotti, Minichilli, & Piscitello, 2016; Pongelli, Caroli, & Cucucelli, 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 endorsement 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, Vorrrabe, & 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 (Banekwitz 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 less willing to undertake technological innovations 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 & Rothermehl, 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 model 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 opposite 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.

Cravotta and Grotke (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; Lyttinen, 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 (Nambsan, 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, Lyttinen 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 innovation 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 (Calabró, Vecchiariini, Gost, 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 (Hitt & Sirmon, & Very, 2007). 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 & Tajeedini, 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; Lyttinen 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, & Studler, 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; Calabro et al., 2013; Sciascia et al., 2012).

Despite the literature on family firms’ internationalization is enriching, the findings are still inconsistent (Pukall & Calabro, 2014). Many studies found a lower export propensity of family firms (Fernandez & 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 Calabro (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 (Gomez-Mejia et al., 2007; Berrone, Cruz, & Gomez-Mejia, 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 & Calabro, 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 (Gomez-Mejia et al., 2010; Gomez-Mejia et al., 2007; Schulze, Lubatkin, & Dino, 2003). This perspective is also in line with SEW (Gomez-Mejia 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 (Lech & 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; 373 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, Mammarino, 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 take-up rates. In Table 1, there is the distribution of family and non-family firms according to the digital tools used.

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 & Kothik, 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 size may influence the internationalization (Majocchi, Bacchiocchi, & Mayrhofer, 2005). Following the literature on family firms, internationalization and innovation for the

### 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%                   | 20                   | 6%                     |
| E-SCM               | 1201       | 41%         | 1039               | 51%                  | 521                  | 44%                    |
| Cloud computing     | 51         | 2%          | 37                 | 2%                   | 14                   | 8%                     |
| Digital skills      | 168        | 7%          | 130                | 6%                   | 38                   | 9%                     |
| Digital training    | 51         | 2%          | 44                 | 2%                   | 14                   | 8%                     |
| None of the above   | 846        | 34%         | 760                | 36%                  | 86                   | 20%                    |
| **Tot. firms**      | **2516**   |             | **2085**           |                      | **431**              |                        |

"Table 1, Distribution of family and non-family firms according to digital tools"
Italian case (Pini, 2019; Cucculelli et al., 2016; Minetti et al., 2015), we included the variable Age indicating the number of years since inauguration. 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 (Fernandez & 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

| Variable                | Definition                                                                 |
|-------------------------|---------------------------------------------------------------------------|
| Export                  | Dummy variable equal to 1 if the firm exports.                             |
| Digitalization          | 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. |
| Family                  | Dummy variable equal to 1 if the firm is owned and managed by an individual or a family entity. |
| Innovation              | Dummy variable equal to 1 if the firm introduced innovation in 2013-2015.  |
| Human capital           | Continuous variable: share of graduated employees.                       |
| Capital strength        | Dummy variable equal to 1 if the firm considers its financial situation well balanced and its asset solid. |
| Age                     | Continuous variable: numbers of years since inception.                    |
| Size                    | Continuous variable: number of employees.                                 |
| North-West              | Dummy variable equal to 1 if the firm is located in the North-West.       |
| North-East              | Dummy variable equal to 1 if the firm is located in the North-East.       |
| Center                  | Dummy variable equal to 1 if the firm is located in the Center.           |
| South                   | Dummy variable equal to 1 if the firm is located in the South.            |
| Industry                | 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

|       | 1.    | 2.    | 3.    | 4.    | 5.    | 6.    | 7.    | 8.    |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.    | 1.000 |       |       |       |       |       |       |       |
| 2.    | 0.282 | 1.000 |       |       |       |       |       |       |
| 3.    | -0.104 | -0.160 | 1.000 |       |       |       |       |       |
| 4.    | 0.287 | 0.314 | -0.094 | 1.000 |       |       |       |       |
| 5.    | 0.015 | 0.153 | -0.032 | 0.075 | 1.000 |       |       |       |
| 6.    | 0.075 | 0.082 | -0.073 | 0.088 | 0.096 | 1.000 |       |       |
| 7.    | 0.163 | 0.028 | -0.094 | 0.032 | -0.090 | -0.017 | 1.000 |       |
| 8.    | 0.195 | 0.205 | -0.260 | 0.124 | 0.038 | 0.052 | 0.115 | 1.000 |

Table 4. Summary statistics

| Variable          | Mean  | Std. Dev. | Min | Max |
|-------------------|-------|-----------|-----|-----|
| Digitalization    | 1.312 | 1.233     | 0   | 7   |
| Export            | 0.120 | 0.326     | 0   | 1   |
| Family            | 0.829 | 0.337     | 0   | 1   |
| Innovation        | 0.296 | 0.432     | 0   | 1   |
| Human capital     | 9.735 | 22.370    | 0   | 100 |
| Capital strength  | 0.762 | 0.426     | 0   | 1   |
| Age               | 2.365 | 13.608    | 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            | 0.231 | 0.434     | 0   | 1   |
| South             | 0.219 | 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:

\[ Y_i = F_i + I_t + S_i + \varepsilon_i \]  

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; \( I_t \) 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). \( \varepsilon_i \) is the 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 \( \varepsilon \) (Wooldridge, 2016). Thus, we used the following probit model:

\[ P(Y_i = 1 | F_i, D_t, S_i) = P(\beta_0 + \beta_1 F_i + \beta_2 D_t + \beta_3 S_i + \varepsilon_i > 0) = \Phi(\beta_0 + \beta_1 F_i + \beta_2 D_t + \beta_3 S_i) \]  

where \( Y_i \) represents the probability that the firm exports (Export). The independent variables are Family \( (F_i) \), Digitalization \( (D_t) \), and control variables \( (S_i) \) included in Eq. (1). \( \Phi \) 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, \( \varepsilon_i \) 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 \( \dot{Y} \) of a change in one regressor, say, \( X_i \)” (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).
Table 5. Family firms, innovation, and digitalization

|                                | Digitalization (1) | Digitalization (2) | Digitalization (3) | Digitalization (4) |
|--------------------------------|--------------------|--------------------|--------------------|--------------------|
| Family                        | -0.276***          | -0.232***          | -0.352***          |                    |
|                               | (0.072)            | (0.070)            | (0.080)            |                    |
| Innovation                    |                    | 0.742***           | 0.470***           |                    |
|                               |                    | (0.058)            | (0.025)            |                    |
| Family*Innovation             |                    |                    |                    | 0.341**            |
|                               |                    |                    |                    | (0.139)            |
| Human capital                 | 0.009***           | 0.009***           | 0.008***           | 0.008***           |
|                               | (0.001)            | (0.001)            | (0.001)            | (0.001)            |
| Capital strength              | 0.122**            | 0.104*             | 0.060              | 0.062              |
|                               | (0.057)            | (0.056)            | (0.053)            | (0.054)            |
| Age                           | -0.001             | -0.001             | -0.001             | -0.001             |
|                               | (0.002)            | (0.002)            | (0.002)            | (0.002)            |
| Size                          | 0.004***           | 0.004***           | 0.003***           | 0.003***           |
|                               | (0.001)            | (0.001)            | (0.001)            | (0.001)            |
| North-West                    | 0.267***           | 0.248***           | 0.167***           | 0.171***           |
|                               | (0.068)            | (0.068)            | (0.066)            | (0.065)            |
| North-East                    | 0.228***           | 0.218***           | 0.108***           | 0.168***           |
|                               | (0.071)            | (0.071)            | (0.067)            | (0.067)            |
| Center                        | 0.115*             | 0.109              | 0.055              | 0.067              |
|                               | (0.060)            | (0.066)            | (0.065)            | (0.065)            |
| Industry                      |                    |                    |                    |                    |
| Constant                      | 0.867***           | 1.143***           | 0.942***           | 1.038***           |
|                               | (0.157)            | (0.174)            | (0.164)            | (0.169)            |
| Obs.                          | 2,285              | 2,285              | 2,285              | 2,285              |
| R^2                           | 0.089              | 0.095              | 0.104              | 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 (β = 0.032; p-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

|                      | Export (1) | Export (2) | Export (3) | Export (4) |
|----------------------|------------|------------|------------|------------|
| **Family**           | -0.048***  | -0.040***  | -0.102***  | -0.102***  |
|                      | (0.015)    | (0.014)    | (0.022)    | (0.022)    |
| **Digitalization**   |            | 0.040***   | 0.024***   |            |
|                      |            | (0.004)    | (0.008)    |            |
| **Family*Digitalization** | 0.032***   |            | 0.000      |            |
|                      | (0.009)    |            | (0.000)    |            |
| **Human capital**    | 0.001**    | 0.001**    | 0.000      | 0.000      |
|                      | (0.000)    | (0.000)    | (0.000)    | (0.000)    |
| **Capital strength** | 0.014**    | 0.011**    | 0.002      | 0.023      |
|                      | (0.016)    | (0.016)    | (0.015)    | (0.015)    |
| **Age**              | 0.001***   | 0.001***   | 0.001***   | 0.001***   |
|                      | (0.000)    | (0.000)    | (0.000)    | (0.000)    |
| **Size**             | 0.001***   | 0.001***   | 0.000      | 0.000      |
|                      | (0.000)    | (0.000)    | (0.000)    | (0.000)    |
| **North-West**       | 0.101***   | 0.096***   | 0.080***   | 0.079***   |
|                      | (0.017)    | (0.017)    | (0.016)    | (0.016)    |
| **North-East**       | 0.070***   | 0.076***   | 0.068***   | 0.062***   |
|                      | (0.016)    | (0.017)    | (0.016)    | (0.016)    |
| **Center**           | 0.033**    | 0.032**    | 0.029*     | 0.027*     |
|                      | (0.016)    | (0.016)    | (0.015)    | (0.015)    |
| **Industry**         | Y          | Y          | Y          | Y          |
| Obs.                 | 2,285      | 2,285      | 2,285      | 2,285      |
| Pseudo R²            | 0.267      | 0.273      | 0.340      | 0.345      |
| Wald chi-square      | 268.84***  | 261.39***  | 337.73***  | 327.72***  |

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 several 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 Durr 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 (Arrogle 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.

REFERENCES

1. Arregle, J. L., Duran, P., Hitt, M. A., & van Essen, M. (2017). Why is family firms' internationalization unique? A meta-analysis. *Entrepreneurship Theory and Practice, 41*(5), 801-831. https://doi.org/10.1111/etap.12246
2. Arregle, J. L., Hitt, M. A., & Mari, I. (2019). A missing link in family firms' internationalization research: Family structures. *Journal of International Business Studies, 50*, 809-825. https://doi.org/10.1057/s41267-019-00213-z
3. Arregle, J. L., Hitt, M. A., Simron, D. G., & Very, P. (2007). The development of organizational social capital: Attributes of family firms. *Journal of Management Studies, 44*(1), 73-95. https://doi.org/10.1111/j.1467-6486.2007.00665.x
4. Banalieva, E. R., & Eddleston, K. A. (2011). Home-region focus and performance of family firms: The role of family vs non-family leaders. *Journal of International Business Studies, 42*, 1060-1072. https://doi.org/10.1057/jibs.2011.28
5. Bankewitz, M., Aberg, C., & Touchert, C. (2016). Digitalization and boards of directors: A new era of corporate governance. *Business and Management Research, 32*, 58-60. https://doi.org/10.5430/bmr.v5n2p58
6. Bell, J., & Loane, S. (2010). ‘New-wave’ global firms: Web 2.0 and SME internationalization. *Journal of Marketing Management, 26*(3-4), 213-229. https://doi.org/10.1080/0267251003594648
7. Bell, J., Deans, K., Ibbotson, P., & Sinkovics, R. (2001). Towards the "internalization" of international marketing education. *Marketing Education Review, 11*(3), 69-79. https://doi.org/10.1057/palgrave.rme.8000799
8. Bernard, A. B., Jensen, J. B. (2004). The digitization of business in China: Exploring the transformation from discontinuous technologies in family firms. *Journal of Management & Business Studies, 31*, 69-279. https://doi.org/10.5430/bmr.v5n2p58
9. Block, J. H. (2012). R&D investments in family firms: A systematic literature review a
10. Calabrò, A., Torchia, M., Pukall, T., & Mussolino, D. (2013). The influence of ownership structure and board strategic involvement on international sales: The moderating effect of family involvement. *International Business Review, 22*(3), 509-523. https://doi.org/10.1016/j.ibusrev.2012.07.002
11. Calabrò, A., Vecchiarini, M., Gast, J., Campopiano, G., De Massis, A., & Kraus, S. (2019). Innovation in family firms: A systematic literature review and guidance for future research. *International Journal of Management Reviews, 21*(3), 317-355. https://doi.org/10.1111/ijmr.12192
12. Carr, C., & Bateman, S. (2009). International strategy configurations of the world’s top family firms. *Management International Review, 49*, 733-758. https://doi.org/10.1111/j.1468-2370.2009.00183.x
13. Cassette, E., Monarca, U., Dileo, L., Di Berardino, C., & Pini, M. (2019). The relationship between digital technologies and internationalization: Evidence from Italian SMEs. *Industry and Innovation, 27*(4), 311-339. https://doi.org/10.1080/13662716.2019.1696182
14. Chen, H. L., & Hsu, W. T. (2009). Family ownership, board independence, and R&D investment. *Family Business Review, 22*(4), 347-362. https://doi.org/10.1177/089446509341062
15. Chen, P. C., & Kim, Y. C. (Eds.). (2018). *The digitization of business in China: Exploring the transformation from manufacturing to a digital service hub*. Springer International Publishing. https://doi.org/10.1007/978-3-319-79848-0
16. Choi, Y. K., Zahra, S. A., Yoshikawa, T., & Bong, H. H. (2015). Family ownership and R&D investment: The role of growth opportunities and business group membership. *Journal of Business Research, 68*(3), 1053-1061. https://doi.org/10.1016/j.jbusres.2014.10.007
17. Chrisman, J. J., Fang, H., Kotlar, J., & De Massis, A. (2015). A note on family influence and the adoption of discontinuous technologies in family firms. *Journal of Product Innovation Management, 32*(3), 384-388. https://doi.org/10.1111/jpim.12206
18. Claver, E., Rienda, L., & Quer, D. (2009). Family firms' international commitment: The influence of family-related factors. *Family Business Review, 22*(2), 125-135. https://doi.org/10.1177/089446508300034
19. Corbetta, G., & Quarato, F. (2019). *MIB Report: Family firms and the world*. Retrieved from http://www.aidaf.eu.uniboconi.eu/wps/wcm/connect/Adif/AIDAF_EN/AIDAF_EN_Adv/Home/
24. Corbetta, G., & Salvato, C. (2004). Self-serving or self-actualizing? Models of man and agency costs in different types of family firms: A commentary on “Comparing the agency costs of family and non-family firms: Conceptual issues and exploratory evidence”. *Entrepreneurship Theory and Practice*, 28(4), 355-362. https://doi.org/10.1111/j.1540-5650.2004.00050.x

25. Cravotta, S., & Grottek, M. (2019). Digitalization in German family firms - some preliminary insights. *Journal of Empirical Studies in Business and Finance*, 5(1), 1-25. https://doi.org/10.1034/jeb20191.1.051

26. Cucculelli, M., Le Breton-Miller, I., & Miller, D. (2016). Product innovation, firm renewal, and family governance. *Journal of Family Business Strategy*, 7(2), 90-104. https://doi.org/10.1016/j.jfbs.2016.02.001

27. Cucculelli, M., Mannarino, L., Papo, V., & Ricotta, F. (2014). Owner-management, firm age, and productivity in Italian family firms. *Journal of Small Business Management*, 52(2), 325-343. https://doi.org/10.1111/jsbm.12103

28. D’Angelo, A., Majocchi, A., & Buck, T. (2016). External managers, family ownership and the scope of SME internationalization. *Journal of Business Internationalization*, 15(4), 534-547. https://doi.org/10.1080/19416520.2016.1170044

29. De Marchi, V., Di Maria E., & Gereffi, G. (2018). *Local clusters in global value chain: Linking actors and territories through manufacturing and innovation*. London, UK: Routledge. https://doi.org/10.4324/9781315182049

30. Denison, D., Lieb, C., & Ward, J. L. (2004). *Culture in family business: An asset for the newly emerging economy.* New York, NY: AMACOM.

31. Díaz-Chao, A., Sainz-Gonzalez, J., & Torrent-Sellens, J. (2015). ICT, innovation, and firm productivity: New evidence from small local firms. *Journal of Business Research*, 16(7), 1439-1444. https://doi.org/10.1016/j.jbusres.2015.01.030

32. Deleman, M. (2018). Reaping what you sow: Your family firm innovation trajectory. *Journal of Family Business Strategy*, 10(4). https://doi.org/10.1111/jfbs.2018.03.003

33. Duran, P., Kammerlander, N., van Essen, M., & Zellweger, T. (2016). Doing more with less: Innovation input and output in family firms. *Academy of Management Journal*, 59(4), 1224-1264. https://doi.org/10.5465/amj.2014.0424

34. Eddleston, K. A., & Kellermanns, F. W. (2007). Destructive and productive family relationships: A stewardship theory perspective. *Journal of Business Venturing*, 22(4), 545-565. https://doi.org/10.1016/j.jbusvent.2006.06.004

35. Eddleston, K. A., Sarathy, R., & Banaleva, E. R. (2019). When a high-quality niche strategy is not enough to spur family-firm internationalization: The role of external and internal contexts. *Journal of International Business Studies*, 50, 783-808. https://doi.org/10.1057/s41267-018-0199-8

36. Etemad, H., Wilkinson, I., & Dana, L. P. (2010). Internalization as the necessary condition for internationalization in the newly emerging economy. *Journal of International Entrepreneurship*, 8, 319-342. https://doi.org/10.1016/j.joiem.2011.07.002

37. European Commission. (2017). Integration of digital technology: Europe’s Digital Progress Report 2017 [Power Point slides]. Retrieved from https://ec.europa.eu/digital-single-market/en/integration-digital-technology

38. Evangelista, R., Guerrieri, P., & Meliciani, V. (2014). The economic impact of digital technologies in Europe. *Economics of Innovation and New Technology*, 23(8), 802-824. https://doi.org/10.1080/10438599.2014.918438

39. Fernández, Z., & Nieto, M. J. (2006). Impact of ownership on the international involvement of SMEs. *Journal of International Business Studies*, 37(3), 340-351. Retrieved from https://www.jstor.org/stable/3785263

40. Fernández, Z., & Nieto, M. (2013). Internationalization of family firms. In L. Melin, M. Nordqvist, & P. Sharma (Eds.), *The Sage Handbook of Family Business* (pp. 403-422). Los Angeles: Sage.

41. Ferreira, J. J., Fernandes, C. I., & Ferreira, F. A. F. (2019). To be or not to be digital, that is the question: Firm innovation and performance. *Journal of Business Research*, 101, 583-590. https://doi.org/10.1016/j.jbusres.2018.11.013

42. Filatotchev, I., Stephan, V., & Jindra, B. (2008). Ownership structure, strategic controls and export intensity of foreign-invested firms in transition economies. *Journal of International Business Studies*, 39, 1133-1148. https://doi.org/10.1057/palgrave.jibs.8400404

43. Filatotchev, I., Strange, R., Piesse, J., & Lien, Y. C. (2007). FDI by firms from newly industrialized economies in emerging markets: corporate governance, entry mode and location. *Journal of International Business Studies*, 38, 556-572. https://doi.org/10.1057/palgrave.jibs.8400279

44. Frank, A. G., Mendes, G. H., Ayala, N. F., & Ghezzi, A. (2019). Servitization and Industry 4.0 convergence in the digital transformation of product firms: A business model innovation perspective. *Technological Forecasting and Social Change*, 141, 341-351. https://doi.org/10.1016/j.techfore.2019.01.014

45. Gallo, M. A., & Sven, J. (1991). Internationalizing the family business: Facilitating and restraining factors. *Family Business Review*, 4(2), 181-190. https://doi.org/10.1177/104143469100400206

46. George, G., Wiklund, J., & Zahra, S. A. (2005). Ownership and the internationalization of small firms. *Journal of Management*, 31(2), 210-233. https://doi.org/10.1177/0149206304271760

47. Gestrin, M. V., & Staudt, J. (2018). *The digital economy, multinational enterprises and international investment policy*. Retrieved from www.oecd.org/investment/the-digital-economy-mnesandinternational-investment-policy.htm

48. Gómez-Mejía, L. R., Campbell, J. T., Martin, G., Hoskinson, R. E., Makri, M., & Sirmon, D. G. (2014). Socioemotional wealth as a mixed gamble: Revisiting family firm R&D investments with the behavioral agency model. *Entrepreneurship Theory and Practice*, 38(6), 1351-1374. https://doi.org/10.1111/etap.12083

49. Gómez-Mejía, L. R., Cruz, C., Berrone, P., & De Castro, J. (2011). The bind that ties: Socioemotional wealth preservation in family firms. *Academy of Management Annals*, 5(1), 653-707. https://doi.org/10.5465/19416520.2011.593320

50. Gómez-Mejía, L. R., Haynes, K. T., Núñez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. (2007). Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills. *Administrative Science Quarterly*, 52(1), 106-137. https://doi.org/10.2189/asqu.52.1.106

51. Gómez-Mejía, L. R., Makri, M., & Kintana, M. A. (2010). Diversification decisions in family-controlled firms. *Journal of Management Studies*, 47(2), 223-252. https://doi.org/10.1111/j.1467-6486.2009.00889.x

52. Graves, C., & Thomas, J. (2006). Internationalization of Australian family businesses: A managerial capabilities perspective. *Family Business Review*, 19(3), 207-224. https://doi.org/10.1111/j.1741-6248.2006.00066.x
82. Nambsan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. Research Policy, 48(8), 103773. https://doi.org/10.1016/j.respol.2019.03.018
83. Nieto, M. J., Santamaría, L., & Fernandez, Z. (2015). Understanding the innovation behavior of family firms. Small Business Economics, 45(2), 382-399. https://doi.org/10.1007/s11187-014-9522-4
84. OECD, & Eurostat. (2005). Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data (3rd ed.). Paris, France: OECD and Eurostat. Retrieved from https://ec.europa.eu/eurostat/documents/385958/5889295/OSLSO-EN.PDF/60a5a2fe-5774-a409-9e09-9fa9e741d4e1
85. Okorocha, S. C. (1999). Internationalization of family businesses: Evidence from Northwest Ohio, USA. Family Business Review, 12(2), 147-158. https://doi.org/10.1111/j.1744-6689.1999.00147.x
86. Over, E., & Gurov, S. (2020). Literature review of Industry 4.0 and related technologies. Journal of Intelligent Manufacturing, 31, 127-182. https://doi.org/10.1007/s10845-018-1433-8
87. Parida, V., Sjödin, D. R., Lenka, S., & Wincent, J. (2015). Developing global service innovation capabilities: How global manufacturers address the challenges of market heterogeneity. Research-Technology Management, 58(5), 35-44. https://doi.org/10.5437/08956308X805360
88. Parida, V., Sjödin, D., & Reim, W. (2019). Reviewing literature on digitalization, business model innovation, and sustainable industry: Past achievements and future promises. Sustainability, 11(2), 391. https://doi.org/10.3390/su11020391
89. Patel, P. C., & Chrisman, J. J. (2014). Risk abatement as a strategy for R&D investments in family firms. Strategic Management Journal, 35(4), 617-627. https://doi.org/10.1002/smj.2119
90. Pickernell, D., Jones, P., Thompson, P., & Packham, G. (2016). Determinants of SME exporting: Insights and implications. The International Journal of Entrepreneurship and Innovation, 17(1), 31-42. https://doi.org/10.5367/ijei.2016.0208-1
91. Pini, M. (2019). Family management and Industry 4.0: Different effects in different geographical areas? An analysis of the less developed regions in Italy. Journal of Entrepreneurship Management and Innovation, 15(3), 73-102. https://doi.org/10.7341/20191533
92. Pongelli, C., Caroli, M. G., & Cucculelli, M. (2016). Family business going abroad: The effect of family ownership on foreign market entry mode decisions. Small Business Economics, 47, 787-801. https://doi.org/10.1007/s11187-016-9763-4
93. Pukall, T. J., & Calabro, A. (2014). The internationalization of family firms: A critical review and integrative model. Family Business Review, 27(2), 103-125. https://doi.org/10.1177/089446513491423
94. Quarato, F. (2017). The long-term horizon of family firms in M&A: The impact on research investments and debt maturity structure. Corporate Ownership & Control, 15(1), 108-122. http://doi.org/10.1080/15474376.2017.1315131
95. Rachinger, M., Rauter, R., Müller, C., Vorbraber, W., & Schirgi, E. (2019). Digitalization and its influence on business model innovation. Journal of Manufacturing Technology Management, 30(8), 1143-1160. https://doi.org/10.1108/JMTM-01-2018-0020
96. Ratten, V., & Tajeddini, K. (2017). Innovativeness in family firms: An internationalization approach. Review of International Business and Strategy, 27(2), 217-230. https://doi.org/10.1108/RIBS-12-2016-0085
97. Sánchez-Bueno, M. J., & Usero, B. (2014). How may the nature of family firms explain the decisions concerning international diversification? Journal of Business Research, 67(7), 1311-1320. https://doi.org/10.1016/j.jbusres.2013.09.003
98. Santulli, R., Torchia, M., Calabrò, A., & Galluccio, C. (2019). Family ownership concentration and firm internationalization: Integrating principal-principal and socioemotional wealth perspectives. Journal of International Entrepreneurship, 17, 220-248. https://doi.org/10.1016/j/joie.2018.09.003
99. Schneider, M. (2018). Digitalization of production, human capital, and organizational capital. In M. Schneider (Ed.), The impact of digitalization in the workplace (pp. 39-52). Springer, Cham. https://doi.org/10.1007/978-3-319-63257-5
100. Schulze, W. S., Lubatkin, M. H., & Dino, R. N. (2003). Exploring the agency consequences of ownership dispersion among the directors of private family firms. Academy of Management Journal, 46(2), 179-194. https://doi.org/10.5465/30040613
101. Schwab, K. (2017). The Fourth Industrial Revolution. New York, USA: Crown Business. Retrieved from https://luminariaz.files.wordpress.com/2017/11/the-fourth-industrial-revolution-2016-21.pdf
102. Sciascia, S., Mazzola, P., Astrachan, J. H., & Pieper, T. M. (2012). The role of family ownership in international entrepreneurship: Exploring nonlinear effects. Small Business Economics, 38, 15-31. https://doi.org/10.1007/s11187-010-9264-9
103. Sestu, M. C., & Majocchi, A. (2020). Family firms and the choice between wholly owned subsidiaries and joint ventures: A transaction costs perspective. Entrepreneurship Theory and Practice, 44(2), 211-232.
104. Sigala, M. (2007). Investigating the internet’s impact on interfirm relations: Evidence from the business travel management distribution chain. Journal of Enterprise Information Management, 20(3), 335-355. https://doi.org/10.1108/17410390710740772
105. Sinkovics, N., Sinkovics, R. R., & “Bryan” Jean, R. J. (2013). The internet as an alternative path to internationalization? International Marketing Review, 30(2), 130-155. https://doi.org/10.1108/02651331311314556
106. Sirmon, D. G., & Hitt, M. A. (2003). Managing resources: Linking unique resources, management, and wealth creation in family firms. Entrepreneurship Theory and Practice, 27(4), 339-358. https://doi.org/10.1111/1540-8520.101-100013
107. Sjödin, D. R., Parida, V., & Lindström, J. (2017). Barriers and conditions of open operation: A customer perspective on value co-creation for integrated product-service solutions. International Journal of Technology Marketing, 12(1), 90-111. https://doi.org/10.1504/IJTMKT.2017.10002376
108. Story, V. M., Raddats, C., Burton, J., Zolkiewski, J., & Baines, T. (2017). Capabilities for advanced services: A multi-actor perspective. Industrial Marketing Management, 60, 54-68. https://doi.org/10.1016/j.indmarman.2016.04.015
109. Tsao, S. M., & Lien, W. H. (2013). Family management and internationalization: The impact on firm performance and innovation. Management International Review, 53, 189-213. https://doi.org/10.1007/s11575-011-0125-9

110. Vago, M. (2004). Integrated change management: Challenges for family business clients and consultants. Family Business Review, 17(1), 71-80. https://doi.org/10.1111/j.1741-6248.2004.00005.x

111. Verbeke, A., & Kano, L. (2012). The transaction cost economics theory of the family firm: Family-based human asset specificity and the bifurcation bias. Entrepreneurship Theory and Practice, 36(6), 1183-1205. https://doi.org/10.1111/j.1540-6520.2012.00545.x

112. Warner, K. S., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. Long Range Planning, 52(3), 326-349. https://doi.org/10.1016/j.lrp.2018.12.001

113. Watson IV, G. F., Weaven, S., Perkins, H., Sardana, D., & Palmatier, R. W. (2018). International market entry strategies: Relational, digital, and hybrid approaches. Journal of International Marketing, 20(1), 30-60. https://doi.org/10.1509/jim.17.0034

114. Westerman, G., Calméjane, C., Bonnet, D., Ferraris, P., & McAfee, A. (2011). Digital Transformation: A roadmap for billion-dollar organizations. Report of Capgemini Consulting and MIT Center for Digital Business. Retrieved from https://www.capgemini.com/resources/digital-transformation-a-roadmap-for-billion-dollar-organizations

115. Wilden, R., Gudergan, S. P., Nielsen, B. B., & Lings, I. (2013). Dynamic capabilities and performance: Strategy, structure and environment. Long Range Planning, 46(1-2), 72-96. https://doi.org/10.1016/j.lrp.2012.12.001

116. Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data (2nd ed.). Cambridge, Massachusetts, London, England: The MIT Press.

117. Wooldridge, J. M. (2016). Introductory Econometrics: A Modern Approach (3rd ed.). Boston, USA: Cengage Learning.

118. Xu, K., Hitt, M. A., & Miller, S. R. (2020). The ownership structure contingency in the sequential international entry mode decision process: Family owners and institutional investors in family-dominant versus family-influenced firms. Journal of International Business Studies, 51, 151-171. https://doi.org/10.1057/s41267-019-00250-8

119. Yoo, W., Mayberry, R., Bae, S., Singh, K., He, Q. P., & Lillard Jr., J. W. (2014). A study of effects of multicollinearity in the multivariable analysis. International Journal of Applied Science and Technology, 4(5), 9-19. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/25664257

120. Zahra, S. A. (2003). International expansion of US manufacturing family businesses: The effect of ownership and involvement. Journal of Business Venturing, 18(4), 495-512. https://doi.org/10.1016/S0883-9026(03)00057-0

121. Zahra, S. A. (2005). Entrepreneurial risk taking in family firms. Family Business Review, 18(1), 23-40. https://doi.org/10.1111/j.1741-6248.2005.00028.x

122. Zahra, S. A. (2012). Organizational learning and entrepreneurship in family firms: Exploring the moderating effect of ownership and cohesion. Small Business Economics, 38, 51-65. https://doi.org/10.1007/s11187-010-9266-7

123. Zahra, S. A., Hayton, J. C., & Salvato, C. (2004). Entrepreneurship in family vs. non-family firms: A resource-based analysis of the effect of organizational culture. Entrepreneurship Theory and Practice, 28(4), 363-381. https://doi.org/10.1111/j.1540-6520.2004.00031.x