

**INTERNATIONALIZATION OF DIGITAL FIRMS:
AN ANALYSIS OF THE MODERATING EFFECTS OF
DIGITALLY ENABLED CAPABILITIES**

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Verfasser: Constantin Cyprian Brenner

Geburtsdatum und -ort: 15.01.1992, Aalen

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Gutachter der schriftlichen Promotionsleistung:

Prof. Dr. Susanne Schmidt

Prof. Dr. David Bendig

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Overview of Literature Review and Research Papers

Literature Review: *Internationalization of Digital Firms: A Systematic Literature Review and Future Research Agenda.*

- Brenner, 2020. Internationalization of Digital Firms: A Systematic Literature Review and Future Research Agenda. *Accepted for presentation at the 2020 EUROMED Academy of Business Annual Conference (digital)*

Research Paper I: Digital Firm Internationalization and Performance: The Moderating Effect of Digital Firm Capabilities.

- Brenner, 2021. International Expansion of Digital Firms: The Relationship between Internationalization and Firm Performance. *Accepted for presentation at the 2021 European Academy of Management Annual Conference (EURAM) (digital)*

Research Paper II: Internationalize to Survive: The Impact of Digital New Venture Capabilities on the Relationship between Internationalization and Survival.

- Brenner, 2021. The Impact of Digital New Venture Resources and Capabilities on the Internationalization-Survival Relationship. *Accepted for presentation at the 2021 European International Business Academy Annual Conference (EIBA) in Madrid*
- Brenner, 2022. The Impact of Digital New Venture Resources and Capabilities on the Internationalization-Survival Relationship. *Accepted for presentation at the 2022 Academy of International Business Annual Conference (AIB) in Miami*

Research Paper III: Stepping into the Virtuality Trap: The Effect of Digital Firm Capabilities on the Relationship between Psychic Distance and Firm Performance.

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Acronyms and Abbreviations

AI	Artificial intelligence
AIB	Academy of International Business
API	Application programming interface
CAGE	Cultural, administrative, geographic, and economic country-level factors
CPHM	Cox Proportional Hazard Model
e.g.	Exempli gratia (=for example)
EIBA	European International Business Academy
ERP	Enterprise resource planning
et al.	Et alii (and others)
etc.	Et cetera (and so on)
EURAM	European Academy of Management
FSA	Firm-specific advantage
GDP	Gross domestic product
GLOBE	Global Leadership and Organizational Behaviour Effectiveness research project
IB	International Business
IE	International Entrepreneurship
IMR	Inverse Mills Ratio
Int.	International
INV	International New Venture
KBV	Knowledge-based view

Max	Maximum
Min	Minimum
MNE	Multinational enterprise
OLI	Ownership, location, and internalization advantages of the eclectic paradigm
OLS	Ordinary least squares regression
p.	Page
p	P-value (probability of a type 1 error)
pct.	Percentage
RBV	Resource-based view
ROA	Return on assets
ROE	Return on equity
ROS	Return on sales
SD	Standard deviation
UNCTAD	United Nations Conference on Trade and Development

PART A: Introductory Overview of Dissertation

1. Topic Motivation

1.1. Relevance of Research Topic

The business world of the twenty-first century has been shaped by the rise of digital firms like Amazon, Meta, Airbnb, and Uber. Within a relatively short time period these digital firms have become a driver of economic growth and a cornerstones of today's world economy (UNCTAD, 2017; UNCTAD, 2019). Their unprecedented success and growth stories are rooted in their revolutionary international expansion process that is rapid, broad in scope, and resource-light (Coviello, Kano, & Liesch, 2017; UNCTAD, 2017).

The unique internationalization process of digital firms challenges existing internationalization logics of international business (IB) research (Monaghan, Tippmann, & Coviello, 2020; Nambisan, Zahra, & Luo, 2019). As a result, researchers have started to integrate digital firms into existing IB theories and theorize about digital firm capabilities that enable rapid, broad, and cost-efficient expansion to foreign markets (e.g., Banalieva & Dhanaraj, 2019; Cahen & Borini, 2020; Monaghan et al., 2020). This research explores the effect of digital firm capabilities on digital firm internationalization. To date, a comprehensive analysis of the different digitally enabled capabilities and their effects on different characteristics of internationalization and its outcomes is still missing in IB research. Understanding these micro foundations in terms of capabilities is critical for our comprehension of modern digital firms and their internationalization (Coviello et al., 2017).

Especially the relationship between internationalization and performance, which is one of the central topics of IB research (Hennart, 2011), remains unexplored in the context of digital

firms and their digitally enabled capabilities. While some of the rapidly expanding digital firms like Amazon, Meta, and Alphabet are highly profitable (Alphabet Inc., 2022; Amazon.com Inc., 2022; Meta Platforms Inc., 2022), others like Airbnb and Uber struggle to turn their explosive international growth into profit (Airbnb Inc., 2022; Uber Technologies Inc., 2022). Thus, it remains unclear whether the established relationship between internationalization and performance, which is generally assumed to be positive, holds true in the case of digital firms. To understand the performance consequences of digital firm internationalization, an in-depth exploration of digital firm capabilities and their influence on digital firm internationalization is needed.

The internationalization process and its outcomes are heavily influenced by a firm's exposure to unfamiliar environments and its ability to bridge the psychic distance associated with these foreign environments (e.g., cultural, economic, and regulatory differences) (Evans, Mavondo, & Bridson, 2008). Thus, psychic distance is one of the main elements underlying international business and internationalization theories (e.g., Håkanson, Ambos, Schuster, & Leicht-Deobald, 2016; Johanson & Vahlne, 1977). Since digital firms possess digitally enabled capabilities that allow for enhanced learning and business model adaptation, it is likely that these capabilities influence the established relationship between psychic distance and internationalization (Monaghan et al., 2020; Yamin & Sinkovics, 2006). Therefore, a detailed exploration of how digital firms and their digitally enabled capabilities influence psychic distance in the context of internationalization is vital to foster a more in-depth understanding of digital firm internationalization.

So far, there is no comprehensive understanding how internationalization and its performance outcomes are affected by digital firms and their digitally enabled capabilities. Hence, this dissertation serves as a first attempt to integrate digital firms into the IB literature

by providing holistic and empirically-backed models that further our understanding of digital firm internationalization.

1.2. Identification of Research Deficits and Deduction of Research Question

In the following section, I outline research gaps and deficits by briefly reviewing existing research efforts. For a more comprehensive and in-depth review, Part B of this doctoral dissertation includes a structured and fully developed literature review. This section also serves to derive three research questions which will aid in advancing the overall understanding of the impact of digital firms and their digitally enabled capabilities on the characteristics and outcomes of internationalization.

Internationalization and Performance

The relationship between internationalization and performance is one of the central topics in IB research. To fully capture the complexity of this relationship, internationalization is divided into the dimensions of degree, scope, and speed of internationalization (Zahra & George, 2002). The relationship between each of these internationalization characteristics and performance is rooted in the underlying mechanisms of organizational learning, scale economies, local adaptation, and time compression diseconomies that create costs and benefits (e.g., Abdi & Aulakh, 2018; Schwens et al., 2018). Digital firms are likely to affect these underlying mechanisms because of their digitally enabled capabilities like inherent scalability (Vendrell-Herrero, Gomes, Collinson, Parry, & Bustinza, 2018), enhanced organizational learning (Mathews & Healy, 2008; Pergelova, Manolova, Simeonova-Ganeva, & Yordanova, 2019), and business model reconfiguration (Banalieva & Dhanaraj, 2019; Cahen & Borini, 2020). However, so far no theoretical or empirical research has addressed how digital firms influence the relationship

between internationalization and performance in general, let alone on the more detailed level of scope, degree, and speed. Hence, the following research question can be derived which will be addressed in *Paper I*: "*How do digital firms and their digitally enabled capabilities influence the relationship between degree, scope, and speed of internationalization and firm performance*".

Internationalization and survival

Internationalization represents a significant strain to a firm's resource base since it needs to acquire foreign market knowledge, develop new capabilities, and adapt to the new market circumstances which are all resource-intensive activities (Fariborzi & Keyhani, 2018). Especially for younger firms, so-called international new ventures, internationalization represents a significant risk for survival since they lack the slack resources and capabilities needed to support the internationalization process (Schueffel, Amann, & Herbolzheimer†, 2011). However, in the case of digital international new ventures, initial research suggests that the digitally enabled capabilities like enhanced organizational learning, business model reconfiguration, and scalability may reduce the amount of resources required for international expansion (Monaghan et al., 2020). Given that, the general relationship between new venture internationalization and survival has not been sufficiently researched (e.g., Sleuwaegen & Onkelinx, 2014; Sui & Baum, 2014) and research so far has neglected the moderating impact of digital firms on this relationship, there exists a fruitful avenue for research. Hence, *Paper II* proposes and answers the following two research questions: "*(1) How does internationalization influence new ventures' likelihood of survival? (2) How do digital new ventures and their digitally enabled capabilities influence this relationship?*"

Psychic distance and the virtuality trap

Psychic distance, defined as the cultural, administrative, geographic, and economic differences between countries, is a key mechanism that influences international expansion (Ghemawat, 2001). In general, the higher the psychic distance a firm is confronted with during international expansion, the more negative are the performance effects it faces due to the lack of knowledge about and the costs and complexities associated with adjusting to the foreign market environment (Beugelsdijk, Kostova, Kunst, Spadafora, & van Essen, 2018; Hutzschenreuter & Voll, 2008; Vermeulen & Barkema, 2002). However, researchers acknowledge that digital firms possess the abilities to digitally acquire foreign market knowledge (Monaghan et al., 2020), to cost-efficiently reconfigure their business model (Cahen & Borini, 2020), and to scale their digital products, services, and processes at marginal costs (Reuber, Fischer, & Morgan-Thomas, 2015; Vendrell-Herrero et al., 2018). As a result, these capabilities are likely to have an influence on the negative effects of psychic distance during international expansion since they allow to cost-efficiently bridge foreign knowledge gaps and adjust business models to foreign markets. Contrarily, Yamin and Sinkovics (2006) propose negative effects for firms that rely heavily on digital knowledge acquisition in their international expansion because of the potential existence of a virtuality trap. This begs the question whether and how digital firms and their digitally enabled capabilities affect the relationship between psychic distance and firm performance during international expansion. Hence, *Paper III* analyzes the research question: *"Whether and how digital firms and their digitally enabled capabilities affect the relationship between added psychic distance and firm performance during international expansion compared to non-digital firms?"*

2. Research Paper Summaries

This section provides summaries of the three research papers that address the research questions identified in the previous section. For more details, the complete research papers are provided in Part B of this dissertation. Figure 1 gives a comprehensive overview of the research models of each paper.

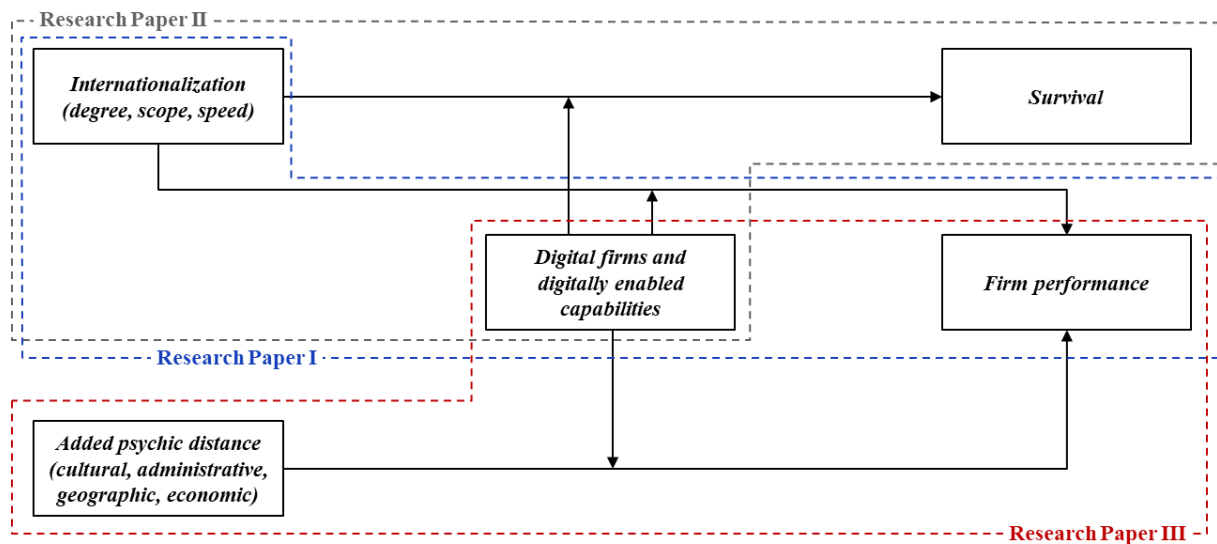


Figure 1: Comprehensive overview of research models

2.1. Research Paper I: Digital Firm Internationalization and Performance

Digital firms challenge the underlying logics of internationalization established within the field of international business by carrying out an internationalization process that is fast-paced, broad in scope, and resource-light (Coviello et al., 2017; Nambisan et al., 2019). This process is based on their digitally enabled capabilities like business model reconfiguration, embeddedness in digital networks and ecosystems, and enhanced absorptive capacity (Banalieva & Dhanaraj, 2019; Cahen & Borini, 2020; Monaghan et al., 2020). I analyze whether and how these digital firms and their digitally enabled capabilities influence the relationship between internationalization and performance which is one of the most central relationships in IB.

To test the hypotheses, I analyze the moderating effects of digital firms on the relationship between scope, degree, and speed of internationalization and firm performance based on a cross-sectional dataset of 617 exchange-listed firms using standard OLS regression.

The results indicate that digital firms amplify the positive performance effect from an increased scope of foreign activities over that of their non-digital counterparts because of the formers' digitally enabled capabilities like technological modularity, business model reconfiguration, embeddedness in digital networks and ecosystems, and enhanced absorptive capacity. The results also show that digital firms are susceptible to negative performance penalties from accelerated internationalization speed as a result of stepping into a virtuality trap.

Research Paper I provides a first step to integrate digital firms into existing IB theories and the internationalization-performance literature by providing a theoretical and empirical link between digital firm capabilities and the internationalization-performance relationship. From a theoretical standpoint, I also extend the organizational capabilities perspective of the RBV by applying its concepts within the context of digital firms.

2.2. Research Paper II: Internationalize to Survive

Internationalization represents one of the most challenging and risky actions new ventures can undertake and poses a serious threat to their survival (Coeurderoy, Cowling, Licht, & Murray, 2012). However, digital new ventures seem to be more capable to handle these challenges than their non-digital counterparts due to the possession of digitally enabled capabilities such as enhanced absorptive capacity, scalability, digital network embeddedness, resource lightness, and business model reconfiguration (e.g., Cahen & Borini, 2020; Monaghan et al., 2020). Thus, this study empirically analyzes the relationship between internationalization and survival of new ventures and the moderating impact of digital new venture capabilities.

Based on the RBV and the knowledge-based view (KBV), I formulate hypotheses along the dimensions of scope, degree, and speed of internationalization and their relationship to new venture survival. I test these hypotheses empirically by using a Cox Proportional Hazard Model to examine a longitudinal dataset of 483 exchange-traded new ventures.

The results indicate that an internationalization process that is fast-paced, broad in scope, and scales international revenues has a positive influence on the likelihood of survival of all new ventures. Moreover, digital firms experience additional positive survival effects from increasing the scope and speed of foreign expansion compared to their non-digital counterparts.

Research Paper II contributes to international entrepreneurship (IE) research by providing a nuanced view of the general relationship between new venture internationalization and survival. Furthermore, this paper advances IE and new venture research by integrating digital new ventures and their digitally enabled capabilities into existing theoretical constructs.

2.3. Research Paper III: Stepping into the Virtuality Trap

Psychic distance is one of the underlying mechanisms that influence the internationalization process (Beugelsdijk et al., 2018). It poses a major obstacle to international expansion and negatively affects firm performance (Hutzschenreuter, Kleindienst, & Lange, 2014). However, digital firms challenge this established relationship since their digitally enabled capabilities seem to diminish the effects of distance (Cassetta, Monarca, Dileo, Di Berardino, & Pini, 2020; Yamin & Sinkovics, 2006). This study analyzes the direct relationship between added psychic distance and firm performance and the moderating effect of digital firms.

The hypotheses of this paper are rooted in the organizational capabilities perspective. I analyze the direct relationship between four types of added psychic distance (cultural, administrative, geographic, and economic distance) and firm performance and the moderating effect of digital firms. To empirically test the hypotheses, I use a longitudinal dataset of 8,739 single-year observations from 1,704 firms and apply a fixed effects model with Driscoll and Kraay (1998) robust standard errors.

The results indicate that all four types of added psychic distance negatively influence firm performance. Moreover, the analyses propose that digital firms and their digitally enabled capabilities amplify the negative effects of added cultural, administrative, and economic distance due to the existence of a virtuality trap. The virtuality trap is caused by digital firms reliance on online acquisition of knowledge about foreign markets and customers whereby this digitally acquired knowledge does not reflect the non-digital market realities.

Overall, *Research Paper III* contributes to a more nuanced and multidimensional empirical analysis of the effect of added psychic distance on firm performance during international expansion. Furthermore, it presents a first attempt to explore psychic distance in the context of digital firms and offers the first empirical indication that a virtuality trap exists.

3. Implications

3.1. Theoretical Implications

This doctoral dissertation makes multiple theoretical contributions. First, I integrate digital firms and their digitally enabled capabilities into existing IB and IE theories, thereby following research calls to bring internationalization theories into the new digital reality. Based on the RBV and its adjacent theories, I identify how digital firm capabilities influence the internationalization process especially regarding the relationship between internationalization characteristics (degree, speed, scope, and psychic distance) and outcomes (performance and survival).

Second, I provide a more nuanced and comprehensive view on the internationalization-performance relationship bringing forward the discussion of this central IB topic. By analyzing the relationship between internationalization and performance along the dimensions of scope, degree, and speed of internationalization, I am able to identify the different underlying mechanisms that constitute the relationship. Thus, my results provide a theoretical and empirical analysis of the relationship that is more robust and detailed than existing research.

Third, by exploring the impact of digital firms and digitally enabled capabilities on psychic distance, I provide the first empirical proof of the existence of a virtuality trap. Additionally, I substantiate the virtuality trap phenomenon by exploring the theoretical foundations of how digital firm capabilities and their interdependence cause the virtuality trap in the first place.

Finally, my dissertation extends the organizational capabilities perspective of the RBV and the KBV in the context of digital firms. By identifying digital firm capabilities and their impact on the internationalization of digital firms and internationalization outcomes, I help to bring these theories into the digital age.

3.2. Avenues for Future Research

Based on the findings of this dissertation, future research can address some of its implications and limitations. While digital firms share some common characteristics and digital capabilities, they can be quite distinct and their overall level of digitalization may vary. Hence, a more granular index measuring the degree of digitalization is needed to facilitate a more adequate comparison of different digital and also non-digital firms. Furthermore, research would benefit from a more detailed understanding of how each of the identified digitally enabled capabilities individually influences internationalization and performance and how these capabilities are interrelated and influence each other. This can be achieved by collecting primary data on the possession of the different types of capabilities and re-running my analyses. Another fruitful avenue for future research would be a more detailed exploration of the virtuality trap phenomenon. Potential topics include the virtuality trap effect on different types of firms (e.g., partially virtual firms, non-digital firms), on different market entry modes as well as potential mitigation strategies. Finally, I suggest a study of additional cultural contexts and firm types. While my data only allowed for the analyses of exchange-traded firms listed in North America, I believe that private and smaller firms from less developed countries may enrich and expand my findings.

3.3. Practical Implications

This dissertation also provides practical insights especially for managers of digital firms that pursue internationalization activities. The findings highlight that, contrary to the believe that digital firms operate in a borderless world, digital firms are more negatively impacted by psychic distance and accelerated internationalization than their non-digital counterparts. Managers need to be aware of these virtuality trap effects and need to account for them when designing their internationalization strategies.

4. Conclusion

This doctoral dissertation aims to provide a first step to integrate digital firms into IB and IE theory. The following insights synthesize the results and findings of my work.

First, the possession of a large international scope leads to positive performance effects for all firms. However, the immediate short-term effects associated with international expansion, added psychic distance, and high speed of internationalization are negative. While at first these findings seem contradictory, they highlight the necessity to distinguish between the static perspective of managing existing levels of multinationality (e.g., degree and scope of internationalization) and the dynamic perspective of managing the international expansion process (e.g., speed of internationalization and added psychic distance). While being active in a large number of foreign markets (high scope of internationalization) is positive for firm performance in the long-run, the process of expanding into these foreign markets (high added psychic distance and internationalization speed) leads to negative performance effects at least in the short-run.

Second, digital firms experience more positive performance effects from a greater scope of internationalization compared to their non-digital counterparts. By possessing an enhanced scalability and absorptive capacity, digital firms can benefit more from economies of scale and knowledge provided by additional foreign markets entered and foreign market partners.

Third, contrary to existing beliefs that digital firms operate in a digital world where distances do not matter, the international expansion performance of digital firms is more negatively impacted by cultural and economic distance than the performance of non-digital firms. By relying on the acquisition of foreign customer and market knowledge via virtual interaction, digital firms step into the virtuality trap. They make decisions and adapt their business models based on digitally acquired information that does only partially or in some

cases not at all reflect foreign market reality.

Fourth, new ventures can increase their probability of survival by increasing their scope, degree, and speed of internationalization. Based on learning advantages of newness and in line with international new venture (INV) theory, these young firms use internationalization as a means to acquire knowledge, capabilities, and access to network resources. The positive survival effects of scope and speed of internationalization are reinforced for digital new ventures due to their enhanced learning abilities, scalability, and embeddedness in digital networks.

Finally, this dissertation explores the internationalization of digital firms and digital new ventures by identifying multiple digitally enabled capabilities that influence internationalization and international firm performance. These digitally enabled capabilities include enhanced absorptive capacity, scalability, digital network embeddedness, technological modularity, and business model reconfiguration. By identifying and exploring how these capabilities influence the internationalization of digital firms, I present a first step towards exploring the digital firm phenomenon. Given, the importance of digital firms in today's world, I hope these initial findings encourage more research on this topic.

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PART B: Literature Review and Research Papers

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Research Paper III: Stepping into the Virtuality Trap: The Effect of Digital Firm Capabilities on the Relationship between Psychic Distance and Firm Performance.

Literature Review

INTERNATIONALIZATION OF DIGITAL FIRMS: A SYSTEMATIC LITERATURE REVIEW AND FUTURE RESEARCH AGENDA

ABSTRACT

The emergence of digital firms fundamentally challenges the underlying logics of established internationalization theories since digital firms conduct an internationalization process that is fast-paced, resource-light, and broad in scope. However, so far little research has focused specifically on the internationalization of digital firms and their integration into existing international business theory. Hence, this literature review aims to consolidate the fragmented research on internationalization of digital firms to build a strong basis for future research. Based on a structured review of 100 articles, this study identifies eight digitally enabled capabilities that influence the internationalization of digital firms: modularity, business model reconfiguration, network and ecosystem embeddedness, absorptive capacity, scalability, resource lightness, automation, and enhanced communication and coordination. The identified capabilities are used to revisit the most important internationalization theories and discuss the impact of digital firms on the validity of these theories. Finally, I provide a research agenda consisting of five major research gaps that outline potential avenues for future research.

Keywords: *Digitalization, internationalization, literature review, research agenda*

1. INTRODUCTION

Over the past decade, digitalization and digital firms have fundamentally transformed how businesses internationalize (UNCTAD, 2019). When Marriott hotel was founded in 1927, it took the company more than 40 years until its first international expansion and almost 100 years to expand into additional 132 countries while owning approximately 1.4 million hotel rooms (Marriott, 2019). In contrast, Airbnb expanded into more than 220 countries within the last 12 years while not owning a single room (Airbnb, 2020). These fundamental differences in the internationalization speed, scope, and operating model can be attributed mostly to Airbnb's underlying digital technology that facilitates the operation of a platform business model that leverages external resources (Brouthers, Geisser, & Rothlauf, 2016; Nambisan, Zahra, & Luo, 2019).

Digital firms have challenged the academic foundations on which the field of international business (IB) resides (Eden, 2016) by changing the nature of the internationalization process in terms of speed, scale, and scope (Coviello, Kano, & Liesch, 2017). The integration of digital firms into the IB field is rather novel as researchers have just recently started to acknowledge the new digital reality as a new context for IB and initiated the adaption of certain assumptions and theories relevant to the field (Alcácer, Cantwell, & Piscitello, 2016; Autio & Zander, 2016; Banalieva & Dhanaraj, 2019). Hence, this study sets out to provide a comprehensive review of digital firm internationalization in IB literature and its adjacent academic fields.

In recent years, academics have started to integrate digitalization into the IB field selectively. Based on the networks built by digital firms, researchers started to theorize about network-based ownership advantages as a new type of firm-specific advantage (FSA) within internationalization theory (Banalieva & Dhanaraj, 2019; Buckley & Casson, 1976). Similarly, multiple researchers challenge the mechanisms and implications of the process theory of internationalization (Johanson & Vahlne, 2009), within the context of digital firms (Brouthers

et al., 2016; Monaghan, Tippmann, & Coviello, 2020; Nambisan et al., 2019). Enhanced flexibility, scalability, and automation combined with network effects and the ability to directly engage with stakeholders, facilitate a new kind of internationalization process (Monaghan et al., 2020). This process is more time-compressed, broader in scope, and resource-lighter, therefore challenging the relatively slow and incremental foreign expansion suggested by the process theory of internationalization (Monaghan et al., 2020; Nambisan et al., 2019).

While the examples above show how researchers have selectively commenced integrating the new reality of digital firms into existing IB theories, there exists no systematic and comprehensive integration. Moreover, the lack of a well-defined research agenda delimits our current understanding of the phenomenon. Most researchers explore the internationalization of digital firms either by focusing on one specific characteristic of digital firms like network effects (e.g., Banalieva & Dhanaraj, 2019) or in the context of specific theories of internationalization like the process theory of internationalization (e.g., Monaghan et al., 2020). However, a more holistic and in-depth approach is required to identify the underlying capabilities that allow digital firms to conduct this different type of internationalization in the first place. By taking on a more holistic view, this literature review sets out to provide a comprehensive understanding of the internationalization of digital firms and the underlying factors influencing it. By doing so, this paper acknowledges existing research accomplishments, unveils contradictory propositions and findings, and identifies potential gaps for research extension.

By integrating 100 papers from 38 journals, this literature review advances IB theory in three ways: First, it identifies the specific capabilities that influence the unique internationalization process of digital firms. Second, it re-examines major existing internationalization theories in the context of digital firms and their capabilities by carving out inconsistencies and contradictions that inform potential shortfalls of these theories and encourage theory extension. Third, it offers a detailed agenda for future research outlining five

major research gaps that will help to advance the theory of digital firm internationalization.

Besides theoretical implications this study also provides essential guidance for managers of digital firms. By identifying the capabilities that enable a fast, resource-light, and broad internationalization it makes managers aware of potential capability deficiencies within their firms and hence encourages them to development an adequate capability base for internationalization.

The remainder of this study is structured as follows: Section 2 delineates the investigated research field by providing definitions of key concepts such as digital firms and internationalization. Section 3 conducts a systematic literature review based on a diligent four-step process using the Web of Science database and conducting a manual review of major business journals in the IB field. Based on this literature review, Section 4 identifies the digitally enabled capabilities of digital firms that influence internationalization thereby laying the basis for an in-depth theoretical understanding. Section 5 revisits the most prominent internationalization theories and analyzes how the identified capabilities influence their validity in the context of digital firms. Based on the comprehensive theoretical understanding of digital firm internationalization from existing academic literature, Section 6 identifies five major research gaps that guide future research endeavors. Finally, Sections 7 and 8 discuss the limitations, conclusions, and implications of the literature review.

2. DEFINITION OF THEORETICAL KEY CONCEPTS

2.1 Definition of digital firms

Current academic literature misses a uniform and consistent understanding of digital firms and uses broad and assorted samples of Internet-related and electronic business companies. Among the different terms used by researchers in the IB field are e-commerce companies (Singh & Kundu, 2002), e-businesses (Jean & Tan, 2019; Zhu, Kraemer, & Dedrick, 2004), Internet firms

(Javalgi, Radulovich, Pendleton, & Scherer, 2005; Rothaermel, Kotha, & Steensma, 2006), digital information good providers (Mahnke & Venzin, 2003), ibusiness firms (Brouthers et al., 2016; Chen, Shaheer, Yi, & Li, 2019), sharing economy firms (Parente, Geleilate, & Rong, 2018), and digital platform providers (Li, Chen, Yi, Mao, & Liao, 2019; Ojala, Evers, & Rialp, 2018; Zeng, Khan, & Silva, 2019). By using these different definitions of digital firms, the scope of companies under research has either been too broad, by mixing digital firms with other firm types that have significant non-digital elements, or too narrow, by focusing only on specific business model types of digital firms especially platform businesses (Cahen & Borini, 2020). Therefore, a definition of digital firms needs to achieve a clear demarcation from firms that have significant non-digital business parts, while, at the same time, account for the different types of digital business models.

In the following, I will thus use the definition introduced by Monaghan et al. (2020) and the UNCTAD (2017) whereby digital firms are "characterized by the central role of the Internet in their operating and delivery model" (UNCTAD, 2017, p. 165) and hence "rel[y] on the Internet for [their] production, operating and delivery processes" (Monaghan et al., 2020, p. 12). The companies falling under this definition include pure digital players as well as mixed players and can be categorized into four subtypes: digital platforms (e.g., Meta, Alphabet, LinkedIn), digital solution providers (e.g., Zoom, PayPal, Salesforce), e-commerce firms (e.g., Amazon, Alibaba, Expedia), and digital content producers and distributors (e.g., Netflix, Sky, Thomson Reuters) (Monaghan et al., 2020; UNCTAD, 2017).

According to Monaghan et al. (2020), digital firms have two common characteristics. First, digital firms create and use digital infrastructure. This does not imply that digital firms have no physical footprint – some parts of the firm like data centers, offices, and warehouses make physical infrastructure inevitable. At the same time, firms might actively choose to digitize only certain processes. Second, digital firms depend on digital infrastructure to produce and market

their products and services via a digital business model. Hence, firms with offerings that depend on the distribution via digital infrastructure and products or services that are digital in nature are inherently considered as digital firms.

2.2 Definition of internationalization

Internationalization is defined as "allocating, accessing, and deploying resources and capabilities across national [...] boundaries" (Autio & Zander, 2016, p. 1). This definition follows the initial notion of Welch and Luostarinen (1988) who define internationalization as "the process of increasing involvement in international operations" (p. 2). This broad definition is chosen for this paper, in order to encompass the full spectrum of internationalization modes and motivations.

3. METHODOLOGY

For this literature review I use an integrative review methodology. I choose this methodology as the research field of digital firms and their internationalization constitutes an emerging field that is still in its infancy and hence in need for initial conceptualization (Snyder, 2019). In addition, this approach allows to evaluate and synthesize the existing literature on adjacent bodies of research (Torraco, 2005). Given the novelty of the topic under research and building on the definition of digital firms, I also include research articles in the literature research that focus on the use of digital technology in the context of internationalization.

Following the recommendations provided by Torraco (2005) I developed a four-step process that systematically structures the literature identification and review: (1) Initial Web of Science keyword search, (2) abstract screening, (3) manual screening of major IB, IE, and IM journals, (4) detailed read-through and follow-up articles. This approach incorporates the criteria used by Rialp et al. (2005) whereby articles need to be published between 2000-2022,

published in English, theoretical and/or empirical papers, closely related to the topic at hand, and major works that were systematically listed as key references in other selected studies with similar focus.

First, I conducted an initial search using the Web of Science's SSCI database for keywords representing "digital" and "internationalization" within the title, abstract, and article keyword list of each publication. Details of the keywords used can be found in Appendix 1. I limited the search results by only considering articles that were written in English, published between 2000-2022, are part of Web of Science's "Management" or "Business" category, and have a SCImago Journal rank indicator (SJR) score ≥ 1.2 . I selected the 2000-2022 timeframe as the concepts of digitalization and digital firms are rather novel and the majority of academic contributions have been published after 2000 (Rialp et al., 2005; Vadana, Torkkeli, Kuivalainen, & Saarenketo, 2019). The SJR score of 1.2 or higher was selected to ensure that the academic papers considered were of high quality. Using these criteria, I arrived at an initial list of 1,225 articles.

Second, I reviewed the abstracts of the identified papers to determine their relevance in relation to the internationalization of digital firms. This review yielded the exclusion of all papers that are unrelated to the research field in focus. Examples include literature regarding tourism management and online marketing. This screening process resulted in a set of 125 remaining articles.

Third, I manually screened the individual issues of top International Business (IB), International Entrepreneurship (IE), and International Marketing (IM) journals to ensure that I identified all relevant articles on the topic. This search identified 27 additional articles which enlarged the final set of articles to 152.

Fourth, I read all articles to ensure the fit of content with the topic of internationalization of digital firms. This helped to identify further relevant papers that were cited by researchers.

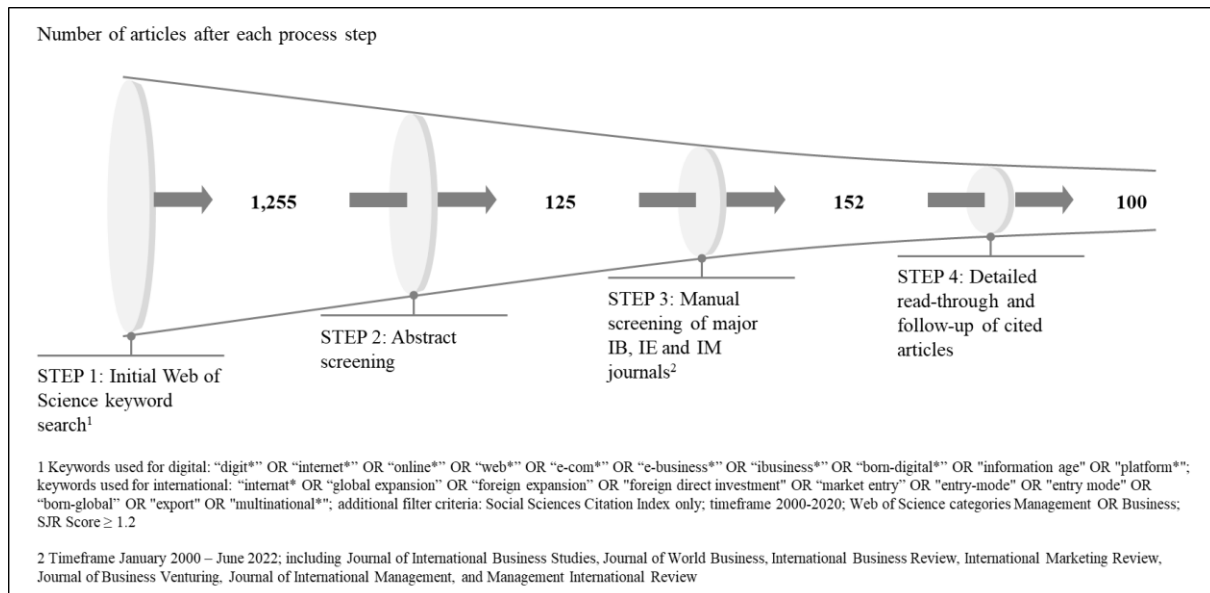


Figure 1: Illustration of the four-step article selection process

While most of the articles excluded within this step touch upon the topic of internationalization of digital firms or digitalization in the context of internationalization their main focus lies on aspects not directly related to my core topic. Examples include topics like international supply chain management, online marketing management, or e-commerce and digital platforms as an entry mode of non-digital firms. I also excluded research on international entrepreneurship that focuses on the individual entrepreneur since this review focuses on the firm and its environment as its unit of analysis. As a result, the four-step article selection process (see Figure 1) yielded a final sample of 100 articles.

I analyze the final set of articles to display the overall trends of the research field with Figure 2 showing the number of articles published within each year since 2000. The graph allows for two observations: First, there seems to be an initial interest in the research field of internationalization of digital firms around the time when the Internet initially gained popularity and in the aftermath of the burst of the Dot-com bubble in 2000. Second, following this initial academic interest, the number of publications decreased until 2015 when the academic field experienced a strong surge in publications once again. This renewed interest might be explained by the economy entering into the diffusion phase of the information revolution, which led to

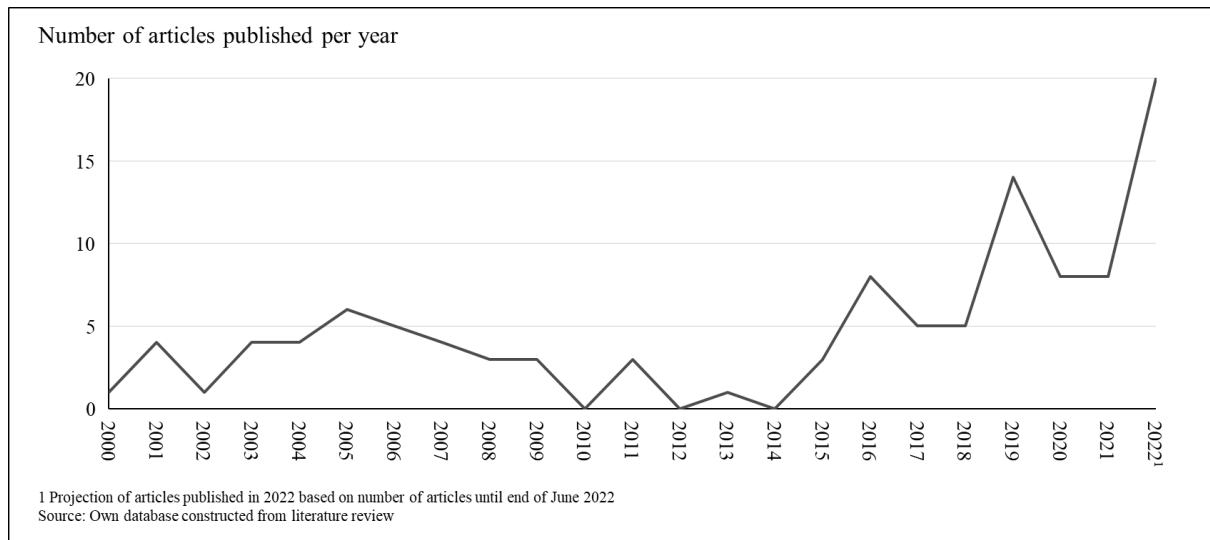


Figure 2: Number of articles published related to the internationalization of digital firms over time

the widespread adoption and utilization of digital technology. This not only changed the way business was conducted globally, but also continues to challenge existing business theories (Alcácer et al., 2016). The increased interest in the research field was further accentuated by special issues by the Journal of International Business Studies regarding internationalization in the information age and the Journal of International Marketing regarding international marketing in a digital environment. Indeed most publications regarding the internationalization of digital firms stem from the fields of IB and IM which is displayed in Table 1 by listing the top journals with respect to the number of articles published connected to the topic.

Journal name	Number of publications
Journal of International Business Studies	21
International Marketing Review	9
International Business Review	7
Journal of International Marketing	6
International Small Business Journal	4
Journal of Business Research	4
Journal of World Business	4
Management International Review	4
Journal of International Management	3
Journal of Business Venturing	2
Journal of International Entrepreneurship	2
Other	34
Total	100

Table 1: Most common outlet journals

4. DIGITALLY ENABLED CAPABILITIES INFLUENCING THE INTERNATIONALIZATION OF DIGITAL FIRMS

To provide an understanding of the current state of academic research regarding the influence of digital firms on internationalization, this section identifies digitally enabled capabilities of digital firms. These capabilities lie at the heart of the phenomenon of digital firm internationalization as they enable digital firms to conduct an internationalization process that is vastly different from the one conducted by non-digital firms. Synthesized from existing literature, I was able to identify eight digitally enabled capabilities of digital firms. By selecting these eight capabilities, I purposely focus on capabilities that are either specific to digital firms or are enhanced by digital technology and hence are particularly pronounced for digital firms. These digitally enabled capabilities differentiate themselves from the digital capabilities defined by other researchers like Gurbaxani and Dunkle (2019) that focus solely on the talent and digital expertise necessary within a firm to deploy digital technologies. The digitally enabled capabilities identified below go one step further and focus on the capabilities that digital firms have as a result of applying digital technologies and digital expertise within firm processes, infrastructure, and services. Table 2 gives an overview of the literature addressing the digitally enabled capabilities influencing the internationalization of digital firms.

4.1 Modularity

Most digital firms use modular technological infrastructure for their products and services (Birkinshaw, 2022). This modularity of technological infrastructure and services is one of the core capabilities of digital firms as it provides them with a competitive advantage for internationalization (Banalieva & Dhanaraj, 2019; Birkinshaw, 2022). Drawing on Langlois (2002), modularity can be defined as a set of principles that facilitates the handling of complexity by "breaking up a complex system into discrete pieces—which can then

Digitally enabled capabilities	Details	Potential impact on internationalization	Sources
Modularity	<ul style="list-style-type: none"> ▪ Fast and efficient adaptation of technology and thus products, services, and business models ▪ Improved speed and flexibility ▪ Access to external resources and capabilities ▪ Complementary innovation 	Cost-efficient and fast internationalization because of modular technology facilitating rapid resource reconfiguration, bundling, and sharing, increased flexibility, and enhanced cross-border transferability	Autio et al. (2021), Banalieva and Dhanaraj (2019), Birkinshaw (2022), Nambisan et al. (2019), Monaghan et al. (2020), Tatarinov et al. (2022)
Business model reconfiguration	<ul style="list-style-type: none"> ▪ Fast and efficient adaptation of products, services, and business models to local market needs based on modularity ▪ Leverage of external partners for reconfiguration and adaptation ▪ Resource lightness, automation, and enhanced absorptive capacity reduce costs and increase speed of reconfiguration 	Cost-efficient and fast internationalization because of enhanced business model reconfiguration	Autio (2017), Autio and Zander (2016), Banalieva and Dhanaraj (2019), Cahen and Borini (2020), Nambisan et al. (2019)
Network and ecosystem embeddedness	<ul style="list-style-type: none"> ▪ Increased number of complementarities because of multilateral network relationships ▪ External resource bundling based on modular architecture ▪ Network-based local adaptation, co-creation, and innovation 	Lower costs and resource needs for internationalization because of access to external resources and capabilities	Banalieva and Dhanaraj (2019), Brouthers et al. (2016), Chen et al. (2019), Huang et al. (2017), Li et al. (2019), Monaghan et al. (2020), Nambisan et al. (2019), Ojala et al. (2018), Parente et al. (2018)
Absorptive capacity	<ul style="list-style-type: none"> ▪ Digital technology enhances collection, analysis, and integration of information ▪ Digital ecosystems give access to external knowledge and improve knowledge sharing ▪ Ecosystem openness incentivizes innovation and knowledge co-creation 	Increased ability to acquire foreign market knowledge reduces liability of foreignness and accelerates internationalization	Autio and Zander (2016), Glavas et al. (2019), Javalgi et al. (2005), Liu et al. (2020), Luo (2022), Moen et al. (2008), Monaghan et al. (2020), Nambisan et al. (2019), Pergelova et al. (2019), Prashantham (2005), Raymond et al. (2015), Tolstoy et al. (2022), Tolstoy et al. (2021), Wang (2020)
Scalability	<ul style="list-style-type: none"> ▪ Digital nature of products and services facilitates scaling ▪ Routines, infrastructure, and processes are encoded and readily replicable ▪ Leverage of external partner resources for scaling 	Cost-efficient and fast internationalization because of enhanced scalability and increased scale economies	Autio and Zander (2016), Banalieva and Dhanaraj (2019), Birkinshaw (2022), Ekeledo and Sivakumar (2004), Monaghan et al. (2020), Reuber et al. (2015), Vendrell-Herrero et al. (2018)
Resource lightness	<ul style="list-style-type: none"> ▪ Cost-efficient and resource-light transfer of digital business models and offerings ▪ Small physical footprint reduces overall foreign resource investment ▪ Access to external local resources and capabilities reduces internal resource needs 	Lower costs of internationalization especially due to lower initial setup costs	Arenius et al. (2005), Autio (2017), Autio and Zander (2016), Brouthers et al. (2016), Cahen and Borini (2020), Coviello et al. (2017), Li et al. (2019), Ojala et al. (2018), Parente et al. (2018), Pergelova et al. (2019), Pezderka and Sinkovics (2011), Verbeke and Hutzschenreuter (2021)
Automation	<ul style="list-style-type: none"> ▪ Pioneering role of digital firms in automation based on artificial intelligence and process digitization ▪ Automation of human interaction for trust and relationship building ▪ Automation of foreign market knowledge generation 	Cost-efficient and fast internationalization because of enhanced efficiency, relationship building, and knowledge collection	Brynjolfsson et al. (2019), Denicolai et al. (2021) Monaghan et al. (2020)
Enhanced communication and coordination	<ul style="list-style-type: none"> ▪ Direct and frequent communication with stakeholders facilitates rapid communication interaction ▪ Efficient knowledge and information sharing ▪ Enhanced relationship creation and maintenance ▪ Cost-efficient coordination of cross-border activities 	Lower costs of internal and external cross-border communication, coordination, knowledge acquisition, and relationship building	Autio (2017), Autio et al. (2021), Autio and Zander (2016), Cassetta et al. (2020), Chari et al. (2007), Chen et al. (2019), Hamill and Gregory (1997), Jean et al. (2008), Luo (2022), Mathews and Healy (2008), Monaghan et al. (2020), Nguyen and Barrett (2006), Reuber and Fischer (2011), Wang (2020)

Table 2: Literature overview on digitally enabled capabilities influencing digital firm internationalization

communicate with one another only through standardized interfaces within a standardized architecture" (p. 19). Based on these principles, modern APIs (application programming interfaces) split services into smaller pieces, that facilitate a more efficient and rapid adjustment and re-arrangement, and the integration of external services (Banalieva & Dhanaraj, 2019; Gawer, 2009). Thus, modularity of digital technology provides digital firms with multiple advantages for internationalization.

First, modularity allows digital firms to quickly and efficiently reconfigure its value proposition and business model, as a result of which digital firms can more rapidly enter international markets (Nambisan et al., 2019). In general, modularity improves the speed and flexibility with which digital firms can react to changing market conditions (Monaghan et al., 2020; Nambisan et al., 2019).

Second, the modular architecture makes it possible for digital firms to leverage local complementors for adaptation of products and services since the standardized open interfaces facilitate the integration of external services (Nambisan et al., 2019). Hence, modularity facilitates the building of networks and ecosystems of integrated products and services that profit from partner complementarities and shared resources that in turn provide advantages for and lower the overall costs of internationalization (Banalieva & Dhanaraj, 2019; Gawer, 2009; Nambisan et al., 2019).

Third, modular technology encourages and fosters innovation especially in the form of complementary innovation as external partners are able to easily access and integrate technology (Nambisan et al., 2019).

In conclusion, modularity gives digital firms competitive advantages by facilitating the recombination, bundling, and sharing of internal and external resources and capabilities, which creates flexibility, enhances cross-border transferability, and enables fast internationalization that demands fewer resources (Banalieva & Dhanaraj, 2019; Monaghan et al., 2020; Nambisan

et al., 2019). Moreover, modularity capacitates or enhances other capabilities of digital firms like business model reconfiguration, networks and ecosystems embeddedness, absorptive capacity, scalability, and resource lightness that are outlined in the following.

4.2 Business model reconfiguration

The ability to quickly and effectively change business models in order to adapt to international markets was recently termed international business model reconfiguration capability by Cahen and Borini (2020) and was found to be crucial for successful internationalization of digital firms. In order to reach new customers in foreign markets, digital firms need to be able to adjust the different parts of their existing business model to fit the local customer needs and business context (Cahen & Borini, 2020). Based on their modular digital architecture, digital firms are inherently flexible as it facilitates a quick and efficient reconfiguration of value propositions and business models (Autio, 2017; Yoo, Henfridsson, & Lyytinen, 2010). This reconfiguration capability is further enhanced by digital firm's ability to leverage external partners for adaptation (e.g., Nambisan et al., 2019). The open and standardized interfaces encourage external complementors to integrate and co-specialize their services and processes which in turn adapts the overall business model to the needs of local customer (Banalieva & Dhanaraj, 2019; Nambisan et al., 2019). In addition, resource lightness, automated processes, and enhances learning abilities support successful business model reconfiguration since they reduce the costs and accelerate the speed of adaptation (Autio & Zander, 2016; Cahen & Borini, 2020).

4.3 Network and ecosystem embeddedness

While establishing relationships with foreign partners and occupying a strong network position is key for all internationalizing firms (e.g., Johanson & Mattsson, 1988), the networks formed by digital firms have unique characteristics. Digital firms' networks are not built on traditional

dyadic relationships but on multilateral relationships among groups of actors (e.g., users, suppliers, complementors) (Li et al., 2019). These groups form a network of relationships with each other with the overall goal to maximize the value of the ecosystem (Jacobides, Cennamo, & Gawer, 2018). This digital ecosystem allows digital firms to profit from high numbers of complementarities (Banalieva & Dhanaraj, 2019; Jacobides et al., 2018). The leveraging of external ecosystem resources and capabilities is further enhanced by digital firms' modular technological architecture, which facilitates the bundling of and access to external resources while fostering innovation, co-creation, and local adaptation based on technological openness (Nambisan et al., 2019; Ojala et al., 2018; Parente et al., 2018). As a result, the embeddedness of digital firms within digital networks and ecosystems allows them to access external resources and capabilities for internationalization and business model adaptation.

4.4 Absorptive capacity

Absorptive capacity is defined as the ability to identify novel and external knowledge, integrate it, and apply it for commercialization (Cohen & Levinthal, 1990). In the digital firm context, Raymond et al. (2015) identified that digital firms have an enhanced absorptive capacity as they acquire and assimilate knowledge via e-collaborations, e-business intelligence, and e-commerce, which positively effects internationalization. Digital technology and direct customer interaction facilitate a richer, faster, and more cost-efficient information collection about foreign markets and customers (e.g., Monaghan et al., 2020; Pergelova et al., 2019). Digital technologies enable direct communication with customers and other relevant stakeholders leading to reduced reliance on intermediaries to provide information to and about markets (Lohrke, Franklin, & Frownfelter-Lohrke, 2006; Morgan-Thomas & Jones, 2009; Nachum & Zaheer, 2005). This immediacy of interaction creates rapid communication cycles that build the basis for generating, processing, integrating, and sharing vast amounts of information (Mathews

& Healy, 2008). Likewise, digital tools and applications (e.g., automated data analytics, ERP systems, front-end customer tracking) help to collect primary data about customers, competitors, market trends, and other stakeholders, thus representing an efficient way of creating high-quality market information (Hagsten & Kotnik, 2017; Nguyen & Barrett, 2006; Pergelova et al., 2019; Tolstoy et al., 2022; Zhu et al., 2004). As a result, digital firms reduce their information uncertainty and asymmetry, which decreases overall liability of foreignness and positively affects internationalization (Mathews, Bianchi, Perks, Healy, & Wickramasekera, 2016; Pergelova et al., 2019).

In addition, digital firms experience advantages when it comes to knowledge acquisition via collaboration. Nambisan et al. (2019) argue that the embeddedness of digital firms within digital networks and ecosystems in combination with technological modularity facilitates and expands knowledge acquisition and sharing. Increased connectivity of digital ecosystems provides digital firms with a greater and diversified number of partners and opportunities for external knowledge acquisition. This knowledge acquisition and recombination is further facilitated by the standardized interfaces and processes of modular technology that allow to quickly codify and integrate complementary knowledge. Furthermore, the openness of digital ecosystems incentivizes open innovation and support the co-creation of knowledge by various different ecosystem participants (Nambisan et al., 2019). Hence, digital firms have an increased ability to assimilate knowledge via e-collaborations and therefore enhance their absorptive capacity.

4.5 Scalability

Digital firms are more easily scalable than their non-digital counterparts based on inherent characteristics of digital products, services, processes, and infrastructure (Hennart, 2014; Monaghan et al., 2020). The nature of digital products and services allows digital firms to scale

them more readily (Autio & Zander, 2016). Digital goods can be reproduced, stored, and transmitted to customers at nearly zero marginal costs (Banalieva & Dhanaraj, 2019; Ekeledo & Sivakumar, 2004; Vendrell-Herrero et al., 2018). In addition, digital products and services are non-excludable; everyone can access them either freely or based on a fee and an additional user does not decrease the accessibility or functionality for others (Barwise & Picard, 2015; Vendrell-Herrero et al., 2018). Moreover, digital firms have readily scalable processes and infrastructure that are not location-bound (Autio et al., 2021; Monaghan et al., 2020; Reuber et al., 2015). Digital processes and routines are already encoded and hence can be easily replicated and transferred (Reuber et al., 2015). As a result, digital firms can rapidly scale and transfer core business processes across countries supporting internationalization through economies of scale (Birkinshaw, 2022; Monaghan et al., 2020; Reuber et al., 2015). Finally, digital firms can also leverage the resources of external partners using their technological modularity and network embeddedness to reduce the resource limitations that usually inhibit scalability (Autio, 2017; Banalieva & Dhanaraj, 2019; Collinson, Narula, & Rajneesh, 2014).

4.6 Resource lightness

Because of the digital nature of the underlying business models, products, and services, digital firms can internationalize with reduced resource expenditures (Autio & Zander, 2016; Brouthers et al., 2016; Eden, 2016; Parente et al., 2018; UNCTAD, 2017). This mode of internationalization with reduced needs for resources, assets, and physical locations was termed '*lean internationalization*' by Autio and Zander (2016) and is a typical characteristic of digital firm internationalization (Cahen & Borini, 2020; Verbeke & Hutzschenreuter, 2021). Business models of digital firms are mostly digital and hence can be transferred to foreign countries cost-efficiently and with a small physical footprint (Brouthers et al., 2016; Coviello et al., 2017). The actual size of the physical foreign footprint thereby varies and depends on the specifics of

the business model and the products and services offered by a digital firm (Coviello et al., 2017). Moreover, the modularity of digital technology in combination with ecosystem embeddedness gives digital firms access to external local resources (Ojala et al., 2018; Parente et al., 2018). Digital firms bundle their own resources and capabilities with local firms' resources and capabilities, which increases cross-border transferability and decreases resources needs of international expansion (Banalieva & Dhanaraj, 2019; Collinson et al., 2014; Ojala et al., 2018; Parente et al., 2018).

4.7 Automation

Digital firms are especially capable of leveraging automation based on the digitization of processes and artificial intelligence (AI) (Brynjolfsson et al., 2019; Monaghan et al., 2020). Brynjolfsson et al. (2019) highlight the pioneering role of digital platforms in utilizing machine translation, which leads to an increase in exports through a reduction of the language barrier. Similarly, digital firms can capitalize on automated processes through AI in fields like customer support or recruiting based on digital technologies (e.g., voice recognition and computer vision) (Brynjolfsson et al., 2019). Monaghan et al. (2020) especially highlight the capability of digital firms to create efficiencies based on the automation of human interaction (Legner et al., 2017) like trust and relationship building or knowledge creation, which play a central role in internationalization. Moreover, AI can be leveraged to generate foreign market knowledge by automating the collection and analyses of customer and market information which improves international performance (e.g., Denicolai et al., 2021).

4.8 Enhanced communication and coordination

Digital firms use digital technology to improve their internal and external communication and coordination (Jean, Sinkovics, & Cavusgil, 2010; Monaghan et al., 2020). Digital technology

facilitates direct, rapid, and frequent interaction with customers, suppliers, and other partners which increases the depth of communication and creates a strong connectivity between the parties (Cassetta et al., 2020; Mathews & Healy, 2008). As a result, digital firms are able to build and maintain strong business relationships which are essential for firm internationalization (Mathews & Healy, 2008; Monaghan et al., 2020; Wang, 2020). This digitally enhanced interaction also allows for a cost-efficient coordination of internal cross-border activities as it facilitates communication and generation of information and decreases issues associated with opportunistic behavior and moral hazard (Autio & Zander, 2016; Chen & Kamal, 2016; Reuber & Fischer, 2011).

5. IMPACT OF DIGITAL FIRMS INTERNATIONALIZATION THEORIES

To create an understanding of how digital firms and their digitally enabled capabilities influence internationalization theory, I systematically assess their influence on existing internationalization theories. Therefore, I start each subchapter with a general description of the theory. Based on this, I then identify how different digital firm capabilities challenge these theories, revealing potentials for theory extension and advancement. The main arguments and the research articles relevant for this section are displayed in Table 2.

5.1 Internalization theory

Internalization theory uses transaction cost analysis to explain the internationalization of multinational enterprises (MNEs) (Buckley & Casson, 1976; Hennart, 1982). In general, firms internationalize to exploit their firm-specific advantages (FSAs) that can be either asset-based or transaction-based ownership advantages (Dunning, 1988a). Internalization theory predicts whether firms will choose to internalize or externalize the exploitation of FSAs based on the transaction costs associated with these two governance mechanisms (Li et al., 2019). If the

Theory	Impact of digital firms and digitally enabled capabilities	Theoretical impact	Sources
Internalization theory	<ul style="list-style-type: none"> ▪ Reduced costs of information collection, exchange, communication, and coordination ▪ Direct communication with stakeholders ▪ Increased information availability ▪ Digital firms mobilize and orchestrate external resources to create FSAs 	<ul style="list-style-type: none"> ▪ Contradictory forces may lead to both increased internalization and externalization ▪ Increased notion to externalize ▪ Increased notion to externalize ▪ Increased notion to externalize – externalization logic of digital firms not captured by internalization theory 	Chen et al. (2019), La Torre and Moxon (2001), Li et al. (2019), Loane et al. (2004), Mathews and Healy (2008), Monaghan et al. (2020), Morgan-Thomas and Jones (2009), Nambisan et al. (2019), Prasad et al. (2001), Singh and Kundu (2002), Zeng et al. (2019), Zhu et al. (2004)
Resource-based view	<ul style="list-style-type: none"> ▪ Digital technologies are relatively common and imitable ▪ Digital technologies are versatile and can be embedded in applications and processes to support internationalization ▪ Utilization of external resources to gain competitive advantages 	<ul style="list-style-type: none"> ▪ No competitive advantage from a Barnean view ▪ Competitive advantage from a Penrosian view in the form of marketing and sales, production and logistics, technology, and strategy capabilities ▪ Challenge for resource-based view as it only recognizes internal resources 	Autio and Zander (2016), Bianchi and Mathews (2016), Brouthers et al. (2016), Brynjolfsson et al. (2019), Cahen and Borini (2020), Cassetta et al. (2020), Dachs et al. (2019), Gregory et al. (2007), Gregory et al. (2019), Javalgi et al. (2005), Kim et al. (2018), Kotha et al. (2001), Mathews and Healy (2008), Mathews et al. (2016), Monaghan et al. (2020), Nambisan et al. (2019), Pergelova et al. (2019), Raymond et al. (2015), Singh and Kundu (2002), Sinkovics et al. (2013)
Network and ecosystem theory	<ul style="list-style-type: none"> ▪ Extended set of multilateral relationships and benefits from network complementarities, interdependencies, and value maximization logic ▪ Digital technology is characterized by layered modular architecture ▪ Digital platforms create enhanced connectivity with other ecosystem members 	<ul style="list-style-type: none"> ▪ Increased number of relationships and higher number of complementarities – digital networks as ecosystems ▪ Increased dependence on network resources for internationalization ▪ Higher ecosystem-specific advantages based on shared or complementary resources supporting internationalization 	Banalieva and Dhanaraj (2019), Brouthers et al. (2016), Chen et al. (2019), Li et al. (2019), Monaghan et al. (2020), Nambisan et al. (2019), Ojala et al. (2018), Parente et al. (2018), Stallkamp and Schotter (2019)
Eclectic paradigm (OLI)	<ul style="list-style-type: none"> ▪ Ownership advantages based on digitally enabled resources and capabilities ▪ Limited offline presence of digital firms ▪ Digital infrastructure availability necessary for value creation ▪ Existence of agglomeration and co-location benefits ▪ Reduction in transaction costs and leverage of ecosystem resources ▪ Network-/ecosystem advantages as new type of advantages 	<ul style="list-style-type: none"> ▪ Competitive advantage supporting internationalization ▪ Limited location-specific advantages ▪ Location-advantages exist based on digital infrastructure and agglomeration economies ▪ Decreased advantages from internalization ▪ Potential extension of the Eclectic paradigm 	Banalieva and Dhanaraj (2019), Coviello et al. (2017), Hennart (2019), La Torre and Moxon (2001), Nambisan et al. (2019), Parente et al. (2018), Pezderka and Sinkovics (2011), Singh and Kundu (2002)
Process theory of internationalization	<ul style="list-style-type: none"> ▪ Enhanced absorptive capacity allows for faster and more efficient acquisition of foreign market knowledge ▪ Modularity and network embeddedness facilitates fast and efficient business model reconfiguration ▪ Resource-light business models and access to external resources and capabilities circumvent resource limitations 	<ul style="list-style-type: none"> ▪ Challenge of incremental, slow, and evolutionary internationalization process since digital firm capabilities facilitate a fast, resource-light, and broad internationalization 	Autio (2017), Brouthers et al. (2016), Chen et al. (2019), Kim (2003), Li et al. (2019), Luo et al. (2005), Monaghan et al. (2020), Nambisan et al. (2019), Ojala et al. (2018), Parente et al. (2018)

Table 2: Literature addressing the impact of digital firms and their digitally enabled capabilities on IB and internationalization theories

internal hierarchical structure of a firm, instead of an external market, is more efficient to exploit FSAs in international markets, the cross-border transaction will be internalized, as a result of which the MNE is created (Buckley & Casson, 1976). In the context of digital firms, internalization theory is influenced by digital firm capabilities that reduce transaction costs and encourage externalization.

Digital firms are able to bypass and thus reduce overall transaction costs because of their use of digital technology for communication and acquisition of information (Monaghan et al., 2020; Park, Mezias, & Song, 2004). The digitally enhanced communication capabilities of digital firms facilitate a more immediate interaction with external partners and customers that substantially reduce market transaction costs (Lohrke et al., 2006; Monaghan et al., 2020). Besides this reduction of direct transaction costs, the heightened absorptive capacity of digital firms attenuates indirect transaction costs by increasing information transparency and therefore reducing the negative effects associated with moral hazard, adverse selection, and holdup (Zhu et al., 2004; Zhu, 2004). As a result of the reduced transaction costs with external parties, digital firms might favor higher levels of externalization through market-based transactions (La Torre & Moxon, 2001; Singh & Kundu, 2002). However, digital technology not only decreases the costs of interactions with external parties, but also internal transaction costs, like internal communication and coordination (Birkinshaw, 2022; Rangan & Sengul, 2009). This is believed to strengthen the propensity of digital firms to internalize cross-border activities (Rangan & Sengul, 2009). Thus, researchers argue that digital technology, and by extension digital firms, might increase both internalization and externalization (Afuah, 2003; Birkinshaw, 2022; La Torre & Moxon, 2001) and that the net effect depends on firm-specific factors or individual cost elements of production and transaction (Afuah, 2003).

The modularity of digital technology in combination with the embeddedness in digital networks and ecosystems encourages digital firms to externalize which presents a fundamental

challenge to internalization theory. Internalization theory focuses on asset- and transaction-based ownership advantages that are proprietary and that cannot be accessed by competitors therefore constituting FSAs (Li et al., 2019; Nambisan et al., 2019). Contrarily, the exploitation of FSAs of digital firms and especially platform firms is rooted in externalization (Chen et al., 2019). Digital firms' modular technology with its standardized and open interfaces encourages autonomous external partners to integrate their complementary services thus fostering co-specialization and innovation (Banalieva & Dhanaraj, 2019; Nambisan et al., 2019; Nambisan, Siegel, & Kenney, 2018). By opening up parts of their digital technology and bundling their technology with complementary assets of external parties, digital firms are able to create and exploit FSAs (Banalieva & Dhanaraj, 2019). As a result, FSAs of digital firms do not solely depend on the assets and resources digital firms control internally, but also on their ability to mobilize and bundle external ones (Zeng et al., 2019). Hence, digital firms follow a fundamentally different underlying logic. The ability to orchestrate resources is valued more than the ability to internalize or own them (Nambisan et al., 2018). This challenges internalization theory as its focuses on optimizing transaction costs and exploiting internal resources and capabilities and ignores the potential to leverage external resources and create value through exogeneous network participants (Li et al., 2019; Zeng et al., 2019).

5.2 Resource-based view

Within the context of internationalization the resource-based view serves as a possible explanation why firms expand abroad (e.g., acquisition of new resources and exploitation of existing resources) and how firms' resources influence internationalization performance (e.g., Dhanaraj & Beamish, 2003; Hitt, Bierman, Uhlenbruck, & Shimizu, 2006). According to the resource-based view (RBV), firms can be seen as an accumulation of heterogeneous resources that enable a competitive advantage (Barney, 1991). Depending on the research stream, the

factors determining whether a resource constitutes a sustained competitive advantage can vary. While Barney (1991) insists that only resources and capabilities that are valuable, rare, inimitable, and non-substitutable create sustained competitive advantages, Penrose (1959) highlights the versatility of resources and capabilities and how this can spur growth. Nevertheless, both streams of theory can be understood as complementary to IB theory and internationalization by highlighting the importance of capabilities and resources for international competition and firm growth (Pergelova et al., 2019; Singh & Kundu, 2002).

However, given that digital technologies and infrastructures are relatively common and hence imitable (Bharadwaj, 2000; Gregory et al., 2019), they would not constitute to sustained competitive advantage and growth for digital firms according to Barney (1991). In contrast, from a Penrosian perspective, digital technologies are versatile as they can be embedded in a wide range of applications and processes supporting the international expansion (Jean et al., 2010; Kotha et al., 2001; Sinkovics et al., 2013). Therefore, the Penrosian view captures the impact of digitally enabled capabilities and their influence on internationalization more appropriately than the Barnean view. This is in line with recent research investigating firm growth and internationalization from a RBV perspective (Nason & Wiklund, 2018; Pergelova et al., 2019). Finally, Barney himself proposed that if computers, machines, and other information processing systems are deeply embedded into a firm's processes they may become a source of competitive advantage (Barney, 1991).

Following the Penrosian view, digital firms leverage their digital technology to obtain digitally enabled capabilities, that positively influences internationalization (e.g., Bianchi & Mathews, 2016; Cassetta et al., 2020). These digitally enabled capabilities include, but are not limited to, the eight capabilities identified before.

5.3 Network and ecosystem theory

The network theory of internationalization describes the internationalization process as the establishment and development of relationships with foreign network entities (Johanson & Mattsson, 1988). The model highlights the importance of establishing formal and informal relationships with other foreign network participants, which enables firms' access to external resources by virtue of their network position (Johanson & Mattsson, 1988). Thus, network theory of internationalization accounts for the possibility to leverage external resources for internationalization.

Networks formed by digital companies are not fully captured by the traditional network view. While traditional network theory focuses mainly on strategic alliances in the form of dyadic relationships, firms in digital networks engage in multilateral relationships (Banalieva & Dhanaraj, 2019). In digital networks, a focal firm can build relationships with and benefit from different types of partners like suppliers, customers, and complementors (Banalieva & Dhanaraj, 2019). In addition, a focal firm also benefits from interdependencies and complementarities arising from relationships between the different partners as all network members follow a logic of value maximization for the entirety of the network (Jacobides et al., 2018). Consequently, members of digital networks benefit from an increased number of relationships and a higher number of complementarities (Banalieva & Dhanaraj, 2019; Jacobides et al., 2018). Hence, digital networks are more accurately described as digital ecosystems following Adner (2017) who describes an ecosystem as "the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize" (p. 40).

Digital firms, and especially digital platforms, are also more dependent on network resources for their internationalization than non-digital firms are because of their high architectural embeddedness (Ojala et al., 2018). Digital technology is characterized by a layered

architecture consisting of four layers: (1) the device layer, (2) the network layer, (3) the service layer, (4) the content layer (Yoo et al., 2010). All four layers, which are mostly owned by different players, have to be in place for a digital firm in order to deliver its product or service (Ojala et al., 2018). As a result, the internationalization of digital companies is much more dependent on building network relationships and accessing the resources of actors providing the different technology layers needed to deliver the product or service (Ojala et al., 2018).

While the above arguments apply to all types of digital firms, digital platforms and the ecosystems they create represent a special case with respect to the network theory of internationalization. Digital platforms can be viewed as a "shared set of technologies, components, services, architecture, and relationships that serve as a common foundation for diverse sets of actors to converge and create value" (Nambisan et al., 2019, p. 1464). Thus, digital platforms and their ecosystems are characterized by the nature of their strong architectural connectivity (Nambisan et al., 2019). This underlying connectivity facilitates interaction, co-creation, and innovation, which create ecosystem-specific advantages that can be leveraged for internationalization (Nambisan et al., 2019). These ecosystem-specific advantages can take on different forms such as shared or complementary assets, exclusive access to customers and other market actors, and intangible resources. By re-using and re-deploying shared resources, digital platforms enable fast and asset-light internationalization (Parente et al., 2018). Furthermore, digital platform ecosystems provide ecosystem-specific advantages by enabling firms to rapidly adapt to changing market environments as knowledge acquisition, reconfiguration, and recombination are facilitated by the shared underlying standards, architecture, and processes (Nambisan et al., 2019). Thus, digital platform firms and platform members can access local market knowledge generated by other platform members and integrate it into the already existing knowledge base of the platform (Nambisan et al., 2019).

Overall, while traditional network theory of internationalization can be used to describe

how digital firms access external resources for internationalization, the internationalization of digital firms, especially digital platforms, is much better described from an ecosystems perspective because of the high dependence on ecosystem partners for delivering a digital firm's value proposition and business model.

5.4 Eclectic paradigm (OLI)

The eclectic paradigm proposed by Dunning (1981) explains why firms engage in foreign direct investment based on the analysis of a firm's ownership (O), location (L), and internalization (I) advantages. It does not constitute an alternative theory to internationalization, but provides a framework which integrates multiple disparate theories like the RBV, transaction cost theory, and internalization theory in order to explain the international footprint and growth of firms (Dunning, 1993; Singh & Kundu, 2002). Since the ownership and internalization advantages that are specific to digital firms were already discussed in detail within the RBV and internalization theory subchapters, I will only briefly touch upon them here.

Digital firms derive specific ownership advantages from digital technology that can be leveraged to obtain digitally enabled resources and capabilities. While the dimension of ownership advantages captures the internal resources and capabilities that influence the internationalization of digital firms, it does not account for the utilization of external resources through networks and ecosystems (Singh & Kundu, 2002).

As opposed to ownership advantages, location advantages are based on external factors like resource endowments or the institutional and economic environment (Dunning, 1988b). Since digital firms have only limited physical footprints, location-specific advantages are quite limited (Coviello et al., 2017; Singh & Kundu, 2002). However, digital firms can still obtain location advantages from two sources: digital infrastructure (Nambisan et al., 2019) and agglomeration economies (Singh & Kundu, 2002). A well-developed digital infrastructure is

the basis for digital firms to provide value to customers and constitutes a location-specific advantage (La Torre & Moxon, 2001; Nambisan et al., 2019; Pezderka & Sinkovics, 2011). In addition, the relevance of a well-developed physical infrastructure persists for e-commerce firms that still distribute physical product (Pezderka & Sinkovics, 2011). Digital firms can also derive location advantages from agglomeration economies and co-location with other ecosystem players as it enables them to access and build-up intellectual and social capital (Nambisan et al., 2019; Singh & Kundu, 2002). In conclusion, digital firms can still benefit from location advantages in the form of digital infrastructure and agglomeration while more traditional location advantages such as access to demand are less relevant.

Digital firms experience reduced internal and external transaction costs which can either increase or decrease a firms' propensity to internalize international activities. However, digital firms also create FSAs based on externalization which decreases the overall advantages of internalization and challenges the logic of internalization as a means to access resources (Parente et al., 2018; Singh & Kundu, 2002).

To account for the new reality of digital networks and ecosystems, researchers propose to extend the eclectic paradigm by a fourth dimension in the form of network- or ecosystem-based advantages (Banalieva & Dhanaraj, 2019; Li et al., 2019; Nambisan et al., 2019; Singh & Kundu, 2002). Singh and Kundu (2002) propose network advantages arising from improved structural and relational embeddedness, electronic brokerage, and network effects while Nambisan et al. (2019) highlight ecosystem-specific advantages in the form of resource sharing and resource complementarities. Similarly, Banalieva and Dhanaraj (2019) suggest to add network advantages as a third type of ownership advantages to the traditional asset- and transaction-based ownership advantages of internalization theory. However, Hennart (2019) challenges this notion because the advantages are neither firm specific, nor observable ex ante and thus cannot explain the foreign footprint and firm internationalization.

5.5 Process theory of internationalization

The initial process theory of internationalization also called Uppsala model of internationalization developed by Johanson and Vahlne (1977) describes internationalization as an incremental process of resource commitment and foreign market entry based on the acquisition of foreign market knowledge. Since firms lack knowledge of foreign markets and experience liability of foreignness when internationalizing, they start the process with relatively low resource commitment in psychically close markets. As the firm gradually acquires foreign market knowledge, it reduces its investment risk, which in turn increases resource commitment and encourages expansion into psychically more distant markets. Internationalization is hence characterized by a reciprocal process of incremental acquisition of knowledge and commitment to foreign markets that minimizes risk (Johanson & Vahlne, 1977).

The incremental notion of the process theory of internationalization and its relatively slow pace is challenged by digital firms that conduct an internationalization process that is time-compressed and broad in scope (Kim, 2003; Luo et al., 2005; Ojala et al., 2018; Parente et al., 2018). This rapid and broad internationalization process can be explained by the different capabilities digital firms have like enhanced absorptive capacity, modularity, network embeddedness, scalability, and resource lightness (Autio, 2017; Brouthers et al., 2016; Monaghan et al., 2020; Nambisan et al., 2019).

First, digital firms have an increased absorptive capacity and are thus able to acquire and integrate more knowledge faster in comparison to non-digital firms. This capability is based on their direct and immediate interaction with stakeholders and their embeddedness in digital ecosystems and platforms, which widens the scope of knowledge acquisition and encourages co-creation (Autio, 2017; Monaghan et al., 2020; Nambisan et al., 2019). Moreover, the underlying modular technology allows for a more flexible and accelerated recombination and sharing of knowledge based on standardized processes and interfaces (Nambisan et al., 2019).

As a result, digital firms are able to acquire foreign market knowledge faster which reduces the liability of foreignness and enables digital firms to enter more foreign markets in a shorter period of time.

Second, based on technological modularity digital firms are able to quickly and efficiently reconfigure their business models to fit new market environments (Banalieva & Dhanaraj, 2019). Moreover, the modularity allows digital firms to leverage their network of external partners to adapt their business model to foreign environments by integrating external services, products, and processes into the existing digital firm offering (Banalieva & Dhanaraj, 2019; Ojala et al., 2018). This capability of rapid and efficient business model adaptation to foreign markets supports a faster internationalization process of digital firms.

Third, digital firms are resource-light and can scale much quicker because of the digital nature of their products, services, and processes (Autio & Zander, 2016; Monaghan et al., 2020). Digital products and services can be replicated and distributed nearly instantly and at marginal costs which make a much quicker and broader market penetration possible (Vendrell-Herrero et al., 2018). Furthermore, digital process are already encoded and can be quickly transferred to new markets which circumvents the lengthy build-up of new processes in foreign markets (Monaghan et al., 2020; Reuber et al., 2015). The resource-light business models of digital firms also reduce the necessity to set up a physical presence in foreign markets thus not only reducing the overall resource investment, but also the time investment associated with internationalization (Autio & Zander, 2016; Brouthers et al., 2016).

In conclusion, the above-mentioned capabilities of digital firms challenge the incremental, slow, and evolutionary internationalization process postulated by the process theory of internationalization as these digitally enabled capabilities facilitate an internationalization process that is much more time-compressed, broader in scope, and less path dependent (Luo, 2022; Monaghan et al., 2020).

6. RESEARCH GAPS AND FUTURE RESEARCH

Based on the review and synthesis of existing research regarding the internationalization of digital firms, I was able to identify five research gaps. These research gaps provide fruitful avenues for future research and are discussed in the following.

Research gap 1: Dedicated digital firm research

Only recently IB researchers started to acknowledge that digital firms are a distinct type of firm with specific capabilities influencing internationalization (e.g., Cahen & Borini, 2020; Monaghan et al., 2020). This literature review revealed that most of the existing research focuses either on the general impact of digital technologies and digitalization on internationalization (e.g., Autio & Zander, 2016; Mathews et al., 2016) or uses samples that mix digital with non-digital firms (e.g., Rothaermel et al., 2006). However, given the distinct capabilities and characteristics digital firms have, it is absolutely crucial to clearly demarcate digital from non-digital firms in the context of internationalization. Based on these digitally enabled capabilities, digital firms conduct an internationalization process that is vastly different in speed, resource commitment, and scope compared to non-digital firms (Monaghan et al., 2020). By disregarding the fundamental differences of digital firms, research will not yield robust results and achieve clarity regarding the internationalization mechanism of digital firms. Thus, distinguishing digital and non-digital firms in internationalization and dedicating specific research endeavors to digital firms is essential.

Future research also needs to increase the depth of analyses by exploring a more nuanced view of digital firms. While digital firms share common characteristics and capabilities these characteristics and capabilities can be more or less pronounced in different subtypes of digital firms. For example, the internationalization of digital platform firms is much more strongly driven by network and platform effects compared to other digital firm types (Nambisan et al.,

2019). Even among digital firms of the same type the degree of digitalization and the importance of different digitally enabled capabilities can vary tremendously. Therefore, I call for the development of a robust scale that measures a firm's degree of digitalization and that controls for the possession of specific digitally enabled capabilities. This would not only bring greater clarity to what constitutes a digital firm, but also provide more nuanced and robust theorizing about digital firms' influence on internationalization.

While this literature review strongly encourage all types of studies specifically focusing on digital firms, it especially calls for more quantitative empirical research since the majority of the studies published recently are of a conceptual or qualitative empirical nature (e.g., Monaghan et al., 2020; Nambisan et al., 2019; Ojala et al., 2018; Stallkamp & Schotter, 2019).

Research gap 2: Extension of internationalization theories

As shown within Section 5 of this literature review, existing theories of internationalization capture the new reality of digital firm internationalization only partially (e.g., Monaghan et al., 2020; Singh & Kundu, 2002). Existing theories should be extended and supplemented by elements accounting for the internationalization of digital firms and their digitally enable capabilities. As elaborated earlier, OLI and internalization theory could be expanded to include advantages arising from network and ecosystem embeddedness (Nambisan et al., 2019). Similarly, the RBV could benefit from the incorporation of external capabilities that can be orchestrated by a focal firm. Moreover, researchers should address the dichotomy between an increased notion to both externalize and internalize foreign activities in the context of internalization theory (Chen et al., 2019; Nachum & Zaheer, 2005). Hence, I encourage researchers to continue their advancement of internationalization theories by including elements that capture the new reality of digital firms.

Research gap 3: Impact of digital firm capabilities

While researchers acknowledge the specific capabilities of digital firms identified in this literature review, empirical research regarding the specific impact of these capabilities on internationalization is missing. Researchers already started to theorize about how digital firms and digitally enabled capabilities like modularity (Banalieva & Dhanaraj, 2019), business model reconfiguration (Cahen & Borini, 2020), network and ecosystem embeddedness (Ojala et al., 2018), absorptive capacity (Monaghan et al., 2020), and scalability (Autio & Zander, 2016) influence the process of internationalization in a general manner. However, to the best of my knowledge, there is no empirical research that explores the impact of digital firms and their digitally enabled capabilities on the specific characteristics and outcomes of internationalization like scope, degree, and speed of internationalization, entry mode, or performance. By identifying the specific capabilities of digital firms that influence internationalization, this paper already lays the groundwork on which this future research can be based.

Future research could also explore the relationships in between the different capabilities of digital firms. The literature review revealed, that the various internal capabilities of digital firms are not independent of each other since they are all based on digital technologies (Cassetta et al., 2020; Pergelova et al., 2019). One example of such an interdependence of digital firm capabilities is the relationship between modularity, business model reconfiguration, and network embeddedness. The technological modularity enables the rapid and cost-efficient business model reconfiguration and the build-up of digital networks (Nambisan et al., 2019) and digital networks amplify business model reconfiguration by leveraging external partners for local adaptation (Banalieva & Dhanaraj, 2019). Hence, future research needs to provide empirical and theoretical clarity regarding the validity of the individual capabilities and the relationships between them.

Research gap 4: Internationalization-performance relationship

There is a long standing tradition in IB literature to explore the relationship between internationalization and performance. Despite the vast body of existing literature, there is still no robust consensus on whether the relationship is positive, negative, u-shaped, s-shaped, or insignificant (Hennart, 2007). The relationship between degree, scope, and speed of internationalization and firm performance is argued to be dependent on various underlying mechanisms such as economies of scale, liability of foreignness, and learning capabilities (Abdi & Aulakh, 2018; Schwens et al., 2018). In the case of digital firms, these mechanisms underlying the internationalization-performance relationship are influenced by their digitally enabled capabilities. Tolstoy et al. (2022) provide a first insight by confirming a positive relationship between digital marketing analytics, an aspect of absorptive capacity, and international performance. Thus, the detailed investigation of the internationalization-performance relationship in the special case of digital firms might be a fruitful avenue not only for establishing a robust relationship within the context of digital firms, but also shining a light into capabilities influencing the general internationalization-performance relationship.

Closely, related to the topic of international performance is the relationship between internationalization and survival especially of younger firms. The relationship underlies mostly the same mechanisms since a positive effect on performance also provides a positive contribution to a firm's survival (Fernhaber, 2013). Hence, it might be a promising avenue for future research to investigate how the capabilities of digital new ventures influence survival in the context of internationalization.

Research gap 5: Digital firms and psychic distance

Despite a seemingly borderless digital world, distance still matters. Researchers suggest that digital firms and the digital environment decrease but not eliminate psychic distance (Shaheer

& Li, 2020; Yamin & Sinkovics, 2006). For example, Swoboda and Sinning (2022) find that for e-commerce firms the relationship between internationalization speed and firm growth is negatively moderated by regulatory and cultural distance. Going even further, Yamin and Sinkovics (2006) propose that online internationalization, which is a central aspect of the internationalization of digital firms, is especially susceptible to negative effects from psychic distance due to the existence of a virtuality trap. Thus, future research should empirically analyze the impact of digital firms and digitally enabled capabilities on psychic distance ideally with appropriately drawn samples of digital and non-digital firms. Relating back to the internationalization-performance relationship, it might also be insightful to investigate the interaction between digital firms, psychic distance, and performance. Hutzschenreuter and Voll (2008) found that high levels of added distance in a certain timeframe negatively influence international performance. Given the postulated diminishing effects of distance in the context of digital firms (Mahnke & Venzin, 2003), it would be interesting to investigate to what extent the relationship between distance and performance will be altered for this new type of firm.

7. LIMITATIONS OF THE REVIEW

This literature review has several limitations. Although the literature research was performed systematically and rigorously following a diligent process, research on the topic of digital firms and their internationalization is highly dynamic. It might be the case that some of the research gaps identified are already under study. Nevertheless, I appreciate this possibility as it highlights the actuality and relevance of the topic. Given the actuality of the topic and the early stage of research on internationalization of digital firms, I extended this literature review to include studies focusing on the impact digital technologies have on internationalization in general. I decided to do so since digital technologies build the basis for digital firms and are central in their existence.

8. CONCLUSION AND IMPLICATIONS FOR THEORY AND PRACTICE

This literature review explores the internationalization of digital firms by analyzing and synthesizing the existing academic literature to lay out a fundamental understanding for future research. With this review I provide a distinct definition of digital firms and digital firm subtypes grounded in literature that allows future researchers to achieve research clarity in differentiating digital from non-digital firms.

Following the initial definition of digital firms, this review identifies eight capabilities from existing research that influence the internationalization of digital firms. While digitally enabled capabilities like network and ecosystem embeddedness, modularity, and enhanced communication and coordination have already been explored in greater depth in existing literature, capabilities like scalability, automation, resource lightness, and business model reconfiguration demand for a more detailed empirical exploration. Based on the identified capabilities of digital firms this review evaluated the impact of digital firms on existing theories of internationalization. It finds that while internationalization theory, the RBV, network theory, the eclectic paradigm, and international process theory still provide a valid explanation for some elements of digital firm internationalization, no theory fully captures this process. Especially the utilization of external network and ecosystem resources and capabilities for enhanced internationalization remains one of the key concepts that needs to be integrated to extant theories of internationalization.

With this literature review I provide several theoretical implications. First, by identifying the digitally enabled capabilities that influence the internationalization of digital firms, I provide a sound basis for theorizing about digital firm internationalization. Second, by analyzing how these digitally enabled capabilities influence the validity of existing internationalization theories I outline and explore potential opportunities for theory extension. Third, based on the holistic literature review, I was able to identify five major research gaps that provide fruitful

guidance for future research which will hopefully advance digital firm research and the overall IB research field.

Finally, this literature review also provides some practical implications. It provides managers of digital firms with a clear perspective on what capabilities are necessary to enable a fast, resource-light, and broad internationalization process. Thus, it creates awareness and encourages managers to prepare their capability base adequately for internationalization and helps to identify potential capability deficiencies within their firms.

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APPENDIX

Appendix 1: Keywords used for initial Web of Science literature search

Keywords used for "digital":	digit*, internet*, online*, web*, e-com*, e-business*, ibusiness*, born-digital*, information age, platform*
Keywords used for "internationalization":	internation*, global expansion, foreign expansion, foreign direct investment, market entry, entry-mode, entry mode, born-global, export, multinational

Research Paper I

DIGITAL FIRM INTERNATIONALIZATION AND PERFORMANCE: THE MODERATING EFFECT OF DIGITAL FIRM CAPABILITIES

ABSTRACT

Digital firms and their digitally enabled capabilities pose a fundamental challenge to the established mechanisms of internationalization. These capabilities allow digital firms an internationalization process that is fast and broad in scope especially when compared to the internationalization of non-digital firms. However, research has not addressed the resulting performance implications. Based on the organizational capabilities perspective of the resource-based view and a cross-sectional dataset of 617 exchange-listed firms, this study analyzes the moderating effect of digital firm capabilities on the relationship between firm performance and the scope, degree, and speed of internationalization. The results indicate that digital firms amplify the positive performance effect from an increased scope of foreign activities over that of their non-digital counterparts because of the formers' digitally enabled capabilities like technological modularity and business model reconfiguration, embeddedness in digital networks and ecosystems, and enhanced absorptive capacity. The results also show that digital firms are susceptible to negative performance penalties from accelerated internationalization speed as a result of stepping into a virtuality trap. This paper provides both theoretical and managerial implications by integrating digital firms into the internationalization-performance literature and informing the internationalization strategies of digital firm managers.

Keywords: *Digitalization, internationalization, performance, scope, degree, speed*

1. INTRODUCTION

The business world of the twenty-first century has been dominated by the phenomenon of digitalization, which has not only transformed how companies operate and create value (Ojala, Evers, & Rialp, 2018), but also changed how companies internationalize (Coviello, Kano, & Liesch, 2017; UNCTAD, 2017). Based on digitally enabled capabilities like enhanced flexibility, scalability, and learning, digital firms carry out a distinct internationalization process that is time-compressed, broad in scope, and resource-light (Monaghan, Tippmann, & Coviello, 2020; Nambisan, Zahra, & Luo, 2019). Thus, digital firms like Airbnb, Uber, and Delivery Hero have expanded rapidly in terms of both timing and scope. For example, since its founding in 2008, the lodging and hospitality platform Airbnb has expanded into more than 220 countries without owning a single room (Airbnb, 2020). In contrast, it took Marriott hotels nearly 140 years to expand into 132 countries (Marriott, 2019). Similarly, Uber entered 70 countries and more than 10,000 cities in the 13 years since founding (Uber, 2021), while Delivery Hero expanded into 43 countries in 10 years (Delivery Hero, 2021). All of these digital firms have thus challenged the previously existing expansion logics of their industries.

The ability of digital firms to manage a broad and time-compressed internationalization is rooted in their digitally enabled capabilities (Monaghan et al., 2020; Nambisan et al., 2019), which include enhanced *absorptive capacity* (Raymond, Bergeron, Croteau, & St-Pierre, 2015), increased *scalability* (Monaghan et al., 2020), *digital networks and ecosystems* embeddedness (Banalieva & Dhanaraj, 2019), *resource lightness* (Autio & Zander, 2016; Parente, Geleilate, & Rong, 2018), and *modularity* that facilitates *business model reconfiguration* (Nambisan et al., 2019; Yoo, Henfridsson, & Lyytinen, 2010). While international business (IB) research acknowledges that the digitally enabled capabilities of digital firms influence the internationalization processes, research has only recently started to integrate them into existing IB theories (Banalieva & Dhanaraj, 2019). To the best of my knowledge, research has not

addressed the internationalization-performance relationship in the context of digital firms and digitally enabled capabilities so far. Therefore, this paper attempts to provide first insights into how digital firms and their digitally enabled capabilities affect the relationship between internationalization and performance.

By applying the capabilities perspective of the resource-based view (RBV) and its adjacent theories, this study identifies digitally enabled firm capabilities that are specific to digital firms and influence internationalization. Based on this, the study explores the underlying theoretical mechanisms for how these capabilities influence the internationalization-performance relationship along the internationalization dimensions of scope, degree, and speed. The theoretical model and hypotheses are empirically tested by using a set of 617 internationalized and exchange-traded North American firms.

With this study, I offer three main contributions to the IB literature. First, I extend research on the internationalization-performance relationship by transferring existing theoretical constructs to the context of digitalization and digital firms. In doing so, I follow research calls from Coviello et al. (2017), Monaghan et al. (2020), and Nambisan et al. (2019) to transfer and validate existing internationalization theories in the context of digital firms, thereby ensuring their applicability in and validity for digital firms. Second, I establish the theoretical link between digital firm capabilities and the internationalization-performance relationship, thus following calls in the internationalization-performance literature to end the escalation of ever-more complex statistical models in favor of refocusing on analyzing the theoretical foundations of the phenomenon (Hennart, 2007; Verbeke, Li, & Goerzen, 2009). Third, I add to the capabilities perspective of the RBV by applying its underlying concepts to the context of digital firm internationalization, thus extending these theories to include aspects of the new digital reality.

This study also has several practical implications. It delivers valuable insights into the

specific performance effects experienced by digital firm when internationalizing, thereby informing future international expansion strategies. Moreover, by discussing the impact of digital firm capabilities on efforts to internationalize, this study delivers valuable insights for managers into how best to prepare their firms' capability bases for foreign activities.

The study is structured as follows: Section 2 provides an overview of the two research fields that this study integrates: internationalization-performance research and research on digital firms. Based on these theoretical foundations, Section 3 develops the hypotheses along the three dimensions of internationalization scope, degree, and speed. Section 4 describes the methodology used to test the hypotheses and Section 5 shows the results of the statistical analyses. Finally, Section 6 and 7 discusses the implications of this study's findings for the academic field, highlights its contributions to theory and practice, and indicates the study's limitations and avenues for future research.

2. THEORETICAL BACKGROUND

2.1 The internationalization-performance relationship

The relationship between internationalization and performance is a central topic in IB research (Capar & Kotabe, 2003). From a theoretical standpoint, most researchers argue that the relationship between internationalization and performance is net positive after weighing the positive and negative effects of internationalization (Contractor, Kundu, & Hsu, 2003). However, this premise has not yet been verified unambiguously by empirical results (Schwens et al., 2018). The lack of consistent empirical results may exist because of the underlying complexity of internationalization, as reflected in its multifaceted influence on benefits and costs (Cardinal, Miller, & Palich, 2011; Hitt, Tihanyi, Miller, & Connelly, 2006b), and the use of diverse and inconsistent measures of internationalization (Hennart, 2011). To ensure precise theorizing, this study follows Zahra and George (2002b) and Schwens et al. (2018) in

subdividing internationalization into the dimensions of scope, degree, and speed. This study explores each of these dimensions and their relationships with performance by identifying the underlying mechanisms from the standpoint of the capabilities perspective of the RBV and its adjacent theories.

The scope of internationalization indicates a firm's exposure to foreign markets, regions, and cultures and comprises the number of countries in which a firm does business (Schwens et al., 2018). A broad international scope is associated with positive performance effects because of broadened learning and economies of scope, although negative effects include coordination and initial setup costs (e.g., Abdi & Aulakh, 2018; Lu & Beamish, 2004).

Rooted in the RBV, the knowledge-based view proposes that knowledge is a firm's most important resource (Gassmann & Keupp, 2007; Prashantham, 2005). In the internationalization context, exposure to a broader and more diverse range of environments increases knowledge and capabilities, improving performance (Zahra, Ireland, & Hitt, 2000). Expanding a firm's international scope also allows it to leverage its competitive advantage across additional markets (Lu & Beamish, 2004). By sharing tangible and intangible resources and capabilities among international operations, firms create economies of scope (e.g., Chao & Kumar, 2010; Qian, 2002) that lead to positive performance effects (e.g., Chao & Kumar, 2010; Contractor et al., 2003).

To obtain a more holistic picture of the underlying mechanisms between international scope and performance, researchers often extend the RBV to include a transaction cost theory perspective (e.g., Hitt, Hoskisson, & Kim, 1997). While exploiting the benefits of increased scope requires firms to coordinate international activities across multiple countries (Hitt et al., 1997; Tallman & Li, 1996), an expanding geographical scope increases the complexity of governance and coordination, resulting in additional costs and a negative impact on firm performance. Having to coordinate business activities and communicate across multiple

organizational layers and cultures can lead to information asymmetry and the challenge of balancing conflicting institutional demands (Hitt et al., 1997; Lu & Beamish, 2004). Hence, increased exposure to international contexts increases overall transaction costs and the costs of acquiring, processing, and distributing information (Chao & Kumar, 2010).

Negative performance effects from internationalization are also caused by the setup costs that are associated with initially establishing foreign operations. Such liabilities of foreignness include the costs of acquiring foreign market knowledge, administrative handling of foreign sales, setting up new organizational entities, and developing the capabilities necessary to engage in international business (Cuervo-Cazurra, Maloney, & Manrakhan, 2007; Lu & Beamish, 2004).

The degree of internationalization refers to a firm's foreign sales as a percentage of total sales (Zahra & George, 2002b), a measure the IB literature predominantly uses to operationalize internationalization (Hennart, 2011). The relationship between degree of internationalization and performance is characterized by theoretical arguments surrounding the benefits of scale (Abdi & Aulakh, 2018; Hennart, 2007; Hennart, 2011). Internationalization enables firms to grow sales and use their competitive advantages and firm-specific assets and capabilities across a larger market, which reduces unit costs and increases profitability (Abdi & Aulakh, 2018; Contractor et al., 2003). In addition, firms with larger international sales strengthen their bargaining power over suppliers, customers, and other market participants (Lu & Beamish, 2004). In contrast to these positive arguments, some researchers argue for adverse performance effects of higher degrees of internationalization — primarily initial setup costs and costs related to increased complexity (e.g., Abdi & Aulakh, 2018; Contractor et al., 2003; Lu & Beamish, 2004). However, higher foreign sales do not necessarily cause these costs to arise, as the degree of foreign sales does not reflect any information regarding a firm's physical presence in a foreign country nor the heterogeneity of its exposure to foreign markets (e.g., Hennart, 2007; Hennart,

2011). Therefore, the theoretical arguments made for adverse performance effects pertain only partially and the positive performance arguments prevail.

The speed of internationalization is often defined as the time between a firm's inception and its first international sales (e.g., Khavul, Pérez-Nordtvedt, & Wood, 2010; Schwens et al., 2018; Zahra et al., 2000). However, this operationalization neglects the internationalization process that occurs after the first international market entry (Chetty, Johanson, & Martín, 2014). Following the initial notion of speed defined in physics, speed can be understood as the time needed by an object to travel a certain distance (Chetty et al., 2014). Therefore, an appropriate measure for internationalization speed may consist of two elements: time and distance (Chetty et al., 2014). This study follows researchers like Casillas and Acedo (2013), Chang and Rhee (2011), García-García et al. (2017), and Vermeulen and Barkema (2002) in defining internationalization speed as the change in the degree or scope of internationalization, divided by time.

Few studies address the relationship between speed of internationalization as defined above and performance (Mohr & Batsakis, 2017), and those that exist show inconsistent results on how rapid firm internationalization affects performance. Studies find positive, negative and, curvilinear relationships (e.g., Chetty et al., 2014; García-García et al., 2017; Jain, Celo, & Kumar, 2019). Nevertheless, most researchers exploring the internationalization speed and performance relationship draw from the process model of internationalization (Johanson & Vahlne, 1977) and argue for a negative relationship between internationalization speed and performance (e.g., Jiang, Beamish, & Makino, 2014; Vermeulen & Barkema, 2002). Rooted in the RBV, the argument follows a knowledge-based and organizational learning perspective whereby firms need sufficient time to acquire knowledge about foreign markets to reduce uncertainties and liabilities of foreignness, resulting in an incremental and comparatively slow internationalization process (Johanson & Vahlne, 1977). Increasing the speed of

internationalization causes issues related to the diseconomies of time compression¹ (Dierickx & Cool, 1989; Vermeulen & Barkema, 2002) and the limitations of *absorptive capacity*² (Cohen & Levinthal, 1990; Vermeulen & Barkema, 2002). Accelerated internationalization requires expedited development and integration of the capabilities and knowledge required for foreign expansion, which increases costs (Dierickx & Cool, 1989; Hilmersson & Johanson, 2016; Jiang et al., 2014). As for a firm's limited *absorptive capacity* (García-García et al., 2017), accelerated internationalization may reduce a firm's ability to acquire, process, and assimilate foreign market knowledge adequately (García-García et al., 2017). Based on both the diseconomies of time compression and limited *absorptive capacity*, a higher speed of internationalization is likely to have a negative influence on firm performance (Jiang et al., 2014; Vermeulen & Barkema, 2002).

To explore the potential for inter-firm differences in the internationalization-performance relationship, IB research started to explore the impact of specific firm resources and capabilities as boundary conditions (e.g., García-García et al., 2017; Hitt, Bierman, Uhlenbruck, & Shimizu, 2006a). This study follows this research based on the RBV and identifies specific firm capabilities of digital firms that influence the internationalization-performance relationship.

2.2 Digital firm capabilities

To create a common understanding of digital firms, this study follows Monaghan et al.'s (2020) and the United Nations Conference on Trade and Development's (UNCTAD) characterization of digital firms. Thus, digital firms are defined "by the central role of the Internet in their operating and delivery model" (UNCTAD, 2017, p. 165) and their reliance on the Internet for

¹ Diseconomies of time compression refers to the higher costs of developing resources quickly (Knott, Bryce, & Posen, 2003).

² *Absorptive capacity* describes the ability to recognize, integrate, and commercialize new and external knowledge (Cohen & Levinthal, 1990), which can be a source of competitive advantage (Zahra & George, 2002a).

their processes related to production, operations, and delivery (Monaghan et al., 2020, p. 12). This definition embraces both purely digital firms, such as digital platforms and digital solution providers, and partially digital firms, such as e-commerce firms and digital content producers and distributors (Monaghan et al., 2020; UNCTAD, 2017). Digital firms may still use non-digital processes and perform non-digital activities, but what distinguishes them from non-digital firms is that their business model depends on a digital infrastructure to produce and market their offerings (Monaghan et al., 2020). This study deliberately takes on a broader perspective of digital firms by including partially digital firms to provide a more holistic view on the entirety of digital firms.

Digital firms leverage digital technology to create new capabilities and enhance existing ones, which affects the underlying mechanisms and logics of internationalization (Monaghan et al., 2020). Information systems research argues that firms enhance their performance through their technological capabilities either directly or indirectly by leveraging these capabilities' complementarity with other internal capabilities (Bharadwaj, 2000; Rivard, Raymond, & Verreault, 2006). Despite the scarce research in the field of digital firm internationalization, the capabilities perspective of the RBV provides a solid theoretical foundation from which to theorize on how various digitally enabled capabilities influence the internationalization-performance relationship in digital firms. Using the extant research on digital firms, this study identifies five capabilities that are specific to or enhanced in digital firms compared to their non-digital counterparts:

(1) *Modularity and business model reconfiguration*: International *business model reconfiguration* refers to the ability to adapt an existing business model to the specific local needs of international markets (Cahen & Borini, 2020). Digital firms have the ability to rapidly and efficiently reconfigure their business models because of the *modularity* underlying their digital technology (Autio, 2017; Yoo et al., 2010). By using the principles of *modularity*, digital

firms break down their digital services and infrastructure into small parts with standardized interfaces (Langlois, 2002). These smaller parts can be rapidly and efficiently rearranged and adjusted to redesign digital firms' offerings and routines. Therefore, *modularity* allows digital firms to rapidly and cost-efficiently reconfigure their business models and adapt them to new market environments (Banalieva & Dhanaraj, 2019). Moreover, the *modularity* and standardization of technology interfaces also enables digital firms to easily integrate external digital services and processes of local complementors into their offerings. This bundling of external and internal capabilities facilitates the transfer of the business model and reduces overall internal resource needs (Banalieva & Dhanaraj, 2019; Collinson, Narula, & Rajneesh, 2014; Parente et al., 2018). As a result, digital firms have advanced *business model reconfiguration* capabilities in terms of speed and cost-efficiency (Cahen & Borini, 2020).

(2) *Digital networks and ecosystems*: Previous research shows that establishing relationships with foreign parties is key to the internationalization process, as a strong network position allows firms to leverage external resources and capabilities (Johanson & Mattsson, 1988). Networks formed by digital firms are not built on traditional dyadic relationships but on multilateral relationships among groups of actors (e.g., users, suppliers, complementors) (Banalieva & Dhanaraj, 2019). These groups form relationships with each other, which maximizes the overall value of the ecosystem (Banalieva & Dhanaraj, 2019; Jacobides, Cennamo, & Gawer, 2018) and allows digital firms to profit from high numbers of complementarities. This leveraging of external ecosystem resources and capabilities is enhanced by digital firms' modular technological architecture, which facilitates the bundling of and access to external resources while fostering innovation, co-creation, and local adaptation based on their technological openness (Ojala et al., 2018; Parente et al., 2018; Yoo et al., 2010).

(3) *Absorptive capacity*: Digital technologies support and advance the collection, processing, and assimilation of information (Mathews & Healy, 2008). They enable direct,

frequent, and rapid customer interactions (Lohrke, Franklin, & Frownfelter-Lohrke, 2006; Mathews & Healy, 2008) and provide digital tools that enhance the collection and integration of primary data (Pergelova, Manolova, Simeonova-Ganeva, & Yordanova, 2019). Moreover, digital firms gain advantages in knowledge acquisition through collaboration and embeddedness in *digital networks and ecosystems* (Nambisan et al., 2019; Raymond et al., 2015). Based on modular technology and standardized interfaces, digital firms can use their *digital networks and ecosystems* to create, share, and integrate knowledge at a wide scope and an accelerated pace (Nambisan et al., 2019).

(4) *Scalability*: Digital firms have enhanced *scalability* because of the nature of digital products and services, the digitally encoded processes, and the ability to leverage external partners (Autio & Zander, 2016; Hennart, 2014; Monaghan et al., 2020). The digital nature of products and services facilitates their reproduction, storage, and distribution at marginal costs close to zero (Vendrell-Herrero, Gomes, Collinson, Parry, & Bustinza, 2018). Moreover, digital firms have readily scalable processes and routines since they are already digitally encoded and can be easily replicated and transferred (Monaghan et al., 2020; Reuber, Fischer, & Morgan-Thomas, 2015). Finally, digital firms leverage external network and ecosystem partners for scale-up to circumvent resource limitations (Banalieva & Dhanaraj, 2019).

(5) *Resource lightness*: Foreign expansion requires considerable upfront investment, including the setup costs associated with establishing the new organizational unit and developing the competencies to realize foreign sales (Abdi & Aulakh, 2018; Cuervo-Cazurra et al., 2007). Because of their relatively asset-light business models and the digital nature of their products and services, digital firms need few resources to access international markets (Autio & Zander, 2016; Brouthers, Geisser, & Rothlauf, 2016; Parente et al., 2018). Depending on their business models, digital firms have relatively small or even no physical foreign footprint, allowing for cost-efficient internationalization (Coviello et al., 2017).

After identifying the core capabilities of digital firms, I now link them to the internationalization-performance relationship. To guide my theorizing, I explore how the five digitally enabled core capabilities affect the mechanisms that underlie each of the three dimensions of the internationalization-performance relationship.

3. HYPOTHESES DEVELOPMENT

3.1 The relationship between scope of internationalization, performance, and digital firm capabilities

From a knowledge-based view and an organizational learning viewpoint, digital firms benefit from heightened learning and *absorptive capacity* because of their digital technologies (Monaghan et al., 2020). The increased ability to generate and use knowledge in and about foreign markets augments organizational learning and reduces liabilities of foreignness, which IB theory presents as a significant obstacle to internationalization (Johanson & Vahlne, 1977; Oviatt & McDougall, 1994). Therefore, the enhanced *absorptive capacity* of digital firms has positive effects on the relationship between a firm's scope of internationalization and its performance (Wu & Voss, 2015; Zahra & Hayton, 2008).

The *modularity* of digital firms' technological architecture enhances the positive effects of economies of scope (Gawer, 2014). Digital modular architecture facilitates the re-use of shared resources, creating economies of scope in production and innovation. These economies of scope apply not only to sharing of internal resources but also to leveraging external resources and capabilities. In combination with *digital networks and ecosystems*, *modularity* allows digital firms to leverage partners' external assets to broaden their resource and capability base and create economies of scope on the inter-firm level (Gawer, 2014; Nambisan et al., 2019). As a result, digital firms experience higher economies of scope that are likely to result in positive performance effects than non-digital firms do.

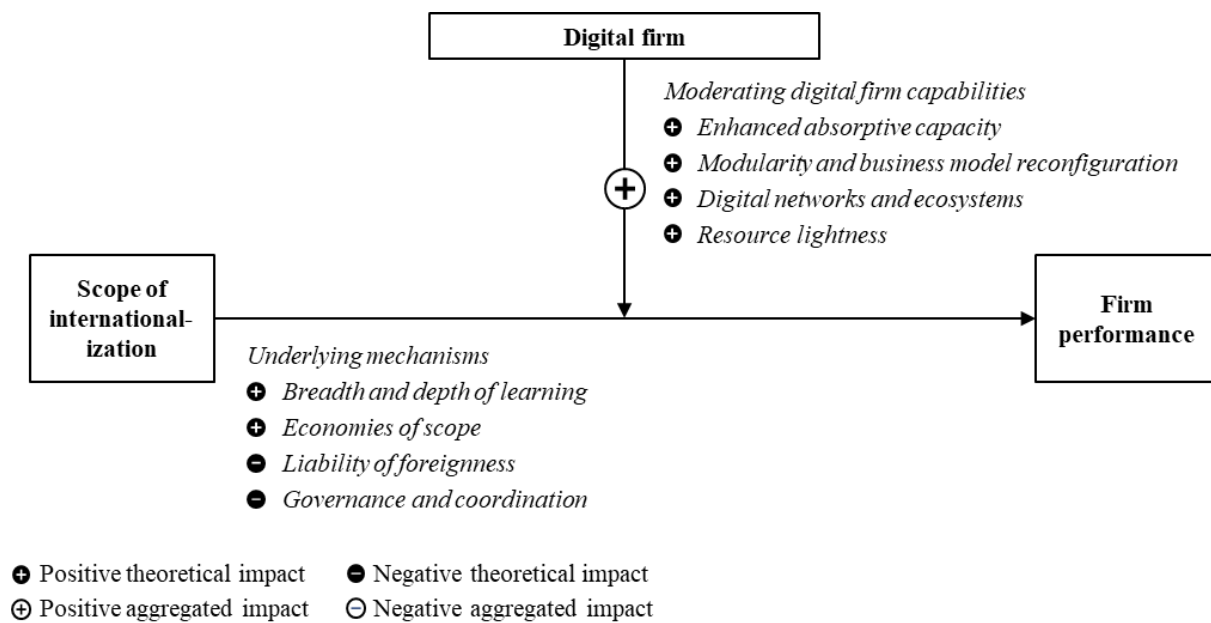


Figure 1: Theoretical mechanisms underlying the direct and moderating effects between scope of internationalization and firm performance

Digital firms' technological *modularity* and capacity for *business model reconfiguration* enable them to reduce their initial setup costs and costs associated with the liabilities of foreignness (Autio & Zander, 2016; Monaghan et al., 2020; Nambisan et al., 2019). Modular digital resources and capabilities are far less location-specific than non-digital and non-modular ones, so they can be re-used for multiple market entries, reducing the overall amount of productive resources required (Autio & Zander, 2016). Furthermore, the underlying layered modular architecture of digital technologies, products, and services allows digital firms to reconfigure their business models and value propositions to the needs of foreign markets cost-efficiently and rapidly (Banalieva & Dhanaraj, 2019; Cahen & Borini, 2020; Nambisan et al., 2019). Combined with their embeddedness into *digital networks and ecosystems*, digital firms' *modularity* and technological openness enables them to leverage their partners' external assets for co-creation and customization of business models and offerings to local needs, reducing the liabilities of foreignness and overall costs (Banalieva & Dhanaraj, 2019; Nambisan et al., 2019). In addition, digital firms are inherently resource- and asset-light because of the digital nature of

their core offerings, so they can enter foreign markets with a limited physical footprint and comparatively low initial setup costs (Autio & Zander, 2016; Banalieva & Dhanaraj, 2019; Parente et al., 2018).

Based on the underlying mechanisms between international scope and performance and the influence of digital firm capabilities (see Figure 1), this study proposes that:

***Hypothesis 1:** The capabilities of digital firms positively moderate the relationship between the scope of internationalization and firm performance.*

3.2 The relationship between degree of internationalization, performance, and digital firm capabilities

Digital firm capabilities substantially influence the underlying mechanism between the degree of internationalization and performance. Digital firms are more easily and cost-efficiently scalable than their non-digital counterparts (Hennart, 2014; Monaghan et al., 2020). Digital products and services can be reproduced, stored, and transmitted at minimal marginal costs, which facilitates *scalability* (Vendrell-Herrero et al., 2018). In addition, digital firms' processes and infrastructures are readily scalable (Monaghan et al., 2020), as digital processes are already encoded and can be easily replicated (Reuber et al., 2015). Besides their inherent ability to scale, digital firms use the *modularity* of their services and products to leverage external resources for scaling (Autio & Zander, 2016; Banalieva & Dhanaraj, 2019). Instead of having monolithic service applications that reduce *scalability*, digital firms tend to shift toward a modular microservice architecture. Breaking down the overall service application into hundreds of micro-services and micro-tasks facilitate a relatively easy integration of external service providers. Thus, instead of adjusting their service offerings themselves to fit different international environments, digital firms can integrate external capabilities and services, leading to more cost-efficient and faster *scalability* (Banalieva & Dhanaraj, 2019).

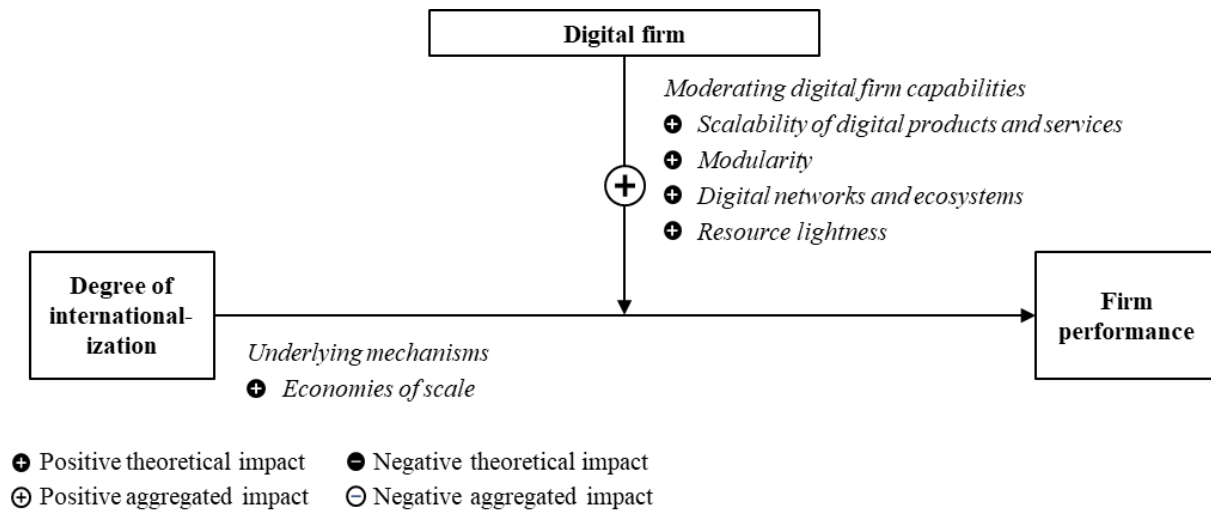


Figure 2: Theoretical mechanisms underlying the direct and moderating effects between degree of internationalization and firm performance

The positive effects of economies of scale are further strengthened by digital firms' *resource lightness*. Asset-light business models, the digital nature of offerings, and the ability to leverage of external resources via *digital networks and ecosystems* result in lower setup costs and lower the commitment of resources that is necessary for foreign expansion (Autio & Zander, 2016; Brouthers et al., 2016; Parente et al., 2018). Given the relatively low setup costs and resource commitment, digital firms see strong economies of scale compared to non-digital firms.

From an RBV standpoint, a digital firm's enhanced ability to scale is a main source of competitive advantage and improved performance (Wernerfelt, 1984) (see Figure 2). As a result, this study posits:

Hypothesis 2: *The capabilities of digital firms positively moderate the relationship between the degree of internationalization and firm performance.*

3.3 The relationship between speed of internationalization, performance, and digital firm capabilities

The relationship between internationalization speed and performance depends primarily on mechanisms related to organizational learning and knowledge acquisition (e.g., García-García et al., 2017). Because of individual firms' limitations in terms of *absorptive capacity* and time-compression diseconomies, any increased speed in internationalization has a negative impact on firm performance (e.g., Jiang et al., 2014). However, for several reasons, digital firms' enhanced *absorptive capacity* has a positive influence on this relationship.

First, the heavy use of digital technologies allows digital firms to have direct customer engagement (Bianchi & Mathews, 2016), which can give them cost-efficient, rich, and nuanced foreign market knowledge (Autio & Zander, 2016; Lohrke et al., 2006). The immediacy of customer interaction also allows firms to test new products and services and acquire information regarding customer preferences rapidly and cost-efficiently (Autio & Zander, 2016).

Second, digital firms use digital technology, tools, and systems to generate and expand their foreign market knowledge base (Nguyen & Barrett, 2006; Pergelova et al., 2019). For example, digital firms use ERP systems, front-end customer tracking, and automated data analytics to enhance information collection, processing, analyzing, and sharing on a large scale (Pergelova et al., 2019; Raymond et al., 2015). This advanced use of digital technology for knowledge creation and integration increases a digital firm's overall *absorptive capacity*, which facilitates the acquisition and assimilation of large amounts of external knowledge.

Third, the *modularity* of digital firms' technology, products, and services, combined with their embeddedness in *digital networks and ecosystems*, enhances their ability to acquire and integrate external knowledge into their existing knowledge base. The standardized and open interfaces of digital technology's layered modular architecture encourage external complementors to integrate market knowledge and capabilities into the digital firm's existing knowledge and capabilities (Banalieva & Dhanaraj, 2019; Nambisan et al., 2019). The

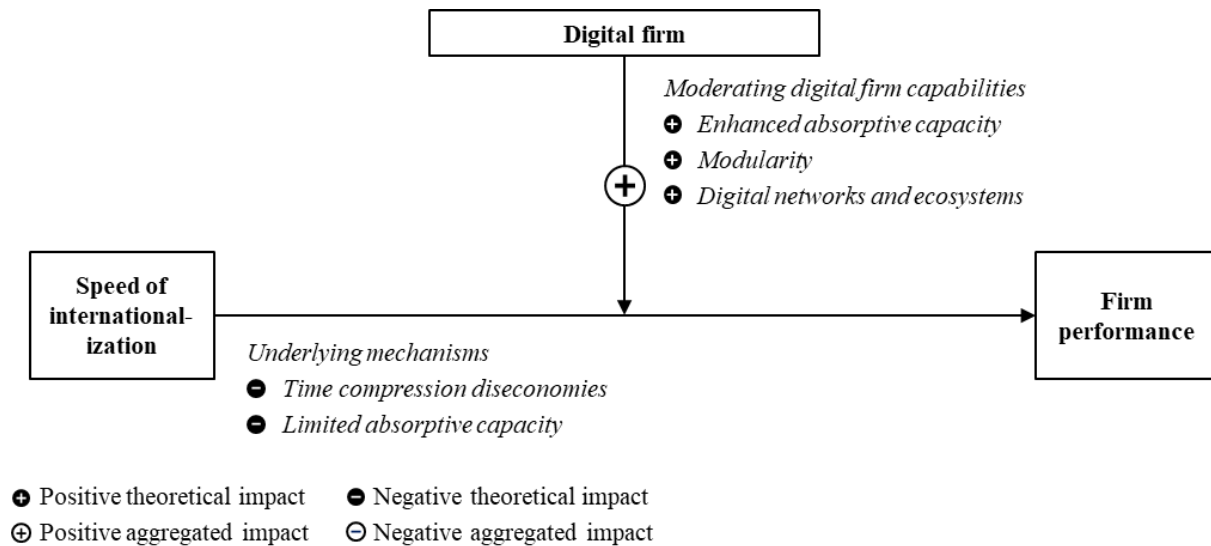


Figure 3: Theoretical mechanisms underlying the direct and moderating effects between speed of internationalization and firm performance

architectural and structural connectivity facilitates the recombination of a digital firm's existing market knowledge with a complementary firm's local market knowledge. This recombination of knowledge not only accelerates a digital firm's learning about a foreign market, reducing liabilities of foreignness, but also increases the firm's overall innovativeness (Nambisan et al., 2019). The *modularity* also fosters connectivity and the creation of *digital ecosystems* with a large number of partners, which increases the diversity and breadth of knowledge available (Banalieva & Dhanaraj, 2019; Gawer & Cusumano, 2014; Nambisan et al., 2019). Hence, the technological *modularity* and the embeddedness in *digital networks and ecosystems* increase a digital firm's *absorptive capacity*, thereby facilitating an accelerated internationalization without incurring negative performance effects.

Given these positive influencing factors of *modularity* and enhanced *absorptive capacity* on knowledge acquisition and learning (see Figure 3), this study proposes:

Hypothesis 3: *The capabilities of digital firms positively moderate the relationship between the speed of internationalization and firm performance.*

4. METHODOLOGY

4.1 Sampling

The basis of the sample used to test the hypotheses is an initial list of 12,390 firms drawn from *Compustat's* complete database of firms for 2016. This study uses *Compustat* because it provides comprehensive information regarding firms' financials and has been widely used in internationalization research (e.g., Abdi & Aulakh, 2018). The sample is enriched with information on firms' number of foreign subsidiaries and the number of countries in which they have subsidiaries, which I collected from *CorpWatch*, a database that specializes in collecting and processing subsidiary data from firms' annual 10K filings. If subsidiary information was not available via *CorpWatch*, I manually checked the firms' 10K filings to add missing data points. In accordance with previous research based on this dataset, the sample excludes firms with less than 1 million USD in annual revenue or negative sales, as they are usually artificial firms that were constructed for tactical reasons (Abdi & Aulakh, 2018). It also excludes firms for which data from 2016-2018 was not available since most of the variables are three-year averages. In addition, the final sample excludes firms that do not provide information regarding their foreign sales, subsidiaries, and initial year of internationalization or have no foreign sales, since the study wants to observe the relationship between the three core dimensions of internationalization (degree, scope, and speed) and performance. Finally, the sample excludes firms that did not report international sales, that were internationalized before their IPO (making the year of internationalization non-transparent), or that provided no information regarding their foreign subsidiaries. The final sample contains 617 firms.

4.2 Measures

Dependent variable

Firm performance: To capture a firm's performance, I focus on its profitability, measured using

the annual *return on assets (ROA)*. This study computes firm performance by dividing net income by total assets (e.g., Lu & Beamish, 2004). I use ROA instead of other accounting-based performance measures, like return on sales (ROS) or return on equity (ROE), because of the high sensitivity of ROE to differences in capital structure and the close correlation between firm sales and ROS (Hitt et al., 1997). ROA provides a more robust way of measuring firm performance. To smooth out annual fluctuations, this study uses the three-year average of ROA (e.g., Chang & Rhee, 2011) and lags the dependent variable one year to allow for causal interference and ensure that the treatment precedes the consequence (Abdi & Aulakh, 2018).

Independent variables

Scope of internationalization: For the scope of internationalization, this study applies two measures to maximize the robustness of its findings: the number of foreign countries a firm operates in to capture the diversity and overall scope of operations (Vermeulen & Barkema, 2002), and the number of foreign subsidiaries a firm has to add information regarding the scale of operations and commitment to these foreign markets (Chao & Kumar, 2010).

Degree of internationalization: This study uses the ratio of international sales to total sales, a widely adopted operationalization of degree of internationalization (Abdi & Aulakh, 2018; Ruigrok & Wagner, 2003). To obtain the foreign sales ratio, I use the *Compustat* segment files, where firms report foreign and domestic sales for each year.

Speed of internationalization: Speed is comprised of two elements: time and distance. As the denominator of the equation for speed, time is the amount of time between initial internationalization and the date of data collection (2016 in this case). Distance can be defined in several ways, one of which is the number of foreign countries entered, such that speed of internationalization is represented by the average number of foreign countries entered per year (García-García et al., 2017; Hilmersson, 2014; Hilmersson & Johanson, 2016; Mohr

& Batsakis, 2017). This operationalization of speed embodies the speed of expansion in scope. Another way of operationalizing distance is as the change in international commercial intensity, with speed represented by the increase or decrease in the percentage of international sales per year (Hilmersson & Johanson, 2016), thus representing the speed of change in the degree of internationalization. To maximize the robustness of my findings, I use both measures of internationalization speed.

Digital firm: Following the UNCTAD's (2017) detailed definition of digital firms, which Cahen and Borini (2020) and Monaghan et al. (2020) use, I manually screen all firms in the sample and use a multi-step process to categorize them as either digital or non-digital: I label the firms in the sample as digital if they match the UNCTAD's Top 100 Digital MNEs list. For the remaining firms, I manually research the value propositions, business model, and product or service offerings of all firms in the UNCTAD's list and the sample and mark firms that match the value proposition and offerings from the UNCTAD's list as digital. This time-consuming process was conducted twice by two independent researchers to ensure intercoder reliability. In the final step, we compare the results and resolve any disagreements. Thus, this study creates a binary variable for use as a moderating variable in its statistical analysis.

Controlling variables

This study controls for multiple factors following previous studies in the internationalization-performance field. It accounts for *firm age*, defined as the time between a firm's initial establishment and 2016, the year for which I collected the cross-sectional data. Researchers find that firm age influences firms' international performance, as older firms tend to have significant business experience and resources, both of which have advantages in foreign expansion (e.g., Chang & Rhee, 2011). It controls for *firm size* as an indicator of the amount of resources available for internationalization (e.g., Dhanaraj & Beamish, 2003). This study uses the widely

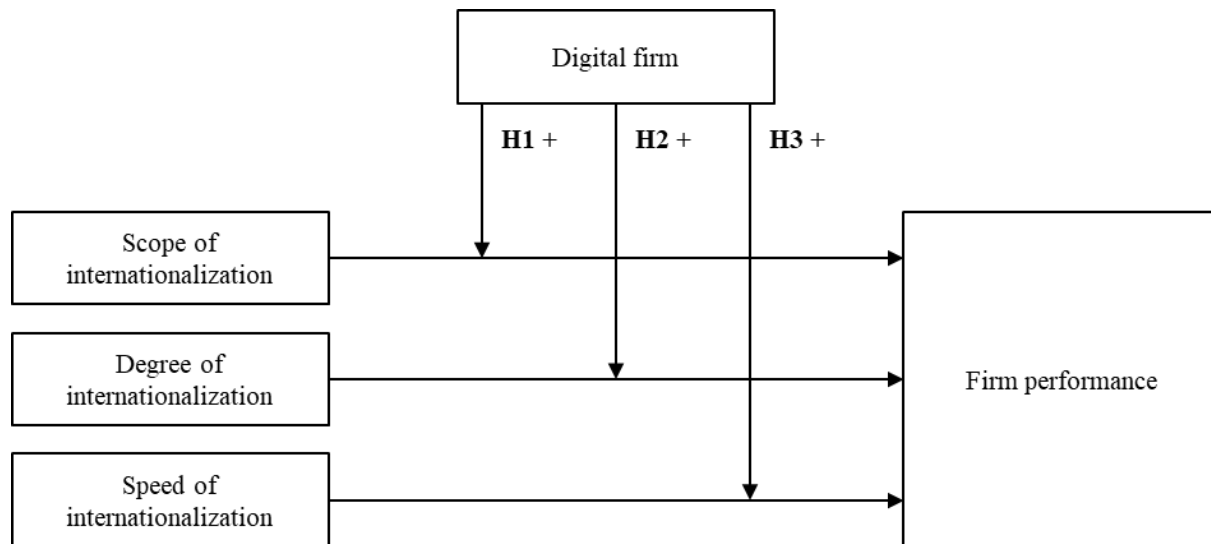


Figure 4: Overview of research model and hypotheses

adopted measure of amount of total sales as an operationalization of firm size (e.g., Lu & Beamish, 2004). Moreover, this study uses the *debt-to-asset ratio* as a control for a firm's capital structure since it effects a firm's performance and its ability to expand (e.g., Abdi & Aulakh, 2018). Finally, it accounts for *industry effects* by using binary variables based on the firm's two-digit SIC codes (e.g., Fernhaber, Gilbert, & McDougall, 2008). As with the three-year ROA average, I also use the three-year average for firm size and debt-to-asset ratio.

4.3 Analysis

I use standard ordinary least squares (OLS) regression to test my hypotheses. To preempt issues that might arise from heteroskedasticity, I apply the robust Huber/White Sandwich estimator of variance (Huber, 1967; White, 1980). To prevent nonessential multilinearity effects between predictor variables, all non-binary independent variables are mean-centered (e.g., Khavul et al., 2010). Finally, I winsorize the control variables and firm performance variable by truncating at the 1st and 99th percentiles to eliminate the effect of extreme values (e.g., Khavul et al., 2010). Figure 4 gives an overview of my research model and hypotheses.

4.4 Descriptive statistics

Table 1 shows the means, standard deviations, minimums, maximums, and correlations of all dependent, independent, and control variables, excluding binary variables. To ensure that multicollinearity does not affect the regression results, I examine the variance inflation factors (VIFs) and follow Kalnins' (2018) three-step approach. Unsurprisingly, Table 1 reveals a correlation between the independent variables of scope, degree, and speed of internationalization which has been acknowledged before (e.g., Fernhaber et al., 2008). Because of the threat of multicollinearity this study decided to regress the different dimensions of internationalization individually in a step-wise model. Using the step-wise models all VIFs are smaller than 1.6, far below the recommended cutoff value of 10 (García-García et al., 2017; Kutner, Nachtsheim, Neter, & Li, 2004). Furthermore, I find no indication of multicollinearity problems following Kalnins (2018). As a result, I conclude that there are no issues with multicollinearity in this regression model that would negatively influence its predictive ability.

5. RESULTS

5.1 Regression results

Table 2 shows the regression results. Model 1 uses controlling variables only, while Models 2 to 7 replicate previous research on the internationalization-performance relationship in terms of scope (Models 2 and 3), degree (Model 4), and speed of internationalization (Models 5 and 6). Models 8 and 9 test Hypothesis 1 empirically. Hypothesis 1 proposes a positive moderating effect of digital firm capabilities on the relationship between scope of internationalization and firm performance. Model 8 shows a positive and significant moderation effect of digital firms on the relationship between scope (measured by the number of foreign countries) and firm performance (ROA) with a coefficient of 0.003 ($p = 0.028$). Model 9 also shows a positive moderation effect of digital firms on the relationship between scope (measured by the number

Table 1: Descriptive statistics and correlations

	Mean	SD	Min	Max	1	2	3	4	5	6	7	8
1. ROA	+0.003	0.257	-1.478	+4.325								
2. Number of foreign countries entered	10.861	12.544	0	89	+0.145***							
3. Number of foreign subsidiaries	30.237	59.205	0	631	+0.092*	+0.709***						
4. Degree of internationalization	0.342	0.263	0.001	1.000	-0.129**	+0.234***	+0.151***					
5. Foreign countries entered per year	0.875	1.586	29.000	0.000	+0.013	+0.441***	+0.397***	+0.047				
6. Change in pct. of int. sales per year	0.034	0.071	0.000	0.985	-0.275***	-0.060	+0.008	+0.376***	+0.278***			
7. Firm age	50.788	36.712	4	239	+0.197***	+0.134***	+0.137***	-0.093*	+0.024	-0.140***		
8. Firm size	6,741	28,338	3	496,889	+0.120**	+0.158***	+0.179***	-0.042	+0.223***	-0.032	+0.115**	
9. Debt-to-asset ratio	0.256	0.235	0.000	1.724	-0.129**	+0.154***	+0.177***	-0.029	+0.087*	+0.024	+0.063	+0.070†

Correlation significance: † p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

of foreign subsidiaries) and firm performance with a coefficient of 0.001 ($p = 0.009$). Both results support Hypothesis 1.

Model 10 tests Hypothesis 2 empirically. Hypothesis 2 proposes that digital firms and their resources and capabilities positively moderate the relationship between the degree of internationalization and performance. The findings do not support Hypothesis 2, as the moderating effect is not significant ($p = 0.075$).

Hypothesis 3 suggests that digital firms experience fewer negative performance effects from increased speed of internationalization. Model 11 shows that there is no significant moderation effect of digital firms ($p = 0.375$) on the relationship between speed of internationalization (measured by the number of foreign countries entered per year) and firm performance. In contrast, Model 12 shows a negative and significant moderation effect of digital firms and their digitally enabled capabilities on the relationship between internationalization speed (measured by change in percentage of international sales per year) and firm performance with a coefficient of -3.032 ($p = 0.046$). Neither result supports Hypothesis 3.

5.2 Robustness checks

I run additional analyses to ensure the robustness of my findings. First, I use General Estimating Equation (GEE) models to substantiate the results because of the quasi-panel nature of the data that is due to the time lag between the performance and internationalization variables, and they are widely applied in time series analysis (e.g., Jain et al., 2019). This technique also provides advantages because of its ability to handle missing data in the dependent variables and robustness to misspecifications of the correlation structure (Jain et al., 2019). Using GEE models, I find support for all results from the OLS models.

Second, I re-run the OLS regressions without winsorizing the control and dependent variables. While winsorizing can improve statistical analysis by eliminating outliers that occur

Table 2: OLS regression models of internationalization degree, scope, speed and digital firms on firm performance (ROA)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Control variables												
Firm age	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Firm size	0.000** (0.000)	0.000* (0.000)	0.000* (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)
Debt-to-asset ratio	-0.139* (0.058)	-0.164** (0.059)	-0.150* (0.059)	-0.139* (0.058)	-0.138* (0.058)	-0.134* (0.055)	-0.138* (0.058)	-0.169** (0.059)	-0.159** (0.060)	-0.136* (0.058)	-0.140* (0.059)	-0.141* (0.055)
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Independent variables												
Number of foreign countries entered	-	0.002*** (0.001)	-	-	-	-	-	0.002** (0.001)	-	-	-	-
Number of foreign subsidiaries	-	-	0.000* (0.000)	-	-	-	-	-	0.000* (0.000)	-	-	-
Degree of internationalization	-	-	-	-0.046 (0.042)	-	-	-	-	-	-0.004 (0.035)	-	-
Foreign countries entered per year	-	-	-	-	-0.002 (0.004)	-	-	-	-	-	-0.003 (0.004)	-
Change in pct. of int. sales per year	-	-	-	-	-	-0.563** (0.196)	-	-	-	-	-	-0.503* (0.196)
Digital firm	-	-	-	-	-	-	-0.042 (0.040)	-0.059 (0.041)	-0.049 (0.040)	-0.033 (0.033)	-0.045 (0.040)	-0.048 (0.036)
Moderation effects												
Number of foreign countries x digital firm	-	-	-	-	-	-	-	0.003* (0.002)	-	-	-	-
Number of foreign subsidiaries x digital firm	-	-	-	-	-	-	-	-	0.001** (0.001)	-	-	-
Degree of internationalization x digital firm	-	-	-	-	-	-	-	-	-	-0.350 [†] (0.196)	-	-
Foreign countries entered per year x digital firm	-	-	-	-	-	-	-	-	-	-	0.032 (0.036)	-
Change in pct. of int. sales per year x digital firm	-	-	-	-	-	-	-	-	-	-	-	-3.032* (1.519)
R-squared	0.141	0.161	0.146	0.144	0.141	0.187	0.144	0.171	0.158	0.168	0.146	0.219
Adjusted R-squared	0.046	0.068	0.051	0.048	0.045	0.096	0.048	0.075	0.600	0.071	0.047	0.128
Change in adjusted R-squared	-	+0.021***	+0.005	+0.002	-0.002	+0.050***	+0.002	+0.029***	+0.014*	+0.025**	+0.001	+0.082***
Number of observations	617	617	617	617	617	617	617	617	617	617	617	617

Significance levels: *** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.1

Notes: Industry dummies are not displayed; control variables and dependent variable winsorized at the 1st and 99th percentile; all variables except dummies and dependent variable are mean centered

because of data entry errors or extreme events, it can be also harmful (Brownen-Trinh, 2019) if extreme values reflect actual variations in cross-sectional data samples (Brownen-Trinh, 2019). To strengthen the validity of the results, I re-run the OLS regressions with non-winsorized data, which shows similar patterns of significance as in the winsorized OLS models, further validating the robustness of my results.

Third, I test for selection bias using Heckman's two-step model (Heckman, 1979). Given that firms decide to internationalize based on individual firm-level and market-level characteristics, their decision can be viewed as endogenous (Carr, Haggard, Hmieleski, & Zahra, 2010). To control for this self-selection into internationalization, I first estimate a probit model based on the initial *Compustat* sample of 5,358 firms. Following previous research in the IB field that corrects for selection bias (e.g., Kim, Hoskisson, & Lee, 2015), I use the control variables from the OLS regressions as independent variables to show the resources and external factors that influence internationalization, which are significant. Then I calculate the inverse Mills ratio, which I introduce into the OLS models. The second-stage regression results support the robustness of previous findings while controlling for a potential selection bias.

6. DISCUSSION AND CONCLUSION

The objective of this study is to integrate recent research on digital firms into the internationalization-performance literature and to determine whether and how the relationships between the different dimensions of internationalization and performance are influenced by digitally enabled capabilities of digital firms. This study uses a comprehensive theoretical view grounded in the capabilities perspective of the RBV to guide its theoretical predictions regarding the effect of digital firms on the internationalization-performance relationship. Consistent with the initial hypothesis, the statistical analyses reveals that digital firms gain performance advantages compared to their non-digital counterparts from increasing their scope

of internationalization. The findings show that an increase of one in the number of foreign countries entered increases the ROA of digital firms by 0.34 percent over that of their non-digital counterparts. Similarly, an increase of one in the number of foreign subsidiaries established leads to a 0.12 percent increase in the ROA of digital firms. These advantages can be explained by digital firms' heightened *absorptive capacity*, technological *modularity and business model reconfiguration*, inherent *resource lightness*, and *digital networks and ecosystems* embeddedness. A firm's ability to acquire and assimilate knowledge about foreign markets is one of the key underlying theoretical mechanisms that support the positive relationship between international scope and performance in the first place (e.g., Barkema & Vermeulen, 1998; Zahra et al., 2000).

This study finds no support for a direct effect of the degree of internationalization on firm performance and no moderating effect of digital firms on this relationship. While a positive relationship between degree of internationalization and performance is one of the bedrock beliefs in IB studies (Contractor et al., 2003), multiple researchers argue for no relationship between the degree of internationalization and performance (e.g., Hennart, 2011; Tallman & Li, 1996). For example, Hennart (2007) argues that scale economies can be achieved independent of foreign sales if domestic markets are large enough for firms to reach a minimally efficient scale, thus challenging the positive scale effects that result from higher degrees of internationalization. Similarly a firm's market power depends on the firm's size, not its foreign sales (Abdi & Aulakh, 2018). Therefore, the results support the conclusion that there is no relationship between the degree of internationalization and performance.

Contrary to the initial theoretical reasoning, the results do not show a positive moderation effect of digital firms on the relationship between speed of internationalization and firm performance. Hence, digital firms seem to be more affected by the negative effects of accelerated internationalization than their non-digital peers are, which is unexpected. The

results show that a one standard deviation increase in the average change in the percentage of international sales per year (7.1 percent) leads to a substantial decrease in the ROA (-21.53 percent) of digital firms. The increased negative impact on performance of accelerated international expansion of digital firms might be explained by the phenomenon of the virtuality trap. The virtuality trap refers to the "perception by the internationalizing firm that the learning generated through virtual interactions obviates the need for learning about the target markets through non-virtual means" (Yamin & Sinkovics, 2006, p. 340). Digital firms and digital offerings in particular often lack on-site experience and often rely heavily on online interactions and communication (Yamin & Sinkovics, 2006). Many digital firms assume that virtual customer interactions not only enable them to learn about online customers' preferences and behavior but also allow them to acquire knowledge about the market environment that forges such preferences and behaviors (Yamin & Sinkovics, 2006). As a result, inaccurate inferences about underlying market conditions based on online customer behavior create misperceptions about foreign markets that are barriers to learning and prevent the firm from acquiring accurate knowledge about their markets (Reuber & Fischer, 2011; Yamin & Sinkovics, 2006). Digital firms' reliance on online communication and interactions creates the illusion that they have accurate knowledge about their foreign markets, although they are actually lacking that knowledge, which results in negative performance outcomes (Lew, Sinkovics, Yamin, & Khan, 2016; Reuber & Fischer, 2011; Yamin & Sinkovics, 2006). This view also follows the notion established in IB research that online internationalization does not fully substitute the need for a firm to have a physical presence in its foreign markets as physical presence aids learning about the foreign business and cultural environment (Gabrielsson & Gabrielsson, 2011; Yamin & Sinkovics, 2006). At first glance the virtuality trap argument seems to contradict the positive moderating effect of digital firms on the relationship between scope of internationalization and performance since it is partially based on arguments of digital organizational learning.

However, definition and operationalization of international scope used in this study entails the establishment of foreign subsidiaries. Hence, this physical presence prevents digital firms from stepping into the virtuality trap and enables to reap the learning benefits from digitally enhanced *absorptive capacity*.

7. CONTRIBUTIONS, LIMITATIONS, AND FUTURE RESEARCH

With this study I offer three primary academic contributions. First, by theorizing about and analyzing digital firms' impact on the internationalization-performance relationship I take a first step to integrate digital firms into the internationalization-performance research stream. This study shows that some of the theoretical mechanisms that constitute the internationalization-performance relationship, such as economies of scale and scope or learning and knowledge acquisition are directly influenced by digital firm capabilities.

Second, I identify digitally enabled capabilities of digital firms and integrate them into the theoretical fundamentals of the internationalization-performance relationship by applying arguments based on the capabilities perspective of the RBV. Thus, I follow recent research recommendations to build a stronger theoretical foundation instead of increasing analytical complexity (e.g., Hennart, 2007; Verbeke et al., 2009).

Third, I extend the RBV and the knowledge-based view to the context of digital firms' internationalization. By applying the underlying concepts of the capabilities perspective of the RBV and the knowledge-based view to identify digital capabilities that are relevant to foreign expansion, I help to bring these theories into the new digital reality.

Despite the robustness of the results, this study has several limitations that provide avenues for future research. First, since firms' levels of digitalization differ, the operationalization of digital firms based on a categorical variable can be improved by developing a digitalization index. Developing such an index may help efforts to measure a firm's overall degree of

digitalization more holistically by analyzing the level of digitalization in value chain activities like operations, marketing, and sales or in the firm's product and service offerings. This index could enable a more nuanced analysis of how digitalization influences the internationalization-performance relationship.

Second, I base the hypotheses on the impact of various digital firm capabilities on the existing internationalization-performance mechanisms. However, because I used aggregated secondary data, it was not able to measure the impact of the individual capabilities. More granularity would allow future research to identify the individual effects of digital firm capabilities on the internationalization-performance relationship, which would be helpful for academia and practice alike. I encourage future research to generate primary data to create a more granular view of the underlying mechanisms that allow digital firms to reap enhanced performance benefits from internationalization.

Third, the cross-sectional nature of the data sample poses limitations regarding the analysis of digital firms' impact on the internationalization-performance relationship. Given that digitalization is a highly dynamic phenomenon, the advantages digital firms have over non-digital firms might shrink as non-digital firms increasingly adapt digital technologies in their core processes and offerings. I urge future research to use longitudinal data to observe the moderating effect of digital firms on the internationalization-performance relationship to account for variations of the effect over time.

Overall, I encourage future research to continue integrating the phenomenon of digital firms into international business theory to challenge existing theoretical beliefs and analytical findings and advance the entirety of academic research in this field.

This study also has several managerial implications. My research shows that digital firms differ from non-digital firms with respect to the relationship between the scope and speed of internationalization and performance. As the research shows, because of the risks of stepping

into a virtuality trap, digital firms are worse off when they try to sustain a fast internationalization pace. On the other hand, digital firms can gain performance benefits from increasing their international scope. Managers of digital firms should be aware of these relationships of international scope and speed with firm performance and balance them when defining their internationalization strategy. Especially when expanding abroad rapidly, managers should be aware of the potential for negative performance consequences and plan accordingly. Moreover, my research identifies five digitally enabled capabilities that support digital firms' internationalization and performance. The capabilities highlighted in this study can inform pre-internationalization plans and strategies for which building-up these capabilities should be key.

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Research Paper II

INTERNATIONALIZE TO SURVIVE: THE IMPACT OF DIGITAL NEW VENTURE CAPABILITIES ON THE RELATIONSHIP BETWEEN INTERNATIONALIZATION AND SURVIVAL

ABSTRACT

Internationalization is one of the most challenging and risky endeavors a new venture can undertake. Nevertheless, little is known about the relationship between new venture internationalization and the likelihood of survival, let alone how digital new ventures and their digitally enabled capabilities influence this relationship. This study analyzes the relationship between internationalization and survival of new ventures and the moderating impact of digital new venture capabilities along the dimensions of scope, degree, and speed of internationalization. Based on a longitudinal dataset of 483 new ventures and using a Cox Proportional Hazard Model, I find that an internationalization process that is fast-paced, broad in scope, and scales international revenues has a positive influence on new ventures' likelihood of survival. Because of their digitally enabled capabilities, digital new ventures see amplified positive survival effects from increasing the scope and speed of foreign expansion. This paper contributes to international entrepreneurship research by providing a nuanced view of the relationship between new venture internationalization and survival and extending new venture research to include digital new ventures.

Keywords: *Digitalization, internationalization, survival, scope, degree, speed*

1. INTRODUCTION

Since Oviatt and McDougall's (1994) first mention of the phenomenon of rapidly internationalizing new ventures, these firms became increasingly important in the world economy (Zahra, 2005). Digitalization and digital technology amplified the phenomenon, altering how new ventures and other firms expand internationally (Coviello, Kano, & Liesch, 2017). Former digital new ventures like Meta, Airbnb, and Salesforce started to internationalize early after their incorporation and at a relentless speed and scope to become the corporate behemoths they are today. However, these exceptional success stories aside, we know little about the widespread consequences of digital and non-digital new venture internationalization in terms of survival (e.g., Sleuwaegen & Onkelinx, 2014).

Research about new venture internationalization and survival is relatively scarce and not yet conclusive (Coeurderoy, Cowling, Licht, & Murray, 2012; Sleuwaegen & Onkelinx, 2014) since two conflicting narratives prevail. The first narrative follows the international process theory (Johanson & Vahlne, 1977) in arguing that new ventures are resource-constrained and inexperienced, so they are unprepared for internationalization. Because of the double liability of foreignness and newness, the narrative contends, new ventures seldom have or can afford to acquire the resources and experience necessary for internationalization (Fariborzi & Keyhani, 2018; Zahra, 2005). Thus, younger firms commonly do not survive attempts to internationalize (e.g., Sapienza, Autio, George, & Zahra, 2006).

The second narrative follows the international new venture (INV) theory (e.g., Oviatt & McDougall, 1994), which proposes that new ventures internationalize strategically to seize opportunities through entrepreneurial actions (Fariborzi & Keyhani, 2018). The narrative contends that new ventures have learning advantages of newness (Autio, Sapienza, & Almeida, 2000) and leverage networks and relationships to create and mobilize the resources they need for successful internationalization (Oviatt & McDougall, 1994). Thus, they are prepared to reap

the benefits of internationalization and are likely to survive the attempt (e.g., Fariborzi & Keyhani, 2018; Puig, González-Loureiro, & Ghauri, 2014).

International Business (IB) research has begun to integrate digital firms into the research field and its theories (Banalieva & Dhanaraj, 2019). Researchers acknowledge that the internationalization processes of digital firms are faster and broader in scope than those of non-digital firms because of digital firms' digitally enabled capabilities (Monaghan, Tippmann, & Coviello, 2020; Nambisan, Zahra, & Luo, 2019). These capabilities include an increased *absorptive capacity* (Raymond, Bergeron, Croteau, & St-Pierre, 2015), enhanced *scalability* (Vendrell-Herrero, Gomes, Collinson, Parry, & Bustinza, 2018), and *modularity*, which enables *business model reconfiguration* (Cahen & Borini, 2020). However, no research has addressed the impact of these digitally enabled capabilities on new venture internationalization and their ability to survive internationalization.

Thus, two primary questions are left unanswered: (1) How does internationalization influence new ventures' likelihood of survival? (2) How do digital new ventures and their digitally enabled capabilities influence this relationship?

To address these questions, this study applies the organizational capabilities perspective of the resource-based view (RBV) and its adjacent theories (Autio, George, & Alexy, 2011; Barney, 1991). I follow the organizational capabilities perspective since a firm's capabilities directly affect its likelihood of survival (Lee, Kelley, Lee, & Lee, 2012; Sui & Baum, 2014). In this context, organizational capabilities are defined as a firm's internal routines for deploying resources and developing new ones (Collis, 1994; Teece, Pisano, & Shuen, 1997). The knowledge-based view (KBV) and the dynamic capabilities view complement my theorizing, since they help to place attention on knowledge acquisition and adaptation to foreign environments, both of which are central elements of the internationalization process. Using these theories, I explore the theoretical mechanisms that underlie the relationship between new

venture internationalization and survival and identify how digital new ventures and their digitally enabled capabilities influence it. I test my theoretical model empirically by using a Cox Proportional Hazard Model to examine a longitudinal dataset of 483 exchange-traded new ventures.

This study offers three main contributions to research. First, it provides more nuanced theorizing and insights into the relationship between new venture internationalization and survival that contribute to consensus-building. In doing so, I follow Zahra and George's (2002) recommendation to split internationalization into the subdimensions of scope, degree, and speed of internationalization, thus expanding extant studies' largely unidimensional approaches (e.g., Carr, Haggard, Hmieleski, & Zahra, 2010; Fariborzi & Keyhani, 2018; Puig et al., 2014). I also follow research calls for more studies on the impact of new venture internationalization on their likelihood of survival (e.g., Sleuwaegen & Onkelinx, 2014; Sui & Baum, 2014). My second contribution advances international entrepreneurship (IE) and INV research by integrating digital new ventures into existing theoretical constructs. Thus, I follow calls from Coviello et al. (2017) and Monaghan et al. (2020) to validate and expand internationalization theories to the context of digital firms. Third, the study extends the organizational capabilities perspective and KBV to the context of digital firm internationalization, bringing these theories into the new digital reality. By applying the capability perspective's and the KBV's theoretical concepts, I identify the digitally enabled capabilities of digital firms and shed light on their impact on the relationship between internationalization and survival. Thus, I answer recent calls to explore factors moderating the internationalization-survival relationship (Lee et al., 2012; Puig et al., 2014).

This study also has two primary practical implications. First, by analyzing the impact of various characteristics of internationalization on new venture survival, it informs managers' decision-making when they design their digital and non-digital new ventures'

internationalization strategies. Second, by identifying digital new venture capabilities and their impact on the internationalization-survival relationship, this study provides managers with valuable insights into the best way to prepare their digital new ventures' capability bases for foreign expansion.

The remainder of this study is structured as follows: Section 2 provides a theoretical overview of the research on the internationalization-survival relationship and internationalization of digital firms. Based on these theoretical foundations, Section 3 develops the hypotheses along the dimensions of scope, degree, and speed of internationalization. Section 4 outlines the methodology used to test the hypotheses and Section 5 describes the results of the statistical analysis. Section 6 synthesizes and discusses the findings by reflecting on their implications for existing research. Finally, Section 7 highlights the paper's theoretical and practical contributions, potential limitations, and suggestions for future research endeavors.

2. THEORETICAL BACKGROUND

2.1 Internationalization and survival of new ventures

Two opposing views dominate the academic field of new venture internationalization: the process theory of internationalization (Johanson & Vahlne, 1977) and INV theory (Oviatt & McDougall, 1994). Proponents of the process theory of internationalization argue that new ventures lack the knowledge-base, resources, and capabilities required to sustain international expansion without threatening their survival (Carr et al., 2010). The theory posits that internationalization follows a slow, incremental process whereby firms, driven by their desire to minimize risk, gradually increase their resource commitment and widen their scope as they accumulate knowledge about foreign markets (e.g., Johanson & Vahlne, 1977; Sapienza et al., 2006). Thus firms minimize the negative effects of foreign liability and maximize their likelihood of survival (Figueira-de-Lemos, Johanson, & Vahlne, 2011; Johanson & Vahlne,

2009). However, research finds that new ventures lack the resources and capabilities needed to support this internationalization process because of liabilities of newness (Carr et al., 2010; Sapienza et al., 2006). Few new ventures have the organizational processes and routines, knowledge bases, and relationships that are required to compete internationally while ensuring their survival (Sapienza et al., 2006; Stinchcombe, 1965). Furthermore, new ventures have fewer slack resources than older firms do to cover the high costs of adapting core activities to foreign markets and developing new routines, structures, and capabilities. Hence, the high costs of international expansion combined with the double liability of newness and foreignness decrease the internationalizing new ventures' likelihood of survival (Sapienza et al., 2006).

Founded on the seminal paper by Oviatt and McDougall (1994), INV theory suggests that new ventures' decision to internationalize is a strategic, entrepreneurial one. New ventures pursue internationalization to acquire capabilities, explore market opportunities, and realize their learning potential (Sui & Baum, 2014). Early exposure to foreign market stimuli triggers capability development with younger firms, which have learning advantages, as they are not bound by existing processes, structures, and routines developed for domestic markets that hamper their ability to adapt to and learn from foreign markets (Sapienza et al., 2006; Sleuwaegen & Onkelinx, 2014). Thus, new ventures are more responsive and flexible in adapting their operations and structures to the international environment's requirements than older firms are and are better equipped to develop new capabilities and knowledge (Hilmersson & Johanson, 2016; Oviatt & McDougall, 1994). Derived from the learning and knowledge aspects of the RBV, this concept was called learning advantages of newness (Autio et al., 2000).

INV research also suggests that internationalizing new ventures circumvent their resource and capability limitations by leveraging alternative governance mechanisms to mobilize and access resources in foreign markets (Sapienza et al., 2006). Oviatt and McDougall (1994) propose that INVs do not have to own the resources and capabilities necessary for

internationalization but can access them by creating relationships and networks with external partners. Access to external resources and capabilities enables INVs to create value in ways that differ from those of resource-rich firms (Zahra, 2005). Hence, INVs use internationalization to explore and exploit opportunities and to generate resources and capabilities that increase their viability and the likelihood of survival (Zahra, Ireland, & Hitt, 2000).

Given these two theoretical views' conceptual disparity, findings from research that focus on the relationship between new venture internationalization and survival are often contradictory (Fariborzi & Keyhani, 2018). Some researchers find positive relationships (e.g., Fariborzi & Keyhani, 2018; Lee et al., 2012; Puig et al., 2014), while others find negative (e.g., Carr et al., 2010) or no relationship after endogenizing strategic choice (Mudambi & Zahra, 2007). However, these studies use an unidimensional measurement for internationalization: either a binary variable for international activity or a percentage of international sales. Because of the significant differences in firms' internationalization strategies, a more nuanced examination of internationalization is needed (Fernhaber, 2013). Therefore, I follow several researchers that use the scope, degree, and speed of internationalization to distinguish among the characteristics of entrepreneurial internationalization (e.g., Schwens et al., 2018; Zahra & George, 2002).

2.2 Internationalization of digital new ventures

As a basis for a common understanding of digital new ventures, I combine the definition of a digital firm that Monaghan et al. (2020) and the UNCTAD (2017) use with the definition of a new venture Shrader et al. (2000) and other IE researchers provide. Hence, digital new ventures are firms that were founded no longer than six years ago and are characterized "by the central role of the Internet in their operating and delivery model" (UNCTAD, 2017, p. 165). Digital new ventures rely "on the internet for production, operating and delivery processes" (Monaghan

et al., 2020, p. 12). This definition includes purely digital new ventures, such as digital platforms and digital solution providers, and partially digital new ventures, such as e-commerce firms and digital content producers and distributors (Monaghan et al., 2020; UNCTAD, 2017). This study takes a broad perspective of digital firms by including partially digital firms to provide a holistic view of the entirety of digital firms (Monaghan et al., 2020).

While the integration of digital firms and especially digital new ventures into the IB and IE fields is still in its infancy, researchers acknowledge that digital firms challenge how companies internationalize (e.g., Coviello et al., 2017). These firms' internationalization processes are not only faster-paced and broader in scope, but also lighter in resource use and physical footprint than the internationalization processes of their non-digital counterparts (Monaghan et al., 2020; Nambisan et al., 2019). Using extant research, I identify five digitally enabled organizational capabilities of digital new ventures that support this new internationalization process and impact the internationalization-survival relationship: enhanced *absorptive capacity* allows digital new ventures to acquire, process, and integrate large amounts of market information more efficiently (Pergelova, Manolova, Simeonova-Ganeva, & Yordanova, 2019; Raymond et al., 2015); an inherent *scalability* facilitated by the digital nature of digital new ventures' products, services, and processes (Autio & Zander, 2016; Monaghan et al., 2020); the *digital networks and ecosystems* digital new ventures create to gain access to external resources and leverage external partners and complementors for innovation, co-creation, and local adaptation (Banalieva & Dhanaraj, 2019; Nambisan et al., 2019); the *resource lightness* that characterizes most digital new ventures' business models, which facilitates cost-efficient transfer to foreign markets (Banalieva & Dhanaraj, 2019; Coviello et al., 2017); and the underlying *modularity* of digital technology, which gives new ventures a rapid and cost-efficient *business model reconfiguration* that provides advantages in adapting to the needs of local markets (Cahen & Borini, 2020; Nambisan et al., 2019).

3. HYPOTHESES DEVELOPMENT

3.1 The relationship between scope of internationalization, survival, and digital new venture capabilities

Scope of internationalization refers to the diversity of a firm's international activities and exposure to foreign markets and cultures and is expressed by the number of foreign countries in which it is active in (Schwens et al., 2018). The relationship between a new venture's international scope and its survival is based on the underlying mechanisms that are associated with organizational learning and the double liability of foreignness and newness (Zahra et al., 2000).

The KBV and organizational learning theory assert that knowledge and organizational learning are essential resources and capabilities for firms in that they are critical for survival (Zahra et al., 2000). Firms that have larger international scopes are exposed to a larger number of foreign markets and cultures, which increases the breadth and depth of their learning and triggers the development and upgrading of their knowledge and capabilities (Barkema & Vermeulen, 1998; Zahra et al., 2000). The learning advantages of newness that are inherent in new ventures amplify the positive learning effects of increased international scope (Autio et al., 2000). Hence, a large scope of internationalization rewards new ventures with opportunities for learning, knowledge building, and acquisition of capabilities that increase the probability of survival (Fariborzi & Keyhani, 2018; Puig et al., 2014).

Like all other firms, internationalizing new ventures face costs that are associated with the liabilities of foreignness and reduce the likelihood of survival (Mudambi & Zahra, 2007; Zaheer & Mosakowski, 1997). These costs include all additional costs that foreign firms face compared to local firms due to unfamiliarity with the local environment or initial setup (Salomon & Wu, 2012; Zaheer & Mosakowski, 1997). Firms must adapt their capabilities and create new ones to compete in foreign markets (Fariborzi & Keyhani, 2018; Sapienza et al., 2006), a costly and

resource-intensive process that is especially challenging for new ventures since they often lack the resources to afford these costs (Fernhaber, 2013; Stinchcombe, 1965). Thus, the expansion of a new venture's international scope drains its resources, reducing the likelihood of survival (Sapienza et al., 2006).

However, these negative effects and costs are attenuated by new ventures' specific capabilities. First, internationalizing new ventures are imprinted with the dynamic capability to adapt to foreign environments due to their early exposure to international markets (Fariborzi & Keyhani, 2018; Sapienza et al., 2006). Second, by possessing capabilities that are fungible and can be re-deployed for alternative use, new ventures reduce the costs of foreign capability development (Sapienza et al., 2006). Third, INV researchers show that new ventures can access the external resources and capabilities necessary for internationalization without owning them by building relationship and networks with external partners (Sapienza et al., 2006).

Because of these capabilities (see Figure 1 for overview), which enhance the positive effects and diminish the negative effects that influence the relationship between new ventures' scope of internationalization and their likelihood of survival, I posit:

Hypothesis 1a: *The scope of internationalization is positively related to the likelihood of new venture survival.*

Digital new venture capabilities related to enhanced *absorptive capacity, modularity, business model reconfiguration, resource lightness, and digital network and ecosystem embeddedness* have positive effects on the relationship between the scope of internationalization and survival. Digital new ventures use digital technology and tools to enhance their information collection and processing via direct and frequent customer interactions, automated collection of primary data, and advanced data analytics (Mathews & Healy, 2008; Pergelova et al., 2019). Because their engagement with international markets is

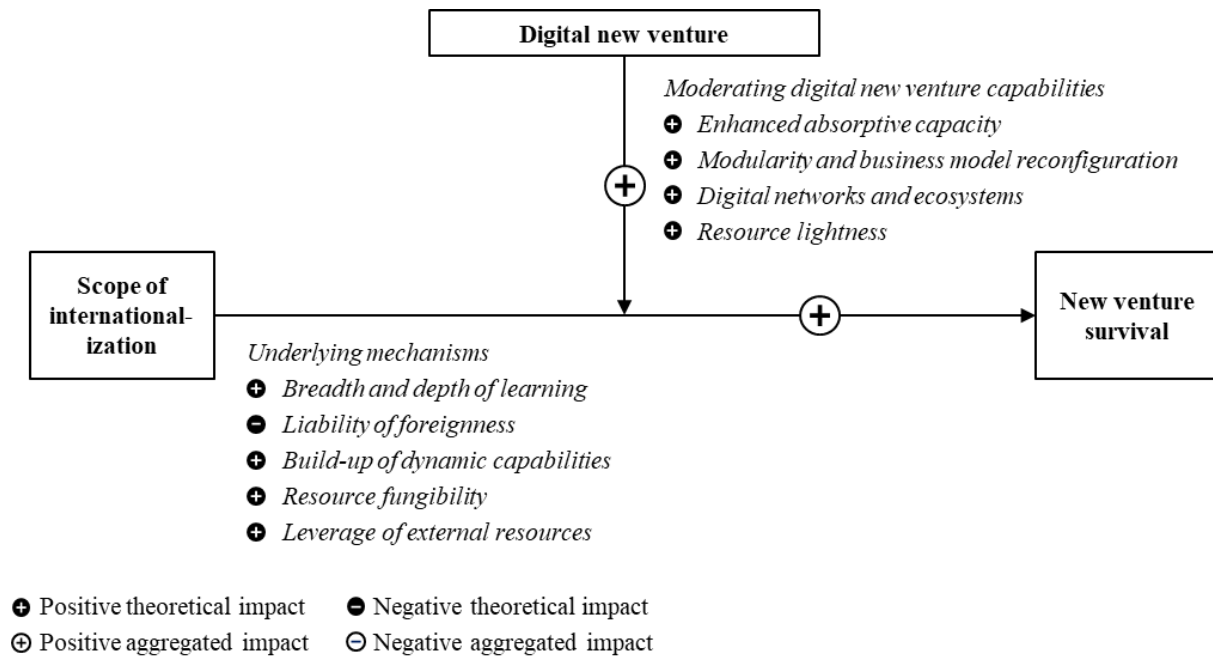


Figure 1: Theoretical mechanisms underlying the direct and moderating effects between scope of internationalization and new venture survival

more immediate, digital new ventures possess an accelerated learning ability (Monaghan et al., 2020). This enhanced ability to create and leverage foreign market knowledge reduces the liability of foreignness (Johanson & Vahlne, 1977; Oviatt & McDougall, 1994) and augments the learning advantages of newness. Thus, the heightened *absorptive capacity* of digital new ventures has a positive influence on the relationship between their international scope and survival.

Digital new ventures are also characterized by their underlying technological *modularity* (Banalieva & Dhanaraj, 2019; Monaghan et al., 2020). This technological *modularity* constitutes a competitive advantage as it enables digital new ventures to rapidly and cost-efficiently reconfigure their business models and adapt them to local markets (Autio, 2017; Yoo, Henfridsson, & Lyytinen, 2010). In turn, their efficient *business model reconfiguration* reduces the initial setup and adaptation costs that are associated with the liability of foreignness (Brouthers, Geisser, & Rothlauf, 2016; Monaghan et al., 2020; Nambisan et al., 2019; Salomon & Wu, 2012).

In addition, digital new ventures can build complex networks with external partners and complementors based on a shared set of standards and processes, enabled by modular technology (Nambisan et al., 2019). The *digital networks and ecosystems* they build are characterized by a logic of value maximization for the entire system (Banalieva & Dhanaraj, 2019; Jacobides, Cennamo, & Gawer, 2018) which fosters resource-sharing and co-creation based on technological openness and allows digital new ventures to leverage local partners for adaptation (Nambisan et al., 2019; Ojala, Evers, & Rialp, 2018). As a result, digital new ventures can leverage more complementarities and access external resources and knowledge to bridge their resource gaps in foreign market entry (Ojala et al., 2018). Thus, *digital networks and ecosystems* attenuate the negative effects of digital new ventures' liability of foreignness and newness by reducing the resource needed for internationalization and reinforce the positive effects of organizational learning.

Finally, digital new ventures' business models are characterized by *resource lightness* (Banalieva & Dhanaraj, 2019; Parente, Geleilate, & Rong, 2018). The digital nature of products and services, combined with asset-light digital business models, allows them to expand into foreign markets in a cost-efficient and resource-light way (Coviello et al., 2017; Parente et al., 2018). Thus, the overall costs of transferring a digital business model to a foreign market are comparatively small (Brouthers et al., 2016).

Digital new ventures' digitally enabled capabilities enhance the positive mechanisms and mitigate the negative mechanisms that underlie the relationship between the scope of internationalization and survival (see Figure 1 for overview). Hence, I posit:

Hypothesis 1b: *Digital new ventures and their digitally enabled capabilities positively moderate the relationship between the scope of internationalization and the likelihood of new venture survival.*

3.2 The relationship between degree of internationalization, survival, and digital new venture capabilities

A firm's degree of internationalization, as opposed to its scope of internationalization, is defined as the foreign sales as a share of total sales and describes a firm's international exposure of sales (Zahra & George, 2002). The degree of internationalization is mainly associated with the benefits of scale (Fariborzi & Keyhani, 2018; Fernhaber, 2013). Expansion of foreign sales is often the only way new ventures can achieve the size necessary to create economies of scale (Puig et al., 2014). International sales growth allows them to leverage their assets, capabilities, and other sources of competitive advantage across a larger market, thereby reducing unit costs, spreading investment costs, and increasing profitability (Fariborzi & Keyhani, 2018). Thus, new ventures pursue expansion of international revenues as a way to realize the economies of scale that increase their likelihood of survival (Fariborzi & Keyhani, 2018; Fernhaber, 2013; Puig et al., 2014).

Contrarily, IB research points out that increasing the degree of internationalization may have adverse effects because of the costs that are associated with the liability of foreignness (Lu & Beamish, 2004). However, a higher degree of internationalization does not necessarily mean that a firm is more exposed to foreign market environments or has a greater physical presence in foreign markets (Hennart, 2011).

Therefore, because the degree of internationalization is mainly linked to scale-related benefits (see Figure 2 for overview), I posit:

Hypothesis 2a: *The degree of internationalization is positively related to the likelihood of new venture survival.*

Digital new ventures can be scaled both cost-efficiently and rapidly (Monaghan et al., 2020), which positively affect the relationship between a firm's degree of internationalization

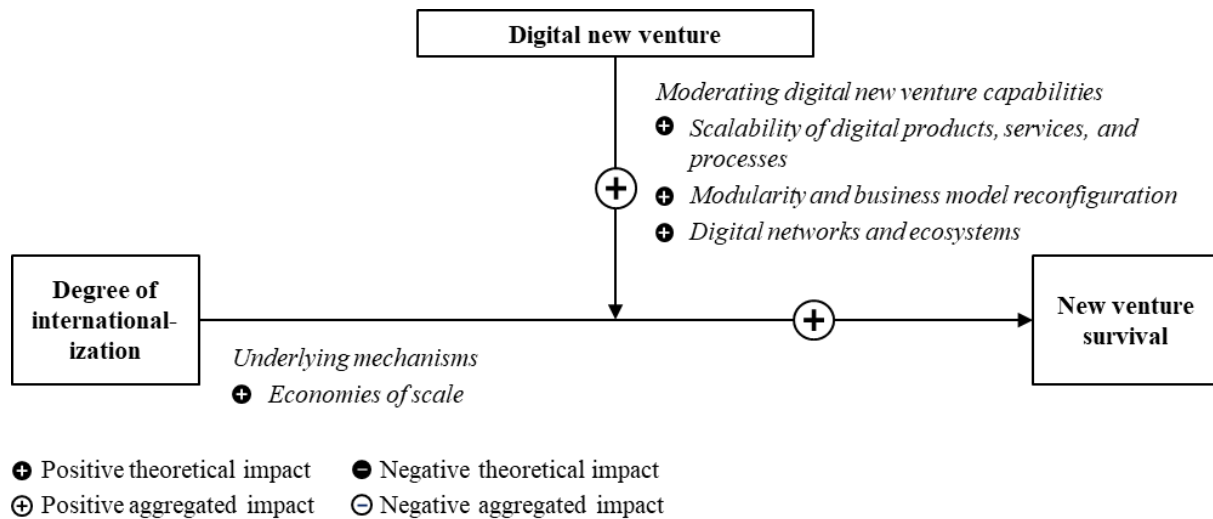


Figure 2: Theoretical mechanisms underlying the direct and moderating effects between degree of internationalization and new venture survival

and its likelihood of survival. Digital new ventures' *scalability* is facilitated by the digital nature of its products and services, which facilitates their reproduction, storage, and transmission at marginal costs close to zero (Vendrell-Herrero et al., 2018). The processes of digital new ventures are also readily scalable, since they are already encoded which facilitates their transferability and replication in foreign markets (Monaghan et al., 2020; Reuber, Fischer, & Morgan-Thomas, 2015). Moreover, digital new ventures can leverage external resources and capabilities for scaling, as their modular technology breaks their digital services and products into smaller parts that allow external services to be integrated into their offerings and processes easily (Autio & Zander, 2016; Banalieva & Dhanaraj, 2019). According to Banalieva and Dhanaraj (2019), instead of using their own resources, digital new ventures can use the resources and capabilities of external partners to adjust to and scale their processes in foreign markets. Thus, technological *modularity* and *ecosystem embeddedness* provide digital new ventures with fast and cost-efficient *scalability* (Banalieva & Dhanaraj, 2019).

According to the RBV's organizational capability perspective, *scalability* is a core capability and source of competitive advantage that positively influences the survival of new

ventures (Fernhaber, 2013; Wernerfelt, 1984). As a result, I posit:

Hypothesis 2b: *Digital new ventures and their digitally enabled capabilities positively moderate the relationship between the degree of internationalization and the likelihood of new venture survival.*

3.3 The relationship between speed of internationalization, survival, and digital new venture capabilities

Speed of internationalization describes the pace at which a firm conducts consecutive foreign market expansions. It is usually defined as the number of foreign markets entered divided by the time since initial internationalization (García-García, García-Canal, & Guillén, 2017; Vermeulen & Barkema, 2002).

Based on the international process theory, IB research proposes that all internationalizing firms need sufficient time to accumulate the experience, knowledge, and capabilities to support internationalization. Speeding up this accumulation process negatively affects firms' likelihood of survival (e.g., Jiang, Beamish, & Makino, 2014; Johanson & Vahlne, 1977). Accelerating the internationalization process creates additional costs because of *time compression diseconomies* (Dierickx & Cool, 1989; Hilmersson & Johanson, 2016) and limited *absorptive capacity* (Cohen & Levinthal, 1990; Vermeulen & Barkema, 2002). Time compression diseconomies refer to the disproportionately positive relationship between the speed with which a firm develops a capability and the costs of doing so (Dierickx & Cool, 1989). Firms that internationalize quickly must increase the speed with which they acquire knowledge about foreign markets and develop the necessary capabilities, which increases costs disproportionately (Dierickx & Cool, 1989; Hilmersson & Johanson, 2016). These additional costs drain the resources that are already strained by the resource-demanding internationalization process, decreasing the probability of survival (Sapienza et al., 2006). In

addition, firms have limited *absorptive capacity*, and accelerated internationalization increases the likelihood of exceeding that capacity and being unable to obtain, process, and integrate knowledge adequately (García-García et al., 2017).

However, INV research finds that new ventures can counteract the negative effects of increased speed of internationalization by leveraging external partners' capabilities, leveraging their own fungible capabilities, and benefitting from the learning advantages of newness (e.g., Fariborzi & Keyhani, 2018; Oviatt & McDougall, 1994; Sapienza et al., 2006). Rapidly internationalizing new ventures circumvent the costs of accelerated capability development by creating networks of partners which they use to access the external resources and capabilities they need for internationalization (Oviatt & McDougall, 1994). Moreover, new ventures have capabilities that are fungible and can be re-deployed, thus reducing the costs of developing capabilities related to foreign markets (Sapienza et al., 2006). In addition, new ventures' learning advantages of newness facilitate efficient and rapid learning and development of capabilities which increases the INVs' *absorptive capacity* (Sapienza et al., 2006). New ventures' lack of rigid structures and processes promotes their ability to absorb and transform knowledge, based on which they can improve their existing capabilities or create new ones (Hilmersson & Johanson, 2016; Sapienza et al., 2006).

Continual and accelerated expansion into new foreign markets also ensures that new ventures' processes and structures remain highly flexible and characterized by lean decision-making and adjustment processes. Continually expanding into new foreign markets prevents new ventures from being restrained by inflexible routines and structures and overall inertia from existing operations (Hilmersson & Johanson, 2016). This flexibility allows new ventures to adapt quickly to foreign market environments, a dynamic capability that positively influences their firm performance and their likelihood of survival (e.g., Fernhaber, 2013; Mudambi & Zahra, 2007; Prashantham & Young, 2011).

Therefore, because of new ventures' advantages in accessing and developing foreign market-related capabilities, they can reap benefits from increasing the speed of internationalization (see Figure 3 for overview). Hence, I posit:

Hypothesis 3a: *The speed of internationalization is positively related to the likelihood of new venture survival.*

The digitally enabled capabilities of digital new ventures in the form of enhanced *absorptive capacity*, *modularity*, and *network and ecosystem embeddedness* provide them advantages in terms of learning and adaptation that moderate the relationship between their speed of internationalization and likelihood of survival. Their enhanced *absorptive capacity* allows digital new ventures to leverage digital technology to improve their acquisition, assimilation, and transformation of foreign market knowledge (Nguyen & Barrett, 2006; Pergelova et al., 2019). Their technological tools (e.g., front-end customer tracking, automated data analytics, online customer live support, ERP systems) facilitate rich, broad, and fast information collection and processing, which increases their overall *absorptive capacity* (Pergelova et al., 2019; Raymond et al., 2015).

New ventures' *modularity*, in combination with their *network and ecosystem embeddedness*, facilitates their access to and integration of external knowledge and capabilities. A modular technological architecture, with its open and standardized interfaces, promotes the ability of external complementors and ecosystem participants to share their market knowledge and capabilities (Banalieva & Dhanaraj, 2019; Nambisan et al., 2019). As a result, *modularity* facilitates the recombination of existing and external foreign market knowledge and capabilities. Thus, digital new ventures' *modularity* and *ecosystem embeddedness* reduce the costs associated with overcoming the liability of foreignness and allow them to cope with the accelerated foreign market learning that comes with increased internationalization speed

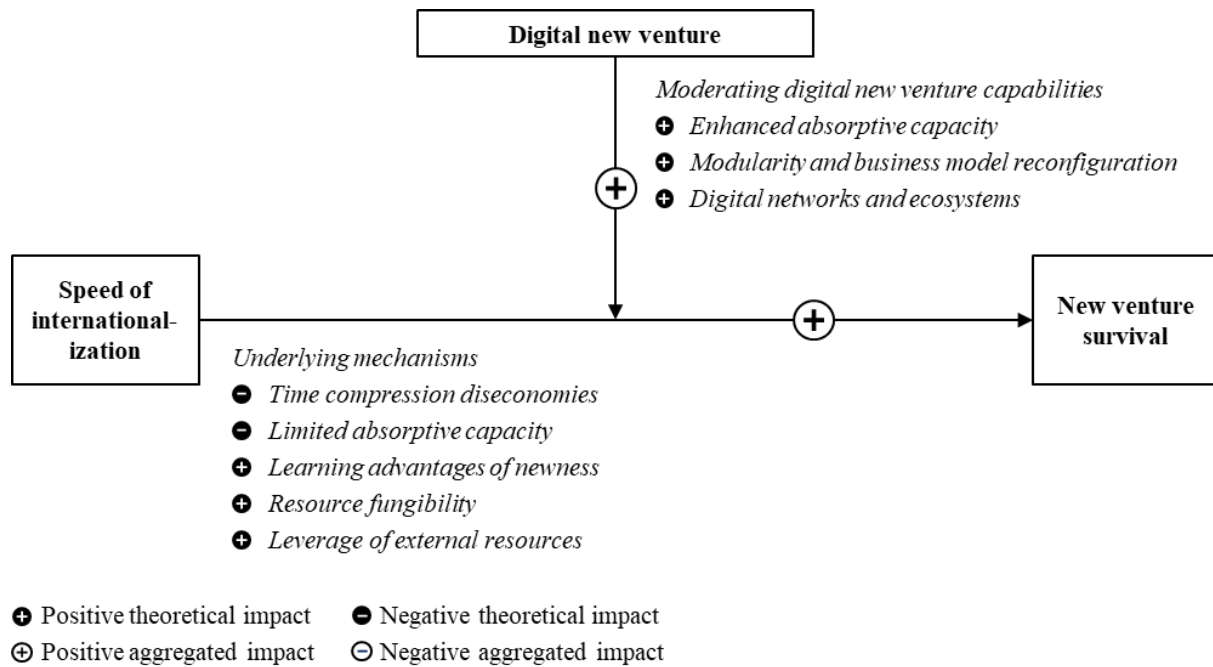


Figure 3: Theoretical mechanisms underlying the direct and moderating effects between speed of internationalization and new venture survival

(Nambisan et al., 2019). In addition, the *modularity* and *network and ecosystem* embeddedness increase the speed and cost-efficiency of adapting to local markets by leveraging external partners (Banalieva & Dhanaraj, 2019; Cahen & Borini, 2020; Nambisan et al., 2019). Given that a high internationalization speed demands fast (and hence costly) adaptation of processes and capabilities, the ability to reconfigure their business models and capabilities rapidly and cost-efficiently provides digital new ventures with survival advantages. Based on new ventures' enhanced learning capabilities and adaptability, I posit:

Hypothesis 3b: *Digital new ventures and their digitally enabled capabilities positively moderate the relationship between the speed of internationalization and the likelihood of new venture survival.*

4. METHODOLOGY

4.1 Sampling

To ensure a representative sample, I base my sample on an initial *Compustat* list of 39,286 firms and 518,358 annual observations representing the entire database until 2018. I use *Compustat* since its database has widely been used in internationalization research (e.g., Abdi & Aulakh, 2018) and provides comprehensive financial and general information about its firms. I obtain information on the number of foreign subsidiaries from the *CorpWatch* database, which specializes in subsidiary information. I also gather missing subsidiary data by reviewing the firms' official 10K filings manually. Since digital firms started to arise around the turn of the century, I exclude firms whose IPOs took place before 2000. I also exclude firms that were older than 6 years at their IPOs and first occurrence in the database following Shrader et al. (2000), Fernhaber (2013), and others. I determine the firms' founding dates based on the S&P Global Market Intelligence database and manually validate them through the firms' websites and official SEC filings. I specify which firms had survived using Bloomberg's company database and matching its bankruptcy information using stock ticker symbols, which I then manually cross-check with official bankruptcy filings.

I use Crunchbase to determine whether a new venture is backed by venture capital financing. Following previous research using the *Compustat* database, I exclude firms with very small (< 0.1 million USD) or negative annual revenue, as these firms are mainly artificial firms that were formed for asset disposition or other tactical reasons (Abdi & Aulakh, 2018). Since this study observes the internationalization of new ventures and its subdimensions, I also exclude new ventures that did not provide any information regarding their foreign sales, subsidiaries, and initial year of internationalization. The final sample consists of 483 new ventures with 4,615 single-year observations.

4.2 Measures

Dependent variable

Survival: The dependent variable of firm survival is based on the event of firm closure or bankruptcy within the observation year, where 1 = closure or bankruptcy and 0 = survival. I calculate the survival time variable for the hazard model by subtracting the year of the firms' IPO and initial inclusion in the dataset from the year of bankruptcy (non-active firms) or censoring (active firms).

Independent variables

Scope of internationalization: The internationalization scope variable is captured by two measures: the number of foreign countries in which a firm operates to represent the overall scope of international activities and their diversity (Chao & Kumar, 2010; Hilmersson, 2014; Vermeulen & Barkema, 2002; Zahra & George, 2002), and the number of a firm's foreign subsidiaries to add information regarding the scale of operations and commitment to these foreign markets (Chao & Kumar, 2010). Using both measures enhances the robustness of my findings.

Degree of internationalization: Following the widely adopted operationalization of the degree of internationalization, this study calculates the variable by dividing international sales by total sales (Fernhaber, 2013; Zahra & George, 2002). I obtain the international sales information from the *Compustat* segment files, where firms report geographic segment sales by region or country. To compute the annual foreign sales, I aggregate all foreign geographic segment sales and ensure data consistency and quality by cross-validating the segment sales data by comparing the sum of all foreign and domestic segments with the firms' total sales in the same year.

Speed of internationalization: Speed is calculated by dividing distance by time. The denominator of time is the time between a new venture's initial internationalization and the year in which the speed is calculated. The numerator of distance is defined as the number of foreign countries the firm entered or the number of foreign subsidiaries it established during the timeframe. The resulting speed of internationalization represents the average number of foreign countries entered or foreign subsidiaries established per year (García-García et al., 2017; Vermeulen & Barkema, 2002). Thus, these measures of internationalization speed represent the speed with which a firm's scope expands.

Digital new venture: I use a binary variable based on the UNCTAD's (2017) categorization of digital and non-digital firms, which the academic literature has begun to adopt (e.g., Cahen & Borini, 2020; Monaghan et al., 2020). To determine whether a new venture in the sample is digital, I screen all new ventures manually and categorize them following a multi-step approach. First, I check whether the new venture is included in the *UNCTAD's Top 100 Digital MNEs* list and label the new ventures listed as digital. Then, I manually identify the product or service offerings and business models of all firms on the UNCTAD's list and all new ventures included in the final database. Next, I manually assess whether the business model and offerings of a new venture in the final database match one of the business models and offerings of the firms on the UNCTAD's list and mark the new venture as digital if there is a match. To ensure intercoder reliability, this study conducts this time-consuming process twice with two independent researchers. Finally, I use a panel of researchers to compare the results of the manual categorization and resolve any disagreements. Based on this categorization of new ventures into digital and non-digital, I create a digital new venture binary variable to use as a moderating variable in the statistical analyses.

Controlling variables

This study controls for multiple factors that can influence the relationship between new ventures' internationalization and survival as suggested by previous studies in the IB and IE fields. First, it controls for *firm size*, as a firm's size indicates the slack resources it possesses (e.g., Mudambi & Zahra, 2007). New ventures can leverage resources for internationalization and as a buffer against the negative liabilities of foreignness and newness, which positively influences their likelihood of survival (Fernhaber, 2013; Lee et al., 2012; Sui & Baum, 2014). I applied the widely adopted measure of total assets to operationalize *firm size* (e.g., Carr et al., 2010). Second, this study uses a binary variable to indicate whether a new venture had received venture capital financing, as such financing can provide new ventures the resources necessary to expand into foreign markets and influence survival (e.g., Coeurderoy et al., 2012; Fernhaber, 2013). Third, this study accounts for *year* and *industry* effects by using binary variables based on the year of observation and the new ventures' two-digit SIC codes (e.g., Fariborzi & Keyhani, 2018; Fernhaber, 2013; Lee et al., 2012).

To prevent nonessential multilinearity effects between predictor variables, I mean-center all non-binary independent variables (e.g., Khavul, Pérez-Nordtvedt, & Wood, 2010). The descriptive statistics and correlations of the independent and control variables in Table 1 reveal a correlation between the independent variables of scope, degree, and speed of internationalization, which the literature has acknowledged (e.g., Fernhaber, Gilbert, & McDougall, 2008). Because of the threat of multicollinearity, I decided to regress the three dimensions of internationalization individually in a step-wise model.

4.3 Analysis

Figure 4 provides an overview of the research model and hypotheses. To test the hypotheses, I apply the Cox Proportional Hazard Model (CPHM), which is one of the most popular

Table 1: Descriptive statistics and correlations

	Mean	SD	Min	Max	1	2	3	4	5	6	7	8
1. Survival (1 = bankruptcy)	0.014	0.118	0	1	1							
2. Number of foreign countries entered	3.414	6.035	0	45	-0.047**							
3. Number of foreign subsidiaries	7.768	16.749	0	287	-0.043**	0.654***						
4. Degree of internationalization	0.325	0.405	0	1.000	-0.038**	0.265***	0.357***					
5. Foreign countries entered per year	0.372	0.879	0	10	-0.045**	0.764***	0.632***	0.343***				
6. Foreign subsidiaries established per year	0.685	1.826	0	24	-0.041**	0.689***	0.791***	0.403***	0.822***			
7. Digital new venture	0.234	0.423	0	1	-0.040**	0.132***	0.174***	0.213***	0.309***	0.332***		
8. Firm size (total assets)	1,992	9,986	0	232,792	-0.017	0.111***	0.127***	0.008*	0.047*	0.084***	0.027*	
9. VC backed	0.356	0.479	0	1	-0.058***	0.094***	0.096***	0.143***	0.167***	-0.118***	0.351***	0.012

Correlation significance: † p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

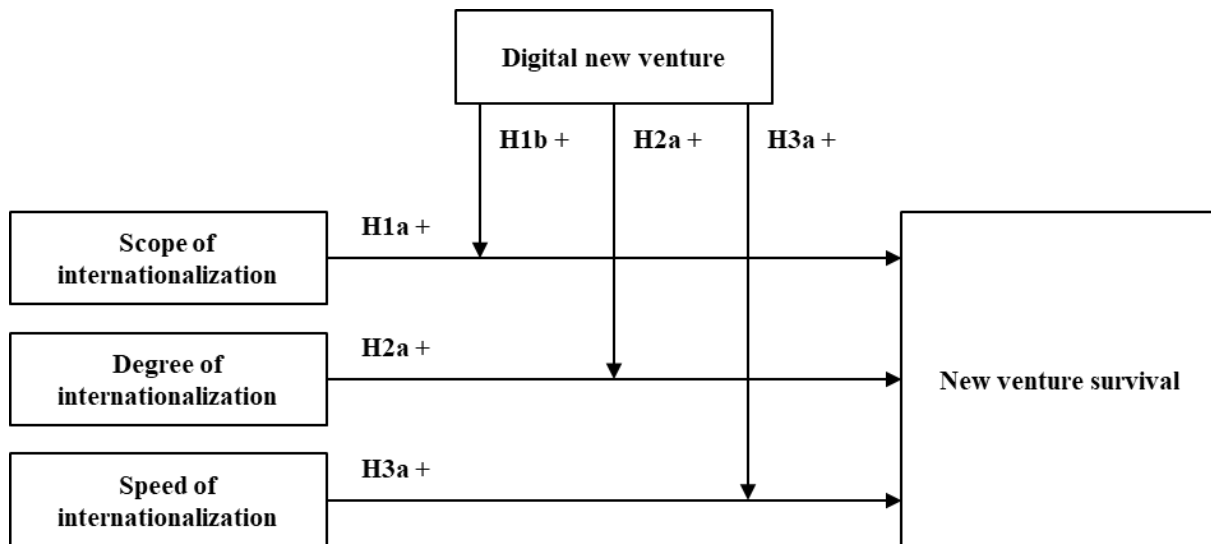


Figure 4: Overview of research model and hypotheses

methods of analyzing firm survival (Puig et al., 2014; Sui & Baum, 2014). As a duration model, it allows researchers to observe how events occur over time and use the observations of different variables at different points in time (Puig et al., 2014). Because of its flexibility in the specification of the underlying hazard function, CPHM allows for "a proportional specification for unobserved heterogeneity and a function of observables" (Sui & Baum, 2014, p. 9). The model also allows researchers to estimate the likelihood of the failure event in the following period by taking sample characteristics into account. Thus, the model is based mainly on the differences between surviving and non-surviving firms (Puig et al., 2014). In short, the CPHM represents the most appropriate empirical method for analyzing the factors that influence firm survival over time, as alternative statistical methods (e.g., logit and probit models) fail to consider time (Puig et al., 2014).

5. RESULTS

5.1 Regression results

Table 2 shows the results for Models 1 to 12. Model 1 uses the control variables only, while Models 2 and 3 show the results of testing the relationship between the scope of internationalization and firm survival. Model 2 shows a significant negative coefficient of -0.172 ($p = 0.024$) for the number of foreign countries entered, and Model 3 shows a significant negative coefficient of -0.098 ($p = 0.012$) for number of foreign subsidiaries established. Given that negative coefficients mean that the hazard rate is reduced, these results support Hypothesis 1a. The corresponding hazard rates can be obtained by taking the exponential coefficients. For example, a negative coefficient of -0.098 corresponds to a hazard rate of e to the power of -0.098, which equals 0.907 and means that the risk of failure is reduced by 9.3 percent. Model 4 indicates that the relationship between the degree of internationalization and firm survival is significant, with a negative coefficient of -0.940 ($p = 0.021$), supporting Hypothesis 2a. Hypothesis 3a suggests the speed of internationalization is positively related to new ventures' likelihood of survival. The findings of Models 5 and 6 support Hypothesis 3a, as both models display significant negative coefficients for the number of foreign countries entered per year of -1.907 ($p = 0.023$) and the number of foreign subsidiaries established per year of -0.920 ($p = 0.036$). Model 7 shows a negative and insignificant coefficient of -0.936 ($p = 0.102$) for the direct effect of the digital new venture variable on new ventures' likelihood of survival.

Hypothesis 1b posits that the relationship between scope of internationalization and new venture survival is moderated by digital new ventures and their digitally enabled capabilities. Model 8 supports this hypothesis, as the interaction effect between the digital new venture variable and the number of foreign countries entered has a negative and significant coefficient of -3.031 ($p = 0.004$). Similarly, Model 9 shows a significant and negative interaction effect of

Table 2: Cox Proportional Hazard Model of internationalization degree, scope, speed and digital new ventures on firm survival, dependent variable is exit hazard

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Control variables												
Firm size	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000† (0.000)	-0.000† (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000† (0.000)	-0.000† (0.000)
VC backed	-1.320*** (0.425)	-1.206*** (0.430)	-1.177*** (0.430)	-1.460*** (0.433)	-1.034† (0.528)	-1.082* (0.529)	-1.140*** (0.437)	-1.103* (0.452)	-1.084* (0.452)	-1.307*** (0.455)	-0.846 (0.549)	-0.858 (0.000)
Industry dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year dummies	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Independent variables												
Number of foreign countries entered	-	-0.172* (0.001)	-	-	-	-	-	-0.096 (0.062)	-	-	-	-
Number of foreign subsidiaries	-	-	-0.098* (0.000)	-	-	-	-	-	-0.056† (0.033)	-	-	-
Degree of internationalization	-	-	-	-0.940* (0.407)	-	-	-	-	-	-0.434 (0.400)	-	-
Foreign countries entered per year	-	-	-	-	-1.907* (0.837)	-	-	-	-	-	-0.843 (0.675)	-
Foreign subs. established per year	-	-	-	-	-	-0.920* (0.439)	-	-	-	-	-	-0.414 (0.354)
Digital new venture	-	-	-	-	-	-	-0.936 (0.572)	1.794*** (0.618)	1.611* (0.639)	0.630 (0.629)	0.753 (0.674)	0.592 (0.700)
Interaction effects												
Number of foreign countries x digital new venture	-	-	-	-	-	-	-	-3.031*** (1.044)	-	-	-	-
Number of foreign subsidiaries x digital new venture	-	-	-	-	-	-	-	-	-1.652* (0.736)	-	-	-
Degree of internationalization x digital new venture	-	-	-	-	-	-	-	-	-	-7.437† (4.424)	-	-
Foreign countries entered per year x digital new venture	-	-	-	-	-	-	-	-	-	-	-8.864* (3.991)	-
Foreign subsidiaries established per year x digital new venture	-	-	-	-	-	-	-	-	-	-	-	-4.151† (2.307)
Model Chi-squared	141.95	147.64	150.50	147.97	117.02	116.59	144.72	171.65	169.30	160.80	125.97	123.38
Prob > Chi-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Number of observations	4,602	4,096	4,096	4,501	2,368	2,368	4,602	4,096	4,096	4,501	2,368	2,368

Significance levels: *** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.1

Notes: Coefficients with standard errors in parentheses; industry and year dummies are not displayed; all variables except dummies and dependent variable are mean centered

-1.652 ($p = 0.025$) between the digital new venture variable and the number of foreign subsidiaries established. Both findings support Hypothesis 1b.

Hypothesis 2b proposes a negative interaction effect between the degree of internationalization and digital new ventures as their positive effects on firm survival are amplified. Model 10 does not support this hypothesis as the interaction effect between the digital new venture variable and the degree of internationalization of -7.437 ($p = 0.093$) is negative but insignificant.

Finally, Models 11 and 12 test the interaction effect of digital new ventures on the relationship between the speed of internationalization and firm survival. Model 11 shows a negative and significant coefficient of -8.864 ($p = 0.026$) for the interaction effect, supporting Hypothesis 3b. Model 12 partly supports Hypothesis 3b as the coefficient of the interaction effect between the digital new venture variable and the number of foreign subsidiaries established per year is negative but only weakly significant, with a coefficient of -4.151 ($p = 0.072$).

5.2 Robustness check

One of the core challenges of assessing the causal effect between internationalization and survival is a selection-based endogeneity bias. New ventures self-select into internationalization based on their anticipation of the outcome. Thus, new ventures are not randomly assigned to be international or domestic but deliberately choose to become international, which causes a self-selection bias to arise (Carr et al., 2010; Fariborzi & Keyhani, 2018). Since the sample includes both internationalizing and non-internationalizing new ventures, selection bias may weaken the analysis' robustness. To ensure the robustness of my findings, I apply a two-stage Heckman selection model (Heckman, 1979). In the first stage, this model uses a probit regression model to predict the treatment variable for whether a new venture has internationalized and to calculate

the Inverse Mills Ratio (IMR) (e.g., Carr et al., 2010; García-García et al., 2017). In the second stage, the model re-runs the initial survival analysis using the CPHM, including the IMR. The results of the second stage CPHM analysis confirm the previous findings and support the robustness of the results.

6. DISCUSSION AND CONCLUSION

This study has two primary objectives. First, it aims to provide a more nuanced perspective on the relationship between new venture internationalization and survival to bring forward the IE and INV field and support consensus-building. Second, it provides a first step toward integrating digital firms into the internationalization-survival literature substream of IE and INV by identifying how digital new venture capabilities influence the relationship between their internationalization and likelihood of survival. To guide the theorizing regarding digital new ventures' influence on the internationalization-survival relationship, I use the organizational capabilities perspective of the RBV and its extended field of theories. In line with my theoretical predictions, the statistical analyses confirm that the scope, degree, and speed of internationalization are positively related to the likelihood of survival of all new ventures. This increased likelihood of survival can be traced back to new ventures' enhanced knowledge acquisition, leverage of external partners' capabilities and resources, fungible capability base, and scale efficiencies. The results also show that digital new ventures are more likely to survive when they internationalize at a higher speed and on a broader scope than their non-digital counterparts do. These survival advantages can be explained by digital new venture capabilities, such as enhanced *absorptive capacity*, *modularity* and *business model reconfiguration*, *resource lightness*, and embeddedness in *digital networks and ecosystems*.

Splitting internationalization into the subdimensions of scope, degree, and speed facilitates precise theorizing regarding the relationship of new venture internationalization and survival.

In line with the arguments proposed in INV research, I find that new ventures with a larger scope of internationalization have a higher probability of survival. By expanding into foreign markets, new ventures leverage their learning advantages of newness to acquire knowledge and capabilities that increase their probability of survival (Chen, Zou, & Wang, 2009; Fariborzi & Keyhani, 2018; Puig et al., 2014). The negative coefficients associated with the number of foreign countries entered and the number of foreign subsidiaries established correspond to hazard rates of 84.2 percent and 90.7 percent respectively, indicating expansion into one additional foreign country increases new ventures' likelihood of survival by 15.8 percent and the establishment of one additional subsidiary by 9.3 percent.

The results also indicate that the degree of internationalization positively influences new venture survival, as increasing the percentage of foreign to total sales by one percent increases new ventures' likelihood of survival by 0.6 percent. These findings support the theoretical argument that new ventures undertake international activities to exploit growth opportunities and realize advantages associated with larger firm size and scale economies (Fariborzi & Keyhani, 2018; Puig et al., 2014).

In line with my initial theorizing, I also find a positive effect of increased internationalization speed on new ventures' likelihood of survival. Increasing average internationalization speed by one foreign country (foreign subsidiary) per year increases a new venture's likelihood of survival by 85.1 percent (60.2 percent). While this effect size seems extreme and certainly needs further investigation by future research, the positive effect is rooted in new ventures' ability to leverage external partners' capabilities, their own fungible capabilities, and their learning advantages of newness (e.g., Fariborzi & Keyhani, 2018; Oviatt & McDougall, 1994; Sapienza et al., 2006), which outweigh the negative effects linked to time compression diseconomies and limited absorptive capacity (Hilmersson & Johanson, 2016; Jiang et al., 2014).

Overall, the results regarding the relationship between scope, degree, and speed of internationalization and new venture survival suggest that theorizing based on INV theory provides a more adequate lens through which to explain the effects of internationalization on new venture survival than traditional international process theory does. The analyses indicate that new ventures experience positive effects from internationalization based on their learning advantages of newness and adaptability. These advantages allow them to reap the benefits of an increased scope, degree, and speed of internationalization by acquiring knowledge, resources, and capabilities and capturing market opportunities. Therefore, following the notion of Sapienza et al. (2006) and others, I suggest that the process theory of internationalization describes the general case of internationalization, while the INV theory complements that view by treating the special case of new venture internationalization.

Regarding the moderating effect of digital new ventures on the relationship between the scope of internationalization and survival, I find that digital new ventures increase their likelihood of survival when they increase their international scope more than non-digital new ventures do. The results indicate that a digital new venture that increases its scope of internationalization by one foreign country decreases its risk of failure by an additional 95.2 percent over a non-digital new venture that does the same. Similarly, a digital new venture that increases its international scope by one foreign subsidiaries decreases its risk of failure by 80.0 percent. While these effects are extreme in terms of magnitude and also need further investigation in future research, they make a strong case for a positive moderation effect. The relationship between international scope and survival is mainly determined by the underlying mechanism of acquiring, assimilating, and transforming foreign market knowledge and capabilities (e.g., Puig et al., 2014; Zahra et al., 2000). Thus, digital new ventures' enhanced *absorptive capacity* is one of the core reasons that digital new ventures experience stronger positive effects from increased scope than non-digital new ventures do. Their technology-

enabled knowledge collection, analysis, and integration (Pergelova et al., 2019), fast and direct stakeholder interaction (Lohrke, Franklin, & Frownfelter-Lohrke, 2006; Mathews & Healy, 2008; Monaghan et al., 2020), and ability to access external knowledge and capabilities via *digital networks and ecosystems* (Nambisan et al., 2019; Raymond et al., 2015) allow digital new ventures to increase their learning from foreign markets. In addition, their flexibility in *business model reconfiguration* based on technological *modularity* and their inherent *resource lightness* attenuate the negative effects of having to transfer and adapt their business models to foreign markets (e.g., Banalieva & Dhanaraj, 2019; Cahen & Borini, 2020; Nambisan et al., 2019).

Finally, the results of this study propose that digital new ventures experience a stronger positive effect of increased internationalization speed on survival than non-digital new ventures do. The underlying mechanism between internationalization speed and survival is based mainly on organizational learning (e.g., Hilmersson & Johanson, 2016). Hence, digital new ventures' increased likelihood of survival can be explained by their increased *absorptive capacity*. In addition, digital new ventures' capability to reconfigure their business model rapidly and cost-efficiently (Banalieva & Dhanaraj, 2019; Cahen & Borini, 2020; Nambisan et al., 2019) fulfills the need for fast adaptation to foreign markets associated with accelerated internationalization.

7. CONTRIBUTIONS, LIMITATIONS, AND FUTURE RESEARCH

This study makes three primary contributions to the literature. First, it provides a more granular analysis of the relationship between new venture internationalization and survival, which advances and contributes to consensus-building in the IE and IB research fields. Thus, I follow research calls for studies that examine the impact of new venture internationalization on their likelihood of survival (e.g., Sleuwaegen & Onkelinx, 2014; Sui & Baum, 2014). By splitting internationalization into the dimensions of scope, degree, and speed, this study also follows

Zahra and George's (2002) recommendation to advance the IE field by providing more precise theorizing and analysis regarding the relationship between internationalization and survival of new ventures.

Second, by theorizing and analyzing the moderating effect of digital new ventures and their digitally enabled capabilities on this relationship, this study takes a first step toward integrating digital new ventures into the IE and INV research field. It shows how digital new venture capabilities influence the theoretical mechanisms that underlie the internationalization-survival relationship, such as learning and knowledge acquisition, scale economies, and time compression diseconomies. In doing so, I follow Monaghan et al.'s (2020) and Coviello et al.'s (2017) calls to expand and validate internationalization theories in the context of digital firms.

Third, this study applies the organizational capabilities perspective and KBV in the context of digital new venture internationalization to identify the digitally enabled capabilities of digital new ventures and their impact on the internationalization-survival relationship. Thus, it helps to bring these theories into the new digital reality and follows recent calls to explore additional factors that moderate the internationalization-survival relationship (Lee et al., 2012; Puig et al., 2014).

This study has several limitations that provide avenues for further research. First, future research may improve the operationalization of the digital new venture variable. I use a binary variable to separate the sample into digital and non-digital new ventures, creating a dichotomy that does not reflect business reality, as new ventures have varying degrees of digitalization in their value chain activities. I encourage future research to introduce a more accurate digitalization index that allows the degree of new ventures' digitalization to be assessed more holistically and granularly by analyzing the degree of digitalization within specific value chain activities and product or service offerings. This index could be utilized to run a more detailed version of my models. A second limitation of this study is that its theorizing is based on

particular underlying capabilities of digital and non-digital ventures and their impact on the internationalization-survival relationship. However, the nature of the secondary data used did not allow me to measure and analyze the individual impacts of single capabilities on survival. Therefore, future research could run the analyses based on primary data, which would provide greater detail with which to observe the identified capability-based mechanisms. Finally, because of limited data availability, this study focused on new ventures that are exchange-listed, so the data is subject to a potential selection bias, given that not all new ventures decide to go public or survive until that point. Therefore, I encourage further research to replicate my analyses with data that allows the observation of new ventures from inception.

This study has multiple implications for management. My analysis of the three dimensions of internationalization on new ventures' likelihood of survival delivers insights that can inform management decisions regarding internationalization strategy. By implementing an expansion strategy that is rapid and broad in scope, managers could increase their firms' chances of survival; however, they must ensure that their new ventures have the capabilities necessary to realize the benefits of scale efficiencies, learning, and flexible adaptability. Moreover, I show that digital new ventures differ from their non-digital counterparts concerning the relationship between scope and speed of internationalization and survival. Managers of digital new ventures should be aware of these relationships and leverage this knowledge to increase their firms' likelihood of survival. Finally, my research identifies several capabilities that support new venture internationalization and survival, which can inform pre-internationalization plans and strategies. Building a new venture's internationalization capabilities should be a key aspect of these plans and strategies.

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Research Paper III**STEPPING INTO THE VIRTUALITY TRAP: THE EFFECT OF
DIGITAL FIRM CAPABILITIES ON THE RELATIONSHIP BETWEEN
PSYCHIC DISTANCE AND FIRM PERFORMANCE****ABSTRACT**

Psychic distance poses a major obstacle to international expansion and negatively affects firm performance. However, digital firms and their technology enabled capabilities challenge this established relationship since the effect of distance seems to diminish in a digital setting. This study contributes to the discussion of the impact of psychic distance on firm performance in the context of digital firms. Based on the organizational capabilities perspective and a longitudinal dataset of 8,739 firm observations, this study analyzes the direct relationship between four types of added psychic distance (cultural, administrative, geographic, and economic) and firm performance and the moderating effect of digital firms. The results show that added psychic distance negatively affects firm performance across all four types of psychic distance stimuli. Moreover, this study finds that the negative performance effects of cultural, administrative, and economic distance are amplified for digital firms since their digitally enabled capabilities make them vulnerable to step into the virtuality trap. This study provides both theoretical and managerial implications by integrating digital firms into the international expansion and psychic distance literature and confronting digital firm managers with the harsh reality that inter-country distance matters even in the digital sphere.

Keywords: *Digitalization, international expansion, psychic distance, virtuality trap, performance*

1. INTRODUCTION

The triumph of the Internet as a borderless and world-spanning space has ingrained the idea that the digital world is detached from national borders and inter-country differences. The phenomenon of highly successful born-global digital firms that cater to international customers from their inception has reinforced the notion of a borderless world even further (Hennart, 2014). However, recent failures in international expansions by digital firms like N26 or Uber challenge the assumption of a borderless world in which inter-country differences do not matter. N26, a German-based FinTech firm, had to abandon its expansion into the U.S. and U.K. market because of its failure to appeal to foreign consumers and regulatory challenges (Megaw, 2020; Shevlin, 2021). Similarly, after its initial aggressive and rapid expansion into foreign markets, Uber had to withdraw from multiple markets like India and Southeast Asia because of the failure to adapt their business model to local regulations (Shead, 2019). These examples indicate that for digital firms mainly conducting business via the Internet, differences between countries such as culture, regulations, or preferences still matter. Reliance on online internationalization and online channels for knowledge acquisition may also create the danger of stepping into a virtuality trap which negatively affects digital firms' international expansion (Yamin & Sinkovics, 2006). Hence, this study sets out to provide a first glimpse of how digital firms and their performance are affected by added psychic distance in the form of cultural, administrative, geographic, and economic (CAGE) differences during international expansion.

In general, international business (IB) research focusing on performance effects of psychic distance in the context of international expansion agrees that added psychic distance negatively affects firm performance (Barkema & Drogendijk, 2007; Beugelsdijk, Kostova, Kunst, Spadafora, & van Essen, 2018; Hutzschenreuter & Voll, 2008). This negative effect is mainly caused by lack of knowledge about and the costs and complexities associated with adjusting to the foreign market environment (Vermeulen & Barkema, 2002). However, more recently IB

scholars have started to acknowledge that digital firms challenge these established theories of international expansion (Banalieva & Dhanaraj, 2019). Digital firms carry out an international expansion process that is time-compressed and broad in scope enabled by firm capabilities rooted in digital technologies (Monaghan, Tippmann, & Coviello, 2020; Nambisan, Zahra, & Luo, 2019). Moreover, Yamin and Sinkovics (2006) propose the potential existence of a virtuality trap for firms in the international expansion process, who rely too much on digital technology. While the fast and broad internationalization process of digital firms indicates reduced negative performance effects of added psychic distance the existence of a virtuality trap proposes increased negative effects of added psychic distance. This begs the question whether and how digital firms and their digitally enabled capabilities affect the relationship between added psychic distance and firm performance during international expansion compared to non-digital firms.

I approach this research question by using a sample of 1,704 exchange-listed firms with 8,739 single-year observations, to explore the effects of added psychic distance along the CAGE dimensions on firm performance and the moderating effect of digital firms on this relationship.

This study sets out to address multiple research gaps, thereby providing valuable contributions to IB theory. First and foremost, this study contributes to the discussion about internationalization of digital firms and the role of psychic distance in a digital world (e.g., Coviello, Kano, & Liesch, 2017; Monaghan et al., 2020; Shaheer & Li, 2020) by theoretically developing the underlying mechanisms through which digital firm capabilities influence the psychic distance-performance relationship. In doing so, it follows recent research calls to integrate digital firms into existing IB literature (e.g., Coviello et al., 2017; Monaghan et al., 2020). Furthermore, it is the first study that compares the effects of psychic distance on the internationalization of digital versus non-digital firms thereby further exploring the virtuality trap phenomenon (Yamin & Sinkovics, 2006). Second, the majority of research only focuses

on one dimension of psychic distance – mostly cultural distance. By exploring the impact of different aspects of psychic distance on performance along the CAGE dimensions (Ghemawat, 2001), this study provides a more granular and comprehensive view on the general relationship between psychic distance and performance. Hence, this study addresses the research call of Beugelsdijk et al. (2018) and others to conduct more in-depth research on the impact of different types of distances in the context of international expansion. It also contributes to a more nuanced theoretical understanding of the relationship between psychic distance and performance.

This study is structured as follows. In Section 2, it will provide the theoretical background on the topics of psychic distance, international expansion and performance, and digital firm capabilities in the context of firm internationalization. Afterwards in Section 3 the hypotheses will be derived based on the mechanisms underlying the added psychic distance and performance relationship and the moderating effect of digital firms. Section 4 describes the methodology applied to test the proposed hypotheses and Section 5 presents the results of these analyses. Finally, Section 6 discusses the findings in the context of existing literature and provides a conclusion while Section 7 sets forth this studies contributions, limitations and avenues for future research.

2. THEORETICAL BACKGROUND

2.1 Definition and operationalization of the psychic distance concept

Since its initial introduction by Beckerman (1956), psychic distance has become one of the central concepts of IB research. Psychic distance is defined by the Uppsala internationalization school as "factors preventing or disturbing the flows of information between firm and market" (Johanson & Wiedersheim-Paul, 1975, p. 308). It is the key determinant influencing firms' international expansion processes as it exacerbates learning about foreign markets (Johanson & Vahlne, 1977; Nordstrom & Vahlne, 1994). However, this relatively vague definition has

created ambiguity for the interpretation and operationalization of the psychic distance concept with no consensus currently existing.

In general, IB research applying the psychic distance concept distinguishes between *perceived psychic distance* and *psychic distance stimuli* when operationalizing psychic distance. Researchers using perceived psychic distance argue that internationalization decisions are made by managers based on their perceptions of distance between a home and foreign country at that time (Evans & Mavondo, 2002). Hence, psychic distance is measured on an individual level as it is subjectively perceived (Stöttinger & Schlegelmilch, 1998). However, the measurement of perceived psychic distance comes with several drawbacks as perceptions are not necessarily stable over time and can usually only be measured ex post which makes them susceptible to the post-decision experiences of managers (Dow & Karunaratna, 2006; Dow & Larimo, 2009).

Researchers applying psychic distance stimuli use objective macro-level factors like culture, political systems, or religion to operationalize psychic distance (e.g., Dow & Karunaratna, 2006; Johanson & Wiedersheim-Paul, 1975). While these objective distance factors are distinct from perceived psychic distance they are related in the sense that perceived psychic distance is regarded as a function of psychic distance stimuli (Dow & Karunaratna, 2006). Therefore, psychic distance stimuli offer an insightful and advantageous way of operationalizing psychic distance since these objective stimuli are more tangible, stable, and readily obtainable (Hutzschenreuter, Kleindienst, & Lange, 2014). Given the large-scale empirical performance research context, this study follows Håkanson and Ambos (2010) and focuses on the operationalization of psychic distance using psychic distance stimuli.

The CAGE framework based on the initial paper of Ghemawat (2001) provides a comprehensive operationalization of psychic distance stimuli by dividing it into the dimensions of cultural, administrative, geographic, and economic distance. However, the majority of researchers has focused on cultural distance as the only psychic distance stimuli (Dow

& Karunaratna, 2006). Based on the cultural distance index of Kogut and Singh (1988) and their reasoning that psychic and cultural distance are largely similar, IB researchers started to approximate psychic distance stimuli via objective country-level factors of culture. While cultural distance stimuli influence the perception of distance, they are only one component determining perceived psychic distance. In their study Håkanson and Ambos (2010) found that cultural distance is a relatively poor predictor as a standalone proxy for perceived psychic distance and that a range of other economic, political, and geographic factors also influence psychic distance perception. Hence, this study follows the initial work of Ghemawat (2001) arguing that inter-country distance can be captured along the four basic dimensions of cultural, administrative, geographic, and economic distance. Although this framework is widely accepted in IB research as it facilitates a more nuanced investigation of distance-related phenomena, this holistic approach to measuring psychic distance stimuli has been rarely used.

Given the arguments above this study will operationalize the psychic distance concept using psychic distance stimuli along the dimensions of cultural, administrative, geographic, and economic distance.

2.2 International expansion, distance, and firm performance

The impact of international expansion on firm performance is one of the central and most researched topics in IB. International expansion literature takes a dynamic viewpoint on internationalization that deals with the outcomes and management of foreign expansion steps within a certain timeframe (e.g., Hutzschenreuter et al., 2014; Johanson & Vahlne, 1977). Rooted in the process theory of internationalization (Johanson & Vahlne, 1977), international expansion literature argues that an increase in psychic distance (perceived psychic distance or psychic distance stimuli) by entering foreign markets creates three main difficulties for firms (Ghemawat, 2001). First, firms expanding into foreign markets lack the required local

knowledge and capabilities to conduct business successfully (Vermeulen & Barkema, 2002). Second, in order to become successful in foreign markets, firms need to transfer and adapt their existing business model, structures, and processes to the new business environment (Vermeulen & Barkema, 2002). Third, setting-up and managing business activities across multiple countries increases coordination complexity (Beugelsdijk, Nell, & Ambos, 2017).

In general, added psychic distance increases both the internal and external complexity a firm has to handle (Wagner, 2004). Internal complexity in the form of coordination and integration of foreign operations and external complexity in the form of novel and different cultural, administrative, and economic environments (Qian, 2002). As a result, expansion into foreign markets and its accompanying added psychic distance leads to increased complexity which in turn negatively affects firm performance (Hutzschenreuter & Voll, 2008).

2.3 Digital firms, capabilities, and internationalization

This study follows the definition of digital firms proposed by Monaghan et al. (2020) and the United Nations Conference on Trade and Development (UNCTAD). Digital firms are characterized by "the central role of the Internet in their operating and delivery model" (UNCTAD, 2017, p. 165) and their reliance on the Internet for processes related to production, operations, and delivery (Monaghan et al., 2020, p. 12). The definition explicitly includes purely digital firms (e.g., digital platforms, digital solution providers) and partially digital firms (e.g., e-commerce, digital content producers and distributors). This study deliberately takes on a broader perspective of digital firms by including partially digital firms since their business models rely on the use of digital technology (Monaghan et al., 2020) and to provide a more holistic view on digital firms.

Recent IB research acknowledges that digital firms possess digitally enabled capabilities which influence their international expansion process and performance. Digital firms carry out a distinct international expansion process that is fast and broad in scope and seems to be

detached from psychic distance barriers (Coviello et al., 2017). This process is enabled by the possession of capabilities that are developed based on digital technology (Monaghan et al., 2020). Similarly, information systems research recognizes that firms leveraging digital technology to develop new and enhance existing capabilities can gain competitive advantages that improve their performance (Bharadwaj, 2000; Rivard, Raymond, & Verreault, 2006). Given the influence of digitally enabled capabilities on international expansion and performance, this study takes an organizational capabilities perspective rooted in the resource-based view (RBV) (Autio, George, & Alexy, 2011; Barney, 1991; Delios & Beamish, 2001) to assess the impact of digital firm capabilities on psychic distance and firm performance in the context of international expansion. Within this context organizational capabilities are defined as a firm's internal routines to deploy resources and develop new ones (Collis, 1994; Teece, Pisano, & Shuen, 1997).

In the following, this study identifies three organizational capabilities that digital firms have based on the use of digital technologies and that influence firm performance in the context of international expansion and psychic distance.

Business model reconfiguration: Digital firms have the ability to reconfigure their business models rapidly and efficiently because of the underlying technological modularity and network embeddedness (Banalieva & Dhanaraj, 2019; Cahen & Borini, 2020). Instead of having monolithic technology, digital firms break down their digital services and infrastructure into smaller pieces that can interact with each other through standardized interfaces (Langlois, 2002). Because of the underlying modular technological structure, digital firms can more efficiently redesign their offerings and routines and thus easily adapt their business model to new market environments (Banalieva & Dhanaraj, 2019). Based on the standardized and open application interfaces, the modular technology structure also allows digital firms to integrate external digital services and processes into their offerings (Banalieva & Dhanaraj, 2019). Thus,

digital firms tend to form large networks of loosely connected firms to access external complementary capabilities that enhance the overall offering for the end customer (Jacobides, Cennamo, & Gawer, 2018; Singh & Kundu, 2002). In doing so, digital firms leverage this network of external partners to adapt their business model to foreign environments, thereby externalizing parts of their business model reconfiguration (Banalieva & Dhanaraj, 2019; Ojala, Evers, & Rialp, 2018).

Absorptive capacity: Digital firms have enhanced *absorptive capacity* – the ability to recognize, assimilate, and apply new, external information (Cohen & Levinthal, 1990) – based on the use of digital technology, modularity, and network embeddedness. Digital technology enables a cost-efficient and high-quality collection, processing, and integration of information for example via front-end digital infrastructure (payment/order systems, websites, etc.), direct online customer interaction, and automated data analytics (Mathews & Healy, 2008; Pergelova, Manolova, Simeonova-Ganeva, & Yordanova, 2019). Since major parts of digital firm offerings and processes take place in the digital sphere, digital firms leverage their digital technology to generate, process, and interpret large amounts of data and information about customers and the market. In addition, digital firms can not only generate new knowledge by themselves, but also access already existing knowledge via external partners (Nambisan et al., 2019; Raymond, Bergeron, Croteau, & St-Pierre, 2015). Facilitated by the aforementioned tendency to participate in networks and the underlying technological modularity, digital firms are able to systematically integrate local market knowledge from external complementors which enhances foreign market learning (Nambisan et al., 2019).

Scalability: Digital firms are inherently more scalable because of the digital nature of their product and service offerings (Hennart, 2014; Monaghan et al., 2020). In contrast to physical products and services, digital products and services can be duplicated and dispensed at minimal marginal costs (Vendrell-Herrero, Gomes, Collinson, Parry, & Bustinza, 2018). Furthermore,

digital firms have processes and routines that are already digitally encoded and are thus readily scalable and transferable into foreign markets (Monaghan et al., 2020; Reuber, Fischer, & Morgan-Thomas, 2015).

3. HYPOTHESES DEVELOPMENT: ADDED PSYCHIC DISTANCE STIMULI, DIGITAL FIRM CAPABILITIES, AND PERFORMANCE

International expansion literature concurs that firms entering a foreign market are exposed to different psychic distance stimuli which increases complexity as firms have to learn to operate in this new setting (Vermeulen & Barkema, 2002). Hence, higher levels of differences in psychic distance stimuli increase the difficulties of successfully conducting business activities in foreign markets (Håkanson & Ambos, 2010). The general logic underlying the relationship between psychic distance stimuli and performance is that firms have limited *absorptive capacity* (Cohen & Levinthal, 1990; Vermeulen & Barkema, 2002). Therefore, they can only handle a limited amount of complexity caused by added psychic distance stimuli. Increasing the added psychic distance within a certain time period will negatively affect performance based on the logic of time compression diseconomies³ (Dierickx & Cool, 1989). As a result, the general effect of adding more distance will be negative, although the magnitude and underlying mechanisms may differ between the four psychic distance stimuli.

³ Diseconomies of time compression refers to the phenomenon the more rapidly resources and capabilities are developed the higher the costs with costs increasing disproportionately with higher speed (Knott, Bryce, & Posen, 2003; Dierickx & Cool, 1989).

3.1 Added cultural distance, performance, and the moderating effect of digital firms

According to Hofstede (1980), culture can be defined as "the collective programming of the mind which distinguishes the members of one human group from another. [...] Culture, in this sense, includes systems of values, and values are among the building blocks of culture" (p. 21). Therefore, cultural distance can be understood as the differences in values, norms, and beliefs between two countries, in this case the target country of international expansion and the closest country a firm already operates in (e.g., Hofstede, 1980; Rothaermel, Kotha, & Steensma, 2006). An increase in added cultural distance affects firm performance based on three underlying mechanisms:

First, added cultural distance restrains a firm's absorptive capacity making it more difficult and time-consuming to acquire foreign market knowledge (Wagner, 2004). Cultural distance makes existing knowledge less applicable and thus hampers a firm's ability to learn, its absorptive capacity, as learning largely depends on the existence of related knowledge (Cohen & Levinthal, 1990).

Second, cultural distance aggravates interpersonal communication, interaction and decision-making (Gómez-Mejía & Palich, 1997; Håkanson & Ambos, 2010). Differences in underlying norms and values cause mutual misperceptions that impede communication and require firms to adjust their behavior to the new cultural setting (Boyacigiller, 1990; Slangen, 2011). In addition, a lack of cultural understanding makes it difficult to interpret incoming foreign market signals and information which impedes the decision-making of managers as they are unable to obtain critical information and understand local requirements (Håkanson & Ambos, 2010).

Third, added cultural distance forces firms to adapt their business models and processes to the cultural values and norms of the new markets. This adaptation requires significant effort by the expanding firms in terms of resources and time and increases overall complexity.

Based on the underlying mechanisms mentioned above (see Figure 1), this study posits:

Hypothesis 1a: *The added cultural distance is negatively related to firm performance.*

Although the digitally enabled capabilities of digital firms reduce negative effects associated with cultural distance barriers (Luo, 2022b), the existence of a virtuality trap (Yamin & Sinkovics, 2006) counters these effects.

Digital firms have an enhanced *absorptive capacity* that attenuates the negative performance effect of added cultural distance associated with difficulties of acquiring foreign market knowledge. Based on the use of digital tools and virtual customer interaction digital firms are able to acquire, analyze, and integrate large amounts of knowledge regarding cultural contexts and behaviors (Mathews & Healy, 2008; Pergelova et al., 2019). This represents an efficient mechanism of foreign knowledge accumulation. However, as postulated by Yamin and Sinkovics (2006), the reliance on digital knowledge acquisition makes digital firms prone to step into a virtuality trap. The virtuality trap is described as the "perception by the internationalising firm that the learning generated through virtual interactions obviates the need for learning about the target markets through non-virtual means" (Yamin & Sinkovics, 2006, p. 340). Digital firms base the majority of foreign market learning and knowledge acquisition on online customer interaction and thus wrongfully generalize information acquired in the virtual world to the physical world. Unfortunately, virtually acquired knowledge is confined to the virtual domain and hence, digital firms are deprived of physical onsite experiences and knowledge gains leading to negative effects on firm performance (Sinkovics, Sinkovics, & "Bryan" Jean, 2013; Yamin & Sinkovics, 2006).

The drawbacks of stepping into the virtuality trap also affect digital firms' ability to reconfigure their business model. Digital firms reorganize their business model and processes

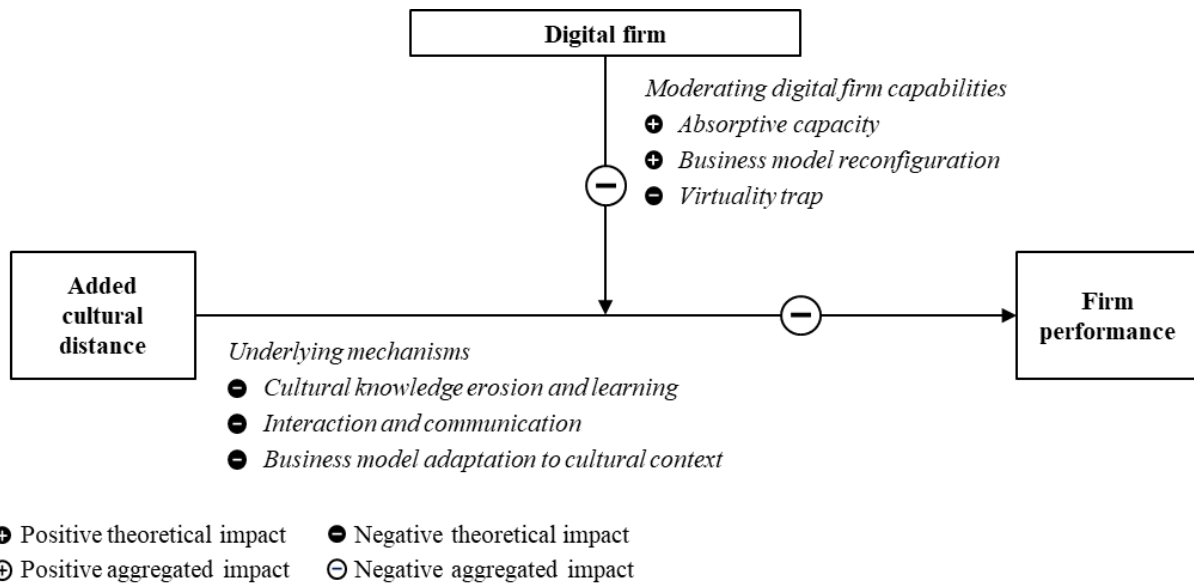


Figure 1: Theoretical mechanisms underlying the direct and moderating effects between added cultural distance and firm performance

to fit the new cultural market context based on the acquired foreign market knowledge. The modular structure of digital technology hereby provides digital firms advantages as it facilitates a rapid and cost-efficient *business model reconfiguration* (Cahen & Borini, 2020; Yoo, Henfridsson, & Lyytinen, 2010). Furthermore, digital firms leverage external resources to adapt their business model and processes by using the standardized technology interfaces to integrate complementary services of local external partners (Banalieva & Dhanaraj, 2019). Hence, the modularity of digital technology reduces the overall resource requirements of *business model reconfiguration* and thereby facilitates the cross-border transfer and adaptation of digital firms' business models (Banalieva & Dhanaraj, 2019; Parente, Geleilate, & Rong, 2018). However, as a consequence of stepping into the virtuality trap, the foreign market knowledge acquired by digital firms does not adequately reflect the foreign market reality. Thus, digital firms adjust their business models based on wrongfully generalized information. As a result, the virtuality trap negatively affects firms' business model reconfiguration and adaptation to foreign markets. Therefore, enhanced *absorptive capacity* and *business model reconfiguration*, which were initially assumed to have a positive performance impact, actually affect firm performance

negatively. Based on the negative effects of stepping into a virtuality trap, this study posits:

***Hypothesis 1b:** The capabilities of digital firms negatively moderate the relationship between added cultural distance and firm performance.*

3.2 Added administrative distance, performance, and the moderating effect of digital firms

Administrative distance is defined as the cross-country differences in national laws, regulations, and governance policies that guide firm behavior (Scott, 1995). An increase in added administrative distance affects firm performance based on three underlying main mechanisms:

First, the higher the administrative distance, the less firms understand the 'rules of the game' (North, 1990). Higher administrative distance erodes a firm's institutional knowledge and capability base creating a competitive disadvantage (Shirodkar & Konara, 2017). Thus, firms need to invest substantial time and effort in building up institutional knowledge within the new regulatory environment.

Second, following Dow and Karunaratna (2006), the lack of knowledge about foreign market laws, regulations, and government policies increase uncertainty about government actions. This uncertainty exacerbates communication and interaction with the government, thereby increasing overall costs and complexity. Lack of knowledge about institutional behavior also increases the probability to misjudge governmental action and reaction, thus hampering decision-making (Dow & Karunaratna, 2006).

Third, administrative distance necessitates the adaptation of a firm's business model, processes, and organizational practices to the regulatory requirements (Chao, Kim, Zhao, & Hsu, 2012; Kostova & Zaheer, 1999). Greater administrative distance increases the probability of failure in adapting the business model to new regulatory contexts (Beugelsdijk et al., 2017).

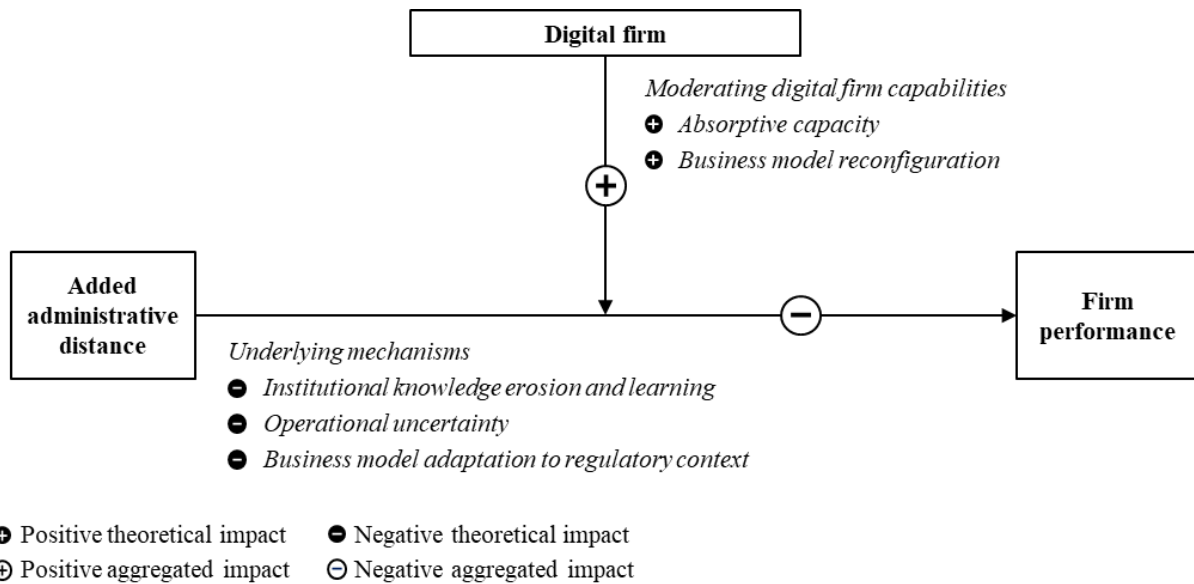


Figure 2: Theoretical mechanisms underlying the direct and moderating effects between added administrative distance and firm performance

Hence, firms expanding into administratively distant markets need to invest substantial resources into adapting their business models (Chao et al., 2012). Based on the underlying mechanisms mentioned above (see Figure 2), this study posits:

Hypothesis 2a: *The added administrative distance is negatively related to firm performance.*

Digital firms' digitally enabled capabilities of *business model reconfiguration* and enhanced *absorptive capacity* help to attenuate the negative direct effect of added administrative distance on firm performance. Technological modularity allows digital firms to rapidly and cost-efficiently adapt their business model and processes to fit the regulatory context (Cahen & Borini, 2020). Moreover, modularity gives digital firms a new form of connectivity by building a network of partners linked by standardized technological interfaces (Nambisan et al., 2019). Thus, digital firms integrate the complementary services of local partners into their overall offerings thereby leveraging external resources to adapt their business model to the new

market environment (Banalieva & Dhanaraj, 2019). As a result, digital firms can adapt their business models and processes to administratively distant markets more efficiently. In addition, by interacting with and integrating complementors that possess specialized local knowledge and capabilities (Nambisan et al., 2019) digital firms acquire knowledge regarding local regulations, laws, and governance policies reducing the lack of knowledge that causes negative performance effects. Therefore, this study posits:

***Hypothesis 2b:** The capabilities of digital firms positively moderate the relationship between added administrative distance and firm performance.*

3.3 Added geographic distance, performance, and the moderating effect of digital firms

Geographic distance can be understood as the "spatial separation of two countries" (Schu & Morschett, 2017, p. 715) and is considered to be the most fundamental and most widely acknowledged form of inter-country distance (e.g., Håkanson & Ambos, 2010; Schu & Morschett, 2017). Research suggests that despite improvements in transportation and communication, geographical distance still creates barriers for conducting international business (e.g., Berry, Guillén, & Zhou, 2010; Leamer & Storper, 2001). Thus, geographic distance influences the performance of firms expanding into foreign countries via two mechanisms, namely transportation and coordination costs (Berry et al., 2010).

First, added geographic distance can be directly associated with higher transportation costs. While the costs of transportation have decreased rapidly in recent years, the basic relationship between increasing geographic distance and increasing transportation costs still holds true (Håkanson, 2014).

Second, geographic distance creates frictions for communication and coordination (Beugelsdijk et al., 2017). Differences in time zones and office hours hinder interaction while

the geographic distance itself prevents face-to-face interaction, which increases relational uncertainty and in turn increases coordination costs (Beugelsdijk et al., 2017; Slangen, 2011). Given the increase in relational uncertainty, added geographic distance is also associated with an increase in monitoring costs (Baaij & Slangen, 2013). Based on these theoretical arguments (see Figure 3), this study posits:

Hypothesis 3a: The added geographic distance is negatively related to firm performance.

The capability of digital firms to scale efficiently positively affects the relationship between added geographic distance and firm performance. The products and services of digital firms are mostly digital (Monaghan et al., 2020). The digital nature of these products and services allow digital firms to reproduce and distribute them at minimal costs (Vendrell-Herrero et al., 2018). Since digital products and services are created and transported digitally to foreign markets they are not influenced by the direct negative effects stemming from additional transportation costs associated with added geographic distance. The lack of transportation costs does not only hold true for purely digital firms like digital platform firms and digital service providers, it also pertains to partially digital firms like e-commerce or digital content providers, albeit to a smaller degree. For instance, digital content producers (e.g., game developers, digital media, info and data providers) offer products and services that are digital and can be digitally transferred, thus incurring minimal transportation costs. E-commerce firms like Amazon, Rakuten, or Zalando offer physical products but follow a marketplace logic which reduces the negative impact of transportation costs. Most e-commerce firms offer their digital marketplaces to local producers which makes e-commerce firms less prone to additional cross-country transportation costs. Moreover, some e-commerce firms also act as a marketplace for services that operate independent of geographic distances (e.g., online travel agencies like Expedia or TripAdvisor).

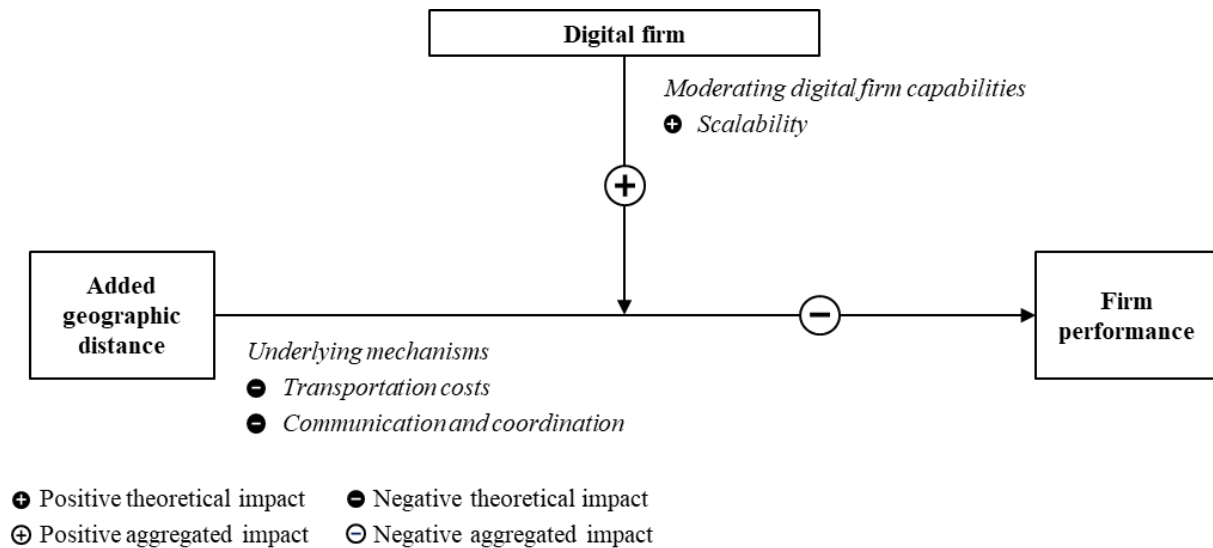


Figure 3: Theoretical mechanisms underlying the direct and moderating effects between added geographic distance and firm performance

Hence, while at different degrees, digital firms generally benefit from the reduced impact of transportation costs associated with added geographic distance. Therefore, this study posits:

***Hypothesis 3b:** The capabilities of digital firms positively moderate the relationship between added geographic distance and firm performance.*

3.4 Added economic distance, performance, and the moderating effect of digital firms

Economic distance refers to the cross-country differences in the level of economic development, which not only includes factors like customer purchasing power and preferences, but also differences in infrastructure and resource endowments (Ghemawat, 2001). The existing literature exploring economic distance effects is relatively sparse and so far only few authors have captured its impact in the context of international expansion and performance (Malhotra, Sivakumar, & Zhu, 2009). The relationship between added economic distance and performance is influenced by one key mechanism – a firm's need for business model adaptation.

Economically distant foreign markets possess different customer preferences, consumption

patterns, and general economic characteristics that impede the transfer of existing business models (Ghemawat, 2001; Malhotra et al., 2009). For example, consumers in countries that have large differences in GDP per capita are likely to differ greatly in consumption and demand patterns and hence need to be approached using a different business model that is adjusted to the local economic circumstances (Malhotra et al., 2009). In addition, high economic distance also exacerbates the transfer and application of existing knowledge and capabilities and forces firms to acquire new and adapt existing market knowledge and capabilities (Malhotra et al., 2009). Thus, higher added economic distance in international expansion results in additional complexity and costs since firms need to adapt their business models, processes, and capabilities to the different economic environment (see Figure 4). Hence, this study posits:

Hypothesis 4a: *The added economic distance is negatively related to firm performance.*

The relationship between added economic distance is directly influenced by digital firms' *business model reconfiguration* capability and indirectly by the negative effects of stepping into the virtuality trap. Rooted in the underlying technological modularity, digital firms can adjust their business model rapidly and cost-efficiently to fit different economic environments (Cahen & Borini, 2020). Moreover, digital firms leverage their network embeddedness and technological interconnectedness to support business model and process adaptation by accessing external resources and integrating complementary services of partners, thereby externalizing parts of the local adaptation (Banalieva & Dhanaraj, 2019; Nambisan et al., 2019). Thus, digital firms can efficiently and rapidly reconfigure their business models and processes in line with local economic circumstances.

The virtuality trap phenomenon does not directly affect digital firms business model reconfiguration, but has an indirect negative effect on it. Successful business model adaptation

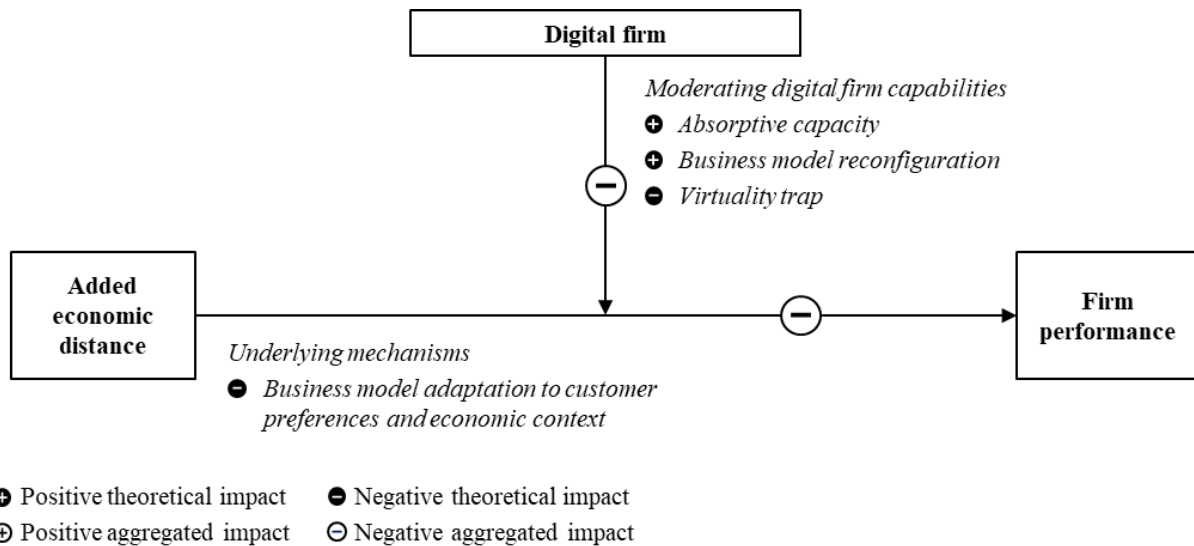


Figure 4: Theoretical mechanisms underlying the direct and moderating effects between added economic distance and firm performance

to economic circumstances is dependent on adequate information about the economic differences such as customer preferences and behaviors in the first place. Digital firms tend to leverage digital technology and virtual customer interaction to acquire knowledge regarding economic circumstances and local customers (e.g., Monaghan et al., 2020; Pergelova et al., 2019). However, the reliance on virtual learning and knowledge acquisition of consumer preferences is likely to result in negative performance effects as mentioned before (Sinkovics et al., 2013; Yamin & Sinkovics, 2006). As digital firms wrongfully generalize digitally acquired information, they step into the virtuality trap and reconfigure their business models based on misinformation (Yamin & Sinkovics, 2006). Hence, despite advantages in *business model reconfiguration*, digital firms are prone to step into the virtuality trap and misadjust their business models to distant economic circumstances. Therefore, this study posits:

Hypothesis 4b: *The capabilities of digital firms negatively moderate the relationship between added economic distance and firm performance.*

4. METHODOLOGY

4.1 Data collection and sample

This study bases its analyses on the *Compustat* database as it provides a representative firm sample with comprehensive financial and general firm information that has been commonly used in IB research (e.g., Abdi & Aulakh, 2018; Berry et al., 2010). Since the phenomenon of digital firms is fairly young and started to emerge around the turn of the century, this study focuses on observations starting from the year 2000 onwards. In line with previous research, all firms with sales < 1 million USD are excluded since these firms usually represent artificial constructs used for tactical purposes and asset disposition (Abdi & Aulakh, 2018). This selection results in a sample of 142,621 single year observations of 17,173 firms. I then enriched the sample with information on foreign subsidiaries gathered from the *CorpWatch* database that specializes in subsidiary information from firms' official 10K filings. Many firms did not provide information regarding the location of their subsidiaries or subsidiary information at all. Thus, I was able to match a total of 34,532 observations from 4,991 firms. Since the control variables were not available for all firms, the sample was further reduced to a final number of 8,739 observations from 1,704 firms. Finally, data was gathered on the psychic distance dimensions from multiple sources. Following previous research, e.g., Beugelsdijk et al., 2017, this study uses Hofstede's cultural dimensions (Hofstede, 1980) and the cultural characteristics from the GLOBE Project (House, Hanges, Javidan, Dorfman, & Gupta, 2004) for cultural distance, the World Bank's World Governance Indicators for administrative distance (Kaufmann, Kraay, & Mastruzzi, 2010), the *CEPII* database for geographic distance (Mayer & Zignago, 2011), and the World Development Indicators provided by the World Bank for economic distance.

4.2 Measures

Dependent variable

Following previous IB research focusing on firm performance (e.g., Abdi & Aulakh, 2018; Chang & Rhee, 2011), the statistical analyses uses the three-year average *return on assets (ROA)* lagged by one year into the future. ROA is advantageous compared to other accounting-based performance measures such as return on equity (ROE) and return on sales (ROS) because ROE is highly sensitive to the underlying capital structure and ROS is closely correlated with firm sales (Hitt, Hoskisson, & Kim, 1997). Moreover, ROA is the most widely used performance measure in IB (e.g., Abdi & Aulakh, 2018; Chao & Kumar, 2010) and thus ensures the comparability and integration of my findings with existing research (Gómez-Mejía & Palich, 1997). The three-year moving average of ROA is used to smooth out annual fluctuations (Chang & Rhee, 2011). Finally the dependent variable is shifted one year into the future to allow for the causal interferences between independent and dependent variables (Abdi & Aulakh, 2018).

Independent variables

In line with the latest research on operationalizing the CAGE distances, this study applies the Mahalanobis technique to measure cross-country distances (e.g., Berry et al., 2010; Beugelsdijk et al., 2017). While most research operationalizes distance by using Euclidean distance measures inspired by the Kogut and Singh Index of cultural distance (Kogut & Singh, 1988), this method does not account for potential correlation between the dimensions an index is comprised of (Beugelsdijk et al., 2018). Hence, this study applies the Mahalanobis technique to control for correlation of the different sub-dimensions comprising cultural, administrative, geographic, and economic distance. The added distance of each CAGE dimension is measured by calculating the distances of a newly entered country to all countries in which the firm is

already operating in and then taking the smallest of these distances (Hutzschenreuter & Voll, 2008). Framed differently for the example of cultural distance, the cultural distance added by a new subsidiary is its distance to the existing subsidiary that is culturally closest. Thus, the reference country to calculate the cultural distance to the newly entered country is the culturally closest country with an existing subsidiary. Finally, to compute a firm's overall added distance within a year, the added distances of each single expansion step within that year are summed up.

Added cultural distance is measured based on the four initial Hofstede dimensions (power distance, uncertainty avoidance, individualism, and masculinity) (Hofstede, 1980) extended by the two recently added dimensions of long-term orientation and indulgence (Hofstede, Hofstede, & Minkov, 2010).

Added administrative distance is measured based on the six World Governance Indicators developed by the World Bank (Kaufmann et al., 2010). The so-called Kaufmann index of administrative distance has been widely used in IB research to measure governance distance (e.g., Abdi & Aulakh, 2012; Beugelsdijk et al., 2017; Håkanson & Ambos, 2010; Lavie & Miller, 2008) and encompasses the sub-dimensions of voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and corruption control (Kaufmann et al., 2010).

Added geographic distance is measured based on the distance between the capital cities of each country (Miller, Lavie, & Delios, 2016). The CEPII database readily provides information on cross-country geographic distances between capital cities using the respective latitude and longitude data and applying the great circle formula that is a mathematical formula to calculate the shortest distance between two points on the surface of a sphere (Mayer & Zignago, 2011).

Added economic distance is mostly measured in IB research based on the differences in countries' GDP per capita (e.g., Håkanson, Ambos, Schuster, & Leicht-Deobald, 2016; Miller

et al., 2016). Therefore, this study uses the World Development Indicators from the database provided by the World Bank to calculate the added economic distance based on GDP per capita.

Digital firm is measured by using a binary variable based on the UNCTAD's (2017) categorization of digital firms, which researchers have started to adopt (Cahen & Borini, 2020; Monaghan et al., 2020). To determine whether a firm in the sample is digital, I screen all firms manually and categorize them following a multi-step process. First, I check whether the firm is included in the *UNCTAD's Top 100 Digital MNEs* list and label the firms listed as digital. Then, I manually identify the product or service offerings and business models of all firms on the UNCTAD's list and all firms included in the final database. Next, I manually assess whether the business model and offerings of a firm in the final database match one of the business models and offerings of the firms on the UNCTAD's list and mark the firm as digital if there is a match. To ensure intercoder reliability, this study conducts this time-consuming process twice with two independent researchers. Finally, a panel of researchers is used to compare the results of the manual categorization and resolve any disagreements. Based on this categorization of firms into digital and non-digital, I create a digital firm binary variable to use as a moderating variable in the statistical analyses. Ideally one would use a more nuanced digital firm variable that distinguishes between the different levels of digitalization of each firm individually. However, there is no established scale that measures degree of digitalization currently in existence. Thus, I use this binary variable as a first attempt of capturing digital firms and their digitally enabled capabilities.

Controlling variables

This study controls for multiple factors following previous research in the field of international expansion and firm performance. It uses firm sales in a given year to account for a *firm's size* which indicates the amount of resources potentially available and influences firm

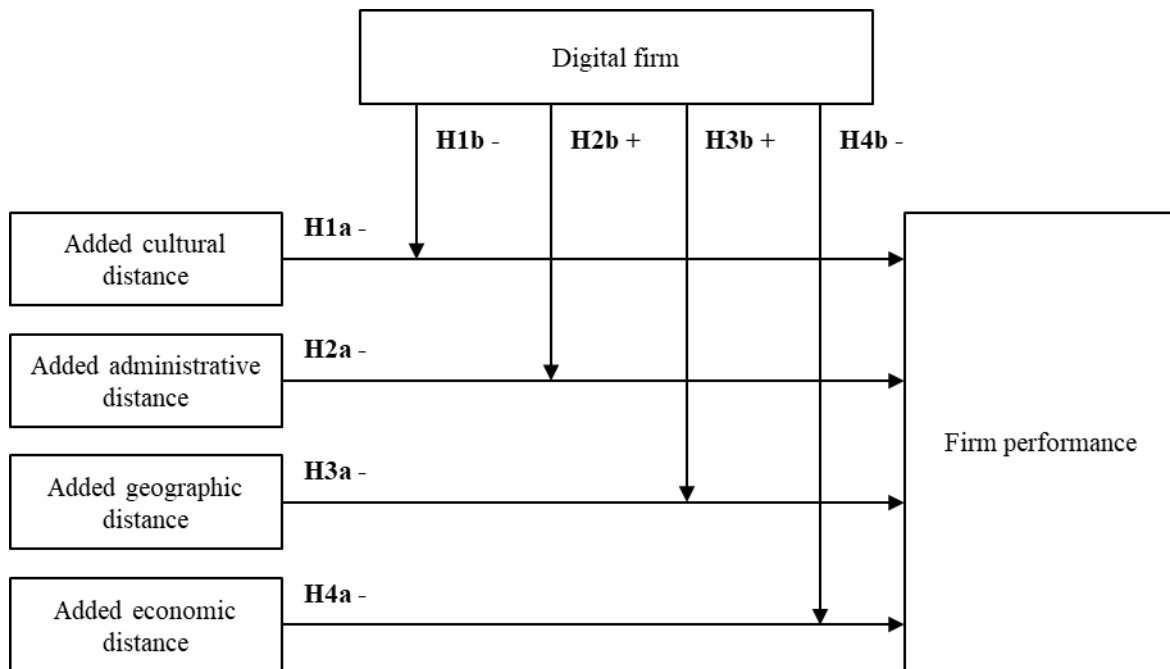


Figure 5: Overview of research model and hypotheses

performance (e.g., Dhanaraj & Beamish, 2003; Lu & Beamish, 2004). Since a firm's capital structure directly influences its ability to expand and its performance, this study uses *debt-to-asset ratio* to control for differences in capital structure (Abdi & Aulakh, 2018). Following previous studies, this study controls for *product diversity* using a Herfindahl measure based on a firm's revenue within its different product segments reported in the *Compustat* segment files (Goerzen & Beamish, 2003; Lu & Beamish, 2004). I control for product diversity since a firm that is highly diversified in terms of products has to deal with a higher level of complexity than one with lower diversity, but also is able to achieve competitive advantages (Tallman & Li, 1996). Following extant international expansion research, this study also controls for *degree of internationalization* measured by the percentage of foreign sales (e.g., Chang & Rhee, 2011; Fisch, 2012) and *R&D intensity* (Abdi & Aulakh, 2018). Degree of internationalization controls for a firm's exposure to foreign markets which influences the performance effects of psychic distance and R&D intensity controls for the possession of intangible technological capabilities and resources that help firms to successfully enter foreign markets (Chang & Rhee, 2011). To

prevent nonessential multilinearity effects between predictor variables and enable comparability of coefficients, all non-binary independent variables are mean-centered and standardized (Khavul, Pérez-Nordtvedt, & Wood, 2010).

4.3 Analysis

Figure 5 gives an overview of my research model and hypotheses. To specify the most suitable model for analysis, this study runs a robust Hausmann test. The results of this test suggest the use of a fixed effects model that controls for unobserved firm characteristics which are stable over time (e.g., industry) (Wooldridge, 2002). Moreover, the modified Wald test for heteroscedasticity and Wooldridge's (2002) autocorrelation test for panel data reveal that the results are affected by heteroscedasticity and autocorrelation. Therefore, this study uses a fixed effects model with Driscoll and Kraay (1998) robust standard errors which not only controls for heteroscedasticity and autocorrelation, but also for cross-sectional dependence.

4.4 Descriptive statistics

Table 1 shows the means, standard deviations, minimums, maximums, and correlations of all dependent, independent, and control variables, excluding binary variables. Following the three-step approach of Kalnins (2018) the high levels of correlation between the variables of the four CAGE dimensions indicate that there are issues related to multicollinearity. To avoid multicollinearity issues the CAGE variables are inserted separately into the model.

Table 1: Descriptive statistics and correlations

	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9
1. Return on assets	-0.006	0.230	-7.617	1.799									
2. Firm size ¹	3.151	11.267	0.001	233.715	0.086***								
3. Debt-to-asset ratio	0.219	0.298	0.000	10.663	-0.189***	0.026							
4. Degree of internationalization	0.321	0.299	0.000	1.000	-0.006	0.048***	-0.148***						
5. R&D intensity	0.200	2.013	-0.013	0.000	-0.159***	-0.021 [†]	0.009	-0.006					
6. Product diversity	0.116	0.203	0.000	0.856	0.094***	0.137***	-0.008	-0.022*	-0.041***				
7. Added cultural distance	1.320	4.616	0.000	119.638	0.029*	0.026*	-0.032**	0.113***	-0.010	0.057***			
8. Added administrative distance	0.236	1.361	0.000	53.066	0.008	0.005	-0.025*	0.049***	-0.007	0.039**	0.741***		
9. Added geographic distance ²	2.099	11.278	0.000	540.485	0.010	0.012	-0.015	0.049***	-0.005	0.051***	0.890***	0.835***	
10. Added economic distance ³	5.221	28.515	0.000	1,133.566	0.009	0.010	-0.016	0.048***	-0.006	0.040***	0.830***	0.902***	0.898***

Correlation significance: *** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.1

¹ Firm size: sales in bn USD

² Added geographic distance in 1,000 km

³ Added economic distance in 1,000 USD

5. RESULTS

5.1 Regression results

Table 2 shows the regression results for all models and hypotheses. Model 1 only uses the control variables while Models 2 to 9 test the eight hypotheses in the order they were derived.

Model 2 shows a negative relationship between added cultural distance and firm performance with a coefficient of -0.002 ($p = 0.006$), therefore supporting Hypothesis 1a. Similarly, Model 3 shows a significant and negative moderation effect of digital firm capabilities on the relationship between added cultural distance and firm performance with a coefficient of -0.003 ($p = 0.002$). Thus, Model 3 supports Hypothesis 1b.

Model 4 only partially supports Hypothesis 2a since the coefficient of -0.001 ($p = 0.098$) indicates a marginally significant direct negative effect of administrative distance on firm performance. Model 5 contradicts Hypothesis 2b since the relationship between administrative distance and firm performance is negatively moderated by digital firms with a coefficient of -0.005 ($p = 0.039$).

Based on the negative and marginally significant coefficient of -0.001 ($p = 0.069$) Model 6 shows weak support of Hypothesis 3a and the negative relationship between geographic distance and firm performance. In addition, Model 7 shows no moderating effect of digital firms on the relationship between geographic distance and firm performance with a coefficient of -0.002 ($p = 0.105$). Thus, Hypothesis 3b cannot be supported.

Finally, Model 8 supports Hypothesis 4a since the added economic distance coefficient of -0.001 ($p = 0.019$) indicates a significant negative relationship with firm performance. Similarly, the negative coefficient of -0.002 ($p = 0.010$) of the interaction term supports Hypothesis 4b and empirically shows the negative moderating effect of digital firms on the economic distance–performance relationship.

Table 2: Fixed-effect model with Driscoll & Kraay standard errors of the effect of psychic distance and digital firms on firm performance (ROA)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Control variables									
Firm size	-0.006 [†] (0.003)	-0.007 [†] (0.004)	-0.007 [†] (0.004)	-0.008* (0.003)	-0.008* (0.003)	-0.008* (0.003)	-0.008* (0.003)	-0.008* (0.003)	-0.008* (0.003)
Debt-to-asset ratio	-0.002 (0.029)	-0.011 (0.021)	-0.011 (0.021)	-0.003 (0.018)	-0.003 (0.018)	-0.002 (0.018)	-0.002 (0.018)	-0.003 (0.018)	-0.003 (0.018)
Degree of internationalization	-0.025*** (0.005)	-0.013* (0.005)	-0.013* (0.005)	-0.011 [†] (0.005)	-0.011 [†] (0.005)	-0.011 [†] (0.005)	-0.011 [†] (0.005)	-0.011 [†] (0.005)	-0.011 [†] (0.005)
R&D intensity	-0.018*** (0.003)	-0.018*** (0.004)	-0.018*** (0.004)	-0.018*** (0.004)	-0.018*** (0.004)	-0.018*** (0.004)	-0.018*** (0.004)	-0.018*** (0.004)	-0.018*** (0.004)
Product diversity	-0.023 (0.015)	-0.025 [†] (0.012)	-0.026 [†] (0.012)	-0.009 (0.013)	-0.009 (0.013)	-0.010 (0.013)	-0.010 (0.013)	-0.010 (0.013)	-0.010 (0.013)
Independent variables									
Added cultural distance	-	-0.002** (0.001)	-0.001* (0.001)	-	-	-	-	-	-
Added administrative distance	-	-	-	-0.001 [†] (0.001)	-0.001 (0.001)	-	-	-	-
Added geographic distance	-	-	-	-	-	-0.001 [†] (0.000)	-0.001 (0.000)	-	-
Added economic distance	-	-	-	-	-	-	-	-0.001* (0.000)	-0.001 [†] (0.001)
Moderation effects									
Cultural distance x digital firm	-	-	-0.003** (0.001)	-	-	-	-	-	-
Administrative distance x digital firm	-	-	-	-	-0.005* (0.002)	-	-	-	-
Geographic distance x digital firm	-	-	-	-	-	-	-0.002 (0.001)	-	-
Economic distance x digital firm	-	-	-	-	-	-	-	-	-0.002* (0.001)
F	20.81***	23.09***	29.28***	12.87***	31.22***	41.55***	53.81***	44.33***	63.66***
Adjusted R-squared	0.015	0.018	0.018	0.022	0.022	0.022	0.022	0.022	0.022
Change in adjusted R-squared	-	+0.003***	+0.003***	+0.007***	+0.007***	+0.007***	+0.007***	+0.007***	+0.007***
Number of observations	8,739	7,312	7,312	7,087	7,087	7,097	7,097	7,055	7,055

Significance levels: *** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.1

Notes: all variables except dummies and dependent variable are mean centered and standardized; Driscoll & Kraay robust standard errors in parentheses

5.2 Robustness checks

To support the robustness of findings this study runs additional analyses. First, this study re-runs the analyses using alternative measures for the main CAGE variables. Since the use of Hofstede's cultural dimension has been recently criticized as being outdated and over-simplified (e.g., Beugelsdijk et al., 2018; Shenkar, 2001), this study also measures added cultural distance based on the nine dimensions of the GLOBE Project (House et al., 2004) thus incorporating additional cultural characteristics. Added economic distance can be alternatively measured by using trade differences (Berry et al., 2010.). Thus, an economic distance index is created using GDP per capita and trade (exports plus imports per capita) applying the Mahalanobis technique. All alternative measures for the CAGE distances yield similar results compared to the initial results therefore supporting the robustness of the findings.

Second, this study re-runs all analyses using winsorized control variables at the 1st and 99th percentiles. Winsorizing eliminates the effect of extreme values and therefore improve the statistical analysis and robustness of findings (Khavul et al., 2010). Despite winsorizing the control variables the initial findings remain the same.

6. DISCUSSION AND CONCLUSION

The overarching objective of this study is to explore the impact of digital firms and their digitally enabled capabilities on the relationship between psychic distance stimuli and firm performance. Thus, this study integrates recent insights regarding digital firms into IB research focusing on international expansion. The theorizing regarding the influence of digital firms on the relationship between psychic distance stimuli and performance is grounded in the RBV more precisely the organizational capabilities perspective. Overall this study finds a negative relationship between the individual added CAGE distances and firm performance and a negative moderating impact of digital firm capabilities on the relationship between psychic

distance stimuli and firm performance for the dimensions of cultural, administrative, and economic distance.

In line with existing research findings on the direct impact of psychic distance on performance (e.g., Fisch, 2012; Hutzschenreuter et al., 2014), the study provides strong evidence of negative and significant effects of added cultural, administrative, and geographic distance on firm performance. These negative performance effects are mainly rooted in firms' lack of knowledge about and unfamiliarity with cultural and administrative environments (Barkema, Shenkar, Vermeulen, & Bell, 1997; Shirodkar & Konara, 2017) and increased transportation costs (Ghemawat, 2001). Moreover, the results also indicate that an increase in added economic distance negatively effects firm performance based on difficulties associated with differences in consumer behavior and the resulting business model adaptation needs. While past psychic distance research has started to theorize about this negative relationship (e.g., Campbell, Eden, & Miller, 2012; Hutzschenreuter et al., 2014), findings were inconclusive. By using multiple alternative economic distance measures, this study is able to provide robust results regarding the negative relationship between added economic distance and firm performance.

Overall, the study results indicate that digital firms and their digitally enabled capabilities enhance the negative relationship between added distance and firm performance for the dimensions of cultural, administrative, and economic distance. In line with the initial theorizing, the results indicate that an increase in added cultural and economic distance by one standard deviation reduces a digital firm's ROA by an additional -0.25 percent and -0.23 percent compared to their non-digital counterparts. At first, these findings seem counterintuitive since digital firm capabilities such as enhanced *absorptive capacity* and *business model reconfiguration* are usually associated with competitive advantages and therefore should have a positive impact on firm performance (e.g., Banalieva & Dhanaraj, 2019; Cahen & Borini,

2020; Jean, Sinkovics, & Kim, 2008). However, as proposed by Yamin and Sinkovics (2006), digital firms might be prone to step into a virtually trap. The results of this study support the existence of a virtually trap for digital firms whereby digital firms base their *business model reconfiguration* and other strategic decisions on wrongfully generalized knowledge acquired online which results in negative performance effects.

Contrary to the initial hypothesis, the negative effect of added administrative distance is reinforced for digital firms whereby an increase in added administrative distance by one standard deviation decreases a digital firm's ROA by additional -0.45 percent compared to non-digital firms. This result is rather surprising since learning about the regulatory and governmental environment should not be affected by the virtuality trap because this type of learning mainly takes place via direct, non-virtual interaction with administrative entities, other market participants, and partners (Golesorkhi, Mersland, Randøy, & Shenkar, 2019). Moreover, digital firms' capability to rapidly and cost-efficiently adapt their business model to new regulatory circumstances attenuates the negative effects of added administrative distance. However, a possible explanation for the reinforced negative performance effects might be the increased regulatory requirements for digital firms. Over the past years regulations specifically targeting digital firms and their business models like the European Union General Data Protection Act, have been increasing across all countries (Luo, 2022a). These digital regulations target topics like information security, customer data protection, and digital taxes (Luo, 2022a). Thus, digital firms are exposed to digital regulatory risks that result in higher levels of complexity and costs since digital firms have to adapt their processes and business models to comply with these new regulations (Chao et al., 2012). The highly fragmented and rapidly changing digital regulatory environment dramatically increases uncertainty about government actions, which has a negative impact on performance (Hutzschenreuter et al., 2014). Moreover, administrative actions continue to become increasingly virtual and automated (Troshani,

Janssen, Lymer, & Parker, 2018), hence creating the possibility of a virtuality trap when interacting with foreign administrations.

This study finds no significant moderating effect of digital firm capabilities on the relationship between geographic distance and performance. This contradicts the initially theorized positive moderation effect rooted in digital firms' digital nature and the negligibly small transportation costs of digital products and services (Vendrell-Herrero et al., 2018). The insignificance of results might be explained based on the inclusion of e-commerce firms in my digital firm definition. Since the business model of most e-commerce firms depends on the transportation and distribution of physical goods, these firms do not profit from reduced transportation costs of other digital firms such as digital solution providers or Internet platforms. Thus, the inability to find a statistically significant moderating relationship may be the results of the sample composition and the initial definition of digital firms.

7. CONTRIBUTIONS, LIMITATIONS, AND FUTURE RESEARCH

The theoretical contributions of this study are twofold. First, by analyzing the moderating effects of digital firms and their digitally enabled capabilities on the relationships between psychic distance stimuli and performance, this study extends the IB and international expansion literature by integrating digital firms. Rooted in the in the organizational capabilities perspective of the RBV, this study identifies digitally enabled capabilities of digital firms that influence international expansion. Based on these capabilities it develops theoretical mechanisms of how digital firm capabilities affect the different mechanisms that constitute the relationships between added cultural, administrative, geographic, and economic psychic distance stimuli and firm performance. Hence, this study constitutes a first attempt to integrate digital firms into existing IB literature thereby answering research calls by other researchers like Monaghan et al. (2020) and Coviello et al. (2017). Moreover, by including all types of

digital firms and not only platform firms, this study deliberately provides a broader and more holistic perspective on digital firms in the context of international expansion. It shows that although digital firms act in a seemingly borderless virtual world, cross-national differences affect digital firms even more than their non-digital counterparts because a virtuality trap exists. In doing, this study also extends the general understanding of the virtuality trap phenomenon to the context of digital firms.

Second, this study theoretically derives and statistically analyzes the direct effect of added psychic distance in the form of added cultural, administrative, geographic, and economic psychic distance stimuli on firm performance. In doing so, it provides a comprehensive view on the psychic distance-performance relationship since the majority of studies solely focuses on one dimension of psychic distance (mostly cultural distance). Therefore, this study substantiates existing findings in the psychic distance-performance literature by analyzing the relationship between psychic distance stimuli and performance on a more granular level. It answers recent research calls for more in-depth studies of different types of distances in the context of internationalization (Beugelsdijk et al., 2018).

This study succumbs to multiple limitations that provide avenues for future research. First, this research operationalizes digital firms using a dichotomous variable to decide whether a firm is digital or not. This simplification does not reflect business reality since individual firms are distinct regarding their level of digitalization of different value chain aspects. Thus, future research may improve the operationalization of the binary digital variable by developing a more granular index measuring the degree of digitalization of each single firm and replicate the analyses conducted in this study. Second, the nature of the used secondary data does not allow to measure individual firm level capabilities on which the different hypotheses are based. Therefore, future research could use primary data to assess the direct effect of individual digital firm capabilities on the relationship between psychic distance stimuli and performance which

would enable a more detailed view on the different mechanisms underlying the identified moderation effects. Third, using the *Compustat* database limits the firm sample to larger exchange-listed firms with a bias towards North America. Therefore, the transferability of findings might be limited especially in the context of private and smaller firms. Fourth, this study measures psychic distance via psychic distance stimuli and not directly via perceived psychic distance. As argued by Dikova (2009) and other researchers psychic distance is sensitive to the individual perception of managers. Therefore, future research should strive to replicate the findings of this study with the CAGE dimensions measured based on perceived psychic distance.

Finally this study also has multiple managerial implications. The negative effects of added CAGE distances on firm performance show that distance still matters. By being aware of these inter-country differences, firm managers can undertake appropriate actions to pro-actively overcome these distances and prevent negative performance effects during international expansion. Therefore, this study encourages managers of all firms to be more sensible to cultural, administrative, geographic, and economic distances when making strategic internationalization decisions. When designing their international expansion strategies, managers should carefully ponder how much added psychic distance their firms can borne based on the predicted immediate negative performance implications. Strategies targeting rapid international expansion may still be valid options but need to account for the negative performance effects. Moreover, this study provides especially valuable insights for managers of digital firm. The findings admonish digital firm managers that digital firms – operating in a digital world that is seemingly borderless – are not detached from inter-country differences in psychic distance. In fact, the results indicate that digital firms need to pay even more attention to bridging cultural, administrative, and economic distances. Despite indicating negative performance effects from international expansion this study should not be misunderstood as a

statement against internationalization. Adverse effects due to added psychic distance are initial short-term effects and by adapting to and acquiring knowledge about foreign markets firms can reduce and eliminate these negative effects, thus profiting from international expansion. Therefore, this study does not discourage digital firm managers from expanding internationally, but urges them to incorporate appropriate measures to counter the adverse effects of added psychic distance in their internationalization strategies.

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