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Digital Infrastructure and Entrepreneurship: The Digital Era's Enabling Effect

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DIGITAL INFRASTRUCTURE AND ENTREPRENEURSHIP: THE DIGITAL ERA'S ENABLING EFFECT

ABSTRACT Scholars have failed to give infrastructure due importance in entrepreneurship studies. Not too far from now, digital infrastructure has been recognized as the most conducive for entrepreneurial activity. Nevertheless, it has not been properly included in opportunity-motivated entrepreneurship (OE) studies, being OE the most propitious to economic growth. Accordingly, our research is the first one to focus on this link. By recognizing the importance of individuals' resources such as human, social, and financial capital for OE; an interaction model is considered. Using logistic regression analysis through a data set of 463,454 individuals from 37 countries (2011-2016), we validate this relationship and find it varies depending on the existing institutional system. Particularly, results suggest that fixed and mobile broadband fulfill distinct roles when relating to OE. Implications of this study may be of interest to policymakers.

KEYWORDS Opportunity entrepreneurship . Broadband . External enablers

JEL CODES L26 . L96 . H54

INTRODUCTION

Distinct levels of entrepreneurial activity across countries and its relationship with economic growth has motivated several studies (Álvarez, Urbano, & Amorós, 2014; Naudé, 2010; Urbano, Aparicio, & Audretsch, 2018). On them, individual-opportunity nexus is the dominant paradigm utilized (Ács, Autio, & Szerb, 2014; Davidsson, 2016; Shane & Venkataraman, 2000). In this sense, most explanation of the phenomenon has been attributed to individuals' characteristics and to institutions which frame their social interactions (North, 1990).

In respect to the opportunity construct, recent questioning about its conception as an objective reality (Shane & Venkataraman, 2000) has emerged in the literature and proposed that there is more about the context to be considered (Davidsson, 2015). Accordingly, the opportunity concept is disentangled into subjective and objective entities, where the external enabler concept is defined as an objective actor-independent factor supposed to set conditions for new economic activities (Davidsson, 2015).

Nevertheless, not looking through the opportunity concept before and the overwhelming emphasis lent to the institutional framework (Su, Zhai, & Karlsson, 2016) has deviated the attention from other aggregated conditions that may affect entrepreneurship (Wennekers,

Uhlaner, & Thurik, 2002). In this sense, infrastructure has been largely overlooked (Audretsch, Heger, & Veith, 2015). However, digital infrastructure has recently wakened up some interest (Alderete, 2014; Kotnik & Stritar, 2015).

On the other hand, not all entrepreneurial activity has the same impact or is beneficial to the economy (Amorós, 2011). In this sense, OE has been lent some particular attention lately (Angulo-Guerrero, Pérez-Moreno, & Abad-Guerrero, 2017; Boudreaux & Nikolaev, 2018; Raza, Muffatto, & Saeed, 2018) for its positive relationship with economic growth (Boudreaux & Nikolaev, 2018; Turkina & Thai, 2013). Nonetheless, digital infrastructure has not been properly incorporated on these studies.

Based on all the previous and in the importance of considering information and communication technologies (ICT) as part of nowadays entrepreneurship's context (Del Giudice & Straub, 2011; Sussan & Acs, 2017), the authors propose to analyze the relationship digital infrastructure has with OE. The majority of studies that tackle the ICT-entrepreneurship link have stayed at a contextual level of analysis (Alderete, 2014, 2017; Kotnik & Stritar, 2015; Lee & Lio, 2017), not considering context contingencies with individual's characteristics (Ács et al., 2014; Shane & Venkataraman, 2000). In this sense, an interaction approach is used by considering human, social, and financial capital's role on entrepreneurship at the individual-level (Baptista, Karaöz, & Mendonça, 2014; Boudreaux & Nikolaev, 2018; De Clercq, Lim, & Oh, 2011); and digital infrastructure as an external enabler at the national-level (Alderete, 2014, 2017).

The paper is structured as follows. Section 2 provides an overview of the relevant literature to the model proposed. Section 3 develops the conceptual framework. Section 4 details the data, variables, and analysis utilized to test the hypotheses formulated in the previous section. Section 5 presents the results and performs a robustness check. Section 6 discusses the implications of the results for the field. In section 7, we list what we think are the limitations of the study and give some guidelines for further research. Finally, in section 8 we state the conclusions of the paper.

This paper contributes to the literature in three important ways. First, it properly incorporates ICT in the study of OE. Second, it presents an empirical approach as a response to the recent call to study actor-independent factors in entrepreneurial activity (Davidsson, 2015). Third, it studies the interaction effect digital infrastructure and individuals' resources have on OE for the first time.

LITERATURE REVIEW

Entrepreneurship is the mechanism through which market inefficiencies are discovered and mitigated (Kirzner, 1997). Its field of study roots its legitimacy on explaining how entrepreneurial opportunities are discovered and exploited, by whom, and what this implies (Venkataraman, 1997). Nevertheless, nowadays literature's mainstream has focused on the individual-opportunity nexus (Ács et al., 2014; Davidsson, 2016; Shane & Venkataraman, 2000) and this has neglected the importance of understanding what is behind these opportunities (Davidsson, 2015).

Entrepreneurship and its context

Consequently, some aspects of the environment in which entrepreneurship develops have been paid little attention. For example, few studies examine how infrastructure relates to entrepreneurial activity (Alderete, 2014, 2017; Audretsch et al., 2015; Bennett, 2018). Nevertheless, this aspect of the context not only provides a platform for running businesses, but it is also a source of new possibilities individuals could value differently in order to enter the market (Alvarez & Busenitz, 2001). This lack of interest may have not only been related to the opportunity dominant conception (Shane & Venkataraman, 2000), but also to the fact that initial advancements in the field were made in homogeneous and robust physical and informational settings to perform economic activities (Khanna & Palepu, 1997; Kirzner, 1997; Knight, 1921; Schumpeter, 1934; Shane & Venkataraman, 2000).

A recent debate on the literature has surrounded a critique made to the opportunity construct proposition as an objective entity (Shane & Venkataraman, 2000), referring to its poor construct clarity and to its inconsistent definition across the literature (Davidsson, 2015; Suddaby, 2010). This posture proposes to distinguish actor-independent factors, referred to as external enablers, which are aggregated-level circumstances that may affect entrepreneurial activity (Davidsson, 2015). In order to answer this call, recent theoretical developments try to elucidate properties and mechanisms by which external enablers would favor entrepreneurship (Nambisan, 2016; von Briel, Davidsson, & Recker, 2018).

Entrepreneurship, institutions, and development economics

Meanwhile, institutional approach has been the main framework utilized to study how context shapes entrepreneurial results (Aparicio, Urbano, & Audretsch, 2016; Boudreaux & Nikolaev, 2018; Cullen, Johnson, & Parboteeah, 2014; De Clercq et al., 2011; Dheer, 2017; Urbano &

Alvarez, 2014). Institutions are the rules that frame human interaction in society (North, 1990). Therefore, as in the case of any other economic outcome, we cannot fully understand entrepreneurship without considering its institutional context (Peter J . Boettke & Christopher J . Coyne, 2009; Welter, 2010).

In fact, development economics and entrepreneurship literature share institutions as a common framework of analysis (Naudé, 2010). Over the years, scholars have increasingly highlighted entrepreneurship's importance due to its promoting effect on economic growth (Naudé, 2010). Nevertheless, this effect is not always beneficial (Amorós, 2011), being possible to distinguish productive from unproductive entrepreneurship (Baumol W, 1990). Accordingly, literature separates OE from necessity-motivated entrepreneurship (NE) to help discriminate these different roles toward economy (Aparicio et al., 2016; Fuentelsaz, González, Maícas, & Montero, 2015; Turkina & Thai, 2013). Unlike NE, where the individual is mainly forced to self-employment due to a lack of employment options, OE is mainly driven by the pursuit of business opportunities (Turkina & Thai, 2013).

On this matter, while formal institutions seem to benefit OE, NE is damaged by them (Aparicio et al., 2016; Fuentelsaz et al., 2015). Also, while formal institutions seem to provide good explanations of NE's variance, it is not the case of OE (Turkina & Thai, 2013). In fact, evidence shows that informal institutions have a stronger link with OE than formal ones have (Aparicio et al., 2016). Further research should seek to unravel institutions' "black-box" to extract better and more precise conclusions about how this aspect of the context affects OE (Naudé, 2010).

There are few empirical studies about OE and only a couple of them consider the interaction between contextual and individual variables (Angulo-Guerrero et al., 2017; Boudreaux & Nikolaev, 2018; Leković & Marić, 2017; Raza et al., 2018). On the other hand, most of these studies utilize an institutional framework to analyze the effect context has on OE (Angulo-Guerrero et al., 2017; Boudreaux & Nikolaev, 2018; Raza et al., 2018). In respect to the agency-level, individual's resources such as human, social, and financial capital have already been validated to promote OE (Boudreaux & Nikolaev, 2018).

Digital infrastructure, the missing context

In contrast to institutions which may represent a liability when framing human interaction, infrastructure presents itself a potential asset for entrepreneurs by shaping their feasibility and desirability assessments to create new businesses (Nambisan, 2016; Welter, 2010). Beyond this, digital infrastructure would excel this benefit by providing them with enabling

mechanisms that support the whole entrepreneurial process (Nambisan, 2016; von Briel et al., 2018) and by interacting with other factors entrepreneurship relates to (Zhang & Li, 2017). In this sense, infrastructure fits the external enabler's definition and particularly broadband has shown to be the most enabling one (Audretsch et al., 2015).

In consequence, as already mentioned, digital infrastructure has become the protagonist of a recent stream in the literature which focus on the effect it has on entrepreneurial activity (Alderete, 2014, 2017; Barnett, William; Hu, Mingzhi; Wang, 2018; Colovic & Lamotte, 2015; Kotnik & Stritar, 2015; Lee & Lio, 2017; Zhang & Li, 2017). However, none of these studies have made a distinction between OE and NE, and only further analysis made on the side of OE's literature shows that ICT development might only be related to OE in case the entrepreneur has high growth aspirations (Turkina & Thai, 2013).

In general, digital technologies' role on entrepreneurship has been largely neglected in the field (Nambisan, 2016; Sussan & Acs, 2017), leaving a significant gap when theorizing around market entry in the digital age (Del Giudice & Straub, 2011; Sussan & Acs, 2017). In this sense, based on the recent call in the literature to study actor-independent factors that affect entrepreneurship (Davidsson, 2015, 2016), recent theoretical developments have focused on answering it (Nambisan, 2016; von Briel et al., 2018). However, it still is missing an empirical approach response focused on these technologies and on their relationship with OE.

CONCEPTUAL FRAMEWORK

We base our theoretical framework on the notion of external enablers (Davidsson, 2015), on the pattern recognition perspective applied to opportunity recognition (Baron, 2006), and on digital technologies' properties and enhancing mechanisms for entrepreneurship (von Briel et al., 2018).

Individual resources and opportunity entrepreneurship

The probability of discovering entrepreneurial opportunities not only depends on possessing the necessary information but also on having the necessary cognitive abilities to exploit them (Mitchell et al., 2002; Shane & Venkataraman, 2000). Pattern recognition perspective proposes cognitive frameworks, based on prior knowledge and experience, that would serve to "connect dots" between apparently unrelated events (Baron, 2006). In this sense, having a more developed cognitive framework (e.g. human capital) would certainly favor OE by allowing opportunities recognition to happen in the first place.

Table 1 Studies on the promotion effect of individual resources on entrepreneurship

		Theoretical reasoning and findings	
		Direct effect	Interaction effect
Human capital	(Schmutzler et al., 2018) Entrepreneurial intention	Entrepreneurial self-efficacy is seen as the individual's belief to be able to successfully launch a business venture (+)	In high individualistic countries, attitudes predict behavior better than social norms; therefore, enhances self-efficacy effect (+);
	(Boudreaux & Nikolaev, 2018) OE	Individuals at the top of the ability distribution are more likely to take advantage of market opportunities (+)	In a high-quality institutional environment , human capital becomes a weaker determinant of OE (-)
	(Madriz, Leiva, & Henn, 2018) Start-up activity	Entrepreneurial self-efficacy improves opportunity recognition, making market entry an attractive choice (+)	Regulatory obstacles obscure pathways to generate positive entrepreneurial outcomes (+); higher education systems provide resourceful entrepreneurs with skilled employees, stimulating his aspirations (+); is attractive to leverage personal resources to undertake when societies value new businesses (+)
	(Lim et al., 2016) Engagement in entrepreneurship	Education provides superior information processing abilities, search techniques, and scanning capabilities. This, plus the knowledge received, enables individuals to recognize opportunities, evaluate and exploit them more successfully (+)	
	(Iversen, Malchow-Møller, & Sørensen, 2016) Entrepreneurship	Skills from schooling pay off mixed with the acquired during wage-work , being the first useful to find opportunities, and the second, to handle the daily job of running a business (+)	Individualism favors as individual-centric motivation to undertake becomes important (+); performance orientation boosts one's confidence (+)
(Urbano & Alvarez, 2014) Entrepreneurial activity (Wennberg, Pathak, & Autio, 2013) Entrepreneurial entry	Entrepreneurial self-efficacy influences entry through enhanced opportunity recognition and exploitation (+) Individuals view entrepreneurship as an attractive career choice when they have entrepreneurial self-efficacy (+)	Financial system favors credible resourceful people (+); educational system supplies trained employees, supporting undertaking (+); trust reduces transactions cost, making people's resources more instrumental to undertake (+); hierarchy restrain resources exchange (-); conservatism reduces resources leveraging possibilities (-)	
(De Clercq et al., 2011) New business activity	Entrepreneurial self-efficacy strongly increases the likelihood to undertake (+)		
(Davidsson & Honig, 2003) Start-up process	In the exploration stage, start-up experience is the most important (+); follows schooling (+); and work experience (+); before becoming viable, start-up experience is the most important (+); follows closely business education (+)		
Social capital	(Schmutzler et al., 2018) Entrepreneurial intention	Social norms and legitimacy of knowing a nascent entrepreneur determines the perceived social value of the entrepreneurial activity (+)	Low self-efficacy pushes to rely more on known nascent entrepreneurs (-); close environment shaped by knowing entrepreneurs fits/enhance the effect of the shared individualistic mental model in the country (+)
	(Boudreaux & Nikolaev, 2018) OE	Social capital helps aid embeddedness and knowledge transfer. Increases trust, which facilitates transactions (+)	In a high-quality institutional environment , social capital becomes a better determinant of OE (+)
	(Madriz et al., 2018) Start-up activity	Knowing business people decreases uncertainty and gives the confidence to undertake successfully (+)	ICT access increases efficiently the resources accessed by guanxi networks, also boosting frequent interaction. Additionally, "peer effect" improves individuals' digital abilities (+)
	(Zhang & Li, 2017) Entrepreneurial performance	Guanxi substitutes formal institutions' flaws and has a critical role during early growth by providing low-cost resources (+)	
	(Semrau & Hopp, 2016) Start-up progress	Financial social capital facilitates success in the undertaking, being nascent entrepreneurs considered high-risk clients (+); informational social capital provides crucial knowledge to succeed (+)	High human capital improves decisions about the investment of financial social capital (+); same with founding experience (+); additional knowledge from informational social capital is compensated by high human capital (-); same with founding experience (-)
	(Afandi, Kermani, & Mammadov, 2016) Entrepreneurial process	Trust in government and civic institutions damages entrepreneurship's early stages (-); trust in government institutions favors success stage (+); trust in banks increases probability to undertake (+); strong ties increase probability to undertake (+); weak or distant ties favor trial stage (+); trade union membership damages entrepreneurial process (-); professional association membership enhances the entrepreneurial process (+); civic norms perceived reduces probability to undertake (-)	
	(Urbano & Alvarez, 2014) Entrepreneurial activity (Nieto & González-Álvarez, 2016)	Knowing entrepreneurs encourage entrepreneurship by accessing knowledge about basic steps to undertake (+) Individual's network access to knowledge enhance discovery process information flow limits and leads to opportunity recognition (+); trust-built complements exploiting efforts (+); social capital norms reduce transaction levels, improving information access during the discovery process (+), knowledge accessed also helps understand exploitation stage (+)	
	(Estrin, Korosteleva, & Mickiewicz, 2013) Employment growth aspirations	Knowing entrepreneurs provide advice and access to resources that support the growth of young businesses (+)	Institutional deficiencies lead to higher transaction cost, which is partly overcome with business networks support (+)
(De Clercq et al., 2011) New business activity	Exposure to entrepreneurial role models increases self-efficacy, reduce uncertainty, and offer advice and emotional support (+)	Financial system favors credible resourceful people (+); educational system provides with high-quality employees, supporting undertaking (+); trust reduces transactions cost, making resources more instrumental (+); conservatism reduces resources leveraging possibilities (-)	
(Davidsson & Honig, 2003) Start-up process	Bonding social capital dispose individuals to start a business (+); bridging social capital becomes more important later, from entry to successful completion (+)		
Financial capital	(Boudreaux & Nikolaev, 2018) OE	Financial capital reduces liquidity constraints and provides cushion and collateral to survive during formative years and to obtain external funding, respectively (+)	In high-quality institutional environments , own sources of financial capital become only one of many alternative options to raise funds (-)
	(Lim et al., 2016) Engagement in entrepreneurship	Financial capital excess may motivate individuals to systematically search for entrepreneurial opportunities (+)	
	(De Clercq et al., 2011) New business activity	The undertaking requires financial capital to meet initial cash flow needs (+)	

Social networks, on the other hand, not only give access to different ideas and other resources but also contribute to improving existing cognitive frameworks (Alvarez & Busenitz, 2001; Baron, 2006). Knowing entrepreneurs would also encourage individuals by presenting them with the “basic steps” to create new businesses (Urbano & Alvarez, 2014). Additionally, having close role models would increase the perceived social value of entrepreneurial activity (Schmutzler, Andonova, & Diaz-Serrano, 2018).

Not to say, nascent businesses’ initial cash flow needs would make financial capital an imperative resource in almost any case (De Clercq et al., 2011). But in the case of OE, financial capital excess would also push individuals to keep systematically searching for opportunities that could finally motivate them (Lim, Oh, & De Clercq, 2016). Besides, usual formative years’ liquidity constraints could be confronted if having enough financial capital to use as a cushion or for obtaining external funding (Boudreaux & Nikolaev, 2018).

As seen in Table 1, studies have widely examined human, social and financial capital promoting effects on entrepreneurship. Particularly, positive relationships with OE have been validated for each one of them (Boudreaux & Nikolaev, 2018). Based on all the exposed, we propose:

Hypothesis 1: Individual’s resources (human (a), social (b), and financial (c) capital) positively relate to opportunity entrepreneurship.

Digital infrastructure and entrepreneurship

One way to contextualize the entrepreneurial phenomena’s theoretical advancement is to recognize key contingencies that influence previously studied relationships (Zahra, 2007). Specifically, this paper focus on the enabling effect digital infrastructure would have on the existing relationships between individual resources and OE. For this purpose, we distinguish digital infrastructure from other digital technologies, being the former a tool that provides communication and other computing capabilities (Nambisan, 2016).

In general, digital technologies potentialize agency possibilities across the venture creation process and fluidify its existing boundaries (Nambisan, 2016; Sussan & Acs, 2017). Thus, the rapid increase in the availability of a potent technology such as broadband would certainly redefine entrepreneurship’s circumstances (Kotnik & Stritar, 2015). High in relationality and low in specificity, this technology would accompany entrepreneurs in all venturing stages (Baron, 2006; von Briel et al., 2018).

Broadband's high relationality is evident in the World Wide Web (WWW), through which web surfers can access tons of information from all over the world about almost anything one can imagine. This last fact relates to this technology's low specificity, which also relates to its capacity to support diverse other digital technologies (e.g. Internet of Things). As it can be deduced from the previous, mere broadband's availability is not what enables market entry. It is information that it gives access to and being the facilitator for other digital technologies existence which in part would make the trick.

On this paper, the authors highlight the information access benefit as it is not their intention to constraint or bias the study toward digital entrepreneurship cases (Steininger, 2018). In consequence, the focus is set on broadband's relationality, being its specificity relevant if it were the case that broadband was necessarily incorporated in the business model (e.g. digital entrepreneurship). However, relationality and specificity are just properties any digital technology have, but enabling mechanisms are what finally translate them into actual benefits for entrepreneurship (von Briel et al., 2018).

In this sense, combination, generation, expansion, and substitution are mechanisms habilitated by broadband's high relationality (von Briel et al., 2018). Combination allows bundling resources to obtain better results, generation helps when replacing resources with alternative ones, expansion increases the availability of a determined resource, and substitution permits replacing resources required (von Briel et al., 2018). The first two mechanisms benefit business prospecting stage (e.g. opportunity recognition), and the second two benefit in developing a new venture idea (e.g. business modeling).

Nevertheless, broadband's low specificity combined with its high relationality could also become favorable when it comes to recognizing heterogeneous high specificity *ad hoc* digital and non-digital tools for the business (von Briel et al., 2018). Therefore, these identified tools would allow compression and conservation mechanisms, important to reduce the time and resources required to run business processes, respectively (von Briel et al., 2018). These mechanisms would become useful in exploiting stage.

Table 2 summarize digital technologies' properties, the enabling mechanisms they mainly facilitate, and the entrepreneurial process stage where they become more useful.

Table 2 Digital technologies properties and enabling mechanisms

Property	Enabling mechanism	Entrepreneurial process stage
Relationality	Combination	Prospecting
	Generation	
	Expansion	Developing
	Substitution	
Specificity	Compression	Exploiting
	Conservation	

Digital infrastructure's moderation and direct effect on OE

In accordance with pattern recognition perspective, any exposure to market disequilibria situations would ignite opportunity recognition (Baron, 2006; Davidsson, 2015; Kirzner, 1997). Consequently, well-developed cognitive framework individuals exposed to broadband's magnified surroundings would probably connect much more distant events than usual and therefore also recognize more market disequilibria situations. Thereby, prospecting and developing entrepreneurial stages are favored by broadband's relationality combined with entrepreneurs' human capital.

On the other hand, digital infrastructure also enhances the already proposed promotion effect social capital has on OE. By increasing the number of resources (e.g. expansion mechanism) accessed to through social networks and boosting effective interactions with each of its members, broadband's relationality stimulates social capital's link to entrepreneurial activity in general (Zhang & Li, 2017). In the case of OE, broadband's expansive effect on individuals' actual social network would also foster pattern recognition by possibly connecting more distant and unique resources accessed through it.

Certainly, it has been validated financial capital has a positive relationship with entrepreneurship, and specifically with OE too (Boudreaux & Nikolaev, 2018; De Clercq et al., 2011). However, formal institutions like economic freedom seem to debilitate it (Boudreaux & Nikolaev, 2018). The authors propose that the case would be similar when broadband is outspread. Individuals' financial capital would become less important when expansion and substitution enabling mechanisms help to reduce usual information asymmetry about alternative financial instruments (Shane & Venkataraman, 2000).

As seen in Table 1, studies have widely examined interaction effects with individuals' resources considered in this document. Nonetheless, only one of them has faced the case of OE (Boudreaux & Nikolaev, 2018). Based on all the exposed, we propose:

Hypothesis 2: As broadband access increases, individual’s resources relationship with opportunity entrepreneurship becomes stronger in the case of (a) human and (b) social capital; and weaker in the case of (c) financial capital.

As said before, broadband’s low specificity in combination with its high relationality results beneficial for entrepreneurship. But especially in the case of OE, active or passive search implied in opportunity recognition (Baron, 2006), would help in identifying more precise tools for the new business operation. It is the high specificity of these tools which would provide efficiency mechanisms, and finally benefit entrepreneurial exploitation stage.

Previous studies have validated the digital infrastructure’s positive relationship with entrepreneurial activity (Alderete, 2014, 2017; Audretsch et al., 2015; Kotnik & Stritar, 2015). However, there is little evidence this could be replicated in the case of OE (Turkina & Thai, 2013). On the other hand, other aggregated conditions’ (e.g. institutions) relationship with OE lead to think this broadband-OE link’s behavior would depend on contextual circumstances (Boudreaux & Nikolaev, 2018; Fuentelsaz et al., 2015; Raza et al., 2018; Turkina & Thai, 2013). Based on the exposed, we propose:

Hypothesis 3: Broadband access positively relates to opportunity entrepreneurship.

Figure 1 shows the authors’ proposed model in which digital infrastructure has a direct effect on OE and an indirect effect through its relationships with the individual’s resources.

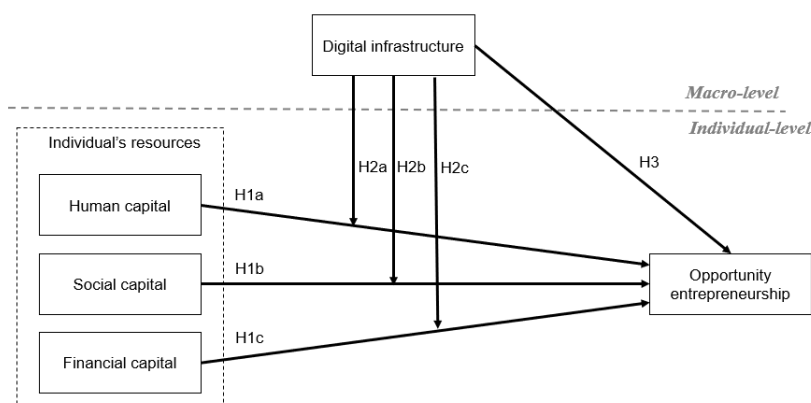


Fig. 1 Conceptual framework

DATA AND METHODS

To test the hypotheses formulated, a data set which combines two main sources is used: The Global Entrepreneurship Monitor (GEM) database for entrepreneurial activity’s individual-level data, and The International Telecommunications Union (ITU) database for broadband

infrastructure's national-level data. The study considered the period 2011-2016, included 37 countries with complete national-level data, and gathered 463,454 individual-level observations.

The GEM project gathers new business activity's yearly data across countries. The authors utilize its Adult Population Survey (APS), which considers a minimum of 2,000 adults per country per year (Amorós, 2011; Urbano & Alvarez, 2014). ITU, on the other hand, gathers country's ICT yearly data from national agencies. Authors utilize broadband penetration rates to capture countries' digital infrastructure availability.

Variables

The dependent variable in this study is OE. Since the relevance of studying it lays on its relationship with economic growth, we focus on growth-orientated opportunity-motivated entrepreneurs. In this sense, we consider an operationalization of the variable which previously has been validated to be linked with ICT development (Turkina & Thai, 2013). We use GEM's classification of early-stage entrepreneurial activity and filter those cases which are opportunity-driven and that expect to have more than ten employees in the next five years. Thus, cases which fulfill the mentioned criteria would have the value 1 in OE, otherwise, this would be 0.

As independent variables, human, social, and financial capital are also considered as dummy variables which take the value of 1 when individuals have had any tertiary education, knows someone who has undertaken a new business in the past two years, or is part of the upper household income tercile, respectively. On the other hand, fixed and mobile broadband national subscription rates are considered as contextual variables. This disaggregation between fixed and mobile is a suggested practice in the literature due to its fine tuning when extracting practical recommendations (Angulo-Guerrero et al., 2017; Boudreaux & Nikolaev, 2018; Colovic & Lamotte, 2015; Schmutzler et al., 2018).

By focusing on digital infrastructure as the only contextual independent variable, we do not pretend to leave aside the importance of institutions when trying to understand the entrepreneurial phenomena, and OE in particular (Aparicio et al., 2016; Peter J . Boettke & Christopher J . Coyne, 2009). Therefore, a recent countries' institutional systems taxonomy is considered as a control variable (Fainshmidt, Judge, Aguilera, & Smith, 2018), just as GLOBE's project ingroup-collectivism cultural dimension which indicates individuals' pride, loyalty, and cohesiveness expression in the various organizations they are a part of (Schmutzler

et al., 2018). Age and gender are also considered control variables as is in most related studies.

Table 3 shows a further description of each variable.

Table 3 Description of variables

Variable	Description and source	Values	Authors based on
Dependent variable	OE Early-stage entrepreneur (have paid wages for at least the last three months and are less than 3.5 years old) who is opportunity-driven and expects to have more than 10 employees within 5 years. GEM (APS)	1. Yes 0. No	(Turkina & Thai, 2013) (Boudreaux & Nikolaev, 2018) (Raza et al., 2018)
Individual resources	Human capital (HC) Individual with any tertiary education. GEM (APS)	1. Yes 0. No	(Boudreaux & Nikolaev, 2018) (De Clercq et al., 2011) (Lim et al., 2016) (Ramos-Rodríguez, Medina-Garrido, Lorenzo-Gómez, & Ruiz-Navarro, 2010) (Bayon, Lafuente, & Villaint, 2016)
	Social Capital (SC) An individual who knows someone who has created a firm in the last two years. GEM (APS)	1. Yes 0. No	(Ramos-Rodríguez et al., 2010) (Nieto & González-Álvarez, 2016)
	Financial capital (FC) An individual who is in the top household income tercile. GEM (APS)	1. Yes 0. No	(Lim et al., 2016) (Boudreaux & Nikolaev, 2018)
Digital infrastructure	Fixed-broadband (FB) Country's number of fixed-broadband subscriptions per 100 inhabitants. ITU		(Lee & Lio, 2017)
	Mobile-broadband (MB) Country's number of active mobile-broadband subscriptions per 100 inhabitants. ITU		(Alderete, 2017) (Lee & Lio, 2017)
Control variables (country)	Coordinated market economy (CME): Institutional system characterized by concertation through inter-organizational networks	1. Yes 0. No	(Fainshmidt et al., 2018)
	State-led: Institutional system characterized by a state which acts directly in the economic ordering of society	1. Yes 0. No	
	Fragmented with fragile state: Institutional system like "state-led", but higher in state's intervention and with multiple institutional voids	1. Yes 0. No	
	Family-led: Institutional system characterized by the presence of economically powerful families with central roles in society	1. Yes 0. No	
	Centralized Tribe: Institutional system like "family-led", but powerful families guard vital resources and provide a paternalistic net for lower levels of society	1. Yes 0. No	
	Emergent LME: Institutional system characterized by market supply and demand resource allocation, but with some state orchestration of a regulatory government system	1. Yes 0. No	
	Collaborative agglomerations: Institutional system like "coordinated market economy", but more focused on growth than in welfare programs	1. Yes 0. No	
	Hierarchically Coordinated: Institutional system like "collaborative agglomerations" but with more state intervention and some family-influence on corporate governance	1. Yes 0. No	
Ingroup – collectivism: Average of what individuals' pride, loyalty, and cohesiveness expression in the various organizations they are a part of should be measured in a seven-point Likert scale. GLOBE		(Schmutzler et al., 2018)	
Control variables (individual)	Age Individual's age. GEM (APS)	[18-64]	(Boudreaux & Nikolaev, 2018) (Raza et al., 2018)
	Gender Individual's biological sex. GEM (APS)	1. Female 0. Male	(Boudreaux & Nikolaev, 2018) (Raza et al., 2018)

Data analysis and model

We use logistic regression analysis given the binary nature of our dependent variable. Given that fixed and mobile digital infrastructure are expected to be highly correlated and their effect on economic activity, and particularly on entrepreneurship have been proven to be distinct

(Alderete, 2014; Thompson & Garbacz, 2011), two equivalent scenarios are proposed to analyze each case separately. For each one, a stepwise testing strategy is utilized by first considering a “null model” which includes individuals’ resources relationship with OE (Model 1) (Boudreaux & Nikolaev, 2018). Then, we augment all control variables to estimate the amount of variance they explain (Model 2). A third model includes the direct relationship proposed between digital infrastructure and the dependent variable. Following, human, social, and financial capital’s interaction with digital infrastructure are independently added in the subsequent models 4, 5, and 6. Thus, the complete logistic regression’s equation would be (1):

$$\begin{aligned}
 \text{Logistic } OE_i = & \beta_0 + \beta_1 \text{human capital}_i (HC) + \beta_2 \text{social capital}_i (SC) + \beta_3 \text{financial capital}_i (FC) \\
 & + \beta_4 \text{age}_i + \beta_5 \text{gender}_i + \{\beta_{6-13}\} [\text{institutional systems' dummies}]_i + \beta_{14} \text{ingroup collectivism}_i \\
 & + \beta_{15} \text{broadband}_i (B) + \beta_{17} HC_i \times B_i + \beta_{19} SC_i \times B_i + \beta_{21} FC_i \times B_i + e_i \dots\dots\dots(1)
 \end{aligned}$$

Further description of the data utilized is displayed in tables 4 and 5.

Table 4 Opportunity-driven entrepreneurs per gender distribution

Entrepreneur	OE	Male (50.2%)	Female (49.8%)
Yes (10.5%)	Yes (11.5%)	4'080 (73.1%)	1'502 (26.9%)
	No (88.5%)	24'456 (56.8%)	18'635 (43.2%)
No (89.5%)		204'013 (49.2%)	210'768 (50.8%)

RESULTS AND DISCUSSION

Table 6 displays pairwise correlation coefficients between variables as well as other summary statistics. Particularly, fixed and mobile digital infrastructure are measured through continuous variables and each one has been mean standardized to their Z-score. A multicollinearity test is also conducted due to some high correlation coefficients displayed. However, in no case, a variable’s variance inflation factor (VIF) exceeds the 10-cut-off value and mean VIF’s are 2.12 and 1.64 for fixed and mobile broadband scenarios, respectively.

Logistic regression’s results are shown in Table 7. Odds ratio that exhaust both scenarios’ models are reported and most of them are significant. Just as in previous studies (Urbano & Alvarez, 2014), the probability of a man becoming an opportunity-driven entrepreneur seems to be considerably higher (odds ratio = 0.43, p = 0.000). Although age is statistically significant, its effect on OE is minimal (odds ratio = 0.99, p = 0.000).

Table 5 Descriptive statistics by country

Country	N	FB	MB	HC	SC	FC	OE	Ingroup- collectivism	Institutional System
Australia	5,178	26.64	103.17	0.63	0.30	0.47	0.017	5.75	
Ireland	8,568	25.35	78.02	0.66	0.33	0.39	0.013	5.74	
Switzerland	8,431	42.71	68.76	0.33	0.29	0.42	0.006	4.94	Market-based (LME)
United Kingdom	19,718	36.33	82.37	0.50	0.29	0.40	0.008	5.55	
United States	15,728	29.98	97.85	0.64	0.27	0.38	0.021	5.77	
Austria	8,768	27.22	65.02	0.21	0.37	0.41	0.004	5.27	
Denmark	4,613	40.68	106.10	0.75	0.33	0.33	0.006	5.50	
Finland	9,735	31.00	125.47	0.33	0.43	0.38	0.005	5.42	
France	7,614	39.38	62.40	0.48	0.34	0.29	0.004	5.42	
Italy	6,776	23.42	65.02	0.15	0.24	0.18	0.003	5.72	
Japan	5,091	29.44	118.04	0.58	0.15	0.35	0.006	5.26	CME
Netherlands	10,901	40.55	68.57	0.35	0.35	0.49	0.008	5.17	
Portugal	7,291	25.73	42.47	0.31	0.26	0.27	0.008	5.94	
Spain	77,492	26.55	68.17	0.37	0.33	0.38	0.002	5.79	
Sweden	11,024	33.87	111.72	0.48	0.37	0.38	0.005	6.04	
Argentina	6,680	14.28	43.40	0.28	0.33	0.28	0.018	6.15	
China	17,075	15.83	35.32	0.34	0.53	0.38	0.020	5.09	
India	13,577	1.22	6.54	0.33	0.28	0.32	0.002	5.32	
Indonesia	12,144	1.38	38.97	0.13	0.65	0.24	0.002	5.67	
Malaysia	10,274	8.80	46.74	0.31	0.39	0.36	0.003	5.85	State-led
Philippines	5,454	3.32	28.42	0.30	0.40	0.23	0.005	6.18	
Russia	11,362	16.53	62.15	0.73	0.34	0.34	0.004	5.79	
Thailand	10,592	7.89	54.46	0.47	0.31	0.32	0.009	5.76	
Egypt	5,005	3.62	37.80	0.37	0.23	0.17	0.009	5.56	Fragmented with fragile state
Brazil	27,542	10.81	60.48	0.10	0.36	0.31	0.006	5.15	
Colombia	25,621	9.63	27.71	0.32	0.29	0.38	0.056	6.25	Family-led
Mexico	12,854	11.15	29.19	0.13	0.48	0.39	0.005	5.95	
Nigeria	4,387	0.02	12.35	0.33	0.79	0.37	0.035	5.48	
Iran	14,712	7.33	11.38	0.45	0.41	0.34	0.014	5.86	Centralized tribe
Israel	6,601	26.26	62.79	0.63	0.43	0.30	0.013	5.75	Emergent LME
Singapore	4,787	25.87	133.86	0.66	0.18	0.30	0.023	5.50	
Hungary	9,608	25.18	30.53	0.34	0.26	0.28	0.010	5.54	
Poland	9,351	17.12	57.26	0.43	0.43	0.34	0.010	5.74	Collaborative agglomerations
Slovenia	7,749	26.10	44.85	0.41	0.37	0.33	0.005	5.71	
Kazakhstan	4,295	11.54	56.83	0.57	0.61	0.40	0.020	5.44	
South Korea	6,429	38.70	107.55	0.67	0.31	0.34	0.010	5.41	Hierarchically Coordinated
Turkey	30,427	11.63	38.03	0.43	0.32	0.31	0.029	5.77	

Regarding the institutional context, only one institutional system's dummy is not statistically significant (fragmented with fragile state). Specifically, ingroup collectivism has the highest odds ratio with a value of 3.03 ($p = 0.000$). This means that one unit more in this cultural dimension would imply an increase by a factor of 3.03 in the probability of becoming an opportunity-driven entrepreneur. At last, having the highest odds ratio in ingroup collectivism

Table 6 Descriptive and bivariate statistics

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
<i>Individual-level</i>																	
(1) EO	1.00																
(2) HC	0.05*	1.00															
(3) SC	0.08*	0.07*	1.00														
(4) FC	0.06*	0.24*	0.09*	1.00													
(5) Age	-0.03*	-0.04*	-0.10*	-0.00*	1.00												
(6) Gender	-0.05*	0.00*	-0.06*	-0.07*	0.02*	1.00											
<i>Country-level</i>																	
(7) CME	-0.05*	-0.02*	-0.04*	0.03*	0.13*	-0.01*	1.00										
(8) State-led	-0.02*	-0.02*	0.06*	-0.03*	-0.08*	0.02*	-0.33*	1.00									
(9) Fragmented	-0.00*	-0.00	-0.03*	-0.04*	-0.01*	-0.00	-0.07*	-0.05*	1.00								
(10) Family-led	0.05*	-0.16*	0.03*	0.00*	-0.10*	0.02*	-0.29*	-0.20*	-0.04*	1.00							
(11) Centralized	0.00*	0.02*	0.02*	-0.00*	-0.08*	0.00*	-0.12*	-0.09*	-0.02*	-0.08*	1.00						
(12) Emergent	0.01*	0.08*	-0.01*	-0.02*	-0.00*	0.00*	-0.11*	-0.08*	-0.02*	-0.07*	-0.03*	1.00					
(13) Agglomerations	-0.01*	0.00*	-0.00	-0.02*	0.04*	0.02*	-0.17*	-0.12*	-0.03*	-0.10*	-0.04*	-0.04*	1.00				
(14) Coordinated	0.04*	0.06*	-0.00*	-0.02*	-0.01*	-0.08*	-0.22*	-0.15*	-0.03*	-0.13*	-0.06*	-0.05*	-0.08*	1.00			
(15) Collectivism	0.04*	0.05*	-0.02*	-0.01*	-0.01*	-0.01*	0.02*	-0.06*	-0.03*	0.08*	0.12*	-0.01*	0.00	0.02*	1.00		
(16) FB	-0.04*	0.13*	-0.07*	0.04*	0.17*	0.01*	0.54*	-0.48*	-0.15*	-0.40*	-0.20*	0.08*	0.05*	-0.12*	-0.22*	1.00	
(17) MB	-0.04*	0.11*	-0.04*	0.00	0.13*	0.01*	0.38*	-0.28*	-0.05*	-0.28*	-0.26*	0.19*	-0.11*	-0.10*	-0.15*	0.70*	1.00
Mean (N=463,454)	0.12	0.386	0.353	0.349	39.77	0.498	0.322	0.188	0.011	0.152	0.032	0.025	0.058	0.089	5.659	0	0
Standard deviation	0.109	0.487	0.478	0.477	12.874	0.5	0.467	0.391	0.103	0.359	0.175	0.155	0.233	0.284	0.309	1	1
Min	0	0	0	0	18	0	0	0	0	0	0	0	0	0	4.943	-1.747	2.23
Max	1	1	1	1	64	1	1	1	1	1	1	1	1	1	6.253	1.758	2.837

* shows significance at the .05 level

Table 7 Logistic regression results predicting OE (odds ratios)

	Scenario with Fixed-Broadband						Scenario with Mobile-Broadband			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 3	Model 4	Model 5	Model 6
<i>Estimates</i>										
Individual-level										
H1a: HC	1.72* (0.05)	1.79* (0.05)	1.79* (0.05)	1.74* (0.06)	1.79* (0.05)	1.78* (0.05)	1.8* (0.05)	1.85* (0.06)	1.8* (0.05)	1.79* (0.05)
H1b: SC	3.87* (0.11)	3.62* (0.11)	3.63* (0.11)	3.63* (0.11)	4.09* (0.14)	3.63* (0.11)	3.63* (0.11)	3.63* (0.11)	3.98* (0.13)	3.63* (0.11)
H1c: FC	2.24* (0.06)	2.12* (0.06)	2.12* (0.06)	2.12* (0.06)	2.12* (0.06)	2.08* (0.06)	2.1* (0.06)	2.1* (0.06)	2.1* (0.06)	2.06* (0.06)
Age		0.99* (0)	0.99* (0.01)	0.99* (0)	0.99* (0)	0.99* (0)	0.99* (0)	0.99* (0)	0.99* (0)	0.99* (0)
Gender		0.43* (0.01)	0.43* (0.01)	0.43* (0.01)	0.43* (0.01)	0.43* (0.01)	0.43* (0.01)	0.43* (0.01)	0.43* (0.01)	0.43* (0.01)
Country-level										
CME		0.29* (0.02)	0.3* (0.02)	0.29* (0.02)	0.29* (0.02)	0.3* (0.02)	0.28* (0.02)	0.29* (0.02)	0.28* (0.02)	0.28* (0.02)
State-led		0.58* (0.03)	0.65* (0.05)	0.65* (0.05)	0.63* (0.05)	0.65* (0.05)	0.49* (0.03)	0.49* (0.03)	0.48* (0.02)	0.49* (0.03)
Fragmented with fragile state		1 (0.16)	1.15 (0.2)	1.15 (0.2)	1.02 (0.18)	1.15 (0.2)	0.83 (0.13)	0.84 (0.13)	0.83 (0.13)	0.83 (0.13)
Family-led		1.7* (0.08)	1.87* (0.14)	1.88* (0.14)	1.81* (0.13)	1.86* (0.14)	1.37* (0.08)	1.38* (0.08)	1.36* (0.08)	1.36* (0.08)
Centralized tribe		0.7* (0.06)	0.78* (0.08)	0.78* (0.08)	0.75* (0.08)	0.77* (0.08)	0.52* (0.05)	0.53* (0.05)	0.52* (0.05)	0.52* (0.05)
Emergent LME		1.2* (0.1)	1.23* (0.1)	1.23* (0.1)	1.21* (0.1)	1.22* (0.1)	1.22* (0.1)	1.21* (0.1)	1.21* (0.1)	1.21* (0.1)
Collaborative agglomerations		0.66* (0.05)	0.69* (0.06)	0.68* (0.06)	0.67* (0.05)	0.69* (0.06)	0.56* (0.05)	0.56* (0.05)	0.55* (0.04)	0.56* (0.04)
Hierarchically coordinated		1.66* (0.08)	1.8* (0.12)	1.8* (0.12)	1.74* (0.11)	1.79* (0.12)	1.4* (0.08)	1.41* (0.08)	1.38* (0.08)	1.4* (0.08)
Ingroup-collectivism		3.03* (0.14)	3.1* (0.12)	3.08* (0.15)	3.01* (0.15)	3.09* (0.15)	2.8* (0.14)	2.8* (0.14)	2.75* (0.13)	2.8* (0.14)
H3: FB			1.06 (0.03)	1.1* (0.04)	0.81* (0.03)	1.09* (0.04)				
H3: MB							0.88* (0.02)	0.84* (0.02)	0.73* (0.02)	0.91* (0.02)
Cross-level interaction terms										
H2a: HC x FB				0.94* (0.03)						
H2a: HC x MB							1.07* (0.03)			
H2b: SC x FB					1.41* (0.05)					
H2b: SC x MB								1.28* (0.04)		
H2c: FC x FB						0.95 (0.03)				
H2c: FC x MB										0.94* (0.03)
<i>Model fit statistics</i>										
Log Likelihood	-28'049.161	-25'932.829	-25'931.111	-25'929.123	-25'876.818	-25'929.713	-25'910.773	-25'908.385	-25'876.566	-25'908.711
LR chi2	4'333.68	8'566.34	8'569.78	8'573.75	8'678.36	8'572.57	8'610.45	8'615.23	8'678.87	8'614.58
Number of variables	3	14	15	16	16	16	15	16	16	16
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.0717	0.1418	0.1418	0.1419	0.1436	0.1419	0.1425	0.1426	0.1436	0.1425

* shows significance at the .05 level

is coincident with the fact that informal institutions are the most related aspect of the institutional context with OE (Aparicio et al., 2016).

Hypotheses 1a, 1b, and 1c are validated in all models as in a recent study (Boudreaux & Nikolaev, 2018). Knowing an entrepreneur who has initiated a new business in the last two years is related to an increase by a factor of 3.87 ($p = 0.000$) in the probability of becoming an opportunity-driven entrepreneur. A similar case occurs with financial and human capital, but by a factor of 2.24 ($p = 0.000$) and 1.72 ($p = 0.000$), respectively.

On the other hand, only the interaction hypothesis 2b is fully validated. Social capital's important effect match with previous findings in the literature (Davidsson & Honig, 2003; Zhang & Li, 2017), not only on its direct effect but also on its interaction effect with both kinds of digital infrastructure considered. Hypotheses 2a and 2c are partially validated. Contrary to what was expected, human capital's promoting effect on OE is weaker in countries with more access to fixed-broadband (odds ratio = 0.94, $p = 0.045$). Regarding financial capital's promoting effect on OE, it is not affected by the variance in countries' access to fixed-broadband. Figures 2 and 3 describe the interaction effects validated.

Counterintuitively, digital infrastructure seems to discourage OE. However, just as in the case of hypotheses 2a, the partial validation of hypothesis 3 not only makes evident what has already been mentioned about the distinct effect fixed and mobile broadband have on economic activity, but also a complementarity effect between both kinds of technology (Alderete, 2017; Thompson & Garbacz, 2011). The p-value for fixed-broadband scenario's odd ratio in model 3 is close enough to 0.05 to say that at least the direction of the almost validated effect would favor the probability of becoming and opportunity-driven entrepreneur (odds ratio = 1.06, $p = 0.062$), contrary to what happens in the mobile-broadband's scenario.

CONCLUSIONS

As previously mentioned, entrepreneurship can't be fully understood without considering its institutional context. Being this said, this study locates its interest in the lowest contextual level of analysis according to Williamson's hierarchical model of institutional systems, the Kirznerian level (Bylund & McCaffrey, 2017). Nevertheless, there is no doubt of the nowadays superior importance of the institutional context for entrepreneurship compared to the one proposed on this paper, therefore it is not rare to find most of our dependent variable's variance explained after augmenting contextual control variables in Model 2. However, not only fast society's digitalization process and the existing and increasing adoption gap between

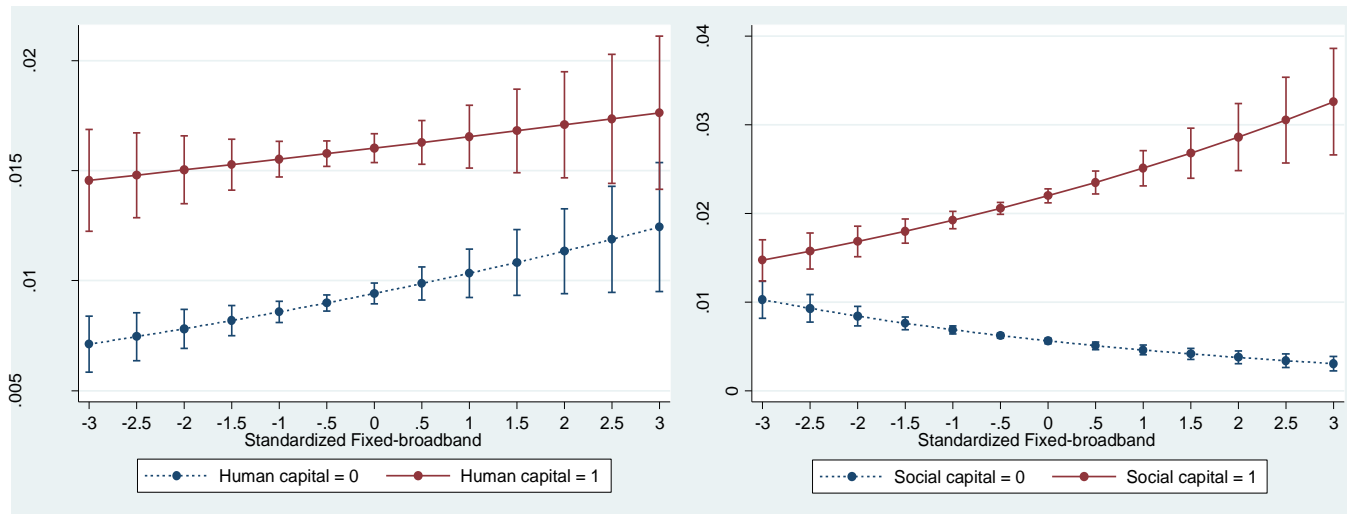


Fig. 2 Interaction plot of Fixed-broadband and individuals' resources. *Note.* 95% confidence intervals reported

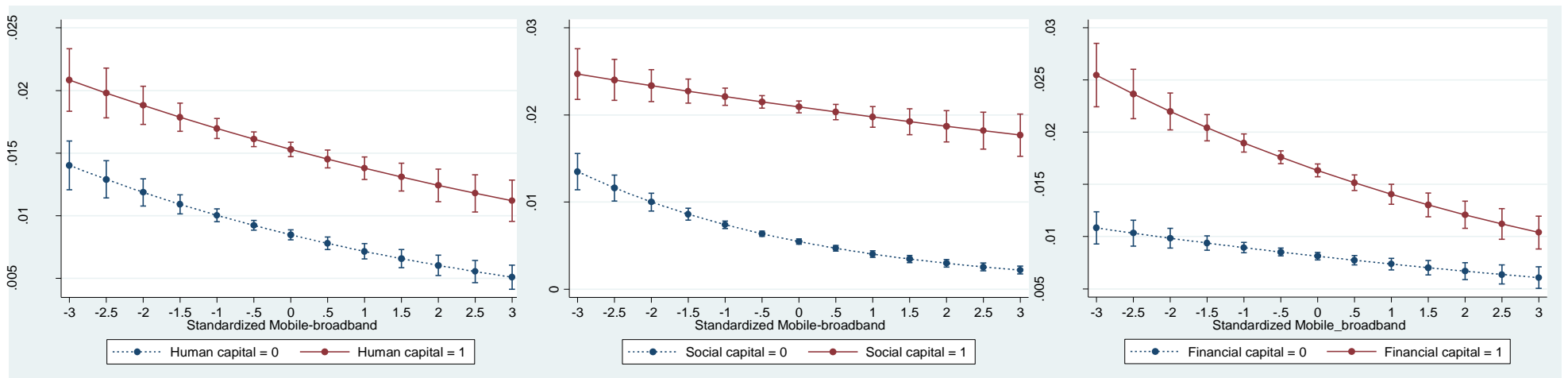


Fig. 3 Interaction plot of Mobile-broadband and individuals' resources. *Note.* 95% confidence intervals reported

developing and developed countries makes it imperative to consider this topic in every country's agenda.

Regarding the institutional system's taxonomy utilized, family-led and hierarchically coordinated countries are the most encouraging towards OE. Most of those are developing countries, and various of them are upper-middle-income Latin-American countries. Somehow, this countries' precarious institutional development (Ge, Carney, & Kellermanns, 2018; Khanna & Palepu, 1997; Stephan, Uhlaner, & Stride, 2015) could have opened possibilities mainly detected by opportunity-driven entrepreneurs. Further analysis of the enabling effect these contexts have on OE could be a matter of a future study.

Particularly, collectivism has gained attention in many previous studies (Cullen et al., 2014; Petrakis, 2014). It is accepted that entrepreneurship is a team sport (Davidsson, 2016), but it is also established that there is not only one conception of the phenomenon on this matter (Ben Letaifa & Goglio-Primard, 2016). Accordingly, our results sustain that more collectivistic societies highly support OE. Given the importance of this institutional dimension and the subjacent network aspect shared with the also important social capital, an interaction effect between them could be a matter of a future study.

Broadband's effect on entrepreneurship, in general, has proven to be positive (Alderete, 2014, 2017). Nevertheless, this study shows some contradiction in this matter. Considering the growth-oriented adjusted version of OE to extract more relevant conclusions to development policymakers might have shed light into an unexpected effect digital infrastructure have on this case of market entry. Properties and mechanisms of broadband previously explained certainly reduces the number of resources the entrepreneurs would need to operate a new business. Nevertheless, it is plausible they could underestimate the number of employees needed within a five years period. Based on this, digital infrastructure would discourage entrepreneurs from having many employees and OE therefore. On the other hand, more potential entrepreneurs would be enabled by digital technologies to undertake new businesses and the benefits brought to the table by those technologies could potentialize their added value to the economy. In other words, the traditional conception of what productive entrepreneurship is could be reframed as the digital era restructures the economy. Further analysis of this reflection should be considered in future empirical designs.

Regarding the interaction effects evidenced on this study, the one that involves human capital could deserve deeper reflection about the mechanisms by which mobile-broadband

infrastructure encourages its promoting effect in opposition to what seems to happen with fixed-broadband infrastructure. One possible explanation for this could be the fact that already established firms may be enabled to expand their locations by a more extended fixed-broadband infrastructure that could support their operations. Being this the case, highly trained potential entrepreneurs could be induced by these firms to become part of their staff, blocking the possibility of new market entries. On the other hand, mobile-broadband infrastructure is within everyone's reach and eventually could enable knowledgeable entrepreneurs to pursue business possibilities by making them not only desirable but also feasible.

Limitations of any quantitative approach, especially utilizing secondary data with predefined variables, are not missing on this study. ITU defines ICT development through three dimensions: access, use and skills (Ayanso, Cho, & Lertwachara, 2014). This study has only focused on the access dimension, but further analysis of the other two could certainly clarify the results obtained. Also, characteristic heterogeneity across countries' contextual and development spectrum makes it imperative to consider countries' contextual variance. This was done by including contextual control variables that summarize relevant aspects recognized in the literature. However, a multi-level technique could incorporate in the estimates not considered countries' variance.

Finally, incorporating digital infrastructure as a heterogeneous aspect in the context (Katz & Callorda, 2018) will help to continue in the understanding of the entrepreneurial phenomena and closing the gap between research and policy design (Zahra, 2007; Zahra & Wright, 2011).

REFERENCES

- Ács, Z. J., Autio, E., & Szerb, L. (2014). National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy*, 43(3), 476–494. <https://doi.org/10.1016/j.respol.2013.08.016>
- Afandi, E., Kermani, M., & Mammadov, F. (2016). Social capital and entrepreneurial process. *International Entrepreneurship and Management Journal*, 13(3), 685–716. <https://doi.org/10.1007/s11365-016-0421-8>
- Alderete, M. V. (2014). ICT incidence on the entrepreneurial activity at country level. *International Journal of Entrepreneurship and Small Business*, 21(2), 183. <https://doi.org/10.1504/IJESB.2014.059472>
- Alderete, M. V. (2017). Mobile Broadband: A Key Enabling Technology for Entrepreneurship? *Journal of Small Business Management*, 55(2), 254–269. <https://doi.org/10.1111/jsbm.12314>
- Álvarez, C., Urbano, D., & Amorós, J. E. (2014). GEM research: Achievements and challenges. *Small Business Economics*, 42(3), 445–465. <https://doi.org/10.1007/s11187->

- Alvarez, S. A., & Busenitz, L. W. (2001). The entrepreneurship of resource-based theory. *Entrepreneurship: Concepts, Theory and Perspective*, (August), 207–227. https://doi.org/10.1007/978-3-540-48543-8_10
- Amorós, J. (2011). El Proyecto Global Entrepreneurship Monitor (GEM): Una Aproximación Desde el Contexto Latinoamericano THE Global Entrepreneurship Monitor Project (GEM): A Latin-American Context Approach. *Academia*, 46(sin issue), 1–15. <https://doi.org/amos2011>
- Angulo-Guerrero, M. J., Pérez-Moreno, S., & Abad-Guerrero, I. M. (2017). How economic freedom affects opportunity and necessity entrepreneurship in the OECD countries. *Journal of Business Research*, 73, 30–37. <https://doi.org/10.1016/j.jbusres.2016.11.017>
- Aparicio, S., Urbano, D., & Audretsch, D. (2016). Institutional factors, opportunity entrepreneurship and economic growth: Panel data evidence. *Technological Forecasting and Social Change*, 102, 45–61. <https://doi.org/10.1016/j.techfore.2015.04.006>
- Audretsch, D. B., Heger, D., & Veith, T. (2015). Infrastructure and entrepreneurship. *Small Business Economics*, 44(2), 219–230. <https://doi.org/10.1007/s11187-014-9600-6>
- Ayanso, A., Cho, D. I., & Lertwachara, K. (2014). Information and Communications Technology Development and the Digital Divide: A Global and Regional Assessment. *Information Technology for Development*, 20(1), 60–77. <https://doi.org/10.1080/02681102.2013.797378>
- Baptista, R., Karaöz, M., & Mendonça, J. (2014). The impact of human capital on the early success of necessity versus opportunity-based entrepreneurs. *Small Business Economics*, 42(4), 831–847. <https://doi.org/10.1007/s11187-013-9502-z>
- Barnett, William; Hu, Mingzhi; Wang, X. (2018). Does the Utilization of Information Communication Technology Promote Entrepreneurship: Evidence from Rural China - EconLit - ProQuest, 1–38. <https://doi.org/10.1128/JB.187.20.7161>
- Baron, R. A. (2006). Opportunity Recognition as Pattern Recognition: How Entrepreneurs “Connect the Dots” to Identify New Business Opportunities. *Academy of Management Perspectives*, 20, 104–120. <https://doi.org/10.5465/AMP.2006.19873412>
- Baumol W. (1990). Entrepreneurship: Productive, Unproductive, and Destructive. *Journal of Business Venturing*, 11(1), 3–22. [https://doi.org/10.1016/0883-9026\(94\)00014-X](https://doi.org/10.1016/0883-9026(94)00014-X)
- Bayon, M. C., Lafuente, E., & Villaint, Y. (2016). Human capital and the decision to exploit innovative opportunity. *Management Decision*, 54(7), 1615–1632. <https://doi.org/10.1108/09574090910954864>
- Ben Letaifa, S., & Goglio-Primard, K. (2016). How does institutional context shape entrepreneurship conceptualizations? *Journal of Business Research*, 69(11), 5128–5134. <https://doi.org/10.1016/j.jbusres.2016.04.092>
- Bennett, D. L. (2018). Infrastructure investments and entrepreneurial dynamism in the U.S. *Journal of Business Venturing*, (October), 1–28. <https://doi.org/10.1016/j.jbusvent.2018.10.005>
- Boudreaux, C. J., & Nikolaev, B. (2018). Capital is not enough: opportunity entrepreneurship and formal institutions. *Small Business Economics*, (May), 1–30.

<https://doi.org/10.1007/s11187-018-0068-7>

- Bylund, P. L., & McCaffrey, M. (2017). A theory of entrepreneurship and institutional uncertainty. *Journal of Business Venturing*, 32(5), 461–475. <https://doi.org/10.1016/j.jbusvent.2017.05.006>
- Colovic, A., & Lamotte, O. (2015). Technological Environment and Technology Entrepreneurship: A Cross-Country Analysis. *Creativity and Innovation Management*, 24(4), 617–628. <https://doi.org/10.1111/caim.12133>
- Cullen, J. B., Johnson, J. L., & Parboteeah, K. P. (2014). National Rates of Opportunity Entrepreneurship Activity: Insights From Institutional Anomie Theory. *Entrepreneurship: Theory and Practice*, 38(4), 775–806. <https://doi.org/10.1111/etap.12018>
- Davidsson, P. (2015). Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization. *Journal of Business Venturing*, 30(5), 674–695. <https://doi.org/10.1016/j.jbusvent.2015.01.002>
- Davidsson, P. (2016). The field of Entrepreneurship Research: Some Significant Developments. In *Contemporary Entrepreneurship: Multidisciplinary Perspectives on Innovation and Growth* (pp. 17–28). <https://doi.org/10.1007/978-3-319-28134-6>
- Davidsson, P., & Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing*, 18(3), 301–331. [https://doi.org/10.1016/S0883-9026\(02\)00097-6](https://doi.org/10.1016/S0883-9026(02)00097-6)
- De Clercq, D., Lim, D. S. K., & Oh, C. H. (2011). Individual-level resources and new business activity: The contingent role of institutional context. *Entrepreneurship: Theory and Practice*, 37(2), 303–330. <https://doi.org/10.1111/j.1540-6520.2011.00470.x>
- Del Giudice, M., & Straub, D. (2011). Editor's Comments – IT and Entrepreneurism: An On-Again, Off-again Love Affair or a Marriage? *MIS Quarterly*, 35(4), 3–8.
- Dheer, R. J. S. (2017). Cross-national differences in entrepreneurial activity: role of culture and institutional factors. *Small Business Economics*, 48(4), 813–842. <https://doi.org/10.1007/s11187-016-9816-8>
- Estrin, S., Korosteleva, J., & Mickiewicz, T. (2013). Which institutions encourage entrepreneurial growth aspirations? *Journal of Business Venturing*, 28(4), 564–580. <https://doi.org/10.1016/j.jbusvent.2012.05.001>
- Fainshmidt, S., Judge, W. Q., Aguilera, R. V., & Smith, A. (2018). Varieties of institutional systems: A contextual taxonomy of understudied countries. *Journal of World Business*, 53(3), 307–322. <https://doi.org/10.1016/j.jwb.2016.05.003>
- Fuentelsaz, L., González, C., Maícas, J. P., & Montero, J. (2015). How different formal institutions affect opportunity and necessity entrepreneurship. *BRQ Business Research Quarterly*, 18(4), 246–258. <https://doi.org/10.1016/j.brq.2015.02.001>
- Ge, J., Carney, M., & Kellermanns, F. (2018). Who Fills Institutional Voids? Entrepreneurs' Utilization of Political and Family Ties in Emerging Markets. *Entrepreneurship Theory and Practice*, 104225871877317. <https://doi.org/10.1177/1042258718773175>
- Iversen, J., Malchow-Møller, N., & Sørensen, A. (2016). Success in entrepreneurship: a complementarity between schooling and wage-work experience. *Small Business*

- Economics*, 47(2), 437–460. <https://doi.org/10.1007/s11187-016-9732-y>
- Katz, R., & Callorda, F. (2018). Accelerating the development of Latin American digital ecosystem and implications for broadband policy. *Telecommunications Policy*, 42(9), 661–681. <https://doi.org/10.1016/j.telpol.2017.11.002>
- Khanna, T., & Palepu, K. (1997). Why Focused Strategies May Be Wrong for Emerging Markets. *Harvard Business Review*.
- Kirzner, I. M. (1997). Entrepreneurial Discovery and the Competitive Market Process: An Austrian Approach. *Source Journal of Economic Literature*, 35(1), 60–85.
- Knight, F. H. (1921). *Risk, uncertainty and profit*. Augustus Kelley.
- Kotnik, P., & Stritar, R. (2015). Ict As the Facilitator of Entrepreneurial Activity: an Empirical Investigation. *Amfiteatru Economic*, 17(38), 277–290.
- Lee, M. H., & Lio, M. C. (2017). Can information and communication technology promote venture creation? A cross-country study using an instrument variable approach. *Information Development*, 34(4), 321–333. <https://doi.org/10.1177/0266666917697368>
- Leković, B., & Marić, S. (2017). The Technological Availability: Incentive for Opportunity Entrepreneurship. *Strategic Management Journal*, 22(3), 11–18.
- Lim, D. S. K., Oh, C. H., & De Clercq, D. (2016). Engagement in entrepreneurship in emerging economies: Interactive effects of individual-level factors and institutional conditions. *International Business Review*, 25(4), 933–945. <https://doi.org/10.1016/j.ibusrev.2015.12.001>
- Madriz, C., Leiva, J. C., & Henn, R. (2018). Human and social capital as drivers of entrepreneurship. *Small Business International Review*, 2(1), 29–42. Retrieved from <http://sbir.upct.es/index.php/sbir/article/view/129/47>
- Mitchell, R. K., Busenitz, L. W., Lant, T., McDougall, P. P., Morse, E. A., & Smith, J. B. (2002). Toward a Theory of Entrepreneurial Cognition: Rethinking the People Side of Entrepreneurship Research. *Entrepreneurship Theory and Practice*, 93–104. <https://doi.org/10.1111/1540-8520.00001>
- Nambisan, S. (2016). Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship. *Entrepreneurship: Theory and Practice*, 41(6), 1029–1055. <https://doi.org/10.1111/etap.12254>
- Naudé, W. (2010). Entrepreneurship, developing countries, and development economics: New approaches and insights. *Small Business Economics*, 34(1), 1–12. <https://doi.org/10.1007/s11187-009-9198-2>
- Nieto, M., & González-Álvarez, N. (2016). Social capital effects on the discovery and exploitation of entrepreneurial opportunities. *International Entrepreneurship and Management Journal*, 12(2), 507–530. <https://doi.org/10.1007/s11365-014-0353-0>
- North, D. C. (1990). *Institutions, institutional change and economic performance*.
- Peter J . Boettke, & Christopher J . Coyne. (2009). Context Matters: Institutions and Entrepreneurship. *Foundations and Trends in Entrepreneurship*, 5(3), 135–209.
- Petrakis, P. E. (2014). The construction of opportunity entrepreneurship function. *International Entrepreneurship and Management Journal*, 10(2), 207–230.

<https://doi.org/10.1007/s11365-012-0241-4>

- Ramos-Rodríguez, A.-R., Medina-Garrido, J.-A., Lorenzo-Gómez, J.-D., & Ruiz-Navarro, J. (2010). What you know or who you know? The role of intellectual and social capital in opportunity recognition. *International Small Business Journal*, 28(6), 566–581. <https://doi.org/10.1177/0266242610369753>
- Raza, A., Muffatto, M., & Saeed, S. (2018). The influence of formal institutions on the relationship between entrepreneurial readiness and entrepreneurial behaviour: A cross-country analysis. *Journal of Small Business and Enterprise Development*. <https://doi.org/10.1108/JSBED-01-2018-0014>
- Schmutzler, J., Andonova, V., & Diaz-Serrano, L. (2018). How Context Shapes Entrepreneurial Self-Efficacy as a Driver of Entrepreneurial Intentions: A Multilevel Approach. *Entrepreneurship Theory and Practice*, 104225871775314. <https://doi.org/10.1177/1042258717753142>
- Schumpeter, J. A. (1934). *Capitalism, socialism, and democracy*. Harper & Row. <https://doi.org/10.4206/aus.2016.n19-12>
- Semrau, T., & Hopp, C. (2016). Complementary or compensatory? A contingency perspective on how entrepreneurs' human and social capital interact in shaping start-up progress. *Small Business Economics*, 46(3), 407–423. <https://doi.org/10.1007/s11187-015-9691-8>
- Shane, S. A., & Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research. *The Academy of Management Review*, 25(1), 217–226.
- Steininger, D. M. (2018). Linking information systems and entrepreneurship: A review and agenda for IT-associated and digital entrepreneurship research. *Information Systems Journal*, (December 2013), 1–45. <https://doi.org/10.1111/isj.12206>
- Stephan, U., Uhlaner, L. M., & Stride, C. (2015). Institutions and social entrepreneurship: The role of institutional voids, institutional support, and institutional configurations. *Journal of International Business Studies*, 46(3), 308–331. <https://doi.org/10.1057/jibs.2014.38>
- Su, J., Zhai, Q., & Karlsson, T. (2016). Beyond Red Tape and Fools: Institutional Theory in Entrepreneurship Research, 1992–2014. *Entrepreneurship: Theory and Practice*, 41(4), 505–531. <https://doi.org/10.1111/etap.12218>
- Suddaby, R. (2010). Editor's Comments : Construct Clarity in Theories of Management and Organization. *Academy of Management Review*, 35(3), 346–357. <https://doi.org/10.5465/AMR.2010.51141319>
- Sussan, F., & Acs, Z. J. (2017). The digital entrepreneurial ecosystem. *Small Business Economics*, 49(1), 55–73. <https://doi.org/10.1007/s11187-017-9867-5>
- Thompson, H. G., & Garbacz, C. (2011). Economic impacts of mobile versus fixed broadband. *Telecommunications Policy*, 35(11), 999–1009. <https://doi.org/10.1016/j.telpol.2011.07.004>
- Turkina, E., & Thai, M. T. T. (2013). Socio-psychological determinants of opportunity entrepreneurship. *International Entrepreneurship and Management Journal*, 11(1), 213–238. <https://doi.org/10.1007/s11365-013-0288-x>
- Urbano, D., & Alvarez, C. (2014). Institutional dimensions and entrepreneurial activity: An international study. *Small Business Economics*, 42(4), 703–716.

<https://doi.org/10.1007/s11187-013-9523-7>

- Urbano, D., Aparicio, S., & Audretsch, D. (2018). Twenty-five years of research on institutions, entrepreneurship, and economic growth: what has been learned? *Small Business Economics*, 1–29. <https://doi.org/10.1007/s11187-018-0038-0>
- Venkataraman, S. (1997). The Distinctive Domain of Entrepreneurship Research. *Advances in Entrepreneurship, Firm Emergence and Growth*, 3, 119–138.
- von Briel, F., Davidsson, P., & Recker, J. (2018). Digital technologies as external enablers of new venture creation in the it hardware sector. *Entrepreneurship: Theory and Practice*, 42(1), 47–69. <https://doi.org/10.1177/1042258717732779>
- Welter, F. (2010). Contextualizing Entrepreneurship—Conceptual Challenges and Ways Forward. *Entrepreneurship: Theory and Practice*, 35(1), 165–184. <https://doi.org/10.1111/j.1540-6520.2010.00427.x>
- Wennberg, K., Pathak, S., & Autio, E. (2013). How culture moulds the effects of self-efficacy and fear of failure on entrepreneurship. *Entrepreneurship and Regional Development*, 25(9–10), 756–780. <https://doi.org/10.1080/08985626.2013.862975>
- Wennekers, S., Uhlaner, L., & Thurik, R. (2002). Entrepreneurship and Its Conditions : A Macro Perspective. *International Journal of Entrepreneurship Education*, 1(1), 25–68. <https://doi.org/10.1111/jog.12750>
- Zahra, S. A. (2007). Contextualizing theory building in entrepreneurship research. *Journal of Business Venturing*, 22(3), 443–452. <https://doi.org/10.1016/j.jbusvent.2006.04.007>
- Zahra, S. A., & Wright, M. (2011). Entrepreneurship ’ s Next Act, 67–83.
- Zhang, F., & Li, D. (2017). Regional ICT access and entrepreneurship: Evidence from China. *Information and Management*, 55(2), 188–198. <https://doi.org/10.1016/j.im.2017.05.005>