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The Impact of Economic Crisis on High-Impact Entrepreneurship -Evidence from Brazil

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By Julia Katharina Kleber

Abstract

High-impact entrepreneurship (HIE) as a type of entrepreneurship is an essential driver of economic growth. However, HIE is sensitive to the economic climate. Therefore, this study analyzes how the crisis impacts the different determinants of HIE and, in turn, HIE itself. Brazil's 2014 economic crisis serves as a case. I conducted a quantitative analysis using logistic regression, with data from the Adult Population Survey provided by Global Entrepreneurship Monitor (GEM). I created two samples to compare the determinants' effects on HIE in the period before and during a crisis. My findings indicate that only some determinants have an increased effect on HIE during the crisis period. The results vary among the two periods and different dimensions of HIE. Entrepreneurs with higher education-levels, or who are driven into entrepreneurship by economic necessity are more likely to be innovative during the crisis. Entrepreneurs that fear failure are less likely to have strong growth-intentions during the crisis. Wealthier entrepreneurs seem to be generally more likely to engage in HIE. Having a good network and using new technologies seem to be the strongest determinants of HIE in the crisis period. To mitigate the effects of a crisis on HIE, public and private entities may provide educational programs focusing on innovation and should create networking platforms for entrepreneurs. The different levels of innovativeness of entrepreneurs with different entrepreneurial motives should be considered when designing initiatives.

Keywords: High-Impact Entrepreneurship, Economic Growth, Economic Crisis, Determinants of Entrepreneurship, Entrepreneurial Perceptions, Growth-Intentions, Innovativeness, Technologies

O Impacto da Crise Económica no Empreendedorismo de Alto Impacto – Evidências do Brasil

Por Julia Katharina Kleber

Resumo

O empreendedorismo de alto impacto (HIE) como um tipo de empreendedorismo é um motor essencial do crescimento económico. O HIE é sensível ao clima económico. Portanto, este estudo analisa como a crise impacta os diferentes determinantes do HIE e, por sua vez, o próprio HIE. A crise económica do Brasil em 2014 serve como um caso. Realizei uma análise quantitativa por meio de regressão logística, com dados da Adult Population Survey fornecida pelo Global Entrepreneurship Monitor. Criei duas amostras para comparar os efeitos dos determinantes no HIE no período antes e durante a crise. Minhas descobertas indicam que apenas alguns determinantes têm um efeito maior no HIE durante o período de crise. Os resultados variam entre os dois períodos e diferentes dimensões do HIE. Os empreendedores com níveis de educação mais elevados ou que são impelidos ao empreendedorismo por necessidade económica têm maior probabilidade de inovar durante a crise. Os empreendedores mais ricos parecem ter maior probabilidade de se envolver em HIE. Porém, os que temem o fracasso tem menos probabilidade.Ter uma boa rede de empreendedores e utilizar novas tecnologias parecem ser determinantes fortes do HIE. Para mitigar os efeitos de uma crise no HIE, entidades públicas e privadas podem oferecer programas educacionais com foco na inovação e devem criar plataformas de networking para empreendedores. Os diferentes níveis de capacidade de inovação dos empreendedores com diferentes motivações empreendedoras devem ser considerados na concepção das iniciativas.

Palavras-chave: Empreendedorismo de Alto Impacto, Crescimento Econômico, Crise Econômica, Determinantes do Empreendedorismo, Inovatividade, Tecnologias

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Table of Contents

List of Figures

List of Equations

List of Tables

List of Abbreviations

APS	Adult Population Survey
EA	Entrepreneurial Activity
FGV	Fundação Getulio Vargas
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
HIE	High-impact Entrepreneurship
SEBRAE	Serviço Brasileiro de Apoio às Micro e Pequenas Empresas

1. Introduction

Entrepreneurship is a global phenomenon and is a crucial contributor to an economy's gross domestic product (GDP) and driver of economic development (Todorovic & McNaughton, 2017). In fact, in some countries, small businesses represent over 99 percent of all employing companies and are, therefore, responsible for a large part of job creation (Acs et al., 2008). Its relevance and relation to economic growth are recognized and increasingly caught the interest of researchers over the years (e.g. Agarwal et al., 2007; Wennekers et al., 2005; Wennekers & Thurik, 1999).

However, the actual contribution of new business on economic development varies depending on the type of business (Wong et al., 2005). The literature argues that there are specific characteristics among entrepreneurs, such as the growth-intentions, innovativeness, and international orientation, which cause that their ventures have a higher impact on a country's economic development (Shane, 2009; Guzmán & Santos, 2001; Wong et al., 2005; Hessels et al., 2008a).

1.1. Research Purpose and Objective

Researchers from different domains (economics, psychology, sociology), from the macroeconomic level to the micro-level, study the factors that influence these high-impact entrepreneurs, which makes it a very compelling field of research. Also, the relevance of HIE is very high due to its impact on economic growth. Entrepreneurship and HIE, in particular, also play an essential role in the recovery of a country from an economic crisis (Fairlie, 2011), where public resources are often even more limited, and the adequate measures for resource allocation become even more critical.

In 2020, within the global pandemic related to the COVID-19 outbreak, it became more evident than ever that the economic environment can change quickly, and that entrepreneurship can be strongly affected by such environmental changes and external shocks. The effects of a crisis on industries and enterprises are already studied. However, how the crisis impacts HIE on a microlevel is a relatively new field.

Giotopoulos et al. (2016 & 2017), who conducted a study on the effects of the 2008 financial crisis on high-quality entrepreneurship in 32 European countries, and on high-growth entrepreneurship focusing on Greece as a case study, calls for more research in this field applied

to other countries. Every economy or economic region has specific characteristics and dynamics, and every economic crisis is a unique case with different causes and consequences for economies. Thus, the effect of a crisis on HIE and its underlying drivers is assumed to differ among countries. Moreover, findings from only one country or economic region do not allow to derive and generalize recommendations that may support public or private entities when it comes to policies, programs and initiatives with the target to foster entrepreneurship in times of crisis and, in turn, promote economic development.

Therefore, this thesis provides a replication of the study on high-quality entrepreneurship of Giotopoulos et al. (2016), adding country-specific statistical evidence. I use Brazil's 2014 economic crisis as a case study since the crisis is recent, and sufficient data is available. Also, as a BRIC nation, Brazil is a relevant and interesting economy to study regarding entrepreneurial measures, programs, and initiatives regarding HIE.

1.2. Research Question, Expectations, and Main Findings

I expect that, overall, during an economic crisis, the effects of the HIE determinants on HIE are stronger than before the crisis. This is because the different driving factors that determine whether an individual becomes a high-impact entrepreneur may weigh more heavily in a more challenging economic environment caused, with higher uncertainty and more restricted access to resources. The individual determinants of HIE and how they are expected to change in a crisis scenario, I will discuss in-depth in chapter 2.

In line with the research purpose and expectations explained above, the primary research question to be answered with this thesis is the following:

"How did the 2014 economic crisis in Brazil impact the determinants of high-impact entrepreneurship and, in turn, high-impact entrepreneurship itself?"

I find that, for the case of Brazil, not all the HIE determinant's effects on HIE are stronger during the crisis and that the results are somewhat mixed. The results also vary among the different groups of determinants. Independent of the period, I find only a few significant effects for determinants regarding sociodemographic factors as well as the entrepreneur's perceptions towards entrepreneurship. The strongest and most coherent results for HIE in the crisis I find for the determinants that regard the dynamics of the entrepreneurial environment.

1.3. Research Structure

The literature discussed in chapter 2 provides an in-depth understanding of the concept of HIE, of the different determinants of HIE, and how they are expected to behave in a deteriorating economic scenario. Section 2.3 contextualizes the 2014 economic crisis in Brazil and outlines the Brazilian entrepreneurial environment and its characteristics. Chapter 3 presents the research design and discusses the available data and used methodology. Chapter 4 presents and discusses the results from the quantitative analysis, answering the research question, and deriving practical implications. Finally, chapter 5 concludes the study and its findings, discusses identified limitations and provides suggestions on further research.

Concluding, this thesis aims to contribute to the literature by adding empirical evidence, exploring the impact of an economic crisis on HIE. Moreover, it helps to better understand the relationship between the perceptions, attitudes, and beliefs, as well as demographic and social backgrounds of individuals towards HIE on the micro-level, and the way the economic environment can influence these attributes, such as an economic crisis.

2. High-Impact Entrepreneurship, its Determinants, and the Context of Entrepreneurship in Brazil

The first half of this chapter discusses the existing academic literature on the concept of HIE and its determinants to provide a good understanding of the research topic and its relevance towards economic development. The second half provides a contextualization of the economic crisis and the entrepreneurial ecosystem in Brazil.

2.1. The Concept of High-Impact Entrepreneurship and Economic Growth

Entrepreneurship is a multidimensional concept (Carree & Thurik, 2010) and builds on various disciplines, including economics, psychology, and sociology. Numerous competing definitions exist (Audretsch & Belitski, 2017; Spigel, 2017), with entrepreneurship as self-employment as its simplest form (Blanchflower, 2001). From the economic point of view, entrepreneurship refers to the process of the recognition and exploitation of valuable business opportunities (Kirzner, 1997; Shane, 2009), while the entrepreneur is considered a utility maximizer (Acs, 2014). The social perspective considers the decision to become an entrepreneur linked to cultural and societal values and the institutional systems. In contrast, the psychological perspective focuses on the micro-level, thus the individuum, where personality traits and perceptions determine whether a person starts to engage in entrepreneurial activity or not (Cuervo, 2005).

Rather than a state, entrepreneurship is a process, where the early stage usually spans actions from opportunity recognition until the actual market entry, before the ventures enter a more established and mature phase (Price, 2004). In this thesis, the focus lies on early-stage entrepreneurial activity. GEM defines early-stage ventures as businesses that are active for less than three and a half years (Reynolds et al., 2000).

Scholars state that only a small share of new businesses are responsible for economic growth, the creation of jobs, and increased productivity (Acs, 2016; Mueller, 2007). Pioneer researchers such as Guzmán and Santos (2001) build upon the foundation of Birch (1979), who distinguished so-called “gazelles” as businesses that have a higher impact on economic growth. This is because they create more value in the form of higher job creation, show fast growth, innovate and do international business more successfully and therefore survive longer

(Kirchhoff, 1994; Gundry & Welsch, 2001; Hessels et al., 2008a). An increasingly popular field of research focuses on the entrepreneur's behavior regarding ambitions and growth aspirations (Wong et al., 2005; Stam et al., 2011). However, there is no precise terminology or unified concept (Hermans et al., 2015). In line with Herman et al.'s (2015) framework, in this paper, complementary concepts, for instance, high-expectation entrepreneurship (Manolova et al., 2002) or ambitious entrepreneurship (Stam et al., 2009 & 2011) , among others, are taken under the umbrella concept of high impact entrepreneurship (HIE). The framework of HIE, as often applied by GEM research, comprises the three key dimensions: growth-intentions, innovativeness, and internationality of the entrepreneur (Reynolds et al., 2005; Autio, 2007).

Giotopoulos et al. (2016) highlight the theory of planned behavior (Ajzen, 1991) as a theoretic base for numerous studies on relations between perceptions, motivations, and the actual action, which are driving variables of high-impact entrepreneurial behavior (Estrin et al., 2013; Guzmán & Santos, 2001). The theory proposes that

> "intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes toward the behavior, subjective norms, and perceived behavioral control; and these intentions, together with perceptions of behavioral control, account for considerable variance in actual behavior" (Ajzen, 1991, p. 179).

Van Gelderen et al. (2006) find that entrepreneurs with more substantial growth ambitions tend to be more motivated intrinsically through so-called "pull motives" (such as personal development, autonomy, or being challenged). In contrast, less ambitious entrepreneurs are motivated rather externally by "push motives" (such as the lack of career alternatives and economic necessity). Section 2.2. further outlines the individual perceptions and growth aspirations of entrepreneurs, which play an essential role when identifying high-impact businesses (Davidsson, 1991) .

Understanding the drivers of entrepreneurs with high impact potential is also important for policy implications and the design of initiatives in two aspects. First, early-stage entrepreneurs can be incentivized or rewarded for an intended behavior early on. Second, in this way, the cost of subsidization of potential low-impact entrepreneurs can be avoided in the first place (Stam et al., 2009). Giotopoulos et al. (2016) state that research increasingly provides valid empirical evidence that entrepreneurs' ambitious growth intentions, as well as innovation capacity, are positively related to firm growth and performance (Gundry & Welsch, 2001; Vivarelli & Audretsch, 1998). Those research results prove to be valid predictors for venture performance and support the suggestion that HIE indeed contributes more vital to economic growth than the number of businesses or entrepreneurial activity in general (Szerb et al., 2019).

Even though scholars, as well as the public and private sector, are increasingly interested in HIE, there is still a lack of research and evidence regarding the possible impacts of economic crisis. It is important to be aware that the overall entrepreneurial activity (EA) within an economy, as well as the entrepreneur as an individuum, are sensitive towards changes in the economic environment (Fritsch et al., 2015). In turn, such changes may also affect the determinants of HIE and, therefore, HIE itself.

2.2. The Determinants of High-Impact Entrepreneurship

The importance of sociodemographic aspects, as well as factors related to environmental dynamics as determinants of HIE, is commonly agreed on among scholars. Moreover, research increasingly provides evidence and highlights the critical role of entrepreneurial behavior, more specifically, the entrepreneur's traits and perceptions towards entrepreneurship (Kerr et al., 2018). In the following, some of the most relevant attributes from these different categories will be analyzed regarding their potential impact on HIE, starting with the group of variables regarding an entrepreneur's perceptions.

2.2.1. The Entrepreneur's Perceptions as Determinants of High-Impact Entrepreneurship

As mentioned in the previous chapter, the motivation for engaging in EA is very relevant to distinguish the types of entrepreneurs with higher impact-potential from less ambitious entrepreneurs. Several studies suggest that entrepreneurs that are driven into entrepreneurship by economic necessity and lack of alternatives on the labor market, therefore, tend to be motivated by external factors or "push-factors" (Kelley et al., 2016).

This necessity motive usually holds for large proportions of entrepreneurs in poorer economies, where unemployment is high, and job opportunities are scarce (Brünjes & Diez, 2013). Entrepreneurs that are driven by necessity tend to face higher constraints regarding financial and non-financial resources, which is likely to inhibit their impact potential (Hermans et al., 2015). In contrast, entrepreneurs driven by opportunity are motivated intrinsically (by, e.g., self-realization and independence) and engage in EA because they want to explore a business opportunity they identified (Carter et al., 2003; Reynolds et al., 2005). The latter group of entrepreneurs seems to have higher aspiration levels and therefore encompasses higher growth and also tends to present more increased innovation and internationalization levels (Darnihamedani & Hessels, 2006). In contrast, entrepreneurs driven by necessity contribute less to economic growth than opportunity-driven entrepreneurs, according to research (Devece et

al., 2016). In an economic crisis scenario, I expect that more individuals are pushed into entrepreneurship out of necessity because of a more challenging labor market.

Moreover, according to the GEM framework, next to opportunity as a motive, also the entrepreneur's capacity to perceive opportunities in the market is relevant for HIE (Reynolds et al., 2005). This is because it takes a certain level of innovation capacity in the form of creativity and knowledge for an entrepreneur to identify business opportunities. Moreover, there is empirical evidence that when pursuing internationalization of business, the capability of opportunity recognition becomes even more relevant (Di Gregorio et al., 2008; Mathews & Zander, 2007).

De Zhi-jie (2009) suggests in his paper with the same title that "Crisis Brings Reform, and Reform Brings Opportunity". Thus, when an economy suffers a crisis, it usually comes along with the realization of market reforms and restructuring to boost productivity and labor. This process and the overall increased dynamics may positively impact entrepreneurs' growth expectations (Wiklund & Shepherd, 2003) and innovativeness. Moreover, due to crisis, new gaps in the market will arise resulting from the changes that come along with it. These gaps may present new opportunities to entrepreneurs (Giotopoulos et al., 2016) and call for innovation. Lastly, low domestic demand within a crisis-hit economy, entrepreneurs may increasingly look for sales markets or business opportunities outside the country.

Not only the perception and identification of opportunities are important in the process of an individuum towards becoming a high-impact entrepreneur (Verheul & Van Mil, 2011). One more relevant aspect regarding perceptions is the subjective fear of failure, meaning the fear of an entrepreneur to fail in starting or running its business and facing negative consequences. The aspect of entrepreneurial fear of failure has become a focus of research as an inhibitor of entrepreneurship (Welpe et al., 2012; Reynolds et al., 2005). One can link it to the perception of threat, high risk, and risk prevention (Casson et al., 2009). What is more, it is closely related to the fact that most people are risk-averse and fear losses, which negatively impacts potential EA (Arenius & Minniti, 2005). Giotopoulos et al. (2017) highlight research findings where the fear of failure affects individuals' motivation towards achievement and work as well as entrepreneurial growth ambition (Vaillant & Lafuente, 2007). Research also provides evidence that fear of failure increases in an economic downturn (Cacciotti & Hayton, 2015), due to growing uncertainty and risk.

In contrast, Cacciotti et al. (2016) argue that the fear of failure can also be a motivator, making entrepreneurs strive even more for the success of their ventures. This effect may be even more substantial in a more challenging economic scenario. However, I expect the fear of failure to have an even stronger negative impact on HIE in times of crisis.

The fear of failure is also related to self-confidence and self-efficacy since individuals with higher skills and knowledge relevant for entrepreneurship tend to perceive the risk of starting a business as lower. (Casson et al., 2009). Self-efficacy is an important contributor to the prediction of behavioral intentions and is considered a vital aspect of the Theory of Planned Behavior (Huang & Chuang, 2007). People with high self-efficacy, thus, people who believe in their capabilities and personal attributes, and who believe that these capabilities are sufficient to run a business, are more likely to take the risk to engage in EA (Krueger & Dickson, 2007; Baum et al., 2001). Research also finds a link between self-efficacy and start-up growth as well as the entrepreneur's success (Markman et al., 2002). In a scenario of economic instability and higher risk, I expect the factor self-efficacy to be more critical for high-impact entrepreneurs (Giotopoulos et al., 2017) than without a crisis.

2.2.2. Sociodemographic Factors as Determinants of High-Impact Entrepreneurship

The sociodemographic background of the entrepreneur and its implications regarding conditions and constraints plays an essential role in identifying potential characteristics or determinants of high-impact entrepreneurs. In this context, some of the seemingly relevant factors discussed in this literature review include the gender, income level, educational level, and professional experience of entrepreneurs. A study of literature and research results on these mentioned factors follows.

Literature and research highlighting the relationship of gender on HIE is plenty and cross-sectional. Though the number of self-employed women has been increasing significantly over the last years, in many countries, they are still underrepresented, and face high constrains (OECD, 2020) compared to their male counterparts. Empirical evidence reports inconsistent results regarding a gender effect on HIE, depending on the studied factors (Pines & Schwartz, 2008). One aspect of supporting gender differences is that women entrepreneurs are considered more risk-averse (Eckel & Grossman, 2008). This fact, in turn, lowers the expectations towards high-impact potential, since pursuing strong growth ambitions or the internationalization of a business usually require a certain willingness to take risks (Giotopoulos et al., 2016).

Regarding internationalization, there is evidence from several countries that female entrepreneurs tend to have a lower export orientation (Welch et al., 2008). Moreover, women that own a business seem to often lack financial skills (Lerner & Almor, 2002), whereas they do not appear to have an inferior innovation capability (Cowden & Tang, 2017). One can conclude from this finding that financial or economic constraints might inhibit the full exploitation of women's' innovation potential (Pines et al., 2010).

Furthermore, for women, pull-motives such as independence and flexibility tend to be stronger motives for starting a business (Ramadani et al., 2015). In contrast, men seem to prioritize financial gains, are more competitive (Buss & Schmitt, 1993), and tend to have greater self-confidence (Pines & Schwartz, 2008). Consequently, when being compared, businesses owned by females appear to be smaller, less profitable and experience slower growth (Gupta et al., 2009).

Findings from other recent studies state that there are only a few consistent gender differences regarding individual entrepreneurial attributes in terms of traits, intentions, and ability (Pines & Schwartz, 2008). These findings imply that female entrepreneurs' inferior potential for HIE does not result from personality traits and entrepreneurial intentions but rather from social and economic exclusion, labor market exclusion due to childcare and domestic work as well as gender inequality (Pines & Schwartz, 2008).

The mentioned factors already seem to constrain female entrepreneurs in regular economic times. Thus, in a recession, low liquidity levels and increased uncertainty make receiving loans from private or public institutions even more difficult since women-led businesses are considered more vulnerable due to the more substantial constraints. Due to rising unemployment and instability resulting from a recession, women tend to have fewer choices for income sources. Consequently, more women than men engage in entrepreneurship out of economic necessity with lower impact potential (Arenius & Minniti, 2005). Even though the number of female entrepreneurs might increase more in times of crisis than for men, I expect women to be even stronger underrepresented regarding HIE in an economic crisis.

The next factor to be discussed is the income level and its potential impact on HIE. In literature, the income level of an entrepreneur is considered an important determinant of an individual's orientation towards entrepreneurship and its growth intentions (Nandamuri & Gowthami, 2013; Autio & Acs, 2010). Dunn & Holtz-Eakin (2000) state that entrepreneurs from households with higher incomes are better off in terms of financial resources needed for the growth of a venture

and that their social stand makes them more likely to identify entrepreneurial opportunities. Accordingly, Raijman (2001) finds that the level of the family's financial resources directly impacts entrepreneurial intentions. On the other side, research on early-stage entrepreneurship found that the family wealth does not affect EA (Wang & Wong, 2004), while the individual income seems to positively impact the engagement in EA (Van Gelderen, 1999). Regarding HIE, the literature identifies financial capacity as one impact factor of performance in the studied ventures (Jorunn et al., 2011).

Other research leans on Maslow's hierarchy of needs theory, stating that with increasing income-levels (both individual and household income), people's basic needs are usually satisfied. Consequently, with their basic needs met, those entrepreneurs may be able to focus more on the dimensions related to HIE, which in turn, research proves to have a higher contribution to economic development (Edmiston, 2008). What is more, wealthier entrepreneurs may also have a higher tolerance towards taking risks, since they tend to have a better "security net", which individuals of lower-income levels often do not have (Nkurunziza, 2012).

Taking these aspects into consideration, in a financial downturn, entrepreneurs may even more strongly rely on or benefit from the mentioned security net, savings, or financial resources from the family that comes along with higher income levels. In a crisis, this aspect might be even more important to allow them to grow their venture, pursue international operations, and be innovative.

The following paragraphs of this section discuss the HIE determinants comprising human capital. Entrepreneurial human capital includes the entrepreneur's working experience, often represented by age, as well as the skills and knowledge acquired through formal education. Both are considered critical determinants for ventures' performance and high-impact potential (Ertuna & Gurel, 2011; Cappelleras et al., 2018). This is because scholars found that increased human capital increases the entrepreneur's managerial abilities, ambitions, and growth aspirations. Furthermore, Colombo and Grilli (2005) state that entrepreneurs with greater human capital tend to have better capabilities and entrepreneurial judgment and therefore outperform others.

Professional experience is one more relevant aspect of entrepreneurial impact potential since acquired management and organization skills "partly […] compensate for lack of business experience and resources" (Kato & Honjo, 2015, p. 928). Moreover, Guzmán and Santos

(2001) argue that more working experience leads to higher entrepreneurial quality since the involved learning process helps the entrepreneur with the reduction of inefficiencies and enhances the capacity of internal motivation and ambition. This effect may become even more critical in a more complex economic scenario, characterized by higher uncertainty and more restricted access to resources.

Moreover, entrepreneurs' educational backgrounds are one more crucial determinant for HIE, and empirical evidence shows that a venture's survival is higher when entrepreneurs are highly educated (Jiménez et al., 2015). Research states that increased education enhances an entrepreneur's opportunity exploration capacity and creativity (Davidsson & Honig, 2003). What is more, Sapienza & Grimm (1997) argue that a higher education level leads to improved business skills, technical skills, and soft skills, and a more solution-based mindset. Higher education levels among entrepreneurs also indicate a better capability of external stakeholder management (Kato & Honjo, 2015), and they seem to show increased energizer behaviors and intrinsic motivation, indicating high entrepreneurial ambition. All the mentioned attributes are essential for an entrepreneur's growth and innovation capacity. Ganotakis and Love (2012) also find a positive relationship between the entrepreneurs' education levels and the export orientation and success. Literature states that tertiary education, especially when including entrepreneurial education (Verheul & Van Mil, 2011), seems to enhance the skills mentioned above and influence the growth aspirations and realization of opportunities (Autio & Acs, 2010).

In regular times, given the existence of opportunity costs, individuals with a higher level of education may be more likely to have greater alternatives and success as an employee than when undertaking a venture (Gimeno et al., 1997). In times of crisis, the scenario may be different. Following the rational of Giotopoulos et al. (2017), in a recession, highly educated individuals might lack good labor-market alternatives, which reduces their opportunity costs and incentivizes them to engage in EA with high-impact potential. Moreover, individuals with higher education levels may be more intrinsically motivated and tend more to seek for self-realization, which makes them more likely to create a high-impact business.

2.2.3. Aspects of Environmental Dynamics as Determinants of High-Impact Entrepreneurship

The last group of determinants of HIE regards the dynamics of the entrepreneurial and business environment. Here the primary focus is the entrepreneurial network and its possible impact on

the engagement of entrepreneurs in HIE. The term entrepreneurial network is subordinate to the concept of social capital, which scholars broadly describe as "an asset embedded in relationships — of individuals, communities, networks or societies*"* (Liao & Welsch, 2003, p. 1). Literature states that the resources acquired through the entrepreneurial network, such as associated knowledge and information exchange, interpersonal trust, and commitment, as well as shared practices and even strategic partnerships, can positively influence ventures' performance (Andersson et al., 2002). Especially in difficult economic times, those intangible assets such as knowledge, practices, information, and even tangible resources such as equipment and technology, that entrepreneurs obtain through the mobilization of the social network (Estrin et al., 2013), may become even more valuable. Since in a crisis, financial resources tend to be scarce, and the overall business environment is more challenging, I expect the benefits of the entrepreneurial network to become more critical for all three dimensions of HIE during a crisis (Giotopoulos et al., 2016; Feki, 2019).

Lastly, I discuss the literature on the use of new technologies within a venture regarding its potential impact on HIE. In today's information society where communication, information, and knowledge are crucial for a venture to strive, new technologies have had a critical impact regarding access to those resources. Hence, also, entrepreneurship has benefitted significantly from the existence of technologies (Tavakoli, 2013). This fact may apply mostly to EA that focuses on growth, innovation, or international operations and thus, has a higher impact.

Most innovation today is driven directly or indirectly by technology. New technologies are, therefore, not only considered an accelerator but rather a prerequisite of innovation today (Errikson Björling, 2017). Furthermore, Bouter (2018) argues that technology is an essential driver of scalability. Thus, new technologies increasingly facilitate or even enable entrepreneurial activity regarding venture growth, nationally and internationally. Especially through the rise of e-commerce marketplaces or digital communication platforms, enabled by technology, many ventures can scale their business operation in a way and pace that has not been possible before. Constraints regarding the acquisitions and service provision to international customers have undoubtedly been firmly decreased through the above, whereas the impact depends on the kinds of business and service. The aspects mentioned above make it clear that the use of technology is becoming an increasingly strong competitive advantage. I, therefore, argue that in an economic crisis, the competitive advantage obtained through the use of technology may even have a more substantial positive impact on HIE.

Considering the literature discussed above, I expect all discussed determinants of HIE to have a stronger effect on HIE during an economic crisis, as compared to before the crisis, deriving the following hypothesis:

During an economic crisis, the effects of the determinants of high-impact entrepreneurship on high-impact entrepreneurship increase.

The determinants of HIE discussed in this section and the derived hypothesis build the theoretical foundation for the econometric models used in the quantitative analysis (see chapter 3). In this research, the determinants will serve as the independent variables. The conceptual framework is outlined in section 2.4, providing an overall picture of the aspects studied in this quantitative analysis.

2.3. Contextualizing the 2014 Economic Crisis and Entrepreneurship in Brazil

The quantitative analysis of HIE conducted in this thesis uses data on Brazilian entrepreneurs and takes Brazil's 2014 economic crisis as a case study. For better contextualization and to provide a better understanding, this thesis provides background information on the economic crisis as well as on the characteristics of entrepreneurship in Brazil, outlined in this section.

2.3.1. The Context of Brazil's 2014 Economic Crisis

Brazil is the world's ninth-largest economy and the largest economy in Latin America, representing 35 percent of the region's GDP (World Bank, 2019). Due to its rich natural resources, the country is an export nation for primary commodities such as soy, iron ore, crude petroleum, and sugar, and coffee (OEC, 2020). Historically, related to Brazil's colonial heritage, socioeconomic inequality is still rooted deep within the country.

After more than a decade of economic instability and high poverty rates, the "Plano Real" in 1994 ended hyperinflation and laid the path for economic stabilization and growth (Pereira, 1994). From 2000 to 2012, the economy started to undergo significant structural changes and was benefiting enormously from increasing commodity demand from China, which lead to more rapid development (OEC, 2020). At that time, Brazil counted among one of the fastest-growing major economies, reporting GDP growth rates of 5 percent per year, resulting in the country becoming part of the BRICS association in 2001 (Baumann et al., 2017). Utilizing the favorable economic situation, the government increased spending to finance development projects and to enhance consumption (Garcia, 2015).

According to research, the SME sector performed relatively well during the 2008 financial crisis and showed a great deal of resilience (Mc Cahery et al., 2015). However, political and economic instability led the country into a downward cycle, making Brazil entering a recession and severe economic crisis in 2014. GDP dropped 3.5 and 3.3 percent in 2015 and 2016, respectively (World Bank 2015 & 2016). Overall, unemployment surged from an average of 6.8 percent up to 12.7 percent in 2016, while the young part of the labor force was hit especially hard (Reuters, 2017).

The causes of Brazil's economic crisis are multidimensional. According to experts, approximately one-third of the crisis can be explained by external reasons that acted as a trigger, while the other two-thirds relate to internal problems and errors (Branco, 2016). The different causes can be divided into the following three: the decreasing demand for commodities as the external factor, political instability, corruption scandals[1], and the most severe reason, errors in macroeconomic politics.

According to FGV and the Brazilian Economic Institute (IBRE), the country got out of the technical recession at the beginning of 2017, after eight consecutive trimesters of GDP drops. The main countermeasures for economic recovery were in the form of a reform of the labor law, which, however, did have little effect on reducing unemployment. In contrast, self-employment, temporary, and outsourced labor increased (Futema, 2018).

The recovery process was slow and socioeconomic consequences continue until today, with unemployment rates continuing high, and the GINI-index steadily increasing (Villas Bôas, 2019). In 2017, the economy started to show slight signs of recovery. However, it did not last long until the economic outlook for Brazil turned negative once more. Then in 2020, Brazil, like most economies, entered an economic and health crisis caused by the COVID-19 pandemic.

2.3.2. A Profile of Entrepreneurship in Brazil

This section outlines the entrepreneurial conditions in Brazil, emphasizing specific structural and cultural characteristics as well as significant challenges and constraints.

Brazil was categorized by WEF as an economy in transition from being an efficiency-driven economy to an innovation-driven economy (Schwab & Sala-i-Martín, 2014). This fact underlines the ongoing development in the country regarding its innovativeness and business

[1] Relevant to mention here is the reknowed "Operation Carwash" (Portuguese: Operação Lava Jato), a historic anti-corruption campaign that started in 2014 and brought to light large-scale corruption schemes

sophistication, necessary conditions for HIE. According to GEM data, Brazil is a very entrepreneurial country, with a total entrepreneurial activity rate[2] of 34.5 percent in 2014. Such high numbers are often typical for emerging and developing countries, which are usually high above the average of developed countries (GEM, 2017). There were approximately ten million small and medium-sized businesses in Brazil in 2014, which account for 99 percent of Brazil's total businesses and which are responsible for 20 percent of the generated GDP (Veiga & McCaheryk, 2019).

An important socioeconomic characteristic of entrepreneurship in Brazil is the large informal sector (Meneguin & Bugarin, 2008), which accounted for 39.1 percent of the working population, has increased by 15 percent in only three years during the crisis until 2017, according to IBGE (Nitahara, 2019). The predominant ethnic groups in the informal sector are the "black" and the "pardos", which indicates the ongoing existence of racial segregation in the labor market (Agência Brasil, 2018). However, this thesis only studies formal entrepreneurship in Brazil, and the analysis includes no data regarding the ethnicity of entrepreneurs. Approximately 40 percent of the Brazilian entrepreneurs are driven towards entrepreneurship by necessity (GEM, 2017). This relatively high proportion is linked to the high unemployment rates and the lack of alternatives on the labor market. Figure 1 shows clearly show the increase of necessity-driven entrepreneurship with the start of the crisis in 2014.

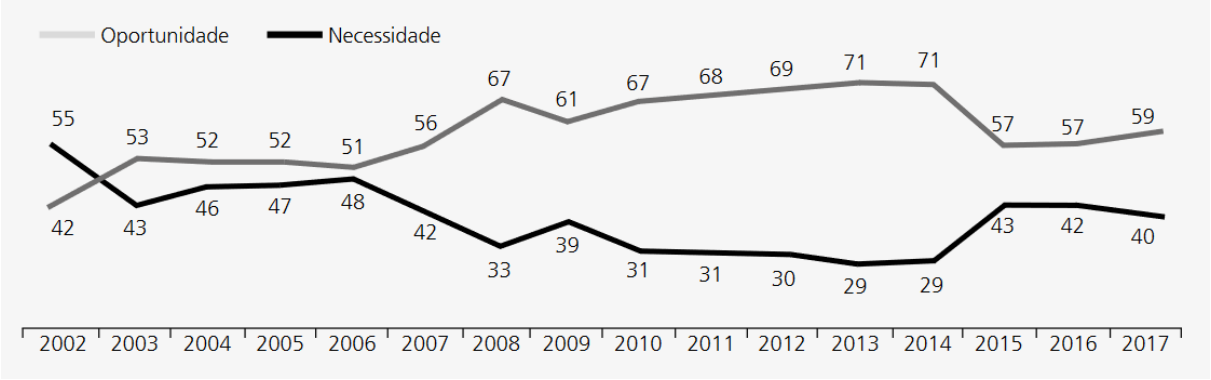

Figure 1: Opportunity-driven and Necessity-driven Entrepreneurship as a Proportion of Early-stage Entrepreneurship in Brazil over Time (source: GEM)

Close to one-quarter of all registered businesses in Brazil fail after only two years. Furthermore, despite being a BRICS nation and showing high EA, Brazil has been ranked rather poorly regarding its global competitiveness and the facility to do business, which mirrors the

[2] Percentage of 18-64 population who are involved in starting or running a new business

entrepreneurial conditions within the country (Schwab, 2014). Throughout the last decade, WEF and World Bank particularly identified as inhibiting factors for business and entrepreneurship in Brazil the high degree and complexity of bureaucracy, the inefficient and complex tax system, weaknesses in infrastructure, tightening access to financing as well as low government efficiency and high corruption (Doing Business, 2014). In 2014 it took on average 88 days to open a business in Brazil, which was high above the global average. Due to reforms, this number improved within the last two years (World Bank, 2020), and the number of procedures and costs also improved slightly.

Its complex environment makes Brazil quite a rugged country to open successfully and to run a formal business, demanding high self-confidence, courage, and perseverance from entrepreneurs. Also, in the Brazilian culture, the relevance of the social and network is very high, since personal contacts play the most crucial role within negotiations. Moreover, in a complex business environment such as Brazil, it is even more relevant to have a strong network to share information and practices. What is more, due to the complexity of the tax system and bureaucracy, entrepreneurs either need to have specific knowledge or depend on legal advisors or, again, a strong network (Erikson, 2009).

Another important fact is that Brazil's education system is still relatively poor, failing to provide individuals with the necessary skills for a more knowledge-based economy, including business and entrepreneurial skills. According to IBGE, only 16.2 percent of the Brazilian population has a college degree, with the largest part of this proportion concentrating in major cities in the Southeast and the South of the country. In the North and North-east, illiteracy rates are high, and finding a qualified workforce can be challenging (IBGE, 2019). The importance of entrepreneurial education gets more and more acknowledged within the country, and universities seem to expand their curriculums. Nevertheless, there is still a strong need for educational institutions, public initiatives, and the private sector to engage and invest more and to adapt their education and project design towards entrepreneurial education (Schaefer & Minello, 2016).

Less than 12 percent of the Brazilian population speaks English (Novais, 2012), less than 10 percent of the adult population has had any entrepreneurship training, and only around 70 percent of universities offer at least one course on entrepreneurship. The Literature states that there is a significant educational gap since the primary and secondary education levels lack entrepreneurship education significantly (Zacharakis, 2013). There are already some initiatives

trying to fill this gap, with SEBRAE offering the most extensive national program. It also creates more and more local and online-based initiatives.

As in most emerging economies, a severe financing gap exists in Brazil, which presents a big challenge to entrepreneurs (IFC, 2017). Bank loans and credit lines are the primary sources of entrepreneurial financing. However, the bank-lending system in Brazil was weakened during the financial crisis, and with the 2014 recession (FEBRABAN, 2016) lending-risks increased, leading to higher interest rates and rejection rates (Veiga & McCahery, 2019). Public loan guarantee programs exist, such as funds from SEBRAE and BNDES. However, these do not seem to fill the financing gap, especially for very small and low-quality businesses (Veiga & McCahery, 2019). The investment volume of alternative sources of financing for small companies, such as private equity and venture capital, in Brazil is relatively small compared to similar countries and decreased during the recession (KPMG, 2019). Despite some progress in improving access to financing for entrepreneurs, the lack of available collateral and the little progress in creating or expanding guarantee programs still is an essential barrier for enhancing the growth of small businesses in Brazil (Veiga & McCahery, 2019).

Despite the existence of several institutions and programs that support small businesses also through advisory and mentorship, such as SEBRAE, SENAC, or Endeavor, in 2014, only around 15 percent of all entrepreneurs seek such institutions for support (GEM, 2017). GEM reports that the most common reason for such little participation is the lack of perceived necessity and the lack of knowledge of the existence of such programs.

Different from other developing or emerging countries, female entrepreneurs are not underrepresented in Brazil, where they accounted for 51.2 percent of early-stage and 45 percent of established entrepreneurs in 2014, respectively. These numbers had been increasing significantly since the beginning of the millennium (GEM, 2017). In the less developed regions such as the North and Central-west, the numbers even tend to be slightly higher for the early-stage entrepreneurship.

Despite the relatively low proportion of creative and innovative entrepreneurs in Brazil and a small proportion of international customers, innovation is more and more institutionalized in the entrepreneurial ecosystem, represented through a reasonable proportion of research and development investments (Da Silva, 2017). Overall, the Brazilian entrepreneur is characterized by rather running traditional business sectors and offering already established services in the country.

Due to Brazil's size and geographic characteristics, the capacity for economic growth, and the dynamics of entrepreneurial ecosystems are regionally distinctive (Da Silva, 2017). Brazil's financial center São Paulo accounts for 18 percent of the country's GDP, concentrates more than 60 percent of total start-up investments in Brazil, and counts over 2,000 technology-related ventures, making it Brazil's center of innovation (Mari, 2019). Rio de Janeiro represents the center of social entrepreneurship, and other major cities such as Belo Horizonte and Florianopolis develop into independent entrepreneurial hubs (Lustig, 2018). Also, smaller cities report growing EA and increasingly establish their own regional dynamics with local players. A significant trend is also a rise in rural entrepreneurship, where the younger rural generation utilizes advances in technology and industrialization to exploit opportunities mainly related to the agricultural sector, such as minimizing crop losses and risks, optimization of processes, and the decrease of environmental damages (IPOG, 2019).

Other trends regarding entrepreneurship in Brazil are the raising entrepreneurial hubs in universities (Lopes, 2017), the increased stimulation of entrepreneurship in Favelas, and the engagement of its communities (SEBRAE, 2020), as well as an increasing focus on niche products and services. As of today, Brazil continues to present strong growth rates regarding EA, and more importantly, opportunity-driven entrepreneurship was rising to 61.8 percent in 2018, according to SEBRAE (2019), which seems to be an important development for HIE within the country.

2.4. Conceptual Framework

The thesis at hand deals with the impact of an economic crisis on the determinants of HIE, and in turn, the impact on HIE itself. Brazil and its 2014 economic crisis serve as a case study. It became clear in this chapter that literature on the relationship between entrepreneurship and economic growth is extensive, and also that HIE increasingly gets into focus. This chapter also discussed how the determinants of HIE are expected to behave in an economic downturn. The next two chapters will, therefore, discuss the conducted quantitative research to answer this thesis' research question:

"How did the 2014 economic crisis in Brazil impact the determinants of high-impact entrepreneurship and, in turn, high-impact entrepreneurship itself?"

For a better structure, I grouped the different determinants of HIE into three groups. Namely, attributes regarding the entrepreneur's perceptions towards entrepreneurship, attributes

regarding the entrepreneur's sociodemographic background, and, lastly, attributes related to the dynamics of the entrepreneurial environment.

From the reviewed literature, the following hypothesis derives that I will test through quantitative analysis:

During an economic crisis, the effects of the determinants of high-impact entrepreneurship on high-impact entrepreneurship increase.

I use the discussed HIE determinants and the hypothesis as the theoretical foundation for the econometric models used in the quantitative analysis (see chapter 3). The conceptual model below aims to provide a better understanding of the structure of the conducted research, visualizing the study's design:

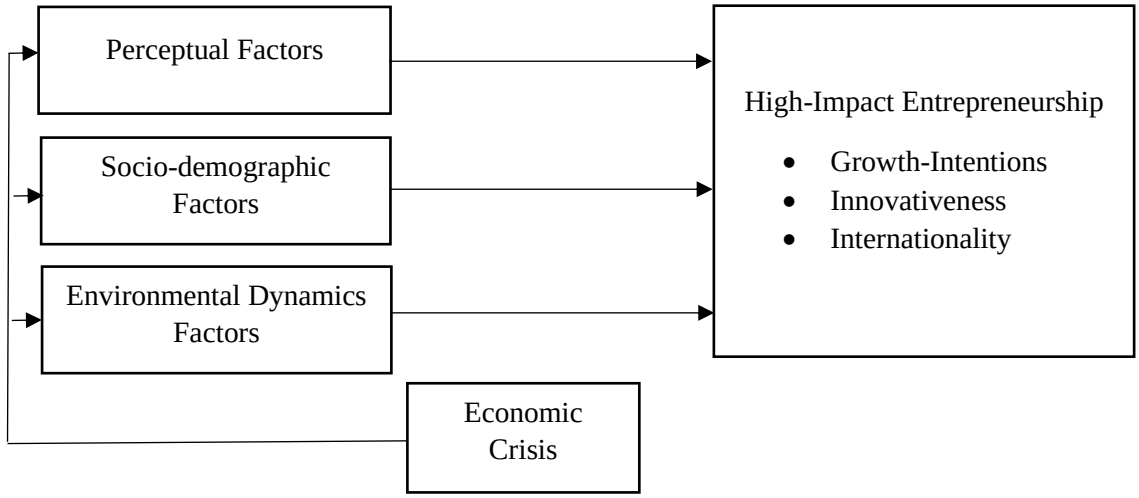

Figure 2: Conceptual Model (source: own representation)

I expect all the effects of the determinants on HIE to increase during a crisis, for all three dimensions of HIE (entrepreneurial growth intentions, innovativeness, and internationality).

Furthermore, I state expectations of the directions of the determinants' effects, based on the literature and empirical evidence. Regarding the entrepreneurial motive, distinguishing between (opportunity-driven and necessity-driven entrepreneurs), I expect that being an opportunity-driven entrepreneur increases the likelihood of an entrepreneur to engage in HIE during a crisis. Regarding the gender, there is very incoherent empirical evidence; however, I expect that being a male entrepreneur, rather than a female entrepreneur, increases the likelihood of engaging in HIE. The only determinant, or variable, for which I expect an adverse effect is the fear of failure

since it is an inhibitor of HIE and entrepreneurship in general. For the remaining determinants (opportunity perception, self-efficacy, income level, experience, education, entrepreneurial network, the use of new technologies), I expect positive effects on the dimensions of HIE.

3. Data and Methodology

The need for more country-specific evidence regarding the impact of an economic crisis on HIE, and the objective of this research to add statistical evidence, was made clear in the previous chapters.

To collect statistical evidence on HIE in Brazil and to test the hypothesis, I use data provided by the Global Entrepreneurship Monitor. The GEM assessment data explores the dynamics of EA and its relationship to economic growth. In this thesis, early-stage entrepreneurship, according to GEMs definition, will be measured. Also, the GEM framework for HIE will be applied (Autio, 2007). Data will be distinct in a crisis and a non-crisis period, and identified changes will be assumed to occur due to the crisis. Relevant variable definitions, as well as information about the data sample, variables, and used methodology, will be discussed in this chapter.

3.1. Sample Data

As mentioned, to answer the research question, I use GEM data in Brazil. First started in 1999, the GEM research project is the world's most extensive ongoing assessment regarding entrepreneurship today, annually providing a harmonized high-quality assessment on EA for more than a hundred economies (Reynolds et al., 2005). The collected data provides a unique empirical instrument widely used in entrepreneurship research since the data is publicly available to a broad audience (see gemconsortum.org). The international consortium's main objective is the exploration and analysis of entrepreneurial dynamics around the world and the relationship of entrepreneurship and economic growth (IBQP, 2020).

GEM has several research programs, however, its main instrument is the Annual Population Survey (APS) (Autio, 2007). The APS's focus lies on the conceptual domain of the individual entrepreneur and its entrepreneurial behavior, thus the entrepreneur's attitudes, aspirations, and activities towards entrepreneurship (Reynolds et al., 2005). Annually, national teams from more than 50 countries conduct the standardized survey on a minimum of 2.000 randomly selected individuals out of the respective adult population (18-64 years old). For GEM Brazil, the Brazilian Institute of Quality and Productivity (Portuguese: IBQP) is responsible for collecting and reporting the data, with national partners including SEBRAE and FGV, among others.

For this thesis, the APS individual-level data on Brazil for six years, from 2011 to 2016, is used.

I divided the data into two sub-periods, the non-crisis period, including data for the years 2011 to 2013, and the crisis period, including data for the years 2014 to 2016, as 2014 marks the recession's start. The three years seem sufficient to capture the most intense period of the crisis. The assumption holds that the crisis' full effects may have been felt socioeconomically and by individual entrepreneurs only after 2014, thus in 2015 and 2016. The comparison of those two subsamples allows the analysis of the impacts of the economic crisis on the determinants of HIE. The single entrepreneur or rather its responses from the standardized survey is the unit of analysis. Since this thesis focuses on early-stage entrepreneurship, thus, on nascent and new entrepreneurs as defined by GEM, it does not consider data on established entrepreneurs.

According to the GEM definition, nascent entrepreneurs are individuals that were actively involved in setting up a business within the last 12 months, expecting to be the owner or part-owner of the venture. Also, no salaries have yet been paid, or other payments have been made to the owners for more than three months (Reynolds et al., 2000). New entrepreneurs are those individuals who own and manage a running venture that has already paid salaries or any other payments to the owners for more than three months, but not more than 42 months (Reynolds et al., 2000).

After careful preparation of the data, the total available sample size counts 3,391 early-stage entrepreneurs. The sample for the non-crisis period counts 1,935 observations, while the sample for the crisis period comprises 1,456 observations. Thus, the sub-samples are relatively equally distributed in terms of the number of observations. The empirical models developed for this thesis follow previous GEM related research, such as Levie and Autio's (2011) study on entrepreneurial growth and specifically Giotopoulos et al. 's (2016, 2017) studies on high-growth and high-quality entrepreneurship.

3.2. Dependent Variables

In the empirical analysis carried out for this thesis, measures HIE through three dimensions, following the GEM framework and previous research. Those three dimensions are captured through the variables expressing the entrepreneurial growth intentions (*Growth*), innovativeness (*Innov*), and internationalization (*Internat*). Those variables represent the dependent variables, and result, as do all variables used in this analysis, from the entrepreneurs' APS survey responses. It follows a description of the dependent variables:

High-Growth Intentions (*Growth*): The prospect of growth intentions is estimated in terms of job creation. For this variable, the early-stage entrepreneur estimates the number of employees (excluding the owners) he or she expects to be working in the business in 5 years' future (Reynolds et al., 2000). GEM research and other literature commonly use the threshold value 5, 10, or 20 new jobs to classify high-growth entrepreneurs (Wong, Ho, & Autio, 2005; Autio, 2007; Levie & Autio, 2008). For this analysis, I transformed the originally categorical variable into a dummy variable, defining 10 jobs as the threshold value to distinguish between high-growth entrepreneurs and those without high growth intentions.

Innovativeness (*Innov*): To measure the entrepreneur's or venture's level of innovativeness, the entrepreneur gives his perspective on how innovative his customers perceive the product or service. The variable is estimated in terms of the proportion of customers that consider the product or service as new and unfamiliar. The entrepreneur selects from the answer options "all", "some", and "none." (Reynolds et al., 2000). I transformed the categorical variable into a dummy variable to distinguish highly innovative entrepreneurs (those who reported that some or all customers regard their product as unfamiliar) from the less innovative entrepreneurs. Appendix 1 provides all the detailed variable descriptions. By using this variable, I follow other GEM related studies focusing on the entrepreneur's innovativeness. It is important to mention that this variable is only an available proxy in the attempt to capture the actual innovative component of the HIE concept (Giotopoulos et al., 2016). However, it serves as an indication of individuals' ambitions and level regarding innovation (Bosma et al., 2009).

Internationalization (*Internat*): As a proxy for the level of export orientation and intensity, the entrepreneurs give an estimate on the proportion of their customers who live outside of the respective entrepreneur's country. I transformed the categorical variable into a dummy variable, using the ratio of 10 percent of international customers as the threshold value to classify an entrepreneur with high international orientation (see Appendix 1). Due to the small sample size and relatively low export orientation among Brazilian entrepreneurs, I selected rather low threshold value for this analysis.

3.3. Independent Variables

For the analysis at hand, I adapted the empirical models of Giotopoulos et al. (2016 & 2017) and similar research. The detailed descriptions of all variables can be found in Appendix 1.

A set of variables regarding the perceptions of entrepreneurs comprise the variables entrepreneurial motive, opportunity perception, fear of failure, and perceived capabilities, thus the self-efficacy of early-stage entrepreneurs. The collected data for these variables grounds on the perceptions of the individual entrepreneurs. Therefore, they are prone to subjectivity. However, they are broadly recognized and frequently used as proxies in entrepreneurial research, serving as key indicators for GEM research. Those variables that initially have not been dummy-variables I transformed into such.

Additionally, a set of sociodemographic characteristics was included, including the gender, the household income level, education, and professional experience of the entrepreneur. It is common to use the entrepreneur's age as a proxy for professional experience. Regarding the education of early-stage entrepreneurs, the variable distinguishes between an entrepreneur who received tertiary education and an entrepreneur that did not.

Also, two variables regarding the dynamics of the entrepreneurial environment were included, which can be important drivers of an entrepreneur towards HIE. For the variable entrepreneurial network, the entrepreneur reports whether he knows and is in touch with other entrepreneurs or not. Furthermore, I included the variable New Technology, stating whether an entrepreneur uses technologies within its business that are less than five years old at the time of the survey.

3.4. Methodology

The first step to study the impact of the crisis is a descriptive statistics analysis, quantitatively describing and summarizing the main features of the data sample. Appendix 3 presents a frequency table, showing the proportions within the dependent variables. Appendix 4 presents the summary statistics for the full set of variables. R Studio served as the software to conduct the quantitative analysis.

The correlation matrix presented in Appendix 4 includes the full set of variables and provides a deeper understanding of correlations among the variables. It tested for the occurrence of multicollinearity among the variables. None of the correlation values resulting from the analysis is above the commonly used 70 percent threshold for suspected multicollinearity. Moreover, since each variable represents an entirely different piece of information, and no redundant information was assumed, it was decided that a VIF test is not necessary in this case.

I used logistic regression to test the hypothesis and to statistically analyze the relations of the HIE determinants on the HIE dimensions. I selected this method because the dependent

variables are binary (Field, 2005; Le, 2018). The logistic regression follows the following mathematical model:

$$P = \frac{e^{a+bX}}{1+e^{a+bX}}$$

Equation 1: Logistic Model

For both periods (non-crisis period and crisis period), I create three models each - one model for each dependent variable representing the tree dimensions of HIE (growth-intentions, innovativeness, internationality). The included independent variables (see section 3.3) are the same for all models, comprising a set of variables for the perceptions, sociodemographics, and environmental dynamics.

The empirical models used follow the following regression functions:

Growth = $ß_0$ + $ß_1$*Motive + $ß_2$*Oppt. Perception + $ß_3$* Self-efficacy + $ß_4$* Fear of Failure + $ß_5$*Gender + $ß_6$*Income Group + $ß_7$*Experience + $ß_8$*Education + $ß_9$*Network+ $ß_{10}$*New Technologies

Innov = $ß_0$ + $ß_1$*Motive + $ß_2$*Oppt. Perception + $ß_3$* Self-efficacy + $ß_4$* Fear of Failure + $ß_5$*Gender + $ß_6$*Income Group + $ß_7$*Experience + $ß_8$*Education + $ß_9$*Network+ $ß_{10}$*New Technologies

Internat = $ß_0$ + $ß_1$*Motive + $ß_2$*Oppt. Perception + $ß_3$* Self-efficacy + $ß_4$* Fear of Failure + $ß_5$*Gender + $ß_6$*Income Group + $ß_7$*Experience + $ß_8$*Education + $ß_9$*Network+ $ß_{10}$*New Technologies

I run the same models with the two data samples, the sample for the non-crisis period (including 2011 to 2013 data) and the sample for the crisis period (including 214 to 2016 data). This allows me to directly compare the results regarding the effects of the HIE determinants on the HIE dimension (Baron & Kenny, 1986). I assume that all differences in results among the two periods are due to the economic crisis. Thus, the differences in the coefficients of the same two models in the two different periods represent the impact of the crisis.

4. Results and Discussion

In this chapter, first, the descriptive results will be discussed to provide a better understanding of the sample data regarding entrepreneurship in Brazil. Subsequently, I discuss the results from the logistic regression models and derive practical implications.

4.1. Descriptive Analysis

The sample derived from GEM's APS data for the total period (2011 – 2016) consists of 3,391 Brazilian early-stage entrepreneurs. For the sub-periods non-crisis period (2011 – 2013) and the crisis period (2014 – 2016), the sub-samples count 1,935 and 1,456 observations, respectively. Appendix 3 presents the summary statistics for the two sub-samples as well as the sample comprising the full (six-year) period.

Considering the total period, the average age of the interviewed early-stage entrepreneurs in Brazil is 35.8 years, and 52.9 percent of those are female entrepreneurs. There seems to be a slightly positive trend over time towards female entrepreneurship when comparing the two sub-periods. Moreover, only 8.8 percent of the Brazilian entrepreneurs reported having some level of tertiary education, with no identified change over the total period of six years.

Regarding the entrepreneurial motive, in the total period, 34.1 percent of Brazilian entrepreneurs are driven into entrepreneurship through necessity. In comparison, 65.9 percent engaged in EA because of the exploration and exploitation of a business opportunity. Unsurprisingly, when comparing the two sub-periods, the proportion of necessity-driven entrepreneurs increased in the crisis period, from 32.6 percent in the period before the crisis, to 36.2 percent during the crisis.

As expected, the fear of failure among entrepreneurs is higher in the crisis period, increasing from 30.1 percent in the period before the crisis to 35.2 percent in the crisis period.

Another interesting development is the use of new technologies within the business processes and practices. In the three years before the start of the crisis, only 0.8 percent of the Brazilian early-stage entrepreneurs report the use of new technologies within their venture, while this number increases to 5.1 percent the period of 2014 to 2016. This result indicates a strong trend towards technological and digital adaption over time, which may or may be driven by the deteriorating economic situation. Regarding the entrepreneurial network, 50 percent of the

entrepreneurs indicate that they know at least one other entrepreneur, with no relevant change among the sub-periods.

Lastly, we look at the HIE dimension, thus, the classifiers of high-impact entrepreneurs (growth-intentions, innovativeness, internationality). Overall, only 4.2 percent of the early-stage entrepreneurs in Brazil expect to create more than ten new jobs within the subsequent five years. This rate of high-growth entrepreneurs in Brazil decreased from 5.2 percent before the crisis to 3 percent in the crisis period. The result seems intuitive since a deteriorating economic scenario commonly affects the expected growth of entrepreneurs. However, at this point, I also detect a weakness, or rather limitation, of this analysis in the form of a reporting bias in the dependent variable growth-intentions provided by the GEM APS, as one dimension of measurement to classify high-impact entrepreneurs. An entrepreneur that, under normal circumstances, has high growth-intentions and would be considered a high-growth entrepreneur is likely to report a lower and more conservative number of expected job-growth in a crisis scenario. This is because the entrepreneur would probably already consider the more challenging conditions and higher uncertainty in a crisis within its estimation of expected employee growth within the next five years. Therefore, this measurement dimension of HIE is subject to reporting bias within the crisis period, since the answer given by the individual is not conform to the individual's inherent ambition or perception towards his growth-ambitions. The economic scenario may influence his or her judgment. However, eventually, the lower reported job creation rate of the individual entrepreneurs in the crisis scenario would consequently accumulate and, in turn, result in an overall lower high-growth EA within the country, which seems regular within a crisis.

Regarding entrepreneurial innovativeness, the proportion of innovative entrepreneurs increased from 11.9 percent in the non-crisis period to 19 percent in the crisis period. Following the assumption that all identified changes between the periods are due to the crisis, then crisis seems to accelerate the innovativeness of entrepreneurs in Brazil. This result goes in line with the literature stating that, even though a crisis causes significant challenges, it also lets new market opportunities arise (Bingham et al., 2020) and fosters the creativity and invention capacity of entrepreneurs (Archibugi et al., 2012). This fact may also be linked to the generally more dynamic environment (Atwater, 2020). Moreover, entrepreneurs' tolerance towards risk and to "dear something new" may increase since the overall situation is already more complicated, and opportunity costs are usually lower during a crisis.

Finally, the findings for the internationality of Brazilian entrepreneurs indicate low numbers. In the period before the crisis, only one percent of entrepreneurs are internationally oriented, while this proportion increased to 5.2 percent within the crisis period. Holding on to the assumption that all identified changes are due to the crisis, this would indicate that entrepreneurs increasingly focus on export during the economic crisis. The reason herefore might be that during an economic downturn, entrepreneurs seek better sales opportunities outside the country, where the purchasing power may be more potent as in the country plagued by crisis. Without this assumption, this development toward export may have occurred because of the general trend towards open and internationalized markets and globalization.

4.2. Logistic Regression Results and Implications

This section discusses which of the HIE determinants, here the independent variables, statistically affect the likelihood of an entrepreneur to engage in HIE, and how the identified effects may vary within the two periods. Differences in a coefficient from the same model between the two periods represent the impact of the economic crisis. Appendix 5 presents the regression table, containing all coefficient values and standard errors. The three dimensions (entrepreneurial growth-intentions, innovativeness, internationality) are represented through the three dependent variables. There are two models for each dependent variable – one using data from the non-crisis period and one from the crisis period.

I find that among the different dimensions of HIE, the significant results vary quite a lot among the two periods. While some results align with my expectations and existing research, some do not or show no significant effects. The focus of the result discussion in on the effects found for the crisis period. It discusses the different variables of interest and their coefficient results, always under the assumption of ceteris paribus. The results for the group of variables regarding an entrepreneur's perceptions will be the first to be discussed, followed by the group of sociodemographic variables and, lastly, the variables regarding the dynamics of the entrepreneurial business environment. Table 1 in this section shows all directions of the coefficients.

Overall, the results for the variables regarding the entrepreneur's perceptions are relatively incoherent, and there is no independent variable that presents statistical significance for more than one HIE dimension in the crisis period. The first variable of interest is the entrepreneurial motive. The analysis finds a significant positive effect (at a five percent level) of the necessity-motive on innovativeness in the crisis period. In contrast, no such effect occurs in the non-crisis

period. This means that during the crisis, those entrepreneurs that are driven into entrepreneurship by necessity are more likely to be innovative than entrepreneurs driven by opportunity. This finding contradicts the research of Kontolaimou et al. (2016), who found that the opportunity motive is positively related to innovative performance. I expected that entrepreneurs that are driven by the exploration of a business opportunity are more likely to be innovative in a crisis, since then often more new market gaps or new problems arise that require a degree of product or service innovation to be "tackled" (Atwater, 2020).

However, some approaches attempt to explain the finding that necessity entrepreneurs are a stronger determinant for innovation during the crisis. First, when leaning on prospect theory[3], one could conclude that entrepreneurs driven by necessity may be more inclined to innovative behavior since they have fewer opportunity costs regarding labor opportunities (Koellinger & Thurik, 2012). Thus, they may be more likely to be incentivized to build a venture based on innovative ideas. When assuming that necessity-driven entrepreneurs have " less to lose", they may also be ready to take higher risks in a very uncertain environment. They may feel less fear to pursue innovative activities and to be creative (Goverts, 2015). However, the innovative activity of entrepreneurs driven by necessity may tend to be smaller and less radical and transformational.

Here it may be important to distinguish between different levels of innovativeness. Terwillinger (2015) conceptualizes three levels of innovativeness, according to their required competencies and the created value. He defines "incremental innovativeness" as the lowest level, followed by the "breakthrough" level and lastly the "transformation innovativeness" as the highest level. I assume that necessity-driven entrepreneurs tend to be on the lower innovativeness scale since they became entrepreneurs due to a lack of employment, face more constraints, and tend to be less ambitious regarding their business (Hermans et al., 2015). Therefore, in a crisis, there may be a higher proportion of necessity-driven entrepreneurs that are more likely to be innovative. However, the level of innovation and, therefore, the impact on economic development may still be lower compared to opportunity-driven entrepreneurs.

The finding suggests that programs fostering innovation within a crisis may distinguish between opportunity-driven and necessity-driven entrepreneurs according to their different levels of innovativeness. Therefore, the first step would be to classify the innovation levels of individual

[3] a model of behavioral economics showing how people decide between alternatives that involve risk and uncertainty, such as the probability of gains or losses (Kahneman & Tversky, 1979).

entrepreneurs to assign them to adequate initiatives or incentive mechanisms. Initiatives should be aware of the relevance of necessity entrepreneurs towards economic growth and support those even on lower innovativeness levels. Furthermore, they should consider promoting even small yet meaningful, innovative changes regarding the entrepreneur's products, services, or processes (Terwillinger, 2015). Programs may also include support mechanisms on how to pull promising necessity-driven entrepreneurs to even higher levels of innovation, so their impact on economic development in the crisis can increase further. On those higher levels, usually, the products and services are already highly innovative, and the scope of value creation through innovation is not only within the company but rather affects or even transforms an industry or even society (Terwillinger, 2015).

With a further focus on the crisis period, the absence of a significant effect of the necessity-motive on growth-intentions, even though there is a significant adverse effect found in the non-crisis period, is not according to my expectations. When checking the data, I find that the sub-sample for necessity-driven entrepreneurs in the crisis period, which are considered to have high-growth-expectations, is very small (only 37 observations). I conclude that the insignificance is due to a lack of statistical power. The same is likely to be the case for the effects on internationality, which is insignificant in both periods.

Regarding the attribute opportunity perception, I find no significant correlation on any HIE dimension in neither the crisis nor the non-crisis period. Therefore, it is not possible to provide any evidence on the impact of this determinant on HIE and or on the effects of the economic crisis.

Next, I discuss the estimates for the group of variables regarding perceptions - the variable fear of failure. The results show a strong significant negative relationship (at a 5 percent level) between the variable fear of failure and entrepreneurial growth-intentions. This result is in line with my expectations. In a crisis, the fear of failure seems to lower the likelihood of an entrepreneur to engage in high growth EA. A possible explanation for this effect may be that during a crisis, an overall higher level of uncertainty prevails, and entrepreneurs face higher constraints in terms of access to resources, especially financial resources and access to technologies (Brown, Rocha, & Cowling, 2020). Also, demand is lower in crisis since the purchasing power of the population usually drops, which may intensify the pressure and the perceived fear of failure of entrepreneurs and thus affects the entrepreneur's growth. For the non-crisis period, there is no significant result.

Moreover, the negative effect of fear of failure on growth-intentions within the crisis implicates that to foster job creation and, in turn, economic growth, it may be relevant to find out what exactly causes this fear of failure in an entrepreneur. By understanding which specific factors cause the fear of failure in entrepreneurs and whether those aspects are mostly heterogeneous or homogenous among them, entrepreneurs could be categorized. This way, one could provide more tailored measures or initiatives accordingly to mitigate this effect. I find no significant impact of the fear of failure on neither entrepreneurial innovativeness nor internationality (see Table 1), which contradicts my expectations.

Regarding self-efficacy as a determinant on HIE, I find a negative relationship with entrepreneurial growth-intentions in the crisis period. However, the estimate is only significant at a 10 percent level. Results show no significant effect on the years before the crisis. According to this finding, being confident of having the qualifications and skills required to be a successful entrepreneur harms the likelihood of this entrepreneur to engage in high-growth EA during a crisis. This negative relation contradicts empirical evidence and literature and seems counterintuitive. It also contradicts the negative relationship of fear of failure I found on growth-intentions. A possible explanation may be that some entrepreneurs are overconfident. Thus, they think they have sufficient competencies required to lead a growth-oriented business when, in fact, they do not. Therefore, they may have already attempted to engage in high-growth EA but failed, which consequently decreased their future growth expectations during a prevailing crisis.

On the other hand, the negative effect may also result from the reporting bias outlined in section 4.1. Here I mean that entrepreneurs with high self-efficacy and adequate qualifications and skills may tend to be more rational and have a better sense of judgment when it comes to growth expectations during an economic downturn. The insignificant results of self-efficacy on entrepreneurial innovativeness and internationality (in both periods) may be due to insufficient statistical power.

For the sociodemographic variables, I find few significant results (see Table 1). The most substantial effects on HIE are for the variable income level. Results show a strong positive relationship between the income level and entrepreneurial growth-intentions, as well as internationality, both significant at a one percent level. These effects are not specific to the crisis period but occur in both periods, whereas the impact of income level on internationality is slightly more substantial in the crisis period. Also, the findings go in line with the literature

discussed in section 2.2.2, stating that increased income levels seem to increase the likelihood of an entrepreneur to be oriented towards venture growth and export activities. Entrepreneurs whose basic needs are met and that have a financial security net may be in a more stable position and have better access to resources required for scaling their business, such as specific technologies and, more importantly, human capital.

Moreover, wealthier entrepreneurs may also be more comfortable with taking on more risk, which is essential since inherent risk increases when hiring more people and entering new markets. This strong income-effect may especially be true for entrepreneurship in developing and emerging countries, where social inequality is often more severe and where a large proportion of entrepreneurs are from low-income levels. Therefore, HIE activity within those countries is often lower compared to more prosperous economies (Autio, 2007). Moreover, access to quality education, especially tertiary education and entrepreneurship-specific education, is usually better for individuals of higher income-groups. Literature states that access to intellectual capital is an important resource for an entrepreneur to realize their full potential regarding growth intentions and internationalization strategies (Jiménez et al., 2015).

These findings implicate that different measures and initiatives need to be developed for entrepreneurs from different financial backgrounds. Since the entrepreneurs of higher income levels seem to be stronger contributors to economic development in terms of growth within a crisis, there should be programs and incentives exclusively supporting such promising entrepreneurs to scale their businesses and to accelerate domestic and international expansion. At the same time, it is crucial also to consider and support the low-income entrepreneurs, since they account for the largest part of EA in countries like Brazil and are therefore essential for economic development. For low-income entrepreneurs with lower growth expectations and often even greater financial difficulties, countermeasures in the crisis might focus on business continuation to prevent job losses rather than pushing towards growth. Such measures could include economic relief programs and crisis funds, which provide financial assistance and economic benefits.

Table 1: Directions of Logistic Regression Results

Independent Variable	Dependent Variable	Direction of Result (non-crisis)	Direction of Result (crisis)
Motive	Growth	-	0
	Innovation	0	+
	Internationality	0	0
Oppt. Perception	Growth	0	-
	Innovation	0	0
	Internationality	0	0
Fear of Failure	Growth	0	-
	Innovation	0	0
	Internationality	0	0
Self-efficacy	Growth	0	0
	Innovation	0	0
	Internationality	0	0
Gender	Growth	0	0
	Innovation	+	0
	Internationality	0	0
Income Level	Growth	+	+
	Innovation	+	0
	Internationality	+	+
Experience	Growth	+	0
	Innovation	0	0
	Internationality	0	0
Education	Growth	0	0
	Innovation	0	+
	Internationality	+	0
Network	Growth	+	+
	Innovation	0	+
	Internationality	0	+
New Technologies	Growth	0	0
	Innovation	+	+
	Internationality	0	+

Source: Own representation

Next, I discuss the effects of human capital variables. Regarding the professional experience, expressed through the entrepreneur's age, I find that the professional experience does not affect the likelihood of an entrepreneur to engage in any HIE dimension in the crisis period. However, since I find a significant positive effect of experience on entrepreneurial growth intentions in the years before the crisis, the insignificant impact on the crisis is not in accordance with my expectations and the literature. However, this, again, might be caused by the identified reporting bias in the variable growth-intentions, since with increasing experience, entrepreneurs may become more rational and conservative in their judgment, discounting the effects of a bad economic environment in their growth expectations. This fact, in turn, would lead to less entrepreneurs with higher experience reporting high growth intentions in the crisis period.

As for education, results show a moderate positive relationship (at a 10 percent significance level) between the education-level and innovativeness in the crisis period. In contrast, no significant effect occurs in the non-crisis period. Thus, entrepreneurs that have tertiary education are more likely to engage in innovation related EA in the crisis period, compared to those without tertiary education. The finding goes in line with Giotopoulos et al. (2016) and other literature. One may partially explain this positive effect through the fact that entrepreneurs with higher levels of education more likely received a certain extend of education or training on innovation-related topics such as innovation management, creative thinking, or other relevant managerial skills. In an economic crisis, this knowledge and skills regarding innovation may be even more relevant and valuable in terms of the exploitation of new market opportunities. Therefore, in an economic downturn, being innovative may generally become an even more decisive competitive advantage.

It implicates that measures such as government programs other initiatives to support entrepreneurs and to mitigate the impact of an economic crisis should include educational training, especially focusing on innovation. Such measures are essential for economic development, especially in countries like Brazil, where the overall rate of entrepreneurs who went to university is very low. Even though some initiatives for entrepreneurial education do exist in the country (e.g. SEBRAE), more public investment, but also engagement from universities and the private sector, may help to increase the levels of entrepreneurial intellectual capital and, in turn, to stimulate economic growth. The lack of qualified teachers in Brazil also plays an important role in this regard (Basso, 2017). According to OECD, when looking at entrepreneurial education initiatives, using the right frameworks and approaches to eventually transfer the knowledge acquired in such training to the enterprise plays an important role. Moreover, the importance of the development of early mechanisms to evaluate such programs it is pointed out (OECD, 2018).

Focusing further on the variable education during the crisis, the absence of significant effects of education on growth-intentions and internationality is not in line with my expectations, the literature, and empirical evidence (Verheul & Van Mil, 2011), emphasizing on the positive impact of education on HIE. However, regarding growth-intentions, Giotopoulos et al. (2017) find the same result in a conducted study on Greece. They provide an explanation leaning on

> "the phenomenon of 'brain-drain' (i.e. the outflow of scientists to abroad) that has been intensified in Greece especially during the years of the economic crisis. This phenomenon has led to the loss of well-educated and highly-skilled people that potentially could be involved in ambitious entrepreneurial activities in the country." (Giotopoulos et al., 2017, p. 14).

Also, in Brazil, many young, skilled, and highly-educated people were leaving the country during the economic crisis to pursue a life and career mostly in more developed and stable economies, where they expect to find better opportunities.

Regarding the variable gender, in line with the very inconsistent empirical evidence regarding the effect of gender differences on HIE, I find no statistically significant correlation between gender and HIE during the economic crisis in Brazil (see Table 1).

The last group of variables to be analyzed regard the dynamics of the entrepreneurial environment. Of all the independent variables in the tested econometric models, the variable network is the only independent variable for which the analysis finds a significant correlation with all three dimensions of HIE in the crisis period. Thus, entrepreneurs that have an existing entrepreneurial network and know other entrepreneurs are more likely to engage in HIE activity within the crisis period. No such effect occurs for innovativeness and internationalization in the non-crisis period. However, I find a significant impact of the entrepreneurial network on growth-intentions, which is even slightly more robust than in the crisis period. Research firmly supports the view that social and professional networks are a vital asset to overall early-stage EA and its performance (Liao & Welsch, 2003; Feki, 2019). The benefits of social networks on entrepreneurship include the transfer and diffusion of information and knowledge, innovation, technology, and practices (Greve, Benassi, & Dag Sti, 2006).

Moreover, relatively soft factors such as encouragement, admiration, the feeling of community or mentorship, and mental support among entrepreneurs can be highly valuable, especially in more difficult economic situations. Hence, those mentioned benefits from the entrepreneurial social network may facilitate growth, innovativeness, and internationalization of an entrepreneur and its venture. It may, therefore, be considered one of the most critical drivers of HIE. Interestingly, regarding innovativeness and internationality, the positive relationship with the entrepreneurial network is only significant within the crisis period. This finding may be because access to tangible resources such as financial capital, technologies, and equipment is more restricted in an economic downturn (Brown, Rocha, & Cowling, 2020). This, in turn, gives even more importance to intangible assets such as information, encouragement, best practices provided by the entrepreneurial network. For Brazilian entrepreneurs, the support from other entrepreneurs may become even more crucial in a crisis, considering the high levels of bureaucracy and the complex tax system they need to deal with. Especially in lower-income countries or countries in which the trust in formal institutions tends to be low, which generally

is the case in Brazil, the social and entrepreneurial network may become even more critical in its role as an informal institution (Ivy & Perényi, 2020). What is more, in the Brazilian culture, the relevance of networking and personal contacts in business and venturing is especially high and presents a critical success factor (see section 2.3.2).

Furthermore, the findings indicate that public and private initiatives to foster HIE and, in turn, economic growth should undoubtedly emphasize the importance of the entrepreneurial network and its related benefits. Therefore, a suggestion would be to enforce the creation of physical or virtual platforms as space where entrepreneurs can engage and strengthen their networks. Such initiatives could be in the form of networking events, mentorship programs, or initiatives that facilitate strategic partnerships (Creighton, 2019).

Lastly, I find solid positive relationships between new technologies and innovativeness as well as internationally within the crisis period. Thus, during a crisis, the use of new technologies increases the likelihood of an entrepreneur to engage in HIE activity in terms of innovativeness and internationality. The findings go in line with the literature discussed in section 2.2.3. Regarding entrepreneurial innovativeness, the positive correlation with new technologies is not surprising, since most innovation today is somehow enabled and driven by technology (Errikson Björling, 2017). My analysis finds that in the crisis period, an even more substantial effect between the use of new technologies and innovativeness compared to the non-crisis period. This may be because, in a more challenging economic situation, entrepreneurs face an even higher pressure to staying competitive. Therefore, they are more likely to lever on resources such as technologies that tend to bring a competitive advantage in terms of enabling or boosting innovation.

There is also a strong positive effect of new technologies on internationality in the crisis period, whereas not in the non-crisis period. Bouter argues that technology is an essential driver of scalability (Bouter, 2018). Therefore, we can assume that entrepreneurs who use new technologies within their ventures may face fewer constraints in terms of growth and are, thus, in a better position to scale internationally. Technology in the form of, e.g., digital communication channels, marketplaces, and platforms are commonly agreed to make exporting more easily scalable while driving costs down. What is more, entrepreneurs using new technologies within a turbulent economic environment may have an even more decisive competitive advantage.

The findings imply that the use of technology should be particularly encouraged in a crisis since it seems to stimulate competition and HIE, which are beneficial factors of economic growth. In this respect, the starting point of public or private initiatives may be first to educate entrepreneurs that do not yet use new technologies to a significant extend about the importance and benefits of technologies. Then, there may be more specific programs that provide best practices and offer support with the assessment of technologies to identify which may be the most adequate and useful to be included in a particular venture. Going even further, such programs could even select individual ventures for which the use of a specific technology would have a specifically large impact and then facilitate or subsidize the access to such technology.

Certainly, HIE and, therefore, economic growth could be stimulated significantly through specifically designed programs or countermeasures like those indicated above. However, especially during an economic downturn, the available resources of governments and private institutions for such initiatives may be even more limited. This fact introduces a different topic, namely public and private investments or spending, into measures to mitigate the adverse effects of the crisis on entrepreneurship, which is discussed extensively within many domains.

The result and its discussion show that, other than expected, only a few HIE determinants have significant effects on the dimensions of HIE during crisis. What is more, in those cases for which I find significant results in both periods, only in some of the effects are actually stronger in the crisis period. Yet, there are some cases in which an effect clearly increased in the crisis period, in more than one HIE dimension, such as for network, new technologies, or the income level. Regarding the directions of the significant results, there are only a few results, namely for the entrepreneurial motive and self-efficacy, that contradict my expectations and are counterintuitive to me. Nevertheless, when considering all of the determinants together and not individually, it leads to the rejection of my hypothesis, stating that "*During an economic crisis, the effects of the determinants of high-impact entrepreneurship on high-impact entrepreneurship increase."*

5. Concluding Remarks

Based on the results presented and discussed in the previous part, in this chapter, I briefly conclude the research and its results. Section 5.2 presents the limitations of this study and my suggestions for further research.

5.1. Conclusion

Within the domain of entrepreneurial research, the relevance regarding economic growth of HIE as a subgroup, emphasizing entrepreneurial growth, innovativeness, and internationality, increases more and more. Especially when economies are dealing with the effects of an economic crisis, HIE seems to become even more relevant. Since Brazil is a large economy and entered a recession only recently in 2014, facing a severe economic and political crisis, it seems to be a very relevant case study. Hence, this thesis provides evidence from Brazil, analyzing the impacts on the determinants of HIE on the three dimensions of HIE (growth-intentions, innovativeness, internationality) and how they differ in the period before and during the crisis. The reviewed literature on the determinants of HIE and how they may behave in an economic downturn led me to the hypothesis that the effects of all the studied determinants on HIE increase in the crisis period.

To test this hypothesis, I used individual-level GEM data on Brazilian early-stage entrepreneurs for the years 2011 to 2016, divided into two equal sub-samples, and conducted logistic regression analysis. All in all, the results show that HIE in Brazil seems to be driven by different factors in the two periods. Also, while for some independent variables no significant effects occur in either period, some variables show substantial results on at least one dimension of HIE. Yet, the hypothesis stating that the effects of the different determinants on the dimensions on HIE increase in the crisis period cannot be accepted.

However, when looking at the results for the three HIE dimensions individually, in some cases, the effects of the determinants of HIE did indeed increase in the crisis period. Within the group of variables regarding perceptions, the entrepreneurial motive seems to be an impactful factor. The results show that entrepreneurs who are motivated to engage in EA by economic necessity rather than by opportunity are stronger determinants of innovativeness in the crisis period. The finding implicates that when designing initiatives, one should distinguish between the different levels of innovativeness that may exist among opportunity-driven and necessity-driven entrepreneurs, so their innovation capacity can be levered adequately. The results further

indicate that the fear of failure of an entrepreneur decreases the likelihood of the entrepreneur to have high growth-intentions in the crisis period. The increased uncertainty entrepreneurs face in a crisis scenario may explain this result. A more in-depth analysis of the causes of this fear may allow initiatives to classify and design more adequate approaches to mitigate the effect and, in turn, promote entrepreneurial growth.

Regarding the sociodemographic variables, especially the income-level and education, they seem to play a relevant role when looking at HIE in a crisis scenario. Results show that in the crisis period, entrepreneurs who received a certain level of tertiary education and have a higher income level are more likely to be innovative. This is an important finding, supporting the relevance of educational training for entrepreneurs to mitigate the adverse effects of a crisis. It further indicates that innovation should be a central point of the curriculums of such training and initiatives.

For the group of variables on the dynamics of the entrepreneurial environment, I find strong positive effects for the variables regarding entrepreneurial network and the use of new technologies. Since an existing entrepreneurial network seems to be a vital asset and a significant factor to increase HIE on several dimensions, the creation and encouragement to participate in networking events and similar initiatives should be an element of crisis countermeasures. Lastly, the use of new technologies is found to affect the entrepreneur's innovativeness positively and should, therefore, be encouraged and supported widely.

5.2. Limitations and Future Research

The research at hand uses GEM data, which is considered the most complete and comprehensive publicly available data in the sphere of entrepreneurial research. However, the strong dependency on the GEM framework, the data, and its data collection design and methodology also present certain limitations for this research.

There are undoubtedly many other factors that determine the intentions and the behavior of an entrepreneur that is not captured by the GEM data. Especially for research on entrepreneurship and the impact of the crisis, it would be interesting to have data that allows some analysis of the entrepreneur's access to financial resources and on how the financing of a venture. Unfortunately, no annual data is available yet, enabling such a comparison. Further research in this field may therefore use primary data collection or other secondary data sources, or GEM may include this topic in its data collection in the future. Hence, as some relevant factors of

HIE were not tested, a complete conclusion of what the effects of the crisis on HIE are cannot be stated.

Moreover, the data is subject to biases in the definitions and question design used by GEM, e.g., the definition of an entrepreneur being "innovative". What is more, the data results from the survey responses of entrepreneurs in APS. Hence, the reported answers are influenced by individual choice and perceptions and are, therefore, subjective.

Moreover, GEM does not ask the exact same interview questions in its APS every year. Thus, even slight changes in the wording or framing of a question, may lead to different varying interpretations in different years, leading to biases in the variables.

When using the GEM data particular for making a crisis comparison, I realized that some variables could not be applied adequately without being subject to a reporting bias, such as the reporting bias in the variable growth intentions stated in section 4.1.

Another limitation of this research regards the relatively small sample size, decreasing the statistical power, and leading to the insignificance of variables' coefficients. I identify three factors that lead to the small size of my sample, from which I, in turn, derive suggestions for future research. First, my research focuses on early-stage entrepreneurs by the definition of GEM, which accounted for a relatively small proportion of individuals surveyed in the APS. Hence, further research may focus on the impact of the crisis on HIE among the established entrepreneurs, which is another interesting group to be studied, while allowing larger data samples. Second, to decrease the complexity of the analysis, the variables measuring the dimensions of HIE (growth-intentions, innovativeness, internationality) were transformed into dummy-variables. This created a trade-off between the defined thresholds in the dependent variables and the sub-sample sizes. Since only a very small share of the Brazilian entrepreneurs in the sample "fulfills the requirements" of being a high-impact entrepreneur in terms of reported growth-intentions, innovativeness, and international orientation, the sample sub-groups partially comprise a deficient number of observations. This fact, in turn, decreases the statistical power.

Furthermore, regarding future research, it would be interesting to conduct a similar or the same analysis on other crisis-hit economies in the Latin-American region, such as Argentina or Venezuela. One could then evaluate the main findings of such studies in a cross-country comparison. They may allow the generalization of results and its implication on, i.e., public and private initiatives. What is more, the GEM data also allows conducting research on a regional

level or on sector level (e.g. technology sector, service sector), which may be another interesting field of future research on HIE.

Lastly, studying the effects of the global crisis related to the Covid-19 outbreak on HIE would undoubtedly be a very interesting field of research. However, since GEM's APS data is publicly accessible only after three years, such research could be conducted in 2024 at the earliest.

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7. Appendices

Appendix 1

Variable Definitions

The table presents the definitions of all variables used in the regression models. A variable description, following the GEM framework, the variable type, and the respective coding is provided.

Variable	
Dependent Variables	
Growth	As a proxy to measure the entrepreneur's growth intentions, the respondent provides an estimate of the number of jobs he or she expects to create through the business within five years. When the entrepreneur expects to more than 10 jobs to be created, the entrepreneur is categorized as having low growth intentions. Binary variable (0 – Low growth intentions; 1 – high growth intentions)
Innov	As a proxy to measure the entrepreneur's innovativeness, the respondent provides an estimate on the proportion of customers that consider the product or service as new or unfamiliar. When none of the customers are expected to find the product new, entrepreneurs are considered not innovative. In contrast, they are considered innovative if some or all customers are assumed to regard the product as new. Binary variable (0 – Not innovative; 1 – Innovative)
Internat	As a proxy to measure the entrepreneur's international orientation, the respondent provides an estimate on the proportion of customers that are from outside the national country market. When more than 10 percent of the customers are assumed to be from abroad, entrepreneurs are considered internationally oriented; otherwise, they are considered not internationally oriented. Binary variable (0 – Not internationally oriented; 1 – Internationally oriented)
Perceptual Variables	
Motive	The respondent provides information about the motivation for starting a business. Binary variable (0 – opportunity-driven motive; 1 – necessity -driven motive)
Oppt. Perception	The respondent states whether he or she believes that in the six months following the survey, good opportunities for starting a business will be available in the area he or she lives. Binary variable (0 – No; 1 – Yes).
Fear of Failure	The respondent is asked whether he believes that the fear of failure would prevent him or her from starting a business. Binary variable (0 – No; 1 – Yes).
Self-efficacy	The respondent reports whether he or she believes to have the knowledge, skills, and experience needed to start a venture. Binary variable (0 – No; 1 – Yes).
Sociodemographic Variables	
Gender	The respondent is asked to provide her or his gender. Binary variable (0 – male; 1 –female).

Income Level	The respondent provides his or her annual household income out of 7 given ranges, expressed in Brazilian Real. Ordered seven-category variable (1 – lowest to 7 – highest)
Experience	The respondent provides his or her age. The age presents as a proxy for the professional experience. Continuous variable.
Education	The respondent states the highest educational degree he or she had attained. Binary variable (0 – no tertiary education, 1 - has tertiary education).
Environmental Dynamism Variables	
Network	The respondent provides information on whether he or she knows a person who started a business within 2 years before the time of the survey. Binary variable (0 – No;1 – Yes).
New Technologies	The respondent states whether he or she uses technologies within the business that are less than 5 years old from the time of the survey, hence considered new technologies. Binary variable (0 – No New Technologies; 1 – New Technologies).

Appendix 2

Frequency Distributions of HIE dimensions
Frequency distributions of HIE dimensions - entrepreneurial growth-intentions, innovativeness, and internationality; represented in percentage.

Variable	**Frequency**		
	Total Period	Non-Crisis Period	Crisis Period
Growth			
High Growth Intentions (>10 jobs created within the next 5 years)	4.2%	5.2%	3.0%
Innov			
High Innovativeness (Some part or all customers consider product/service novel and unfamiliar)	8.8%	12.0%	19.0%
Internat			
High Internationality/Export Orientation (> 10% customers out of domestic market)	2.8%	1.0%	5.2%

Appendix 3

Summary Statistics – Total Period (2011 – 2016)
This table shows descriptive statistics for the variables used in the logistic regressions. All variable definitions are outlined in Appendix 2 in the Appendix. *Experience* is denoted as the age of the interviewed entrepreneur denoted in years. St. Dev. indicates the standard deviation. Pctl(25) and Pctl(75) show the values at 25th percentile and 75th percentile, respectively. N is the number of observations per variable, while Max and Min describe the maximum and minimum observed value per variable, respectively.

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Growth	3,391	0.042	0.202	0	0	0	0	1
Innov	3,391	0.088	0.284	0	0	0	0	1
Internat	3,391	0.028	0.166	0	0	0	0	1
Motive	3,391	0.341	0.474	0	0	0	1	1
Oppt. Perception	3,391	0.609	0.488	0	0	1	1	1
Fear of Failure	3,391	0.323	0.468	0	0	0	1	1
Self-efficacy	3,391	0.737	0.441	0	0	1	1	1
Gender	3,391	0.530	0.499	0	0	1	1	1
Income Level	3,391	3.538	2.004	1	2	3	5	11
Experience	3,391	35.782	11.478	18	26	34	44	64
Education	3,391	0.088	0.284	0	0	0	0	1
Network	3,391	0.507	0.500	0	0	1	1	1
New Technologies	3,391	0.026	0.160	0	0	0	0	1

Summary Statistics – Non-crisis Period (2011 – 2013)
This table shows descriptive statistics for the variables used in the logistic regressions. All variable definitions are outlined in Appendix 2 in the Appendix. *Experience* is denoted as the age of the interviewed entrepreneur denoted in years. St. Dev. indicates the standard deviation. Pctl(25) and Pctl(75) show the values at 25th percentileand 75th percentile, respectively. N is the number of observations per variable, while Max and Min describe the maximum and minimum observed value per variable, respectively.

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Growth	1,935	0.052	0.221	0	0	0	0	1
Innov	1,935	0.012	0.108	0	0	0	0	1
Internat	1,935	0.010	0.101	0	0	0	0	1
Motive	1,935	0.326	0.469	0	0	0	1	1
Oppt. Perception	1,935	0.635	0.482	0	0	1	1	1
Fear of Failure	1,935	0.301	0.459	0	0	0	1	1
Self-efficacy	1,935	0.748	0.434	0	0	1	1	1
Gender	1,935	0.522	0.500	0	0	1	1	1
Income Level	1,935	3.671	2.110	1	2	3	5	11
Experience	1,935	35.460	11.132	18	26	34	43	64
Education	1,935	0.102	0.303	0	0	0	0	1
Network	1,935	0.504	0.500	0	0	1	1	1
New Technologies	1,935	0.008	0.088	0	0	0	0	1

Summary Statistics – Crisis Period (2014 – 2016)

This table shows descriptive statistics for the variables used in the logistic regressions. All variable definitions are outlined in Appendix 2 in the Appendix. *Experience* is denoted as the age of the interviewed entrepreneur denoted in years. St. Dev. indicates the standard deviation. Pctl(25) and Pctl(75) show the values at 25th Percentile and 75th percentile, respectively. N is the number of observations per variable, while Max and Min describe the maximum and minimum observed value per variable, respectively.

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Growth	1,456	0.030	0.171	0	0	0	0	1
Innov	1,456	0.190	0.392	0	0	0	0	1
Internat	1,456	0.052	0.223	0	0	0	0	1
Motive	1,456	0.362	0.481	0	0	0	1	1
Oppt. Perception	1,456	0.574	0.495	0	0	1	1	1
Fear of Failure	1,456	0.352	0.478	0	0	0	1	1
Self-efficacy	1,456	0.721	0.449	0	0	1	1	1
Gender	1,456	0.541	0.499	0	0	1	1	1
Income Level	1,456	3.363	1.840	1	2	3	4	11
Experience	1,456	36.209	11.913	18	26	34	45	64
Education	1,456	0.069	0.254	0	0	0	0	1
Network	1,456	0.512	0.500	0	0	1	1	1
New Technologies	1,456	0.051	0.220	0	0	0	0	1

Appendix 4

Correlation Matrix
This table shows correlation coefficients between the full set of explanatory variables.

	Motive	Oppt. Percept.	Self-efficacy	Fear of Failure	Gender	Income Level	Experience	Education	Network	New Tech.
Motive	-	-0.11	-0.14	0.12	0.00	-0.27	0.08	-0.14	-0.9	-0.04
Oppt. Percept.	0.11	-								
Self-efficacy	-0.14	0.14	-							
Fear of Failure	0.12	-0.10	-0.38	-						
Gender	0.00	0.01	0.00	0.04	-					
Income Level	-0.27	0.07	0.17	-0.12	0.03	-				
Experience	0.08	0.01	0.04	-0.01	0.00	-0.05	-			
Education	-0.14	0.01	0.08	-0.06	0.00	0.36	0.01	-		
Network	-0.09	0.11	0.23	-0.12	-0.01	0.19	-0.03	0.11	-	
New Tech.	-0.04	0.02	0.04	-0.03	-0.02	0.05	0.01	-0.01	0.06	-

Appendix 5

Logistic Regression Table

This table presents the logistic regression results for the effects of the determinant variables on the dependent variables representing entrepreneurial growth-intentions (*Growth*), innovativeness (*Innov*), and international orientation (*Internat*) in the non-crisis and the crisis period. All variable definitions can be found in Appendix 1. Standard errors clustered at the individual entrepreneur level are shown in parentheses. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

	Dependent variable:					
	Non-Crisis (2011-2013)			Crisis (2014-2016)		
	Growth	*Innov*	*Internat*	*Growth*	*Innov*	*Internat*
Motive	-0.024**	0.0003	-0.007	-0.006	0.051**	-0.005
	(0.011)	(0.005)	(0.005)	(0.010)	(0.021)	(0.013)
Oppt.Perception	0.008	-0.004	-0.001	0.007	0.008	0.008
	(0.010)	(0.005)	(0.005)	(0.009)	(0.020)	(0.012)
Fear of Failure	-0.011	0.003	-0.001	-0.022**	-0.011	0.001
	(0.012)	(0.006)	(0.005)	(0.010)	(0.022)	(0.013)
Self-efficacy	-0.0002	0.004	0.005	-0.021*	0.007	-0.009
	(0.013)	(0.006)	(0.006)	(0.011)	(0.025)	(0.015)
Gender	0.003	0.009*	0.003	0.003	0.005	-0.004
	(0.010)	(0.005)	(0.005)	(0.009)	(0.020)	(0.012)
Income Level	0.021***	0.005***	0.004***	0.021***	0.006	0.009***
	(0.003)	(0.001)	(0.001)	(0.003)	(0.006)	(0.004)
Experience	0.001**	0.0002	-0.0002	-0.0001	-0.0005	-0.001
	(0.0004)	(0.0002)	(0.0002)	(0.0004)	(0.001)	(0.0005)
Education	0.004	-0.013	0.017**	-0.019	0.076*	0.012
	(0.018)	(0.009)	(0.008)	(0.018)	(0.040)	(0.024)
Network	0.026***	0.006	-0.006	0.017*	0.066***	0.022*
	(0.010)	(0.005)	(0.005)	(0.009)	(0.021)	(0.012)
New Technologies	-0.065	0.226***	-0.022	-0.008	0.393***	0.118***
	(0.058)	(0.028)	(0.027)	(0.020)	(0.045)	(0.027)
Constant	0.024	-0.679***	-0.259	-0.016	0.420**	-0.020
	(0.391)	(0.191)	(0.183)	(0.039)	(0.087)	(0.052)
Observations	1,935	1,935	1,935	1,456	1,456	1,456
Log Likelihood	232.059	1,616.702	1,703.778	547.300	-610.555	143.769
Akaike Inf. Crit.	-438.11	-3,207.404	-3,381.556	-1,068.600	1,247.110	-261.539

Note: *p<0.1; **p<0.05; ***p<0.01