Conditions that make ventures thrive: from individual entrepreneur to innovation impact

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Abstract Entrepreneurship and innovation create a positive impact on the economy and society. Globally, governments invest resources to support new ventures and facilitate innovation. In this study, we examine this phenomenon by studying the pathway that goes from individual entrepreneur to innovation impact. We measure the effect of entrepreneurial motives on different types of innovations, with a particular focus on its amplification by formal and informal institutional conditions. Specifically, we use multi-level models to analyze annual data of 29 countries for 2006 to 2018. We find that opportunity-driven entrepreneurs are associated with higher levels of radical innovation, breakthrough innovation, and disruptive innovation. Better tax policies and less bureaucracy amplify this positive effect on radical innovation and breakthrough innovation. For necessity-driven entrepreneurs, the regulatory quality amplifies the positive effect on radical innovation and disruptive innovation, while monetary resources dampen this effect. Our findings show that the differences in innovation impact can be explained by differences in entrepreneurial motives and their specific interactions with formal and informal institutional conditions.

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Plain English Summary The rise of new business ventures has a positive impact on innovation and on the economy. This positive impact comes in different forms and shapes, such as business ventures introducing new products in new markets, creating new products for existing customers, or repositioning existing products for new consumers. Governments also play an important role through their policies and rules, shaping the conditions that influence the entrepreneurial process. In this study, we argue that entrepreneurs are driven by opportunity or necessity. The main implication for policy is that the two types of entrepreneurs react differently to governmental policies and conditions, and therefore also behave differently when it comes to introducing or creating new products in new or existing markets.

1 Introduction

The creation of new business ventures has a positive impact on the economy and innovation (Acs, 2008; Acs et al., 2008). Governments around the world invest resources to facilitate the entrepreneurial process for new businesses, but there is room for

improvement (UNCTAD).[1] For instance, new businesses in the U.S. fail on average 90 percent of the time.[2] Of these surviving businesses, the question remains how these businesses thrive and how they find ways to achieve high-growth innovation. The challenge for governments is therefore to shape effective institutional conditions that focus on fostering high-growth innovation to create a positive impact.

In this paper we examine this issue from three perspectives: individual, institutional, and innovational. We attribute the rise of business ventures to (1) the individual entrepreneurs, (2) the supportive functioning of institutional conditions (i.e., conditions created by governmental policies), and (3) the ventures' ability to innovate in the market (Fuentelsaz et al., 2018; Fredström et al., 2021; Patzelt et al., 2021). After all, entrepreneurs with high-growth aspirations operate as agents in ecosystems with the market-supporting conditions, which are created by institutional policies and regulations by the governments (Cho et al., 2022; Fuentelsaz et al., 2021; Wang et al., 2023). By triangulating these perspectives, we aim to formulate an answer to how entrepreneurs and their ventures can effectively navigate institutional conditions and create innovation impact.

Prior research examines the success of business ventures from these different perspectives separately. From the individual perspective, the success and failure are determined by factors such as individual talent, passion, grit, entrepreneurial experience, entrepreneurial motivation, and entrepreneurial vision (Eesley & Roberts, 2012; Drnovsek et al., 2016; Mueller et al., 2017; Murnieks et al., 2020; Preller et al., 2020; Patzelt et al., 2021). Yet, it is still crucial for entrepreneurs to align their talents and abilities with effective innovation strategy and a supportive commercialization environment (Eesley et al., 2014; Torres & Godinho, 2022). Hence, there is merit to extend the individual perspective with institutional and innovational perspectives, and to study these perspectives jointly.

From the institutional perspective, formal and informal institutions play an important role in the entrepreneurial process because they lead to higher levels of innovation and economic growth (Urbano et al., 2019; Wong et al., 2005). Public policies stimulate entrepreneurial activity and growth through creating market-supporting conditions that facilitate economic freedom, shape entrepreneurial ecosystems, and reduce financial barriers (Minniti, 2008; Roper & Scott, 2009; Fuentelsaz et al., 2018; Hechavarría and Ingram, 2019;; Fuentelsaz et al., 2021 Wurth et al., 2022). Subsequently, business ventures achieve high growth by engaging in radical innovation, which concerns introducing new products that add significant value to new customers, break new grounds in functionalities and utility, and disrupt existing markets by expanding market boundaries (Chandy & Tellis, 1998; Estrin et al., 2022; Tellis et al., 2009). This innovation aspect is a crucial part to consider if we aim to measure the impact of promoting and facilitating entrepreneurship at an institutional level.

This present study therefore contributes to the existing literature by examining the effect of entrepreneurial motives on radical, breakthrough, and disruptive innovation by analyzing how these relationships are amplified by formal and informal institutional conditions. To achieve this, we combine data from three sources, namely the World Bank, the Fraser Institute, and the Global Entrepreneurship Monitor (GEM). We use multi-level modeling to analyze data of 29 countries from 2006 to 2018. The novelty of our study is that we combine three different perspectives: (1) the behavioral motives of entrepreneurs, (2) the determinants of radical, breakthrough, and disruptive innovation, and (3) the effectiveness of formal and informal institutional conditions.

Our findings are relevant for policy makers, entrepreneurs, and managers of small businesses for several reasons. First, governments can improve their policy making with our present findings if they seek to increase the levels of radical, breakthrough, and disruptive innovation in their countries. We find that there are substantial differences in informal and formal institutional conditions that affect entrepreneurs differently. We also find that entrepreneurial programs and government support programs need to improve to meet innovation goals. Second, positive innovation impact happens through radical, breakthrough, or disruptive innovation. Entrepreneurs and managers can use our findings to better understand their entrepreneurial motives, shift toward a more

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[1] Source: United Nations of Conference on Trade and Development. https://unctad.org/news/invest-small-business-and-reap-big-rewards
[2] Source: Calculated from the data of U.S. Bureau of Labor Statistics: https://www.bls.gov/news.release/cewbd.t08.htm

opportunity-driven focus, and learn how informal and formal institutional conditions influence and provide relevant support to their way of doing business, and subsequently achieve radical, breakthrough, or disruptive innovation.

The remainder of our study is structured as follows. The next section develops the theory. Section 3 describes the data and elaborates on the methodology. Section 4 presents the results. Section 5 discusses the main findings and limitations. Section 6 concludes.

2 Theory

This section develops the theory and hypotheses. We first discuss radical, breakthrough, and disruptive innovation as business outcomes. We then examine the role of institutional conditions in this process. We propose a Conditions-Motives matrix that theoretically explains the fourfold way to achieve such innovation. Subsequently, we discuss the opportunity versus necessity motives in the context of entrepreneurship and develop the hypotheses and the theoretical framework.

2.1 Radical, Breakthrough, and Disruptive Innovation

Innovation takes many forms and shapes when it comes to contributing value to consumers and the market (Chandy & Tellis, 1998). Businesses may decide to introduce new products in new markets, extend their product lines in existing market segments, or reposition their existing products in new markets (Ansoff, 1958). Figure 1 shows the 2×2 Ansoff matrix to illustrate the different types of innovation (Gurcaylilar-Yenidogan & Aksoy, 2018).

First, Radical Innovation is defined as introducing new products in new markets using new technology, having the potential to create a large impact on the economy and society (McDermott and O'Connor, 2002; Tellis et al., 2009; Coccia, 2012; Shkolnykova & Kudic, 2022). Radical innovation is valued because it is the main driver of radical change in markets through new product-market combinations (Domínguez-Escrig et al., 2019). Second, we define Breakthrough Innovation as the introduction of new products in existing markets (Gurcaylilar-Yenidogan & Aksoy, 2018). This type
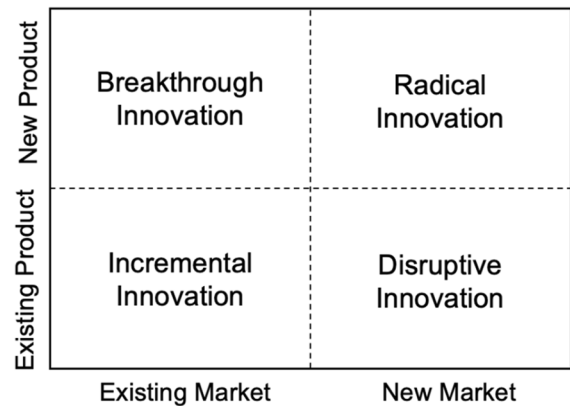

Fig. 1 This framework classifies the different types of innovations in accordance with their impact on consumers or the market (Ansoff, 1958)

of innovation adds value to consumers through the introduction of a completely new product or through the recombination of existing components or attributes that create new value for consumers (Kaplan & Vakili, 2015). Finally, Disruptive Innovation is defined as the diffusion of existing products into the hands of consumers in new markets, creating new demand (Estrin et al., 2022; Gurcaylilar-Yenidogan & Aksoy, 2018).

In larger established firms, the challenge is to recognize new opportunities in existing markets and innovate to capture new value in these markets (O' Connor & Rice, 2001). These established firms also need to consider the enabling and constraining factors that influence high-growth innovation (O' Connor & Rice, 2013). In such firms, radical innovation, breakthrough innovation, and disruptive innovation are driven by the R&D and marketing departments to develop technological competencies and capabilities and develop the right product-market fit (O'Connor & McDermott, 2004). The transformation of competencies is then driven by the organizational orientation toward innovation, organizational learning, willingness to take risks, and long-term orientation (Herrmann et al., 2007). Innovation in larger firms is hence not a matter of luck in the market, but a conscious process of market research, internal organizational alignment of strategy, and execution in the market.

In new business ventures, radical innovation is driven by the entrepreneurs themselves with their perceived opportunities in the market and their drive to exploit these opportunities (cf. Shane &

Venkataraman, 2000). The similarities on a smaller scale are still applicable to the entrepreneurs in terms of orientation toward innovation, entrepreneurial learning, willingness to take risks and long-term orientation. After all, the opportunity-driven entrepreneur perceives the opportunity and is willing to invest in long-term growth and aspires to achieve a lasting impact on society. In such cases, entrepreneurs decide upon whether they introduce new products in existing markets (Breakthrough Innovation), existing products in new markets (Disruptive Innovation), or opt for a completely new approach in terms of new product-market combinations (Radical Innovation).

2.2 The Role of Institutional Conditions

The entrepreneurial process does not happen in a vacuum. Countries have established regulations, laws, and practices designed to support young businesses and to stimulate entrepreneurial growth (Urbano et al., 2019; Van Stel et al., 2007). These establishments are called *institutions* and we distinguish between *informal* institutions and *formal* institutions. Informal institutions determine the conditions that shape the cultural values and cultural leadership ideals, while formal institutions determine the conditions that shape the rules of doing business (Stephan & Pathak, 2016). In this sense, culture and ideals are defined as a set of shared values, beliefs, and expected behaviors from individuals (Hayton et al., 2002). Institutional conditions therefore influence the way entrepreneurship is regulated, play a normative role to guide organizational and individual behavior, and guide individual beliefs and actions based on subjectively constructed rules and meanings (Bruton et al., 2010).

Countries possess institutional conditions to foster entrepreneurial productivity (Fredström et al., 2021). Entrepreneurs learn about these institutions in their education or from experience (Walter & Block, 2016). In practice, these institutional factors have a positive effect on the level of innovation because they facilitate economic freedom and play a market-supporting role in the life of entrepreneurs and support their ability to innovate (Fuentelsaz et al., 2018, 2021). Recent studies propose entrepreneurial ecosystem programs to raise the level of sophistication and support for entrepreneurs to foster innovation (Cho et al., 2022; Wurth et al., 2022). Further

improvements in the institutional conditions will further reduce financial barriers to entrepreneurship and reduce institutional blind spots (Roper & Scott, 2009; Webb et al., 2020). Therefore, institutional conditions are important when conducting research in entrepreneurship because these conditions shape the environment in which the entrepreneurs operate.

2.3 Institutional conditions and entrepreneurial motives

The entrepreneurial process starts with and revolves around the individual entrepreneurs. These entrepreneurs develop their own perceptions and capabilities and use the available resources to start and run their businesses (Kor et al., 2007). With the formation of their business, entrepreneurs have their own growth aspirations and thus different levels of expectations (Autio & Acs, 2010). Entrepreneurs also have different motives and motivations to start their businesses (Murnieks et al., 2020). Some entrepreneurs are motivated by their perceived opportunities, while some are motivated by self-employment as an alternative to regular employment (Thurik et al., 2008; Dawson & Henley, 2012). Opportunity entrepreneurship has a positive impact on economic development, while necessity entrepreneurship has no significant effect (Acs & Varga, 2005). In such a context, we can clearly distinguish between the opportunity and necessity motives of entrepreneurs in terms of the cause and the potential effects (Acs, 2008). There is hence merit to examine these motives at a deeper level to better understand the mechanisms and underlying differences that consequently have an impact on innovation.

Combining the theory of institutional conditions and entrepreneurial motives, we create a 2×2 matrix that describe the four mechanisms that drive radical, breakthrough, and disruptive innovation. Figure 2 presents our study's Conditions-Motives matrix. This matrix features two axes, institutional conditions and entrepreneurial motives, to depict the interplay between the external environment and the individual entrepreneur.

The Conditions-Motives matrix explains the interplay between institutional conditions and entrepreneurial motives in four ways that lead to radical, breakthrough, or disruptive innovation (Fig. 2).

Fig. 2 This Conditions-Motives Matrix depicts the interplay between institutional conditions (informal and formal) and entrepreneurial motives (necessity and opportunity driven)

On the one hand, opportunity-driven entrepreneurs are intrinsically motivated by their vision and high growth aspirations (Estrin et al., 2022). In such a case, the informal conditions in the shape of culture and social norms may benefit the entrepreneurial mindset of the way they perceive their opportunities (Fig. 2, upper-right quadrant) (Meek et al., 2010).

On the other hand, necessity-driven entrepreneurs perceive their entrepreneurial endeavor as an alternative to regular employment (Thurik et al., 2008; Dawson & Henley, 2012). Therefore, they engage in radical, breakthrough, or disruptive innovation only if they perceive to have the right resources, knowledge, and capabilities to start and run their businesses (Kor et al., 2007). Informal institutional conditions play a role in this by lowering the psychological barriers of entry (Fig. 2, upper-left quadrant) (De Clercq et al., 2013). Juxtaposing the opportunity and necessity motives, we clearly distinguish between the underlying motivations and the mechanisms that may drive radical, breakthrough, or disruptive innovation.

Furthermore, opportunity-driven entrepreneurs are motivated by their vision and aspirations to achieve radical, breakthrough, or disruptive innovation. Therefore, they benefit from institutional conditions that allow them the freedom to navigate the innovation landscape and realize their vision. In such a context, these entrepreneurs benefit from a higher ease of doing business due to less restrictive regulations (Van Stel et al., 2007). In terms of mechanism, formal institutional conditions may facilitate this through legislative rules that lead to lower taxes and reduced

levels of bureaucracy. Such rules facilitate the entrepreneurial process by allowing opportunity-driven entrepreneurs to exploit their perceived business opportunities (Fig. 2, lower-right quadrant).

Alternatively, since necessity-driven entrepreneurs perceive their entrepreneurial endeavor as an alternative to regular employment, their main driver to engage in radical, breakthrough, or disruptive innovation is to be financially rewarded for their entrepreneurial activity. The formal institutional conditions may facilitate this motivation through legislative rules that create situations in which entrepreneurs receive monetary benefits or generate larger sums of income compared to regular employment, hereby reducing the financial or physical barriers of entry (Fig. 2, lower-left quadrant).[3]

Based upon this Matrix we will now single out specific factors of formal and informal institutional conditions, which affect the different types of innovation of opportunity-driven entrepreneurs relative to necessity-driven entrepreneurs.

2.4 The opportunity motive

Entrepreneurs are traditionally seen as individuals who explore and discover new possibilities in markets and subsequently exploit these rare business opportunities (Shane & Venkataraman, 2000). They can aspire to realize their entrepreneurial vision, achieve their high-growth goals, or exploit a rare opportunity in the market (Preller et al., 2020; Fuentelsaz et al., 2021). Because these entrepreneurs are driven by their entrepreneurial opportunity, they persist with their endeavor despite potential adversities and continue regardless of counterinfluences or enticing alternatives (Holland & Shepherd, 2013). Eventually, opportunity-driven entrepreneurs, with their high-growth aspirations and persistence, are more likely to engage and achieve innovation and economic growth (Hessels et al., 2008a).

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[3] In this paper, we theorize about the pure motivations and mechanisms of these distinct motives and institutions. However, we acknowledge that entrepreneurial motives and institutional conditions may overlap. For instance, entrepreneurs can be both driven by necessity and opportunity, while legislative rules can also target both informal and formal institutional conditions.

2.4.1 Culture and social norms: shaping vision and aspirations

From the institutional perspective, the level of entrepreneurial activity and growth also depends on the efficacy of policies that shape the culture and social norms (Meek et al., 2010). Within this context, informal institutional conditions shape the culture and social norms of nations and form the basis of the forces that stimulate opportunity driven entrepreneurs (Hechavarria & Reynolds, 2009). Institutions therefore matter in attracting, shaping, and supporting entrepreneurial potential in realizing their goals of exploiting their perceived opportunities (Aparicio et al., 2021). Entrepreneurs with vision and high growth aspirations benefit from a positive entrepreneurial culture that surrounds them (Capelleras et al. 2019). In this sense, individuals with vision and high-growth aspirations are likely to engage in radical innovation, new product introductions (breakthrough innovation), and profound market expansion (disruptive innovation) to achieve a high innovation impact (Chandy & Tellis, 1998; Estrin et al., 2022; Tellis et al., 2009). As the informal institutions shape the culture and social norms and is especially relevant for opportunity-driven entrepreneurs, radical innovation is for them a phenomenon worth pursuing when aspiring for high growth. As radical innovation may eventually result in a breakthrough or disruptive innovation, we hypothesize:

> **H₁:** Higher levels of Entrepreneurs with Opportunity Motives lead to higher levels of (A) Radical Innovation, (B) Breakthrough Innovation, and (C) Disruptive Innovation, positively amplified by Culture and Social Norms.

2.4.2 Tax policies and bureaucracy: making things easier

The combination of individual level resources and institutional conditions is likely to stimulate high-growth entrepreneurial activity (De Clercq et al., 2013; Stenholm et al., 2013). From the institutional perspective, these formal institutional conditions, such as government tax policies, reduced bureaucracy, and government support programs likely play an active supporting and relevant role in driving such

entrepreneurial growth (Audretsch et al., 2022; Autio & Acs, 2010). Opportunity-driven entrepreneurs are pulled toward their perceived business opportunities – opposed to being pushed by necessity – and aim to benefit from the results and consequences of realizing their vision. Therefore, less institutional resistance and lower taxes on their potential gains may increase the likelihood of venturing into high-growth opportunities for these opportunity-driven entrepreneurs. Formal institutions hence form the fundamentals of reducing actual and perceived barriers for entrepreneurs to start and conduct their businesses (Kwapisz, 2019). In sum, better tax policy and reduced bureaucracy make it easier to do business for opportunity-driven entrepreneurs, which will positively impact different types of innovation. We therefore hypothesize:

> **H₂:** Higher levels of Entrepreneurs with Opportunity Motives lead to higher levels of (A) Radical Innovation, (B) Breakthrough Innovation, and (C) Disruptive Innovation, positively amplified by Governmental Tax Policy and Bureaucracy.

2.5 The necessity motive

Alternatively, entrepreneurs can also start their businesses out of necessity. This necessity motive acts as a push factor that drives the potential entrepreneurs toward starting their own business venture. What distinguishes necessity-driven entrepreneurs from opportunity-driven entrepreneurs is that necessity-driven entrepreneurs do not have the vision for a high-growth business opportunity in the market. In this necessity context, these entrepreneurs seek an alternative to regular employment. They perceive entrepreneurship as having many advantages compared to regular employment, such as a feeling of autonomy, higher satisfaction, potentially higher rewards, and a possibility to have an impact on the economy (Hessels et al., 2008b). The mechanisms that drive these entrepreneurs with necessity motive are therefore also different compared to the entrepreneurs with an opportunity motive.

In the context of necessity-driven entrepreneurship, the entrepreneurial process also requires individuals to have the proper levels of knowledge and the capabilities to run their own businesses and

achieve a high performance (Lattacher et al., 2021). Fortunately, governments have installed policies and regulation that create informal institutional conditions (e.g., a culture of education, continuous improvement, and personal development) that facilitate entrepreneurial learning (Tseng, 2013). For instance, governments have created entrepreneurial programs that serve to gain relevant knowledge (Wurth et al., 2022). Entrepreneurs with necessity motives also engage in active learning and obtaining the necessary capabilities to run their business (Lattacher et al., 2021). Entrepreneurs who have higher perceived capabilities in terms of capital, knowledge, and skills may therefore be more likely to start their businesses. By engaging in such programs and being involved in a culture of continuous improvement, entrepreneurs can learn more, gain knowledge, and obtain skills that are relevant for their entrepreneurial endeavors.

2.5.1 Regulatory quality: facilitating perceived capabilities

The effectiveness of the governmental efforts has a high correlation with the regulatory quality. This regulatory quality is determined by the clarity in roles and objectives, autonomy, predictability, transparency of decisions, accountability, participation, and open access to information (Kaufmann et al., 2009). The quality of governance matters when dealing with businesses and especially necessity-driven entrepreneurs are dependent on the legislation and regulations to thrive. After all, entrepreneurs with necessity motives are pushed toward alternative means of employment and are likely, like regular employees, to be more dependent on guidance and regulation from the government to create similar conditions to engage in their work and business (Van Stel et al., 2007). Yet, in contrast to regular employees, these entrepreneurs are still motivated to build and further expand their businesses and achieve high performance (Angulo-Guerrero et al., 2023). In such a situation, the quality of governmental regulation plays a key role in managing the business conditions that lead to radical innovation, breakthrough innovation, and disruptive innovation. We therefore hypothesize:

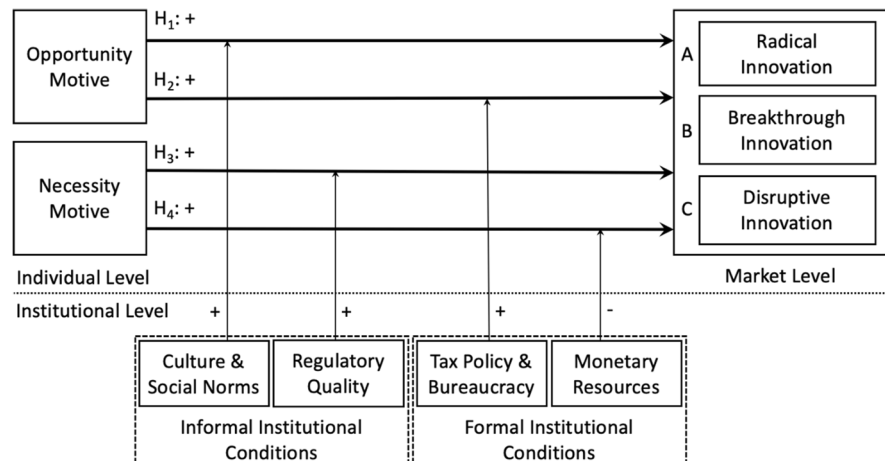**H₃:** Higher levels of Entrepreneurs with Necessity Motives lead to higher levels of (A) Radical Innovation, (B) Breakthrough Innovation, and (C) Disruptive Innovation, positively amplified by Regulatory Quality.

2.5.2 Monetary resources: crowding out motivation

Furthermore, government policies also shape the formal institutional conditions for entrepreneurs. Specifically, the tax policy and rules of doing business have a significant influence on entrepreneurial activity in general. By installing governmental rules that facilitate the procedure of starting a business and reducing the costs of conducting business, potential entrepreneurs with opportunity and necessity motives are more likely to consider starting a business as an alternative to regular employment. It is therefore enticing to theorize that better tax policies and reduced bureaucracy may lead to an increase in total entrepreneurial activity.

However, the reality may be more complex than we may assume in theory. Namely, institutional conditions may also have 'crowding out' effects in terms of the availability of monetary resources, which reduce the extrinsic motivation to aim for radical innovation, breakthrough innovation, and disruptive innovation (cf. Frey & Oberholzer-Gee, 1997). Businesses that launch out of a necessity motive are different in innovative nature compared to the business launched from an opportunity motive (Block et al., 2015). The case may be that necessity-driven entrepreneurs are driven by higher financial rewards that are not the consequences of high-growth opportunities, such as the case of opportunity-driven entrepreneurs, but higher financial awards that are merely seeking substitutes of or alternatives to regular employment. In such a case, institutional policies may then conflict with each other. There is therefore a fine line between the relevance of institutional conditions and potential negative consequences. Specifically, the availability of monetary resources may therefore help in some situations, such as encouraging entrepreneurial activity and incremental innovation in general, but we expect the opposite effect when it comes to extrinsically motivated entrepreneurs with necessity-motive, aiming for radical innovation, breakthrough innovation, and disruptive innovation. These entrepreneurs may be less likely to engage in such activities if their needs are satisfied by institutional policies. We hence hypothesize:

Fig. 3 The theoretical framework

2.6 The theoretical framework

Figure 3 shows the theoretical framework of our study. We theorize that there are distinct mechanisms that drive the effects of the entrepreneurial motives on radical innovation, breakthrough innovation, and disruptive innovation. These differences can be explained by the interplay between the entrepreneurial motives and the formal and informal institutional conditions as shown in the Conditions-Motives matrix (Fig. 2). The exact differences in effect sizes will be demonstrated empirically.

3 Methodology

This Section first describes the data and variables, and then proceeds with the multi-level modeling technique to analyze the data.

3.1 Data and variables

For this study, we combine and analyze the yearly data of three databases. These three databases are from the (1) World Bank,[4] (2) Fraser Institute,[5] and (3) Global

Entrepreneurship Monitor (GEM).[6] First, we obtain the World Governance Indicators (WGI) and World Development Indicators (WDI) from the World Bank database. Second, we obtain an Index of Economic Freedom (IEF) variable from the Fraser Institute database. Third, we obtain variables from the Adult Population Survey (APS) data and National Expert Survey (NES) data from the GEM database. Our present dataset features 13 variables that are measured annually across 29 countries,[7] ranging from 2006 to 2018. Table 1 describes the variables in our dataset. Figure 4 shows the countries on the world map (Appendix 1).

3.1.1 Dependent variables

In our study we examine three dependent variables: (1) Radical Innovation, (2) Breakthrough Innovation, and (3) Disruptive Innovation. First, Radical Innovation is measured as the introduction of new products in a new market, i.e., a new product-market combination. Second, Breakthrough Innovation is measured as the percentage of product introductions that are new to all customers. Third, Disruptive Innovation is measured as the extent to which the introduced products expand the existing market boundaries.

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[4] https://databank.worldbank.org/
[5] https://fraserinstitute.org/economic-freedom/

[6] https://gemconsortium.org/data
[7] The 29 countries are: (1) In North America: The United States. (2) In South America: Argentina, Brazil, Chile, Peru, and Uruguay. (3) In Europe: Belgium, Croatia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, the Netherlands, Norway, Romania, Slovenia, Spain, Sweden, Switzerland, the United Kingdom. (4) In Africa: South Africa. (5) In Asia: China, Iran, Malaysia, and Russia.

Table 1 Variables Description

Dependent Variables	Source	Description	Measurement
Radical Innovation	APS	Percentage of entrepreneurs introducing new products in new markets	0 – 100
Breakthrough Innovation	APS	Percentage of entrepreneurs introducing a product that is new to all customers	0 – 100
Disruptive Innovation	APS	Percentage of entrepreneurs expanding the current market with new or existing products	0 – 100
Independent Variables			
Country Level			
Opportunity Motive	APS	Percentage of entrepreneurs who start a business with an opportunity motive	0 – 100
Necessity Motive	APS	Percentage of entrepreneurs who start a business with a necessity motive	0 – 100
Informal Institutional Level			
Cultural and Social Norms	NES	A score given by experts evaluating the extent to which cultural and social norms encourage or allow actions leading to new business methods or activities that can potentially increase personal wealth and income	1 – 7
Government Entrepreneurial Programs	NES	A score given by experts evaluating the level of presence and quality of government entrepreneurial programs	1 – 7
Regulatory Quality	WGI	A standardized index showing the level of regulatory quality of a country	-1 – 2
Formal Institutional Level			
Government Policies: Taxes and Bureaucracy	NES	A score given by experts evaluating the extent which public policies support entrepreneurship – taxes or regulations are either size-neutral or encourage new and SMEs	1 – 7
Government Policies: Support and Relevance	NES	A score given by experts evaluating the level of support for entrepreneurship as a relevant economic issue	1 – 7
Monetary Resources	IEF	The level of monetary resources available to businesses and entrepreneurs in a country	1 – 10
Control Variables			
GDP per Capita	WDI	The Gross Domestic Product per capita	value
Tertiary Education	WDI	Percentage of population enrolled in tertiary education	0 – 100

3.1.2 Independent variables

In our study, we use six independent variables to draw inferences on the causal relationships: (1) the Total Entrepreneurial Activity with an Opportunity Motive, (2) the Total Entrepreneurial Activity with a Necessity Motive, (3) Culture and Social Norms, (4) Regulatory Quality, (5) Government Policies: Taxes and Bureaucracy, (6) Available Monetary Resources.

3.1.3 Control variables

We use two control variables for informal and formal institutional conditions. First, we use Governmental

Entrepreneurial Programs as a control variable for informal institutional conditions. The entrepreneurial culture and social norms and regulator quality may be influenced by the amount of support that entrepreneurs receive through governmental entrepreneurial programs. Therefore, we consider the level and quality of these programs.

Second, we use Governmental Policies: Support and Relevance as a control variable for formal institutional conditions. This direct formal support and the level of relevance is related to the amount of formal support entrepreneurs receive in addition to reduced taxes, reduced bureaucracy, and available monetary resources. We therefore also account for this direct support and its relevance.

Also, we use two control variables to control for potential macro-economic confounding effects. We measure the economic development and productivity by means of the GDP per capita, which is expressed in purchasing power parities in US dollars (Hessels et al., 2008a). We measure Tertiary Education because this variable influences the level of functioning of the human resources (Fuentelsaz et al., 2018).

3.2 Multi-Level modeling

In this study we test our theoretical framework using a dynamic multi-level modeling approach. We use a multilevel method because we first model the base model at the country level and then proceed with the formal and informal institutional level analysis. By doing so, we can distinguish among different effects across these various levels. Furthermore, we use a dynamic approach because our dependent variables vary over time and are persistent, and hence we include a first lag of the dependent variable. Variables affecting past outcomes have arguably effects on current outcomes.

3.2.1 The base model

The main model at the country level is specified using the following expression:

$$y_{it} = \beta_0 + \beta_1 y_{i,t-1} + \beta_2 t + \beta_{3i} opp_{it} + \beta_{4i} nec_{it} + \delta_1 gdp_{it} + \delta_2 educ_{it} + \varepsilon_{it}$$

where y_{it} denotes the dependent variables which are radical innovation, new product introductions, and profound market expansion for country i at time t. The variable $y_{i,t-1}$ denotes the lagged dependent variable. The variable t denotes the time trend. The opp_{it} and nec_{it} variables are the opportunity and necessity motives measured at the country level at time t. The gdp_{it} and $educ_{it}$ variables are the control variables at the macroeconomic level to control for confounding effects that affect the levels of radical innovation.

3.2.2 The multi-Level model

With our multi-level approach, we specify the base model as the equation above. Additionally, we specify institutional and macroeconomic level effects in the model by a system of equations with the following expression:

$$y_{it} = \beta_0 + \beta_1 y_{i,t-1} + \beta_2 t + \beta_{3i} opp_{it} + \beta_{4i} nec_{it} + \delta_1 gdp_{it} + \delta_2 educ_{it} + \varepsilon_{it}$$

$$\beta_{3i} = \gamma_{03} + \gamma_{13} z_{1,3i} + \cdots + \gamma_{q3} z_{q,3i} + \eta_{3i}$$

$$\beta_{4i} = \gamma_{04} + \gamma_{14} z_{1,4i} + \cdots + \gamma_{q4} z_{q,4i} + \eta_{4i}$$

where the z variables are informal and institutional conditions measured at the country level, and the β coefficients are first estimated in the system of equations and then appear in the base model. The γ coefficients are the parameter estimates for the institutional variables and they measure the amplification effects. We centralize (demean) the variables to allow for correct interpretations of the multi-level interaction effects.[8]

4 Results

This section presents the results. We show the descriptive statistics of the variables across three time periods and present the parameter estimates of the multi-level models.

4.1 Descriptive statistics

Table 2 shows the descriptive statistics of the variables, featuring country level variables, informal and formal institutional level variables, and control variables across the example years 2006, 2012, and 2018.

At the country level, the variables are shown in percentage numbers. The mean (standard deviation across countries) of Radical Innovation across countries is 19.98 (8.44) percent in 2006 and shows a steady growth in 2012 and 2018, reaching 27.94 (11.10) and 26.35 (9.45), respectively. This statistic means that in 2006 around 1 out of 5 ventures engaged in Radical Innovation, while this number went up to more than 1 out of 4 ventures in 2012 and 2018. In 2006, the percentage of Breakthrough Innovation is 14.37 (6.44) and remains constant over time. Similarly, the percentage of Disruptive Innovation is 0.19 (0.21) in 2006 and remains constant over time. Among the total population, there is a 6.26 (5.25) percent of the individuals that launch a business with an opportunity motive in 2006, while this percentage grew to 7.54 (4.20) in 2018. Also, 2.07 (2.47) percent

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[8] We estimate this multi-level model using our own programming code in R, which is available upon request.

Table 2 Descriptive Statistics

Country Level	2006		2012		2018	
	Mean	Std	Mean	Std	Mean	Std
Radical Innovation	19.98	8.44	27.94	11.10	26.35	9.45
Breakthrough Innovation	14.37	6.44	16.43	10.00	15.53	6.29
Disruptive Innovation	0.19	0.21	0.20	0.26	0.24	0.21
Opportunity Motive	6.26	5.25	7.02	3.75	7.54	4.20
Necessity Motive	2.07	2.37	2.26	1.60	2.37	1.84
Informal Institutions						
Culture and Social Norms	3.30	0.61	3.30	0.60	3.39	0.64
Entrepreneurial Programs	3.33	0.55	3.30	0.61	3.38	0.66
Regulatory Quality	0.90	0.72	0.84	0.83	0.77	0.93
Formal Institutions						
Government Support Policies	3.06	0.49	3.06	0.50	3.08	0.51
Government Tax Policies	2.80	0.63	2.81	0.67	2.84	0.73
Monetary Resources	9.04	0.79	9.01	0.80	9.03	0.85
Control Variables						
GDP per Capita	25,189.06	19,758.59	30,498.99	24,234.91	32,513.48	24,254.53
Tertiary Education	–	–	58.91	22.33	–	–

of all businesses are launched with a necessity motive in 2006. This percentage remains constant over time. The relatively large standard deviations means that there are substantial differences across countries.

At the informal institutional level, Culture and Social norms have an average score of 3.30 (0.61) in 2006. Entrepreneurial programs have a similar score with 3.33 (0.55). The relatively small standard deviations indicate that the differences across countries are small. However, Regulatory Quality shows large differences across countries, with a mean score of 0.90 and standard deviation of 0.72. This score declines over time, while the standard deviation increases. This indicates that the regulatory quality decreased over time and the differences increased across countries.

At the formal institutional level, Government Support Policies and Government Tax Policies have the scores 3.06 (0.49) and 2.80 (0.63), respectively in 2006. These scores remain steady over time. The small standard deviations indicate that the differences across the countries are small. In contrast, the Monetary Resources across countries are 9.04 (0.79). The standard deviations indicate that there are substantial differences across countries and these differences grew slightly over time.

4.2 Parameter estimates

This subsection presents the parameter estimates of the three multi-level models that we analyze for Radical Innovation, Breakthrough Innovation, and Disruptive Innovation. We show the results of a more parsimonious model where the results for the (insignificant) variables Entrepreneurial Programs and Government Support Policies are omitted. The results for the full model including these variables are demonstrated in Appendix 2.

4.2.1 Radical innovation

Table 3 shows the parameter estimates of the two models estimated with Radical Innovation as the dependent variable. Model 1 is the base model that features the country level variables and the control variables. Model 2 expands the base model with a second level that features informal and formal institutional variables.

Regarding model 1, the Radical Innovation at time $t – 1$ has a significant effect on the Radical Innovation of time t with an effect of 0.4453 (0.0540) *(p < 0.001)*. This means that the level of Radical Innovation in the previous period is a positive predictor of the level

Table 3 The Effect on Radical Innovation

		Model 1		Model 2
Intercept	β_0	14.9400 (1.8180) ***	β_0	15.9000 (2.1100) ***
Radical Innovation$_{t-1}$	β_1	0.4453 (0.0540) ***	β_1	0.4220 (0.0551) ***
Year	β_2	0.0814 (0.1607)	β_2	0.1390 (0.1410)
Country Level				
Opportunity Motive	β_3	0.4928 (0.1990) **	γ_{03}	0.5480 (0.2710) **
Necessity Motive	β_4	0.2373 (0.4456)	γ_{04}	0.2670 (0.5730)
Control Variables				
GDP per Capita	δ_1	0.00005 (0.00004)	δ_1	0.00012 (0.00005) **
Tertiary Education	δ_2	-0.01179 (0.03401)	δ_2	-0.05410 (0.03460)
Informal Institutional Conditions				
Opp. Motive × Culture & Social Norms (H_{1A})			γ_{13}	-0.2830 (0.3800)
Opp. Motive × Regulatory Quality			γ_{23}	-0.0087 (0.5360)
Formal Institutional Conditions				
Opp. Motive × Governmental Tax (H_{2A})			γ_{33}	0.9770 (0.5760) *
Opp. Motive × Monetary Resources			γ_{43}	-0.3130 (0.3210)
Informal Institutional Conditions				
Nec. Motive × Culture & Social Norms			γ_{14}	1.2600 (0.9530)
Nec. Motive × Regulatory Quality (H_{3A})			γ_{24}	2.8500 (0.8640) **
Formal Institutional Conditions				
Nec. Motive × Governmental Tax			γ_{34}	-2.5600 (0.9470) ***
Nec. Motive × Monetary Resources (H_{4A})			γ_{44}	-1.2100 (0.6860) *

Standard errors are shown between parentheses Significance levels are denoted by asterisks, ***=0.01, **=0.05, *=0.10 significance

of Radical Innovation of the current period. Also, Opportunity Motive has a significant, positive effect, 0.4928 (0.1990) *(p < 0.05)*, on Radical Innovation. This means that the increase of entrepreneurs driven by the opportunity motive is more likely to lead to Radical Innovation.

Model 2 in Table 3 shows the model with informal and formal institutional level interaction effects with the entrepreneurial motives. GDP per Capita now has a positive, significant effect on the level of Radical Innovation, indicating that countries with higher levels of economic development are more likely to produce radical innovations. Regarding the institutional conditions, we find that Culture and Social Norms do not have a significant, amplifying effect of opportunity motive, -0.0283 (0.3800) *(p = 0.46)*. This means that there is no statistical evidence that culture and social norms affect the level of Radical Innovation through the opportunity motive. There is hence no support for hypothesis H_{1A}.

There are institutional conditions that play a role in driving radical innovation. Specifically, the combination of Governmental Tax Policies and Opportunity Motive has a positive, amplifying effect on Radical Innovation, 0.9770 (0.5760) *(p < 0.10)* with a significance level of 10 percent. This means that better tax policies and less bureaucracy in combination with opportunity-driven entrepreneurs lead to higher levels of radical innovation. This result is in line with our theory and there is thus marginal support for hypothesis H_{2A}.

The combination of Regulatory Quality and Necessity Motive has a significant, positive, amplifying effect on Radical Innovation, 2.8500 (0.8640) *(p < 0.01)*. This means that countries with higher regulatory quality and more necessity-driven entrepreneurs have higher levels of radical innovation. This result supports hypothesis H_{3A}.

The combination of Governmental Tax and Necessity motive has a significant, negative

amplifying effect on Radical Innovation, -2.5600 (0.9470) *(p < 0.01)*. This means that countries with better governmental tax support and less bureaucracy and more necessity-driven entrepreneurs have lower levels of Radical Innovation.

Also, the combination of Monetary Resources and Necessity motive has a negative amplifying effect on Radical Innovation, -1.2100 (0.6860) *(p < 0.10)* with a significance level of 10 percent. This means that countries with more money available and more necessity-driven entrepreneurs have lower levels of radical innovation. This result marginally supports hypothesis H_{4A}.

4.2.2 Breakthrough innovation

Table 4 shows the results of the models with Breakthrough Innovation as the dependent variable. Model 1 is again the base level model that features the country level and control variables. Model 2 is again the expanded multi-level model that also features informal and formal institutional variables.

Model 1 in Table 4 shows the parameter estimates of the base model effects on Breakthrough Innovation as the dependent variable. The lagged dependent variable has a significant, positive effect on Breakthrough Innovation, 0.3818 (0.0564) *(p < 0.001)*. Opportunity Motive also has a significant, positive effect on Breakthrough Innovation, 0.4658 (0.1698) *(p < 0.01)*. This result means that more opportunity-driven entrepreneurs also lead to higher levels of Breakthrough Innovation.

Model 2 in Table 4 extends the base model with informal and formal institutional variables. We find a negative effect of Tertiary Education, -0.05730 (0.02810) *(p < 0.05)* and a negative amplifying effect of Culture and Social Norms through the Opportunity Motive on Breakthrough Innovation, -0.5640 (0.3140) *(p < 0.10)* with a significance level of 10 percent. These results mean that higher levels of individuals with a university degree leads to lower levels of Breakthrough Innovation and that culture and social norms do not facilitate or even have a negative effect

Table 4 The Effect on Breakthrough Innovation

		Model 1		Model 2
Intercept	β_0	12.0700 (1.6550) ***	β_0	11.2000 (1.6600) ***
Breakthrough Innovation$_{t-1}$	β_1	0.3818 (0.0564) ***	β_1	0.4700 (0.0557) ***
Year	β_2	-0.1626 (0.1546)	β_2	-0.1310 (0.1160)
Country Level				
Opportunity Motive	β_3	0.4658 (0.1698) ***	γ_{03}	0.4090 (0.2230) *
Necessity Motive	β_4	-0.1926 (0.3798)	γ_{04}	-0.2790 (0.4740)
Control Variables				
GDP per Capita	δ_1	-0.00003 (0.00004)	δ_1	0.00002 (0.00004)
Tertiary Education	δ_2	-0.02763 (0.03029)	δ_2	-0.05730 (0.02810) **
Informal Institutional Conditions				
Opp. Motive × Culture & Social Norms *(H_{1B})*			γ_{13}	-0.5640 (0.3140) *
Opp. Motive × Regulatory Quality			γ_{23}	0.0121 (0.4370)
Formal Institutional Conditions				
Opp. Motive × Governmental Tax *(H_{2B})*			γ_{43}	0.8290 (0.4730) *
Opp. Motive × Monetary Resources			γ_{53}	-0.0582 (0.2670)
Informal Institutional Conditions				
Nec. Motive × Culture & Social Norms			γ_{14}	1.1300 (0.7750)
Nec. Motive × Regulatory Quality *(H_{3B})*			γ_{24}	2.0100 (0.7010) ***
Formal Institutional Conditions				
Nec. Motive × Governmental Tax			γ_{34}	-2.0300 (0.7770) **
Nec. Motive × Monetary Resources *(H_{4B})*			γ_{44}	-0.8150 (0.5680)

Standard errors are shown between parentheses. Significance levels are denoted by asterisks, *** = 0.01, ** = 0.05, * = 0.10 significance

of Opportunity Motive on Breakthrough Innovation. There is hence no support for hypothesis H_{1B}.

Additional results in this model are that the combination of Governmental Tax and Opportunity Motive has a marginally significant, positive effect on Breakthrough Innovation,

0.8290 (0.4730) $(p < 0.10)$ with a significance level of 10 percent. This means that the reduction of taxes and bureaucracy leads to higher levels of new product introductions among opportunity-driven entrepreneurs. This result is in line with our theory, and it marginally supports hypothesis H_{2B}.

Furthermore, Regulatory Quality has a significant, positive amplifying effect with Necessity Motive on Breakthrough Innovation, 2.0100 (0.7010) $(p < 0.01)$. This means that countries with higher levels of regulatory quality and more necessity-driven entrepreneurs have higher levels of Breakthrough Innovation. This result is in line with our theory and supports hypothesis H_{3B}.

The combination of Governmental Taxes and Necessity Motive has a significant, negative effect on Breakthrough Innovation, -2.0300 (0.7770) $(p < 0.05)$. This means that countries with better governmental tax policies and less bureaucracy and more entrepreneurs with necessity motives have lower levels of Breakthrough Innovation.

The combination of Monetary Resources and the Necessity Motive does not have a significant effect on Breakthrough Innovation, -1.2250 (0.8040) $(p = 0.13)$. There is no statistical evidence that Monetary Resources have a significant, negative amplifying effect through the Necessity Motive on Breakthrough Innovation. There is hence no support for hypothesis H_{4B}.

4.2.3 Disruptive innovation

Table 5 shows the results of the model with Disruptive Innovation as dependent variable. Model 1 shows that the Opportunity Motive has a significant, positive effect on Disruptive Innovation, 0.0368 (0.0061) $(p < 0.01)$. This result implies that countries with more opportunity-driven entrepreneurs have higher levels of Disruptive Innovation of their business ventures.

Model 2 in Table 5 includes the informal and formal institutional levels and shows similar results. In addition to model 1, this present model also shows that GDP has a positive effect, while Tertiary

Education has a negative effect on Disruptive Innovation, -0.00215 (0.00102) $(p < 0.05)$. This means that more individuals with Tertiary Education in the population leads to slightly lower levels of Disruptive Innovation among the business ventures. However, the effect size is small in absolute terms.

Regarding the informal and formal institutional variables, we find no statistical evidence of an amplifying effect of Culture and Social Norms through Opportunity Motive on Disruptive Innovation, -0.0138 (0.0110) $(p = 0.21)$. Similarly, there is no significant, amplifying effect of Governmental Tax Policies through Opportunity Motive on Disruptive Innovation, 0.0181 (0.0168) $(p = 0.28)$. This means that these institutional variables do not play a role in facilitating the effect of Opportunity Motive on Disruptive Innovation. There is hence no support for hypotheses H_{1C} and H_{2C}.

However, we do find a marginally significant, negative amplifying effect of Monetary Resources through Opportunity Motive on Disruptive Innovation, -0.0162 (0.0093) $(p < 0.10)$. This result means that higher levels of available monetary resources and more opportunity-driven entrepreneurs lead to a lower level of Disruptive Innovation among business ventures.

Alternatively, Regulatory Quality amplifies the effect of Necessity Motive on Disruptive Innovation, 0.0730 (0.0247) $(p < 0.01)$, indicating that, on average, countries with high regulatory quality support necessity-driven entrepreneurs to engage in Disruptive Innovation. This result is in line with our theory and supports hypothesis H_{3C}. Finally, there is no significant amplifying effect of Monetary Resources and Necessity Motive on Disruptive Innovation. This result therefore does not support hypothesis H_{4C}.

5 Discussion

This study examines the effect of entrepreneurial motives, opportunity versus necessity, on the level of radical innovation, breakthrough innovation, and disruptive innovation, potentially amplified by formal and informal institutional conditions. We combine three databases to form one large dataset and use multi-level modeling to analyze the data of 29 countries between 2006 and 2018. With the current results, we discover several novel findings.

Table 5 The Effect on Disruptive Innovation

		Model 1		Model 2
Intercept	β_0	0.3275 (0.0406) ***	β_0	0.3800 (0.0527) ***
Disruptive Innovation$_{t-1}$	β_1	0.0558 (0.0583)	β_1	0.0740 (0.0581)
Year	β_2	0.0000 (0.0046)	β_2	-0.0012 (0.0040)
Country Level				
Opportunity Motive	β_3	0.0368 (0.0061) ***	γ_{03}	0.0296 (0.0078) ***
Necessity Motive	β_4	0.0146 (0.0124)	γ_{04}	0.0257 (0.0164)
Control Variables				
GDP per Capita	δ_1	-0.0000 (0.0000)	δ_1	0.000003 (0.000001) **
Tertiary Education	δ_2	-0.0016 (0.0010)	δ_2	-0.002150 (0.00102) **
Informal Institutional Conditions				
Opp. Motive × Culture & Social Norms *(H$_{1C}$)*			γ_{13}	-0.0138 (0.0110)
Opp. Motive × Regulatory Quality			γ_{33}	0.0217 (0.0159)
Formal Institutional Conditions				
Opp. Motive × Governmental Tax *(H$_{2C}$)*			γ_{53}	0.0181 (0.0168)
Opp. Motive × Monetary Resources			γ_{63}	-0.0162 (0.0093) *
Informal Institutional Conditions				
Nec. Motive × Culture & Social Norms			γ_{14}	0.0023 (0.0281)
Nec. Motive × Regulatory Quality *(H$_{3C}$)*			γ_{34}	0.0730 (0.0247) ***
Formal Institutional Conditions				
Nec. Motive × Governmental Tax			γ_{54}	-0.0305 (0.0275)
Nec. Motive × Monetary Resources *(H$_{4C}$)*			γ_{64}	-0.0238 (0.0198)

Standard errors are shown between parentheses. Significance levels are denoted by asterisks, *** = 0.01, ** = 0.05, * = 0.10 significance

5.1 Findings

First, radical innovation in the market is indeed driven by entrepreneurs with an opportunity motive. In our analysis, we find that these opportunity-driven entrepreneurs are more likely to engage in radical innovation than necessity-driven entrepreneurs. The same results apply for breakthrough innovation and disruptive innovation. Overall, the results across the different types of innovation are remarkably similar in terms of sign and the opportunity motive is the driving force behind radical, breakthrough, and disruptive innovation.

However, in contrast with the literature, we do not find statistical evidence that supports the positive amplifying effect of culture and social norms as institutional conditions that is supposed to facilitate this main effect of opportunity motive on radical innovation, breakthrough innovation, or disruptive innovation (Hechavarria and Reynolds, 2009; Meek et al., 2010; Capelleras et al. 2019; Aparicio et al., 2021). In

fact, we find a marginally significant, negative effect for breakthrough innovation.

Second, we find statistical support for the amplifying effect of governmental tax policies through the opportunity motive on radical innovation and breakthrough innovation. We however do not find a significant, amplifying effect on disruptive innovation. The significant findings on governmental tax policies are in line with the literature about their positive effects (Autio & Acs, 2010; Stenholm et al., 2013; De Clerq, Lim, and Oh 2013; Audretsch et al., 2022). Our novel finding is that these formal institutional conditions facilitate the effect on radical innovation and breakthrough innovation through entrepreneurs with opportunity motive and not entrepreneurs with necessity motive. This finding therefore emphasizes the importance of distinguishing between opportunity vis-à-vis necessity motives among entrepreneurs when considering governmental policies.

Third, informal and formal institutional conditions affect necessity-driven entrepreneurs through other

mechanisms. There is no direct main effect of necessity-driven entrepreneurship on radical innovation, breakthrough innovation, or disruptive innovation. However, we find that the combination of high regulatory quality and entrepreneurs with a necessity motive has a significant, positive effect on these three dependent variables. This finding is in line with prior literature that regulatory quality has a positive effect on autonomy, accountability, participation, open access to information, which are all features that are essential for the entrepreneurial process for entrepreneurs with a necessity motive (cf. Kaufmann et al., 2009; Lattacher et al., 2021; Angulo-Guerrero et al., 2023).

Fourth, we find a marginally significant, negative amplifying effect of monetary resources through necessity-driven entrepreneurs on radical innovation. This finding is in line with the literature that monetary incentives have a 'crowding out' effect (Frey & Oberholzer-Gee, 1997). Higher levels of available monetary resources may lead to lower levels of radical innovation by necessity-driven entrepreneurs. However, we also find that monetary resources have a negative amplifying effect through the opportunity motive on disruptive innovation. In our study we hypothesized that necessity-driven entrepreneurs are driven by different motivations and therefore may show differences in the way they react to institutional conditions (Block et al., 2015). The findings however show that both entrepreneurial motives show decreased levels of innovation when eventually presented with available monetary resources. The 'crowding out' effect of extrinsic motivation therefore happens to both entrepreneurial motives.

In general, our findings are in line with prior literature that institutional conditions have a supportive function in entrepreneurship (Fredström et al., 2021; Wang et al., 2023). Entrepreneurial motives matter in innovation at a larger scale, emphasizing the importance of the individual entrepreneur (Patzelt et al., 2021). Our findings explain the differences in effects of formal and informal institutions at the level of radical innovation, breakthrough innovation, and disruptive innovation (cf. Fuentelsaz et al., 2021). We contribute to the existing literature by distinguishing between the different entrepreneurial motives and the different amplifying effects of informal and formal institutional conditions (cf. Torres & Godinho, 2022; Wang et al., 2023).

Finally, besides significant results, our findings also notably show that certain factors are not statistically significant. Culture and social norms, governmental entrepreneurial programs, governmental support policies, and tertiary education do not have the desired, positive effects on radical, breakthrough, or disruptive innovation (Appendix 2). These findings are in line with the call for action in the existing literature that governments need to invest in their innovative efforts in shaping favorable entrepreneurial conditions, creating entrepreneurial ecosystems, and incentivizing knowledge institutions to further stimulate entrepreneurial activity (Aparicio et al., 2023; Cho et al., 2022; Wang et al., 2023; Wurth et al., 2022). These findings – or rather, non-findings – indicate that there is room for improvement for governments to reevaluate their potential blind spots (Webb et al., 2020) and reshape their entrepreneurial culture and social norms, entrepreneurial programs, support policies, and knowledge institutions if they aim to achieve radical innovation.

5.2 Limitations and future research

This study combines the data of several databases. These data are collected and maintained by different sources and therefore show varying levels of measurements. At the individual level, the entrepreneurial motives are subjective measures and are therefore susceptible to self-report bias. At the market level, the evaluation of the innovation types are expert opinions and thus are subjective measures. From a methodological perspective, future research may consider using more objective measures to study entrepreneurial motives and market level innovation, such as using indirect survey methods or market performance indicators, respectively.

At the institutional level, the limitation is that data series have different lengths in the periods of time, have missing values, and vary across the countries. We therefore examine aggregate data instead of data at the venture level. In this study, we have reduced the number of potentially available countries to 29 to have a sample that is as complete as possible with the measured variables. However, the databases could have been more complete in terms of the number of available data over time and across variables.

Future research can further explore the different entrepreneurial motives of entrepreneurs and their effects on innovation impact. Our study shows that the distinction between opportunity and necessity motives have real implications on the levels of radical innovation, breakthrough innovation, and

disruptive innovation. Researchers can explore these or other motives and the effect on other dependent variables possibly at the venture level in order to better account for venture specific effects, including motives. They can also measure informal and formal institutional variables in other ways or use alternative mediating variables that may influence the causal effects of entrepreneurial motives on innovation. As our results show some differences in the results of institutional conditions and entrepreneurial motives for the three distinct types of innovations while our hypotheses make no explicit distinction, further theorizing is needed on the differential impact of institutional conditions and entrepreneurial motives.

6 Conclusion

Entrepreneurs face many challenges when they start their business ventures and aim to create innovation impact in the markets. Our study shows that opportunity and necessity driven entrepreneurs behave differently when it comes to radical, breakthrough, and disruptive innovation. Informal and formal institutional conditions play different amplifying roles in this matter. The findings show that entrepreneurs with opportunity motives are more likely to engage in radical, breakthrough, and disruptive innovation. Alternatively, entrepreneurs with necessity motives also engage in radical innovation if they are supported by high regulatory quality. Importantly, the obtained effects of institutional conditions are not always positive. Higher levels of available monetary resources dampen the effect of necessity-driven entrepreneurs on radical innovation and disruptive innovation. Hence, governments need to be cautious in shaping institutional conditions to facilitate desired effects and avoid negative consequences. In sum, achieving radical innovation remains therefore a delicate matter of finding the ideal combination between individual entrepreneurs and institutional conditions.
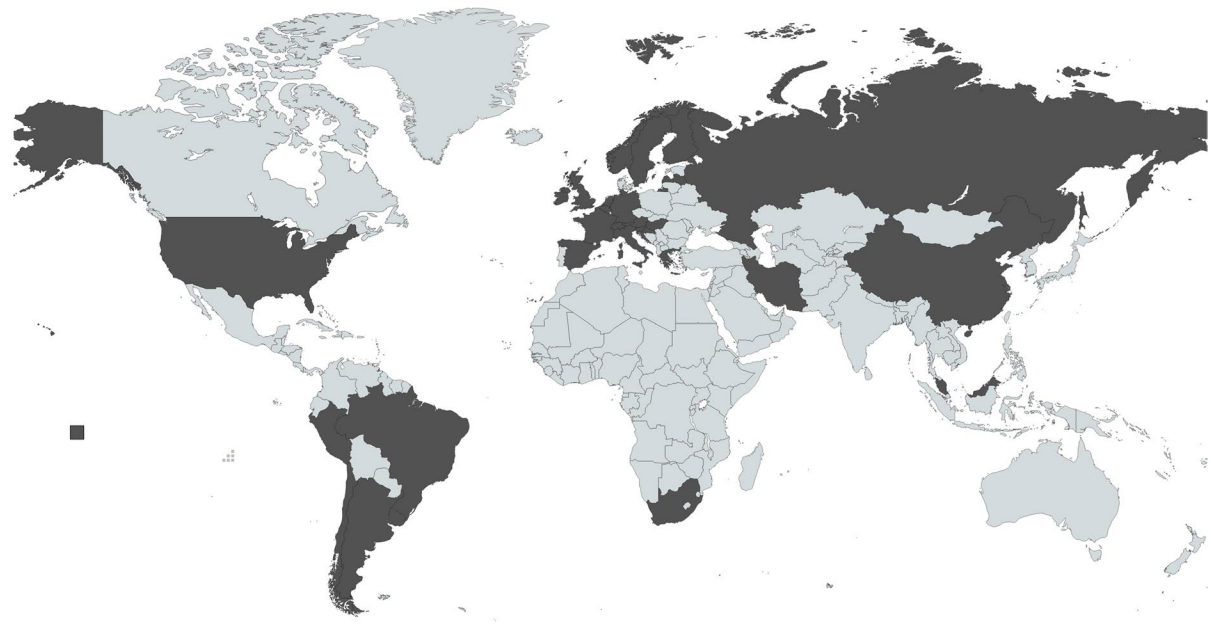
Appendix 1: Data Visualization
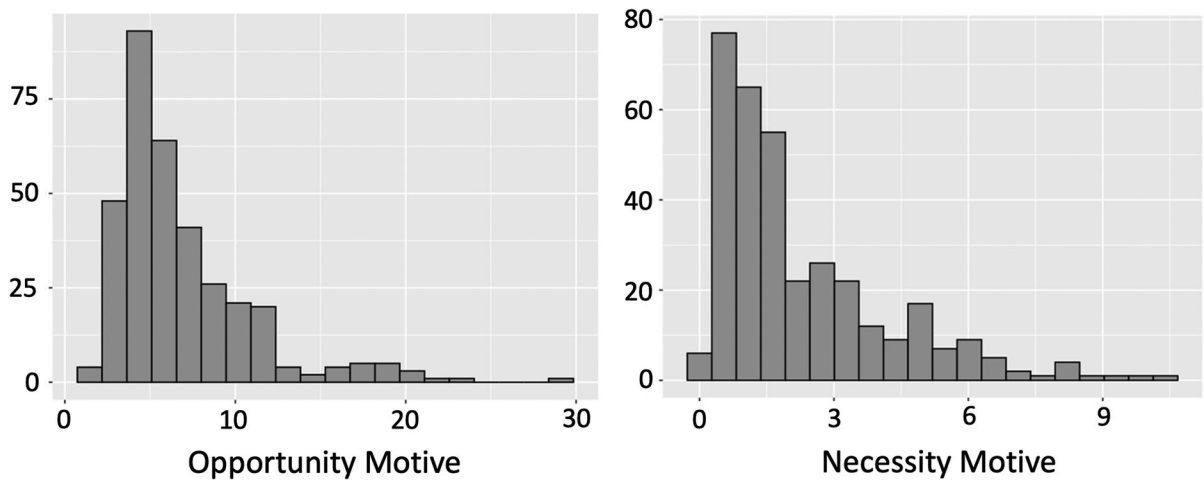

Fig. 4 The Countries in Our Dataset

Fig. 5 The Entrepreneurial Motives Across Countries in Percentages
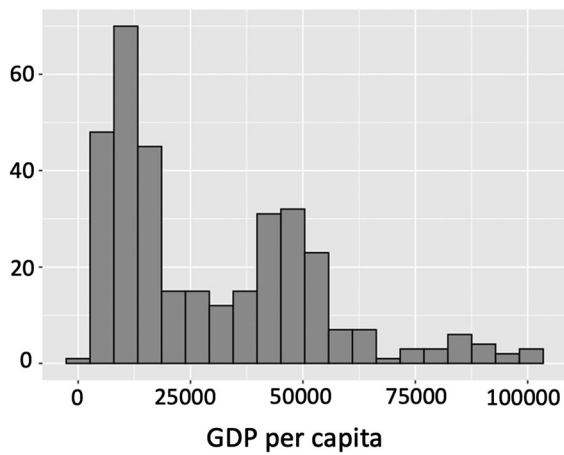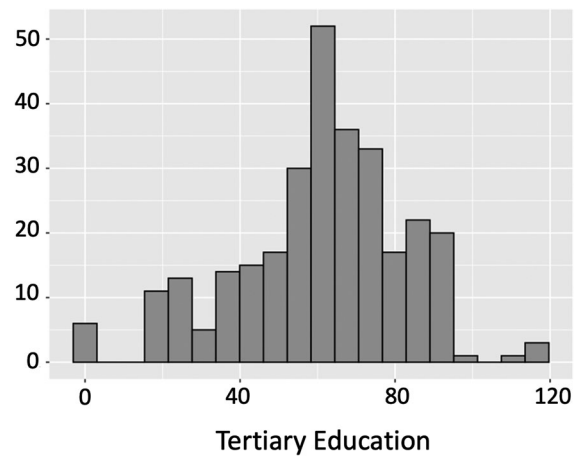

Fig. 6 GDP per Capita of the Countries over Time

Fig. 7 Tertiary Education of the Countries over Time in Percentages

Appendix 2: Parameter Estimates of the Extended Models

This Section shows the results of the extended models. These extended models add additional information to the models in the results section by including Governmental Support and Entrepreneurial Programs.

Table 6 The Effect on Radical Innovation – Extended Model

		Model 1		Model 2
Intercept	β_0	14.9400 (1.8180) ***	β_0	18.3900 (2.4840) ***
Radical Innovation$_{t-1}$	β_1	0.4453 (0.0540) ***	β_1	0.2934 (0.0570) ***
Year	β_2	0.0814 (0.1607)	β_2	0.1742 (0.1944)
Country Level				
Opportunity Motive	β_3	0.4928 (0.1990) **	γ_{03}	0.9368 (0.3046) ***
Necessity Motive	β_4	0.2373 (0.4456)	γ_{04}	1.1610 (0.7209)
Control Variables				
GDP per Capita	δ_1	0.00005 (0.00004)	δ_1	0.0002 (0.0001) ***
Tertiary Education	δ_2	-0.01179 (0.03401)	δ_2	-0.0460 (0.0357)
Informal Institutional Conditions				
Opp. Motive × Culture & Social Norms (H_{1A})			γ_{13}	-0.4377 (0.4443)
Opp. Motive × Entrepreneurial Programs			γ_{23}	-0.4613 (0.7576)
Opp. Motive × Regulatory Quality			γ_{33}	0.1462 (0.6352)
Formal Institutional Conditions				
Opp. Motive × Governmental Support			γ_{43}	-1.9640 (1.3360)
Opp. Motive × Governmental Tax (H_{2A})			γ_{53}	2.6360 (0.9406) ***
Opp. Motive × Monetary Resources			γ_{63}	-0.6610 (0.4536)
Informal Institutional Conditions				
Nec. Motive × Culture & Social Norms			γ_{14}	0.5217 (1.0740)
Nec. Motive × Entrepreneurial Programs			γ_{24}	0.2245 (1.6200)
Nec. Motive × Regulatory Quality (H_{3A})			γ_{34}	3.1520 (1.2160) **
Formal Institutional Conditions				
Nec. Motive × Governmental Support			γ_{44}	-2.2820 (2.7100)
Nec. Motive × Governmental Tax			γ_{54}	-2.6040 (1.8460)
Nec. Motive × Monetary Resources (H_{4A})			γ_{64}	-2.5240 (1.0070) **

Standard errors are shown between parentheses Significance levels are denoted by asterisks, ***=0.01, **=0.05, *=0.10 significance

Table 7 The Effect on Breakthrough Innovation – Extended Model

		Model 1		Model 2
Intercept	β_0	12.0700 (1.6550) ***	β_0	13.7700 (2.1030) ***
Breakthrough Innovation$_{t-1}$	β_1	0.3818 (0.0564) ***	β_1	0.3115 (0.0556) ***
Year	β_2	-0.1626 (0.1546)	β_2	-0.2268 (0.1863)
Country Level				
Opportunity Motive	β_3	0.4658 (0.1698) ***	γ_{03}	0.9991 (0.2432) ***
Necessity Motive	β_4	-0.1926 (0.3798)	γ_{04}	-0.2259 (0.5723)
Control Variables				
GDP per Capita	δ_1	-0.00003 (0.00004)	δ_1	0.00006 (0.00004)
Tertiary Education	δ_2	-0.02763 (0.03029)	δ_2	-0.03519 (0.02793)
Informal Institutional Conditions				
Opp. Motive × Culture & Social Norms *(H$_{1B}$)*			γ_{13}	-0.4554 (0.3572)
Opp. Motive × Entrepreneurial Programs			γ_{23}	0.0714 (0.6025)
Opp. Motive × Regulatory Quality			γ_{33}	0.0103 (0.4993)
Formal Institutional Conditions				
Opp. Motive × Governmental Support			γ_{43}	-3.5520 (1.0750) ***
Opp. Motive × Governmental Tax *(H$_{2B}$)*			γ_{53}	3.2530 (0.7515) ***
Opp. Motive × Monetary Resources			γ_{63}	-0.5517 (0.3617)
Informal Institutional Conditions				
Nec. Motive × Culture & Social Norms			γ_{14}	0.3350 (0.8466)
Nec. Motive × Entrepreneurial Programs			γ_{24}	0.2969 (1.2730)
Nec. Motive × Regulatory Quality *(H$_{3B}$)*			γ_{34}	2.4360 (0.9494) **
Formal Institutional Conditions				
Nec. Motive × Governmental Support			γ_{44}	0.8195 (2.1780)
Nec. Motive × Governmental Tax			γ_{54}	-1.9910 (1.4720)
Nec. Motive × Monetary Resources *(H$_{4B}$)*			γ_{64}	-1.2250 (0.8040)

Standard errors are shown between parentheses. Significance levels are denoted by asterisks, *** = 0.01, ** = 0.05, * = 0.10 significance

Table 8 The Effect on Disruptive Innovation – Extended Model

		Model 1		Model 2
Intercept	β_0	0.3275 (0.0406) ***	β_0	0.4084 (0.0579) ***
Disruptive Innovation$_{t-1}$	β_1	0.0558 (0.0583)	β_1	0.0133 (0.0587)
Year	β_2	0.0000 (0.0046)	β_2	-0.0022 (0.0051)
Country Level				
Opportunity Motive	β_3	0.0368 (0.0061) ***	γ_{03}	0.0363 (0.0090) ***
Necessity Motive	β_4	0.0146 (0.0124)	γ_{04}	0.0396 (0.0211)
Control Variables				
GDP per Capita	δ_1	-0.0000 (0.0000)	δ_1	0.0000 (0.0000)
Tertiary Education	δ_2	-0.0016 (0.0010)	δ_2	-0.0021 (0.0011) *
Informal Institutional Conditions				
Opp. Motive × Culture & Social Norms (H_{1C})			γ_{13}	-0.0154 (0.0132)
Opp. Motive × Entrepreneurial Programs			γ_{23}	-0.0205 (0.0220)
Opp. Motive × Regulatory Quality			γ_{33}	0.0178 (0.0190)
Formal Institutional Conditions				
Opp. Motive × Governmental Support			γ_{43}	0.0113 (0.0387)
Opp. Motive × Governmental Tax (H_{2C})			γ_{53}	0.0231 (0.0275)
Opp. Motive × Monetary Resources			γ_{63}	-0.0118 (0.0134)
Informal Institutional Conditions				
Nec. Motive × Culture & Social Norms			γ_{14}	-0.0060 (0.0313)
Nec. Motive × Entrepreneurial Programs			γ_{24}	-0.0550 (0.0491)
Nec. Motive × Regulatory Quality (H_{3C})			γ_{34}	0.1131 (0.0358) ***
Formal Institutional Conditions				
Nec. Motive × Governmental Support			γ_{44}	-0.0244 (0.0780)
Nec. Motive × Governmental Tax			γ_{54}	0.0159 (0.0539)
Nec. Motive × Monetary Resources (H_{4C})			γ_{64}	-0.0656 (0.0290) **

Standard errors are shown between parentheses. Significance levels are denoted by asterisks, ***=0.01, **=0.05, *=0.10 significance

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