#2105 Bremen Papers on Economics & Innovation

Entrepreneurship Perception during the first COVID-19 Shock: Mental Representations of Entrepreneurship and Preferences of Business Models during the Pandemic

Jessica Birkholz*

Jarina Kühn*

Abstract

We examine the explicit business model preferences and implicit mental representations of entrepreneurship in the early phase of the crisis. We find that the crisis comes with adaptations in both. During crisis, society is open for new business models, even though people increasingly rely on established economic actors instead of opening up towards newly founded firms. We conclude that the early and sudden impact of the crisis influences the entrepreneurial culture onwards and therefore potentially future entrepreneurial activities.

* University of Bremen, Max-von-Laue-Straße 1, 28359 Bremen, Germany
Corresponding author: Jessica Birkholz
e-mail: jessica.birkholz@uni-bremen.de

2/39 **#2105** Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

1. Introduction

The COVID-19 crisis impacted economic structures all over the world in a formerly unknown magnitude (World Bank, 2020), leaving scientists and policy makers clueless of its long lasting economic transformations. Former crises as the financial crisis 2008/2009 serve as accelerator of structural change by making obsolete business models unprofitable and pushing companies to innovate (Archibugi et al., 2013). The COVID-19 crisis differs in this respect due to the nature of the shock. In contrast to other crises uncovering economic system failures, the COVID-19 crisis is created exogenously by the spread of a virus. Thus, the obsolescence of business model cannot be driven by market efficiency, making the impact of the COVID-19 crisis on economic structures unforeseeable (Kuckertz et al., 2020). The hope for economic recovery is put into the adaptability of entrepreneurs to changing environmental conditions brought forward by a crisis (Santos et al., 2017; Williams & Vorley, 2015). As entrepreneurs may be the fastest to respond to drastically changed demand patterns and changed expectations for their societal role, entrepreneurship is widely acknowledged as agenda setter for future developments (Hanusch & Pyka, 2006; McCann & Ortega-Argilés, 2016; Schumpeter, 1911).

However, the general problem is that the direction of change induced by entrepreneurial activities pushed by the crisis is not clear. Manifold effects of the crisis on different levels of entrepreneurship are expected. This belief is supported by findings, that entrepreneurial activities are impacted on early stages in the entrepreneurial process comprising latent and early entrepreneurship as well as on later stages in the entrepreneurial process as firm registrations (Klapper & Love, 2011; Vegetti & Adascalitei, 2017). Besides these effects the crisis is also found to influence the quality of entrepreneurship. Qualitative differences in business models can occur on the explicit as well as on the implicit level. Both levels involve changes during crisis on the cognitive level. Explicit changes in business models correspond to different demand patterns and implicit changes represent different understandings of an entrepreneur´s societal role. On the explicit level it is visible that entrepreneur´s characteristics and the implementation of new processes and resources differ between pre-crisis and post-crisis periods (Bertschek & Erdsiek, 2020; Cucculelli & Peruzzi, 2020; Giotopoulos et al., 2017). On the implicit level a change of the importance of social norms and motivations to start a new venture occurs within the crisis (Santos et al., 2017; Vegetti & Adascalitei, 2017).

The specific problem is that it remains unclear how a crisis impacts the explicit business model preferences and implicit mental representations of entrepreneurship. There is a gap regarding the understanding of the effects of the crisis, especially of the COVID-19 crisis, on early stages of entrepreneurial activities (Filipovic et al., 2018;

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Ratten, 2020; Santos et al., 2017; Vegetti & Adascalitei, 2017). In this vein the early phases of a crisis are of special interest since the early developments lay the foundation for further developments within and after the crisis (Kuckertz et al., 2020). In order to address this gap an approach on cognitive level is required to disentangle the cognitive black box (Devetag, 1999; George & Bock, 2011). There is where our paper ties in.

The main concern of this paper is to shed light on the question if the COVID-19 crisis shapes entrepreneurial activities by influencing preferred types of business models and the understanding of the societal role of entrepreneurs. Therefore, the purpose of this paper is twofold. The first aim is to examine the relation between the COVID-19 crisis and explicit business models applying logistic regression analysis. Second and subsequently, the relation between the COVID-19 crisis and the mental representation of entrepreneurship is investigated by applying a semantic priming technique to retrieve implicit associations on entrepreneurship. The paper concentrates on the initial state of the COVID-19 crisis in Germany. In order to reach these goals, an online survey with 249 participants was conducted in the first shutdown in April and May 2020 in Germany.

The main result of the study is that the early phase of the crisis influences entrepreneurial activities from its pre-conditions on. First, the analyses reveal, that the crisis comes along with differences in explicit preferred business models in both characteristics - their main income source and in the role of entrepreneurs. Second, implicit mental representations of entrepreneurship differ with perceptions of the crisis. Third, rather than the existence of the crisis per se, but the individual perceptions in different affected areas (work place security, income stability, health issues and economic development) are important as they show a distinct influence. Fourth, the study shows that the cognitive level is of key importance in structural change.

The remainder is organized as follows: the next chapter discusses the theoretical background of the interplay of cognition, entrepreneurship and crisis perception. Chapter three lines up empirical findings of former literature and the research questions are derived. In Chapter four the methodological approach taken by this study is outlined. A presentation of the empirical findings is proceeded in Chapter five. The paper concludes with a discussion of the results in Chapter six.

2. Literature review

2.1. Cognition during crises

In the beginning of 2020 the Corona virus reached Germany. The COVID-19 pandemic turned into an economic crisis in Germany due to the sudden spread of the virus without chance to prepare, threatening economic goals (Fragouli, 2016; Kuckertz

4/39 #2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

et al., 2020). The COVID-19 crisis is characterized by a global scope, a simultaneous demand and supply shock and unknown time period (James, 2020; Ratten, 2020). These features of the crisis result in a formerly unknown uncertainty and economic downturn worldwide.

Private demand collapsed as a response to shutdowns and social distancing put in place to contain the spreading of the virus and shortages in income due to short-time working (Clemens et al., 2020; Dong et al., 2021; Loxton et al., 2020). In addition to these measures, the experience of an event as a pandemic lead to behavioural and therefore consumption changes (Forbes, 2017; Loxton et al., 2020). However, a severe crisis as the COVID-19 crisis reshapes economic structures not only in the short run, but also mentally leading to longer lasting changes in institutions (James, 2020). Because mental changes are highly dependent on the social context of an individual (Fernandez-Urbano & Kulic, 2020; Loxton et al., 2020; Stefan et al., 2020), the direction of institutional change is not foreseeable.

Although not foreseeable, mental changes do not appear randomly, but depend on the individual´s mindset. Mindsets can be described as knowledge representations structured in networks. In case of semantic networks, knots correspond to for example events or objects and the links show the association of these knots, meaning if one is remembered of a specific object, other objects and events linked to this are called into remembrance as well (Neely, 1991). These knowledge structures form mental templates for subsequent decision-making (Shepherd & Patzelt 2018, Dutton & Jackson 1987) and are accessible by the individual by two distinct processes. Cognitive processes can be based on system 1 or 2. System 1 includes instinctive and fast processes based on associative learning operating mainly beyond awareness. System 2 is controlled, rule based, slow, serial and deliberative, capable of simulations of the future (Kahnemann, 2003; Mishra et al., 2007; Evans, 2003; Sloman, 2002). Although both cognitive processes account for the perception of entrepreneurship, they are likely to affect different parts. How an entrepreneur behaves in everyday actions is more likely to be driven by implicit beliefs and thus system 1. Forming explicit preferences of certain business models require deliberative decision-making and are high-involvement cognitive processes relying on system 2.

When processing new information, the information is incorporated into prior knowledge through an individual's alignment of mental representations. The so-called structural alignment is a cognitive tool for individuals to compare objects helping them to understand new content, learn novel ideas and create new categories (Holland, 1986; Shepherd & Patzelt, 2018; Day & Gentner, 2007). The perception of these new information and events depend on interpretive schema drawn from past experiences (Strong, 2013). The formation and modification of these knowledge networks and mental representations are involved in most high-level cognition to understand and manage the complex reality and are thus crucial when investigating concept formation, memory,

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

inference and justice (Devetag, 1999). Since values, which may be partly unconscious and implicit, stem from cognitive representations of their needs (Rokeach, 1973; Schwartz, 1992), perception of new information and events may reshape subconscious associations and values. Therefore, neuronal structures such as semantic or knowledge networks are constantly adapting to environmental circumstances and newly acquired knowledge (Fuchs & Flügge, 2014).

A main driver of mental changes in crises are the perceptions of economic conditions on macro as well as on micro level (Fernandez-Urbano & Kulic, 2020). The perception of economic conditions, also known as consumer confidence, is found to influence decision making processes and risk-taking behaviour (Stiglitz et al., 2018). Moreover, perceived work place insecurity is proven to have multiple effects on psychological measures (Fernandez-Urbano & Kulic, 2020). Additionally, the COVID-19 crisis is likely to affect income stability as a related issue to job loss and short-time working. Furthermore, the experience of a pandemic may lead to negative perceptions of health expectations. Based on these considerations, the Corona crisis is differentiated into four dimensions: perceptions of the economic development on a macro level and perceptions in work place security, income stability and health on the micro level.

Evidence was found indicating that crises continue to have an effect even after the end of the crisis (Fernandez-Urbano & Kulic, 2020). As such, individuals or organizations can take advantage of the opportunities that arise in the changing environment and realize substantial gains (Eisenhardt, 1989; Eisenhardt & Martin, 2000; Sirmon et al., 2007) – for example through the introduction of new business models. Therefore, it is expected that the perception of aspects of the COVID-19 crisis influences entrepreneurial activities in a profound way in the years to come (Dieter, 2020).

2.2 Business models changes during crisis

Changes on individual, group, organizational or environmental level are likely to affect business models (George & Bock, 2011). However, for this changes to have a disruptive impact, a collective change of practices or attitudes needs to take place (Kuokkanen et al., 2019). Challenging everyday life, a collective change is given in the COVID-19 crisis. Adaptations of the economic landscape to a shock may be captured by business model changes as these are sensitive to changing environmental conditions (Cucculelli & Peruzzi, 2020; George & Bock, 2011). Because of their adaptability, entrepreneurial activities and entrepreneurs play a crucial role in economic recovery and softening the shock of a crisis (Santos et al., 2017; Williams & Vorley, 2015).

Entrepreneurial activities aim at filling recognized market gaps and at the enactment of opportunities (George & Bock, 2011; Ratten, 2020). Whenever a new venture is founded to exploit these opportunities, explicit and implicit business models

6/39   #2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

determine how value is created (George & Bock, 2011; Pfeifer et al., 2017; Teece, 2010). The minimal definition of a business model is often defined by the processes creating value and the resources required (Bagnoli & Redigolo, 2016; Malone et al., 2006). However, it may also include the entrepreneur´s knowledge and experience (Druilhe & Garnsey, 2004), organizational culture (Mazurek, 2018) or even all structural elements of a venture which explain how the business works (George & Bock, 2011; Magretta, 2002). Another string of literature highlights the importance of the cognitive level for business models (Kamprath, 2015). In this vein, business models are understood as a simplified reflection of reality (Bagnoli & Redigolo, 2016; Page, 2014) or a set of assumptions how a business may be successful (Downing, 2005; George & Bock, 2011). These approaches put emphasis on the subjectivity and perceptions of the environment (Druilhe & Garnsey, 2004). Concluding, the interdependent systemic background has a great influence on prevalent business models and on how entrepreneurs perceive their societal role (Burt et al., 2017; Ratten, 2020).

Former research found that entrepreneurial activities are impacted by crises. An investigation of early entrepreneurship, defined as activities undertaken by individuals prior to firm registration, revealed that crises do not impact these as harshly as expected by the observations on firm registrations (Vegetti & Adascalitei, 2017). However, the crisis affects the latent entrepreneurship, defined as the individual´s desire to found a new venture (Vegetti & Adascalitei, 2017). This translates into declining firm registration developments during crises supporting the dependence of entrepreneurial activities on the current economic environment and the income level of the country (Klapper & Love, 2011; Paniagua & Sapena, 2015). Thus, crises affect entrepreneurial motivations, attitudes (early stage of entrepreneurship) as well as behaviours (firm registrations) (Vegetti & Adascalitei, 2017). However, not only the quantity of ventures can be affected but also their quality in terms of business model specifications.

Explicit business model changes during crisis can be identified by varying importance of specific entrepreneurial characteristics or the implementation of new tools to overcome the hindrances of the crisis. Former research found evidence for changes in the importance of educational attainment and gender for entrepreneurial activities during crisis compared to non-crisis times (Giotopoulos et al., 2017). Moreover, it was observed that entrepreneurs adapted their business model to challenges of the COVID-19 crisis in Germany by implementing digitalization (Bertschek & Erdsiek, 2020). Adaptations of this kind are found to positively affect firm-survival after the crisis (Cucculelli & Peruzzi, 2020). What remains unclear is how the drastically changed demand during crisis affects the business models in their processes to create value and resources required. Therefore, the following research question is formulated:

1) How are perceptions of the COVID-19 crisis reflected in explicit business model preferences?

7/39   #2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

Implicit business model changes during crisis can be identified by changing roles of social norms and role models as well as adjustments in the motivations to start a new venture. In this vein, social norms have received increasing attention since social norms shape attitudes about entrepreneurship and therefore also shape entrepreneurial activities (Krueger et al., 2013; Santos et al., 2017). During crisis, social norms are found to even constrain entrepreneurial activities whereas role model perception shows a more pronounced positive influence during crisis (Santos et al., 2017). Connected to these findings is that motivations to start a new venture change during crisis by pushing individuals into self-employment to avoid unemployment (Vegetti & Adascalitei, 2017). What remains unclear is how the crisis affects the societal role of entrepreneurs. Thus, the second research question is stated:

2) How are perceptions of the COVID-19 crisis reflected in implicit mental representation of entrepreneurship?

It is unlikely that the economy will return to its pre-crisis state after the COVID-19 crisis (Cepel et al., 2020). In order to be able to counteract possible negative impacts on entrepreneurial activities, it is of crucial importance to gain fine grained information on impacts of the crisis. Since the influences in the beginning of the crisis lay the foundation for further developments in the crisis, the effects in the beginning of the crisis are of key interest.

3. Data and Methods

3.1 Sample

An online survey with 249 participants was conducted in Germany in the timeframe from 13th April to May 5th 2020. This time period reflects the core phase of the first shutdown in Germany. The survey was accessible through a variety of channels: It was advertised through the university website and that link was further shared via Facebook, twitter, XING, LinkedIn, work and personal networks. The survey was accessible for adults living in Germany. Following a quasi-experimental approach (Reichardt, 2009), the sample is split into sub-samples representing the four treatments (negative expectations concerning the four crisis dimensions economic development, work place security, income stability and health). Since the respondents self-select themselves into these groups by their intrinsic expectation, a randomization cannot be assured and thus the study qualifies itself as quasi-experimental (Döring & Bortz, 2016). The respondents can qualify themselves for more than one treatment by having negative expectations in multiple dimensions (economic development, work place security, income stability and health issues). Table 3.1 shows an overview of the treatment groups and their characteristics in the most important control variables.

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

Table 3.1: Values of most important variables over the categories of negative expectations as treatments

Negative expectations as treatments

	Economic development	Work place security	Income stability	Health issues	Full sample
Sample size	208	106	106	85	249
Average age	38 (16.358)	35 (15.618)	39 (17.549)	39 (17.152)	38 (16.319)
Share of women	59.2% (0.493)	58.1% (0.496)	63.2% (0.485)	64.3% (0.482)	57.1% (0.496)
Share of respondents having a tertiary education	67.8% (0.468)	67.0% (0.473)	64.2% (0.482)	69.4% (0.464)	67.1% (0.471)
Share of respondents affected by short-time working	5.9% (0.237)	6.0% (0.239)	7.9% (0.271)	2.4% (0.155)	5.4% (0.226)
Share of respondents working from home	64.3% (0.480)	62.6% (0.486)	59.4% (0.494)	67.1% (0.473)	63.0% (0.484)
Share of respondents having children	25.5% (0.437)	21.0% (0.409)	29.8% (0.460)	32.1% (0.470)	24.6% (0.432)
Share of respondents satisfied with the government[1]	87.2% (0.335)	86.5% (0.343)	90.5% (0.295)	89.3% (0.311)	87.7% (0.330)
Average perceived change leisure time (1=no change at all; 101= very much)	74.317 (23.700)	72.028 (25.356)	70.698 (26.647)	72.271 (26.100)	74.201 (24.494)
Average perceived change work time (1=no change at all; 101= very much)	56.463 (31.134)	54.049 (32.523)	53.765 (33.106)	50.750 (32.550)	56.493 (31.311)

Note: standard deviations in parentheses
Source: Own data collection

The variables do not significantly differ in dependence of the sub-group, indicating that control variables like age and education or affectedness of virus containing measures such as working from home or the perceived change in leisure or work time do not relate to the perception in the crisis dimensions. The share of women on the other hand does show a trend: It is higher in the negative expectation samples than in the overall sample. This indicates that women predominantly have more negative expectation than men do. Consequently, as expected, the perceptions are a highly individual phenomenon in which the four crisis dimensions are sufficient to examine impacts on preferred explicit business models and implicit mental representations of entrepreneurship.

---

[1] The rest of the respondents are either dissatisfied or neutral in the evaluation of governmental actions.

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

---

3.1 Survey design

3.1.2 Dependent variables

In order to answer the first research question *"How are perceptions of the COVID-19 crisis reflected in explicit business model preferences?"*, business model preferences are surveyed. For this purpose, the typology of business models by Malone et al. (2006) is used. This business model classification is especially beneficial for the purpose of this study since it offers observable, measurable characteristics and a broad applicability (Malone et al., 2006). The authors developed a model distinguishing business models in accordance to two factors: The first factor is the main income source of the business. As main income source, products are either 1) Financial products 2) Physical products 3) Intellectual property or 4) Human services. The second factor is the role that the entrepreneur is taking. According to the model, the role of the entrepreneur is either 1) Creator 2) Distributor 3) Landlord or 4) Broker.[2] Questions based on these two dimensions were included in the questionnaire: First, which products or services would be most likely to be the main income source and secondly, how subjects would describe their role as entrepreneur if they were to become entrepreneurially active. It may be noted that the respondents had a single choice task for the main income source as well as for the role of the entrepreneur. Therefore, only the main preference of business model characteristics was captured, excluding further preferences. For data preparation purposes, the required variables are controlled to ensure quality standards and the collected data was cleaned accordingly.[3] The descriptive statistics of the dependent variables are given in Table 3.2. A value of 1 corresponds to a respondent´s preferred choice, a value of 0 indicates a respondent does not prefer this option over the others. *Physical products* and *intellectual property* are the most preferred main income sources and *creator* and *landlord* the preferred roles of entrepreneurs.

---

[2] See questionnaire in the appendix 7.1 for the exact formulation of questions. The choice options were aligned with the framework given by Malone et al. (2006).

[3] For the cleansing process, respondents having a high proportion of missing data points might indicate low motivation and lower validity of the existing answers (Barge & Gehlbach, 2012). Although there could be alternative explanations for this response pattern, these subjects are removed from the data set. Secondly, matrix-style questions (e.g. optimism scale) are checked if the variance of the responses is greater than null. This step ensures, that the subjects did not chose the same indication on a Likert-scale for all items in this item battery (Schonlau & Toepoel, 2015). Since this pattern indicates annoyance of respondents (Leiner, 2019; Schonlau & Toepoel, 2015), data from these should not be taken into the analysis, thus they were excluded. Lastly, questionnaires with missing data (15%) weren't taken into further consideration.

10/39 **#2105** Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 3.2: Descriptive statistics for the dependent variables

		N	Share of first preferences	St. Dev.
Main income source	Physical product	225	34.7%	0.477
	Financial product	225	4.9%	0.216
	Intellectual property	225	50.2%	0.501
	Human services	225	10.2%	0.304
Role of the entrepreneur	Creator	232	40.1%	0.491
	Distributor	232	10.8%	0.311
	Landlord	232	41.8%	0.494
	Broker	232	7.3%	0.261

Source: Own data collection

To answer the second research question *"How are perceptions of the COVID-19 crisis reflected in implicit mental representation of entrepreneurship?"*, the respondents were asked to perform an assessment of their attitudes towards newly founded firms in contrast to mittelstand. German mittelstand expresses medium-sized firms with a turnover between 1 million and 50 million Euro per year and with 10 to 499 employees. They represent the largest proportion of firms in Germany.[4] They were chosen to function as counter-part to newly founded firms in the survey as they are presumed to be established and have a long tradition, which is not true for newly founded firms. The goal is to measure how the respondent associates entrepreneurship in contrast to mittelstand in an innovation system context. Innovation systems consist out of three components - actors, network structures and environment (Doloreux & Porto Gomez, 2017). Therefore, as dependent variable for this research question, words along the three components of an innovation system were defined as displayed in Table 3.3.[5] For example, words on the actor level describe entrepreneurs in their potential motivation to start a business ("possibility" or "necessity").

---

[4] Gabler Wirtschaftslexikon about mittelstand:
https://wirtschaftslexikon.gabler.de/definition/mittelstand-40165/version-263557

[5] The particular words used for the semantic priming test were composed by a committee of innovation experts. To retrieve the most important concepts about entrepreneurship, the innovation experts were asked to indicate the first five associations which come to their mind when reminded by "entrepreneurship". All experts wrote down their associations on paper which were collected after five minutes. This task was performed with all experts at the same time and place. Communication between the experts did not take place. We clustered the collected notes and extracted a representative word from each cluster. The extracted words are shown in Table 3.3 and are used in the survey in the reaction time task. The pairing of the words (e.g. "possibility" and "necessity") arise from their theoretical relatedness. All extracted word pairs can be sorted to one level of innovation systems – actors, network or environment.

Table 3.3: Words used in the reaction time task in the survey

ACTOR	NETWORK STRUCTURES	ENVIRONMENT
Possibility / Necessity	Demand / Freedom	Eastern Germany / West Germany / Northern Germany / Southern Germany
Experience / Youth	Cooperation / Autonomy	Career / Insecurity
Role Model / Troublemaker	Funding / Bureaucracy	Progress / Regression

Source: own collection from expert panel

Explicit response schemes have been criticized. Especially the fact that the respondents may answer in socially desirable way (Krosnick, 1999), covering their true opinion, is a drawback of explicit response schemes (Wittenbrink, 2007). Entrepreneurship as a topic presented as newly founded firm may rise this issue due to biased narratives presented in media. Furthermore, in case of measurement of associations, long response times may also lead to answers reflecting more explicit deliberations than an attitude. Therefore, the participants were asked to perform an implicit task measuring their associations concerning newly founded firms and mittelstand along the above presented words in Table 3.3. The words are shown shortly in the middle of the screen (500 milliseconds) followed by either "newly founded firm" (German: "Neugründung") or "mittelstand" (German: "Mittelstand"). The respondent is asked to press the corresponding button as fast and precise as possible to indicate whether "newly founded firm" or "mittelstand" is shown on the screen.[6] This way, the aimed variables are hidden, making it less likely that respondents answer strategically (Wittenbrink, 2007). Based upon theoretical considerations of semantic priming[7], it is expected that the respondent is able to recognize "newly founded firm" faster than "mittelstand" if the foregoing word (contained in Table 3.3) is stronger associated with the concept of entrepreneurship. In order to be able to assess the differences between reaction times, each word from Table 3.3 is once preceding "newly founded firm" and "mittelstand". The difference in times is interpreted as direction of association. With regards to quality measures, a cleansing process ensures the explanatory power of the collected data.[8] The descriptive statistics for the retrieved implicit associations are shown

---

[6] See table 7.2 in appendix for exact formulation of the instruction.

[7] Semantic priming describes the effect, that word recognition is improved in speed or accuracy when a related word is shown shortly before. For an extensive overview see Neely (1991).

[8] Firstly, the error rate per subject is calculated. If a respondent presses the wrong button in more than 25% of the prime-target-combinations by keeping the target constant, it is suspected if the task was fully understood by the participant and the corresponding reaction time measurements were deleted. Moreover, wrong target identifications were also removed from the data set. Secondly, all responses having a faster reaction time than 100 milliseconds and the ones having a slower response indication than 1000 milliseconds were removed (Payne, 2001), ensuring that the answers can be seen as implicit and not made by explicit deliberations or by accident. Thirdly,

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

in Table 3.4. A mean value of 1 corresponds to the phenomenon that the respective word is not associated with newly founded firm or mittelstand, but is a sign of indifference. If the value is higher than 1, the association is directed towards mittelstand and a value smaller than 1 indicates an association with newly founded firms. The results in Table 3.4 indicate a closer association of the tested words to mittelstand than to newly founded firms.

Table 3.4: Direction of association (newly founded firm vs. mittelstand) measured in reaction time difference according to signalling words and for the three levels of an innovation system

		N	Mean	St. Dev.	Min	Pctl (25)	Median	Pctl (75)	Max
Actor level	Possibility	184	1.076	0.367	0.419	0.880	1.030	1.201	4.037
	Necessity	161	1.066	0.287	0.186	0.872	1.048	1.211	1.922
	Experience	165	1.056	0.250	0.391	0.868	1.056	1.216	1.939
	Youth	184	1.035	0.276	0.509	0.858	1.010	1.143	2.552
	Role model	181	1.033	0.277	0.443	0.834	1.000	1.160	1.867
	Trouble maker	167	1.058	0.267	0.543	0.881	1.013	1.196	1.989
Environmental level	Career	169	1.079	0.281	0.605	0.849	1.058	1.234	1.998
	Insecurity	170	1.050	0.287	0.494	0.847	1.027	1.219	2.075
	East Germany	165	1.054	0.266	0.558	0.892	1.015	1.182	2.057
	West Germany	163	1.019	0.265	0.515	0.834	1.016	1.170	2.111
	Northern Germany	168	1.001	0.231	0.503	0.862	0.973	1.127	1.817
	Southern Germany	166	1.088	0.265	0.553	0.915	1.076	1.226	1.921
	Progress	182	1.030	0.234	0.458	0.874	1.006	1.186	1.709
	Regression	170	1.057	0.272	0.441	0.881	1.016	1.176	2.096
Network level	Demand	176	1.025	0.264	0.554	0.827	0.996	1.163	1.987
	Freedom	168	1.034	0.253	0.402	0.856	1.002	1.198	1.782
	Funding	177	1.057	0.246	0.511	0.894	1.043	1.187	1.986
	Bureaucracy	164	0.996	0.23	0.127	0.826	0.975	1.143	1.655
	Cooperation	171	1.055	0.251	0.507	0.885	1.003	1.183	2.085
	Autonomy	167	1.003	0.255	0.581	0.833	0.961	1.162	2.396

Source: own data collection

3.2.2 Independent variables

After having presented the creation of the data set of dependent variables for the two research questions, information on the independent variables – the crisis dimensions – and the controls that are applied is presented. As such, the effects of the Corona crisis

---

individual outliers are removed by deleting responses showing a slower reaction time than the individual mean plus two standard deviations (Wittenbrink, 2007).

on the daily life of the respondents are measured. The respondents are asked to indicate their expectations on the developments in the next 12 months[9] in the four dimensions – 1) their health, 2) their income and financial security, 3) the security of their working place or possibilities in searching for a job, and 4) the macroeconomic perception of overall economic development.[10/11] The subjects` expectations regarding those four dimensions are measured on a continuous scale ranging from 1 "very negative" to 101 "very positive". The respondent´s answers on these scales are transformed into an indicator whether the expectations are positive (values >= 51) or negative (values <51).[12] The descriptive statistics of the COVID-19 crisis perceptions are displayed in Table 3.5.

Table 3.5: Share of respondents with negative expectations in the dimensions of the COVID-19 crisis

	N	Share of respondents with negative expectations	St. Dev.
Economic development	249	83.5%	0.372
Work place security	247	42.9%	0.496
Income stability	249	42.6%	0.495
Health issues	249	34.1%	0.475

Source: Own data collection

Lastly, potentially influential crisis-related additional factors were assessed. On the one hand, those were of personal information character, such as demographic variables (Luca et al., 2012), personality profile[13] (Brandstätter, 2011; Obschonka et al., 2013), degree of optimism[14] (Bernardo & Welch, 2001) as well as experiences with entrepreneurship, that are proven to impact entrepreneurial activities. On the other hand, respondents were asked to indicate the impact of the virus containing measures on their work and leisure time.

---

[9] The assessed time frame of 12 months is chosen because of its accessibility – it's a reasonable time frame that is indicating future trends while still not being as far ahead that predictions are hard to make.

[10] Overall economic development corresponds to the consumer confidence as used by former research (Fernandez-Urbano & Kulic, 2020; Merkle et al., 2003).

[11] See Table 7.3 in appendix for exact formulation of the question.

[12] This transformation is reasoned by retrieving a qualitative differentiation between the responses (positive vs. negative) rather than incremental changes (very negative vs. moderate negative).

[13] Operationalized according to Rammstedt et al., 2017.

[14] Operationalized according to Glaesmer et al., 2008.

3.3 Empirical Approach

A descriptive analysis is performed to reveal the interplay of perceptions of the current crisis. Following this, a two stepped analytical procedure is applied to answer the research questions.

The first research question: *"How are perceptions of the COVID-19 crisis reflected in explicit business model preferences?"* is analysed with the help of binary logistic regressions. Those are applied to reveal the relation of perceptions of the crisis in terms of economic development, income stability, working place security and health issues – positive or negative – and the preference of business models. In order to do so, two models are specified, varying the dependent variable.[15] The first function incorporates the main income source as dependent variable and the second function opts at explaining the role of the entrepreneur as dependent variable. The model is formulated as follows:

$$\log\left(\frac{p(X)}{1-p(X)}\right) = Constant + \beta_1 * Economic\ development + \beta_2 * Income\ stability + \beta_3$$
$$* Work\ place\ security + \beta_4 * Health\ issues + Individual\ Controls + Corona\ controls$$

X corresponds to the dependent variables – main income sources and role of the entrepreneur. Two sets of control variables are sequentially included in the model specifications to test for robustness. The first set of controls applies to the individual level. Personality traits (Big Five profile (Zhao & Seibert, 2006)), demographic variables (e.g. gender (Minniti & Naudé, 2010), age (Blanchflower et al., 2001; Lévesque & Minniti, 2006), educational attainment (Blanchflower, 2000; Jiménez et al., 2015)) and contact to entrepreneurs (e.g. knowing an entrepreneur (Lindquist et al., 2015)) are included. Second, changes in work and leisure time as well as framework conditions are taken into consideration in the Corona control variable set. The descriptive statistics for these variables are shown in Table 7.4 in the appendix. The measures to contain the Corona virus, stronger affect the leisure time conditions of the respondents than their work conditions. At that point in time most of the respondents experienced working from home but did not experience short-time working.

---

[15] Because emotions and thoughts resulting of the different crisis dimensions as independent variable exist before the explicit decision making on business models as dependent variable, endogeneity does not seem to be apparent.

In order to ensure the validity of the results of the logistic regressions, the assumptions of the model are tested.[16] The correlations between the dependent and independent variables are depicted in Table 3.6. As the table reveals, no high correlations can be identified in variables which will be included in one regression model later on.[17] Therefore, no variables have to be excluded. Contrary to former research by Fernandez-Urbano and Kulic (2020), we cannot confirm a strong relation between social background and the perception of economic conditions. Moreover, it is interesting that the perception of the crisis correlates with objective conditions in the crisis (e.g. working from home, short-time working) only to a minor extent. This may be due to the initial state of the crisis in which short-time working and job loss may not be experienced by many of the respondents, underlining that perceptions are not necessarily bounded to objective conditions. The result points at the importance to consider perceptions in the analysis of effects a crisis has.

---

[16] The assumption of linearity between the log of odds and continuous independent variables is tested. Influential values are detected by the value of the absolute standardized residuals. To avoid multicollinearity issues, the variance inflation factor is applied as an indicator. Values below 5 are considered to be unproblematic. Moreover, models are tested with the Likelihood ratio test to ensure that they explain more than more than an empty baseline model. Models with a p-value below 0.1 are considered in the analysis. The quality assessment revealed, that not all of the dependent variables can be incorporated in a logistic regression (main income source: financial products, human services; role of the entrepreneur: broker [reasons were issues regarding the distribution of residuals and the fulfilment of the linear assumption which may be caused by low sample sizes in these cases]). Those three variables are not further included.

[17] All pairwise correlations are lower than 0.40.

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 3.6: Correlation matrix of variables
Source: Calculation based on own data collection

Group	Variable	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	X	y	z	aa	ab	ac	ad	ae	af
Main income source	Physical products (a)		-0.19	-0.74	-0.24	0.34	0.08	-0.44	0.1	-0.17	0.1	0.04	-0.1	-0.09	0.07	0.17	0.1	-0.06	-0.12	-0.15	0.08	0.02	-0.04	-0.05	0.08	0.05	0.2	-0.06	0.2	-0.1	-0.11	0.07	-0.01
	Financial products (b)			-0.24	-0.08	-0.02	0.01	-0.1	0.21	0.05	0.03	0.08	0.15	-0.14	-0.08	-0.19	0.05	-0.06	-0.13	-0.1	-0.06	-0.11	-0.08	0.12	-0.02	-0.1	-0.05	0.06	-0.04	0.01	-0.06	-0.12	0.02
	Intellectual property (c)				-0.3	-0.25	-0.11	0.44	-0.23	0.12	-0.09	-0.07	0.03	0.11	0	0	-0.16	0.08	0.22	0.22	-0.05	0.02	0.01	0.03	0	-0.06	-0.15	0.14	-0.16	0.07	0.07	-0.01	-0.01
	Human services (d)					-0.12	0.04	0.06	0.06	0.04	-0.04	-0.01	0	0.08	-0.05	-0.12	0.07	0	-0.08	-0.04	0	0.02	0.11	-0.06	-0.11	0.11	-0.03	-0.18	-0.04	0.02	0.12	0	0.01
Role of entrepreneur	Creator (e)						-0.28	-0.72	-0.25	-0.14	0.13	0.22	0.14	-0.16	0.08	0.01	0.06	0.09	-0.03	0.03	0.06	-0.02	0	-0.03	0.13	0.1	0.03	0.12	0.1	-0.03	-0.03	0.03	-0.12
	Distributor (f)							-0.26	-0.09	-0.01	-0.12	-0.16	-0.13	0.03	0.07	0	0.08	-0.15	-0.13	-0.08	0.12	0.06	-0.03	0	-0.11	-0.09	0.06	0.08	0.04	-0.17	-0.01	0.08	0.11
	Landlord (g)								-0.23	0.1	-0.02	-0.16	-0.14	0.16	-0.03	0	-0.16	0.05	0.13	0.16	-0.15	0.01	0.06	0.06	-0.08	-0.06	-0.1	-0.05	-0.23	0.16	0.09	-0.01	0.12
	Broker (h)									0.07	-0.07	0.05	0.13	-0.03	-0.15	-0.02	0.11	-0.12	-0.04	-0.27	0.03	-0.04	-0.09	-0.04	0.02	0.01	0.06	-0.21	0.19	-0.06	-0.1	-0.13	-0.11
Crisis perceptions	Economic development (i)										0.16	0.14	0.12	-0.05	-0.1	-0.07	0.22	0.03	-0.07	0.04	0.03	0.04	-0.06	0.05	-0.02	-0.12	-0.06	-0.05	-0.01	-0.07	-0.08	-0.07	-0.01
	Work place security (j)											0.38	0.09	-0.06	0.04	-0.04	0.04	-0.02	-0.01	0.08	-0.14	0.05	-0.08	-0.07	0.13	-0.04	-0.02	-0.03	-0.02	0.08	0	-0.06	-0.02
	Income stability (k)												0.37	-0.06	-0.02	-0.07	0.19	-0.04	-0.13	-0.02	0.07	0.09	0.07	-0.04	0	-0.01	0.07	-0.08	0.04	-0.13	0.05	-0.14	-0.06
	Health issues (l)													-0.07	0.04	0.02	0.19	0.04	0.02	0.02	0.1	0.1	0.08	0.06	-0.01	-0.07	0.04	0.11	-0.02	-0.17	0.02	-0.03	-0.11
Individual set of controls	Extraversion (m)														0.15	0.12	-0.13	0.27	0.18	0.07	-0.13	0.11	0.13	-0.08	-0.16	0.1	0.09	-0.14	-0.17	0.12	0.05	0.1	-0.02
	Agreeableness (n)															0.24	-0.12	0.06	0.25	0.11	0.19	0.23	0.04	0.08	-0.08	-0.04	0.06	0	0.08	-0.13	0.12	0.04	-0.02
	Conscientiousness (o)																-0.12	0.12	0.17	0.02	0.3	0.19	0.15	-0.09	-0.15	0.08	0.11	0.13	-0.01	-0.28	0.06	0.18	0.04
	Neuroticism (p)																	-0.01	-0.13	-0.04	-0.05	0.25	-0.06	0.04	0.09	-0.04	0.07	0.02	-0.12	0.05	-0.01	-0.04	-0.01
	Openness to experience (q)																		0.19	0.05	0.02	0.03	0.11	-0.13	-0.16	0.14	0.05	-0.05	-0.12	0.01	-0.04	0.05	-0.01
	Optimism (r)																			-0.03	0.07	0.16	-0.1	-0.05	-0.05	-0.05	0.08	-0.04	-0.06	-0.13	0.06	0.1	-0.06
	Holding an university degree (s)																				-0.05	-0.03	0.13	-0.06	-0.12	0.14	0.01	0.1	-0.33	0.14	0.05	0.09	0.11
	Age (t)																					0.22	0.06	-0.19	-0.19	-0.02	-0.1	0.04	0.35	-0.76	0.09	-0.05	-0.08
	Gender (u)																						-0.02	-0.04	-0.08	-0.01	-0.04	0.11	0.02	-0.17	0.11	0.01	-0.03
	Self-employed (v)																							0	-0.48	0.23	0.01	-0.09	0	-0.07	0.12	-0.04	0.02
	Knowing an entrepreneur (w)																								0.13	-0.16	-0.03	0.02	0.01	0.16	0.04	0.06	0.06
	Experience with foundations (x)																									-0.33	0	0.02	0.05	0.19	-0.08	0.13	0.14
	Work experience in small and new firms (y)																										0.08	0.01	0.07	0.08	0.1	-0.05	0.01
	Watching TV shows about startups (z)																											-0.11	-0.06	0.1	0.01	-0.04	0.09
Corona set of controls	Short-time working (aa)																												-0.22	0.05	0.14	-0.03	-0.16
	Working from home (ab)																													-0.32	-0.01	-0.07	-0.22
	Children (ac)																														-0.07	0.07	0
	Satisfaction with government (ad)																															0.07	0.06
	Change leisure time (ae)																																0.33
	Change work time (af)																																-

#2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

The second research question *"How are perceptions of the COVID-19 crisis reflected in mental representation of entrepreneurship?"* is examined as follows: The implicitly measured association times to newly founded firm and mittelstand are assessed. It is tested if there are differences in association strengths between the group of respondents expecting positive changes in one of the crisis dimensions versus the subjects indicating a negative expectation in those. Since there is reason to expect the approximate fulfilment of the central limit theorem, Welch´s two-sample t-tests are applied to identify significant differences. ANCOVAs are performed as a robustness check making sure that perceptions are the main driver for observed differences.[18]

4. Results

4.1 Crisis as a differentiated event

First of all, we examined how the respondents are distributed over the crisis perception in the four measured dimensions – economic development, income stability, work place security and health issues. Figure 4.1 illustrates the number of respondents having negative expectations within the time frame of the coming 12 months along the crisis dimensions and their overlap. It can be reasoned, that most negative expectations co-appear. Negative expectations in the context of economic development is the only dimension which appears in a large proportion alone. 52 respondents, ~27%, indicated negative expectations only in economic development. The second largest cluster consists out of respondents with negative expectations in every dimension, with 49 of the respondents, ~22%. This result supports the findings of Fernandez-Urbano & Kulic (Fernandez-Urbano & Kulic, 2020) concerning the distinctiveness of macroeconomic sentiment (overall national development, here economic development) and microeconomic sentiment (individual´s economic situation, here work place security, income stability and health).

---

[18] In this step all control variables mentioned in Table 7.4 are included. The ANCOVA results are available in Table 7.7.

18/39 #2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic
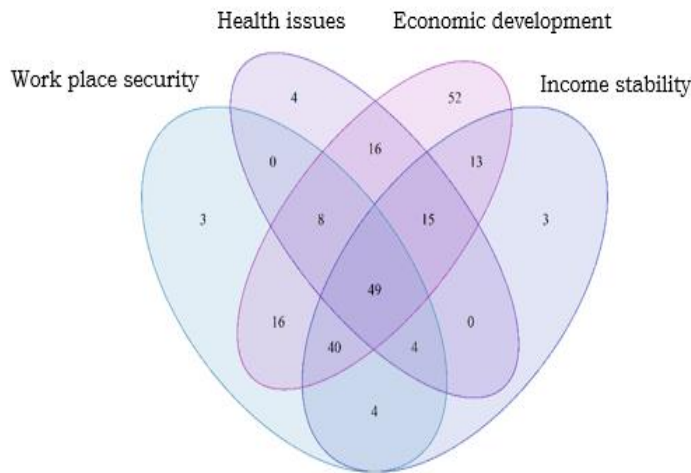
Figure 4.1: Venn diagram of negative expectations
Source: Own data collection

The four investigated crisis dimensions are constituted in a unique manner indicated by distinctive overlaps of the dimensions with each other. Thus, the crisis dimensions are compiled of different groups of subjects. This finding confirms the notion that perceptions of economic conditions during crisis depend on individual characteristics (Stefan et al., 2020). Consequently, the COVID-19 crisis reflects itself not only in an increased uncertainty as found by Loxton et al. (2020), but is likely to affect the economic situation in a distinctive manner. This supports the call for a more fine grained investigation of crises (Filipovic et al., 2018). The assumption of many empirical studies, that the inclusion of a binary variable (Is there a crisis? Yes or No) is sufficient to capture the context of the crisis (Vegetti & Adascalitei, 2017), is contradicted by our results.

4.2 Effects of the COVID-19 crisis perceptions on explicit business model preferences

The results of the analysis of preferred explicit business models are divided into two dimensions: The results of the logistic regressions for the main income sources as dependent variables are shown in Table 4.1, those for the role of the entrepreneur are summarized in Table 4.2. The main results of the analysis on explicit business model preferences are 1) that the crisis impacts the preferred business models in multiple and distinct ways 2) that new business models are preferred rather than others become obsolete. In the following, the results are elucidated in detail.

First, the crisis perception influences both business model dimensions – main income source and role of the entrepreneur. This result confirms the expectations formulated by former research, stating that crises reshape economic structures (James, 2020). Further, these findings support the relevance of the environmental conditions for

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

the incorporation of business models (Cucculelli & Peruzzi, 2020; George & Bock, 2011). Moreover, individual perceptions are of striking importance as these are the foundation of actions rather than objective circumstances confirming former findings (Stefan et al., 2020). Thus, studies with binary variables indicating the presence of a crisis (Vegetti & Adascalitei, 2017) may deliver only limited insights on the impact of crisis circumstances.

More specifically, the perceptions of the crisis affect business models in a distinct manner. Expectations in terms of courses in the next 12 months in the dimensions economic development and work place security play a key role for the preferred main income source. While expectations in economic development are of significance for the preferred entrepreneurial role too, perceptions of the work place security do not influence the preferred entrepreneurial role, but income stability does. Surprisingly, the two business model dimensions – main income source and entrepreneurial role – do not show to be influenced by health issues. Our results deliver further details on the channels of the crisis on pre-conditions of entrepreneurship and therefore advance the literature in this regard (Vegetti & Adascalitei, 2017). The perception of economic development is known to be influential on behavioral and national level (Fernandez-Urbano & Kulic, 2020; Merkle et al., 2003; Stiglitz et al., 2018). Our results advance the literature by finding evidence that this perception is already relevant on individual level leading to the preference of certain kinds of business models. Further, the significant influence of work place security perception on the preferred main income source comes with no surprise. This finding underlines former research discussing significant impacts on subjective well-being and other psychological effects and advances this string of literature with the effect on business models and especially preferred main income sources (Burchell, 2011; Fernandez-Urbano & Kulic, 2020; Geishecker, 2012; Knabe & Rätzel, 2011). However, the insignificance of health issues in the analyses was not expected. Natural catastrophes and healthcare crises are expected to heavily influence individual behavior (Forbes, 2017; Loxton et al., 2020) and entrepreneurial activities may aim at the uncovered gaps in medical services and equipment (James, 2020; Ratten, 2020). Our analyses do not deliver evidence for this in the early stage of the COVID-19 pandemic in Germany.

Second, a more detailed investigation of the direction and height of impacts of the crisis perceptions on the business model dimensions main income source and entrepreneurial role reveals more interesting results. Having a closer look at the odds increases and decreases associated with the perceptions of the crisis, it is remarkable that the increases outrun the decreases multiple times for both business model dimensions, the main income source as well as the role of the entrepreneur.[19] The analysis of the main income sources of business models revealed that negative expectations in *economic development* leads to an increase in likelihood to prefer

---

[19] The respondents had to choose one among four alternatives. Since this question type does not allow multiple answers, reversed effects are to be expected. However, the odd ratios would be similar in magnitude in case of perfect substitution, which is not the case.

#2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

intellectual property about 93.7% - 186.9%, and to a much lower decrease of likelihood
to prefer physical products about 72.5% - 65.6%. For *work place security* an opposite
pattern of business model choices can be retrieved. The likelihood to prefer physical
products as main income source having negative expectations is increased from 92.2%
to 140.3%, contrasted by a much lower decrease of 61.2% to 40.0% for the preference
of intellectual property. The analysis in the dimension of the role of the entrepreneur
yields a similar pattern. Again, negative expectations in *economic development* are
associated with a higher increase in likelihood to prefer landlord as entrepreneurial role
(119.1% - 186.5%) than it leads to a decrease of the likelihood to prefer creator (67.5%
- 63.7%). Similarly, in the case of *income stability* the increases (creator: 118.5% to
219.6%) outrun the associated decreases (distributor: 33.8%) multiple times. These
findings underline previous research that entrepreneurial activities are most reactive in
response to a crisis (Ratten, 2020). Our research advances the literature in proposing
that even a step earlier, pre-foundational preferences for business models, are highly
reactive. Whereas the crisis puts adversity on existing entrepreneurial ventures
(Kuckertz et al., 2020), our analyses reveal a strong indication for quick adaptation of
entrepreneurial processes to changing conditions during the crisis. This phenomenon is
also underpinned by observations of the German economy during the COVID-19 crisis
suggesting that digitalization – thus change – is of key importance in order to survive the
crisis (Bertschek & Erdsiek, 2020). Arguably, this crisis leads more to a favouritism of
certain models than it decreases the attention of others. This seems to correspond to the
nature of this crisis not shaking out obsolete businesses but rather constraining valuable
ones (Kuckertz et al., 2020).

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 4.1: Binary logistic regression results - main income source

	Main income source											
	Physical products						Intellectual property					
	(1)		(2)		(3)		(4)		(5)		(6)	
	B	OR	B	OR	B	OR	B	OR	B	OR	β	OR
Negative expectations - economic development	**-1.067*** (0.390)**	**0.344**	**-1.264*** (0.448)**	**0.282**	**-1.291*** (0.495)**	**0.275**	**0.661* (0.386)**	**1.937**	**0.936** (0.453)**	**2.551**	**1.054** (0.485)**	**2.869**
Negative expectations – work place security	**0.654** (0.318)**	**1.922**	**0.847** (0.384)**	**2.333**	**0.877* (0.456)**	**2.403**	**-0.511* (0.298)**	**0.600**	**-0.948** (0.369)**	**0.388**	**-0.797* (0.419)**	**0.451**
Negative expectations – income stability	0.353 (0.332)	1.424	0.107 (0.396)	1.112	-0.001 (0.469)	0.999	-0.324 (0.312)	0.723	0.169 (0.372)	1.184	0.170 (0.425)	1.185
Negative expectations – health issues	-0.195 (0.329)	0.823	-0.381 (0.379)	0.683	**-0.782* (0.459)**	**0.458**	0.160 (0.309)	1.173	0.247 (0.363)	1.280	0.246 (0.420)	1.279
Constant	-0.127 (0.353)	0.881	0.190 (2.264)	1.210	0.704 (3.777)	2.022	-0.261 (0.356)	0.770	-4.308** (2.170)	0.013	-7.898** (3.716)	0.000
Individual control variables included	No		Yes		Yes		No		Yes		Yes	
Corona control variables included	No		No		Yes		No		No		Yes	
Observations	223		212		179		223		212		179	
Log Likelihood	-137.503		-114.372		-92.061		-150.570		-119.827		-99.673	
Akaike Inf. Crit.	285.006		266.745		234.122		311.139		277.655		249.347	

Note: For full-fledged regression tables depicting also the estimations for control variables in the regressions, please see Table 7.5 in the appendix.
Source: Calculation based on own data collection

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 4.2: Binary logistic regression results - role of entrepreneur

	Role of the entrepreneur													
	Creator						Landlord						Distributor	
	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
	B	OR	B	OR	B	OR	B	OR	B	OR	B	OR	β	OR
Negative expectations - economic development	**-1.015*** (0.378)**	**0.363**	**-1.076** (0.426)**	**0.341**	**-1.125** (0.482)**	**0.325**	**0.784** (0.391)**	**2.191**	**0.937** (0.439)**	**2.552**	**1.052** (0.499)**	**2.865**	-0.059 (0.675)	1.316
Negative expectations – work place security	0.279 (0.306)	1.322	0.100 (0.346)	1.106	0.175 (0.396)	1.192	0.131 (0.303)	1.140	0.113 (0.347)	1.120	0.088 (0.404)	1.092	0.428 (0.600)	0.824
Negative expectations – income stability	**0.781** (0.320)**	**2.185**	**1.162*** (0.379)**	**3.196**	**1.150*** (0.432)**	**3.158**	**-0.692** (0.318)**	**0.501**	-0.592 (0.362)	0.553	-0.535 (0.425)	0.585	**-1.435** (0.690)**	**0.662**
Negative expectations – health issues	0.121 (0.311)	1.128	-0.053 (0.351)	0.948	0.106 (0.402)	1.112	-0.312 (0.311)	0.732	-0.180 (0.346)	0.835	-0.263 (0.418)	0.768	-0.428 (0.616)	0.835
Constant	-0.067 (0.335)	0.935	-4.633** (2.220)	0.010	-6.218* (3.503)	0.002	-0.674* (0.356)	0.510	-1.380 (2.072)	0.251	-1.159 (3.383)	0.314	4.075 (3.584)	0.130
Individual control variables included	No		Yes		Yes		No		Yes		Yes		Yes	
Corona control variables included	No		No		Yes		No		No		Yes		No	
Observations	230		221		188		230		221		188		221	
Log Likelihood	-147.348		-128.250		-104.152		-150.575		-130.467		-102.052		-61.318	
Akaike Inf. Crit.	304.696		294.500		258.305		311.150		298.933		254.103		160.635	

Note: For full-fledged regression tables depicting also the estimations for control variables in the regressions, please see Table 7.6 in the appendix.
Source: Calculation based on own data collection

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

4.3 Implicit mental representation of entrepreneurship during COVID-19 crisis

The results of implicit associations for newly founded firms in contrast to
mittelstand during the COVID-19 crisis are illustrated in Figure 4.2. Significance signs (*)
correspond to significant differences in associations between those two groups. The red
significance signs indicate that the crisis perception cannot be considered as main
covariate with the association difference as revealed by the ANCOVA analyses. The
main results are 1) that perceptions in all crisis dimensions are reflected in different
implicit mental representations, 2) the perception of the crisis is merely reflected on the
environmental level 3) perceptions in work place security do not show a huge impact and
4) in case of negative expectations respondents tend to have stronger associations
towards mittelstand than to newly founded firms. In the following, the results will be
elaborated in detail.

First, throughout all four tested crisis dimensions there are significant differences
between positive (dotted line) and negative (full line) expectations. Meaning, that
expectations in all crisis dimensions co-occur with differences in associations concerning
newly founded firms in contrast to mittelstand. However, the extent of correlation
between crisis perceptions and implicit business models varies. These findings go in line
with theoretical considerations in former literature. Our results support the considerations
by Burt et al. (2017) that the interplay of actor, network and environmental level, in which
a business is embedded in, is expected to be dynamic and may underlie considerable
changes over time. Further, we confirm that crises have a significant impact on the
business environment by changing mental patterns of the population (James, 2020;
Ratten, 2020).

Second, particularly words on the environmental level depend on the expectations
in the crisis dimensions. Perceptions in economic development, income stability and
health issues[20] come with at least two significant differences in implicit associations. On
the actor level only one crisis perception – income stability - indicates differences in
implicit associations.[21] The network level does not seem to be correlated with
perceptions of the COVID-19 crisis.[22] These results deliver an explanation for the
observation that during crisis role models gain importance for entrepreneurial activities

---

[20] Although the perception of health issues is co-occuring with two significant differences, this
result is taken with caution since one of the differences is not merely associated with the
perception but rather with other factors.
[21] Although the perception of work place security is co-occuring with a significant difference, this
result is taken with caution since it is only one item in the multi-item battery.
[22] Although the perception of health issues is co-occuring with a significant difference, this result
is taken with caution since it is only one item in the multi-item battery.

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

(Santos et al., 2017) by revealing that crisis perceptions (especially income security) indeed come along with different conceptualizations of the actor level and therefore role models. The relevance of the perception of economic development cannot be found to correlate with the actor level and therefore contradicts former observations (Stiglitz et al., 2018). These results further support the necessity of the methodological refinement this work offers, namely to look at crises more distinctively as a pure binary macroeconomic phenomenon.

Third, work place security does not seem to contribute as much as the other perceptions to implicit association differences. This finding is coming as a surprise. Former studies were able to identify multiple effects of work place security on psychological measures (Burchell, 2011; Geishecker, 2012; Knabe & Rätzel, 2011). Moreover, work place security was also found to influence the explicit business models in the first analysis step of this study. This pattern may be due to the short-term impact of work place security compared to the other crisis perceptions potentially inhibiting long-term effects. Hence, this finding supports the view that implicit mental representations are affected by the perceptions which are expected to last longer. In other words, cognitive models about entrepreneurship will only be adapted to longer lasting changes in the environment, not if the changes are assumed to be rather short-termed.

Fourth, there's an overall shift of associations, regardless of being positive or negative, towards mittelstand (shift of both curves in all crisis dimensions to the right). Regarding the significant items, negative expectations associations particularly tend to mittelstand if associated with the perception of the crisis dimension (8 of 9 cases). It may be interpreted that entrepreneurial activities in form of newly founded firms suffer from crisis perceptions and mittelstand will be preferred. This may go back to a reorientation of individuals towards basic needs as security during the crisis (Loxton et al., 2020) which may be more connected to the established mittelstand rather than to volatile entrepreneurial activities. Thus, we deduce that an entrepreneurial mindset is pro-cyclical.

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic
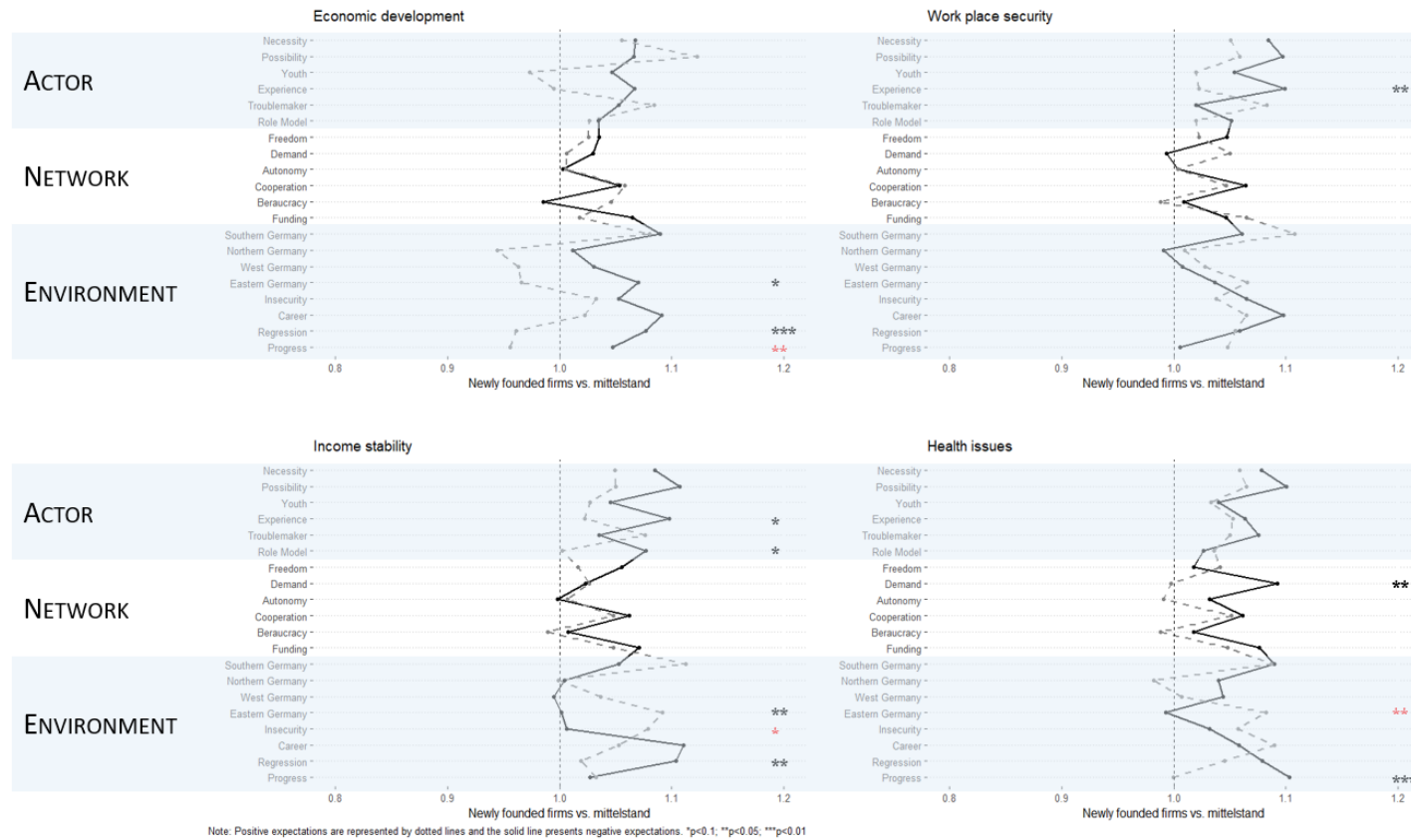
Figure 4.2: Association profiles
Source: Calculation based on own data collection

Note: Sample sizes: Economic development: 189 negative, 40 positive; Work place security: 100 negative, 129 positive; Income stability: 99 negative, 130 positive; Health issues: 76 negative, 153 positive
Please note that the differences marked with a red significance sign cannot be attributed to the difference in crisis perception but to individual and contextual factors (please see Table 7.7 in the appendix). The black significance signs indicate a significant influence confirmed by the ANCOVA analysis or if the crisis perception is one of the top three predictors of this difference in implicit associations. The x-axis indicates whether the word on the y-axis is merely associated with the concept of newly founded firms (entrepreneurship) or mittelstand. The more the mean values are placed on the right-hand side of the Figure 4.2, the more the word tends to be associated with "Mittelstand". The more left it is the more the word is associated with "newly founded firms". The vertical line at the x-value of 1 corresponds to an equally fast response time in both cases, without clear association with one of the concepts. The full line represents respondent´s associations having negative expectations throughout the four dimensions in the next 12 months. This is contrasted by the respondent´s associations having positive expectations which is shown as dotted line in the plots.

5. Discussion

Hope is put into entrepreneurial activities to adapt to the crisis and enable a fast recovery. Nevertheless, it remains unclear how crisis perceptions and the explicit business models as well as implicit mental representations of entrepreneurship relate to each other. There is a gap regarding the understanding of the trends in early stages of entrepreneurial activities especially in the early phases of the COVID-19 crisis (Filipovic et al., 2018; Kuckertz et al., 2020; Ratten, 2020; Santos et al., 2017; Vegetti & Adascalitei, 2017). In order to address this gap an approach on cognitive level is required exploring explicit business model preferences and implicit mental representations of entrepreneurship (George & Bock, 2011). This study was designed to investigate economic crisis developments bottom-up. 249 German citizens completed an online questionnaire measuring crisis developments implicitly as well as explicitly. These crisis dimensions were distinguished into rather positive or negative expectations on economic development, income stability, job security and health.

The first research question *"How are perceptions of the COVID-19 crisis reflected in explicit business model preferences?"* can be answered as follows: Binary logistic regressions revealed that the perception of economic development is of key importance, whereas perceptions in work place security and income stability also play a role in one of the two business model characteristics – income source and role of the entrepreneur. Perceptions in health issues as a main aspect of this COVID-19 crisis surprisingly did not show a significant influence. However, the most consistent finding of this part of the study is the result that in the perspective of the population, this crisis does not seem to make business models obsolete but rather enhances a reorientation to other business model types. Former successful business models which may be focussed in funding programs, are subject of considerable change. This finding suggests that programs stimulating entrepreneurial activities should not restrict themselves on specific business models, but rather broaden their scope in order to support the adaptation processes of entrepreneurial activities to changed conditions.

The second research question *"How are perceptions of the COVID-19 crisis reflected in implicit mental representation of entrepreneurship?"* can be answered as follows: The examination of mental representations of newly founded firms in contrast to mittelstand revealed that crisis perceptions correlate with the association strength and direction. Specifically, the crisis perceptions merely influence the conceptualization of entrepreneurship in terms of their environmental embeddedness and to a lesser extent on the actor characteristics. The network level remains unaffected by the crisis perceptions. Since crisis perception is identified to be the main driver for adaptations in mental representations, policy interventions should take perceptions more into account during crisis. Information campaigns aiming at stimulating entrepreneurship during crisis may especially address issues in terms of income stability.

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

Overall, the study uncovers the influence of crisis perceptions on explicit and implicit business models and puts forward a differentiated understanding of crises. Entrepreneurial activities are affected in its earliest stage – in pre-foundation attitudes and preferences for specific business models. As expected, entrepreneurial activities are shown to be highly reactive to environmental changes. Therefore, it is of key importance to keep track of these changes and their effects on entrepreneurial activities.

Nevertheless, there are some limitations of this study paving the way for further research. First, the gathered sample mainly consists of well-educated people who are surveyed once. To investigate how the perceptions of the crisis evolve in course of the crisis in a broader population could be made possible with a longitudinal approach which covers various types of respondents. Second, future research could differentiate the main income sources and role of entrepreneurs further to gain more detailed information about the crisis influences. Third, the methodology of reaction time tasks to measure implicit associations could be applied to other fields and may be investigated in its robustness. Especially a random assignment of terms being displayed on the left versus on the right side could overcome the bias that right handers were faster reacting to mittelstand, being displayed always on the right side in our analysis. Further, although only accessible by laptop or computer, a limiting factor of this study is that environments of participants in the study differed, as the study was accessible online.

6. Conclusion

Our analysis reveals new findings on entrepreneurship perception in times of crisis. First, we found that entrepreneurship is influenced by differing crisis dimensions from the beginning on of the crisis. However, the effects are manifold and also depend on individual characteristics, despite they do not significantly depend on the objective crisis circumstances reflected in work and leisure changes. Secondly, business models are affected by the crisis in terms of both, their main income source as well as in terms of the role of the entrepreneur. Based on preferences of the society, new business models are welcome rather than others becoming obsolete. Third, mental representations of entrepreneurship occur to depend on crisis perceptions. Overall, the importance of the cognitive level in structural change and crisis is confirmed once more. Implications of these findings concern opportunities in introducing new business models on the market to take advantage of the openness during crisis. Particularly entrepreneurs as fast and flexible actors on the market can stand out now.

28/39 #2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

References

Archibugi, D., Filippetti, A., & Frenz, M. (2013). Economic crisis and innovation: Is destruction prevailing over accumulation? *Research Policy*, *42*(2), 303–314. https://doi.org/10.1016/j.respol.2012.07.002

Bagnoli, C., & Redigolo, G. (2016). Business Model in IPO Prospectuses: Insights from Italian Innovation Companies. *Journal of Management and Governance*, *20*(2), 261–294.

Barge, S., & Gehlbach, H. (2012). Using the Theory of Satisficing to Evaluate the Quality of Survey Data. *Research in Higher Education*, *53*(2), 182–200. https://doi.org/10.1007/s11162-011-9251-2

Bernardo, A. E., & Welch, I. (2001). On the Evolution of Overconfidence and Entrepreneurs. *Journal of Economics & Management Strategy*, *10*(3), 301–330. https://doi.org/10.1111/j.1430-9134.2001.00301.x

Bertschek, I., & Erdsiek, D. (2020). SOLOSELBSTSTÄNDIGKEIT IN DER CORONA-KRISE. *ZEW-Kurzexpertise*, *20*(8).

Blanchflower, D. G. (2000). *Self-employment in OECD countries*. 35.

Blanchflower, D. G., Oswald, A., & Stutzer, A. (2001). Latent entrepreneurship across nations. *European Economic Review*, *45*(4–6), 680–691. https://doi.org/10.1016/S0014-2921(01)00137-4

Brandstätter, H. (2011). Personality aspects of entrepreneurship: A look at five meta-analyses. *Personality and Individual Differences*, *51*(3), 222–230. https://doi.org/10.1016/j.paid.2010.07.007

Burchell, B. (2011). A Temporal Comparison of the Effects of Unemployment and Job Insecurity on Wellbeing. *Sociological Research Online*, *16*(1), 66–78. https://doi.org/10.5153/sro.2277

Burt, S., Johansson, U., & Dawson, J. (2017). Dissecting Embeddedness in International Retailing. *Journal of Economic Geography*, *17*(3), 685–707.

Cepel, M., Gavurova, B., Dvorsky, J., & Belas, J. (2020). The impact of the COVID-19 crisis on the perception of business risk in the SME segment. *Journal of International Studies (2071-8330)*, *13*(3), 248–263.

Clemens, V. M., Dany-Knedlik, G., Michelsen, C., & Junker, S. (2020). Zweite Corona-Infektionswelle: Deutsche Wirtschaft wird zum Jahresende schrumpfen. . . *November*, 5.

Cucculelli, M., & Peruzzi, V. (2020). Post-crisis firm survival, business model changes, and learning: Evidence from the Italian manufacturing industry. *Small Business Economics*, *54*, 459–474.

Devetag, M. G. (1999). From Utilities to Mental Models: A Critical Survey on Decision Rules and Cognition in Consumer Choice. *Industrial and Corporate Change*, *8*(2), 289–351.

Dieter, H. (2020). Germany in the COVID-19 Crisis: Poster Child or Just Lucky? *Journal of Australian Political Economy*, *85*, 101–107.

Döring, N. & Bortz, J. (2016). Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften. *Springer*. 5.

Doloreux, D., & Porto Gomez, I. (2017). A review of (almost) 20 years of regional innovation systems research. *European Planning Studies*, *25*(3), 371–387. https://doi.org/10.1080/09654313.2016.1244516

Dong, D., Gozgor, G., Lu, Z., & Yan, C. (2021). Personal Consumption in the United States during the COVID-19 Crisis. *Applied Economics*, *53*(11), 1311–1316.

29/39 #2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

Downing, S. (2005). The Social Construction of Entrepreneurship: Narrative and Dramatic Processes in the Coproduction of Organizations and Identities. *Entrepreneurship Theory and Practice*, *29*(2), 185–204. https://doi.org/10.1111/j.1540-6520.2005.00076.x

Druilhe, C., & Garnsey, E. (2004). Do Academic Spin-Outs Differ and Does It Matter? *Journal of Technology Transfer*, *29*(3–4), 269–285.

Eisenhardt, K. M. (1989). Making fast strategic decisions in high-velocity environments. Academy of Management journal, 32(3), 543-576.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they?. Strategic management journal, 21(10- 11), 1105-1121.

Fernandez-Urbano, R., & Kulic, N. (2020). Requiem for a Dream: Perceived Economic Conditions and Subjective Well-Being in Times of Prosperity and Economic Crisis. *Social Indicators Research*, *151*(3), 793–813. https://doi.org/10.1007/s11205-020-02404-w

Filipovic, D., Kristo, M., & Podrug, N. (2018). Impact of Crisis Situations on Development of Business Continuity Management in Croatia. *Management*, *23*(1), 99–122.

Forbes, S. L. (2017). Post-disaster consumption: Analysis from the 2011 Christchurch earthquake. *The International Review of Retail, Distribution and Consumer Research*, *27*(1), 28–42. https://doi.org/10.1080/09593969.2016.1247010

Fragouli, E. (2016). Leading Business Organizations in the Global Era: Decision Making in Chaos and Crisis Situations. *East-West Journal of Economics and Business*, *19*(2), 73–89.

Fritsch, M., & Wyrwich, M. (2019). Regional trajectories of entrepreneurship, knowledge, and growth. International Studies in Entrepreneurship, 40.

Fuchs, E., & Flügge, G. (2014). Adult neuroplasticity: more than 40 years of research. Neural plasticity, 2014.

Gabler Wirtschaftslexikon (2018). Mittelstand. https://wirtschaftslexikon.gabler.de/definition/mittelstand-40165/version-263557. Last accessed on 13.04.2021.

Geishecker, I. (2012). Simultaneity bias in the analysis of perceived job insecurity and subjective well-being. *Economics Letters*, *116*(3), 319–321. https://doi.org/10.1016/j.econlet.2012.03.018

George, G., & Bock, A. J. (2011). The Business Model in Practice and its Implications for Entrepreneurship Research. *Entrepreneurship Theory and Practice*, *35*(1), 83–111. https://doi.org/10.1111/j.1540-6520.2010.00424.x

Giotopoulos, I., Kontolaimou, A., & Tsakanikas, A. (2017). Drivers of high-quality entrepreneurship: What changes did the crisis bring about? *Small Business Economics*, *48*(4), 913–930. https://doi.org/10.1007/s11187-016-9814-x

Glaesmer, H., Hoyer, J., Klotsche, J., & Herzberg, P. Y. (2008). Die deutsche version des Life-Orientation-Tests (LOT-R) zum dispositionellen Optimismus und Pessimismus. Zeitschrift für Gesundheitspsychologie, 16(1), 26-31.

Hanusch, H., & Pyka, A. (2006). Principles of Neo-Schumpeterian Economics. *Cambridge Journal of Economics*, *31*(2), 275–289. https://doi.org/10.1093/cje/bel018

Holland, J. H., Holyoak, K. J., Nisbett, R. E., & Thagard, P. (1986). Induction: Processes of inference, learning, and discovery. Cambridge, MA: MIT Press, 42(2–3), 356–384.

James, H. (2020). Seven Transformative Crises from European Revolution to Corona: Globalization and State Capacity. *Financial History Review*, *27*(2), 139–159.

30/39 #2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Jiménez, A., Palmero-Cámara, C., González-Santos, M. J., González-Bernal, J., & Jiménez-Eguizábal, J. A. (2015). The impact of educational levels on formal and informal entrepreneurship. *BRQ Business Research Quarterly*, *18*(3), 204–212. https://doi.org/10.1016/j.brq.2015.02.002

Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist, 58*(9), 697–720. https://doi.org/10.1037/0003-066X.58.9.697

Kamprath, M. (2015). Die Konstruktion von Geschäftsmodelltypologien – Das Beispiel der Diagnostik-Industrie. In E. Eppinger, B. Halecker, K. Hölzle, & M. Kamprath (Eds.), *Dienstleistungspotenziale und Geschäftsmodelle in der Personalisierten Medizin* (pp. 241–278). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-08403-5_8

Klapper, L., & Love, I. (2011). The impact of the financial crisis on new firm registration. *Economics Letters*, *113*(1), 1–4. https://doi.org/10.1016/j.econlet.2011.05.048

Knabe, A., & Rätzel, S. (2011). Quantifying the psychological costs of unemployment: The role of permanent income. *Applied Economics*, *43*(21), 2751–2763. https://doi.org/10.1080/00036840903373295

Krosnick, J. A. (1999). Survey Research. *Annual Review of Psychology*, *50*, 537–567.

Krueger, N., Liñán, F., & Nabi, G. (2013). Cultural values and entrepreneurship. *Entrepreneurship & Regional Development*, *25*(9–10), 703–707. https://doi.org/10.1080/08985626.2013.862961

Kuckertz, A., Brändle, L., Gaudig, A., Hinderer, S., Morales Reyes, C. A., Prochotta, A., Steinbrink, K. M., & Berger, E. S. C. (2020). Startups in times of crisis – A rapid response to the COVID-19 pandemic. *Journal of Business Venturing Insights*, *13*, e00169. https://doi.org/10.1016/j.jbvi.2020.e00169

Kuokkanen, A., Uusitalo, V., & Koistinen, K. (2019). A framework of disruptive sustainable innovation: An example of the Finnish food system. *Technology Analysis & Strategic Management*, *31*(7), 749–764. https://doi.org/10.1080/09537325.2018.1550254

Leiner, D. J. (2019). Too Fast, too Straight, too Weird: Non-Reactive Indicators for Meaningless Data in Internet Surveys. *Survey Research Methods*, 229-248 Pages. https://doi.org/10.18148/SRM/2019.V13I3.7403

Lévesque, M., & Minniti, M. (2006). The effect of aging on entrepreneurial behavior. *Journal of Business Venturing*, *21*(2), 177–194. https://doi.org/10.1016/j.jbusvent.2005.04.003

Lindquist, M. J., Sol, J., & Praag, M. V. (2015). *Why Do Entrepreneurial Parents Have Entrepreneurial Children?* 28.

Loxton, M., Truskett, R., Scarf, B., Sindone, L., Baldry, G., & Yinong Zhao. (2020). Consumer Behaviour during Crises: Preliminary Research on How Coronavirus Has Manifested Consumer Panic Buying, Herd Mentality, Changing Discretionary Spending and the Role of the Media in Influencing Behaviour. *Journal of Risk & Financial Management*, *13*(8), 1–21.

Luca, M. R., Cazan, A.-M., & Tomulescu, D. (2012). To be or not to be an entrepreneur... *Procedia - Social and Behavioral Sciences*, *33*, 173–177. https://doi.org/10.1016/j.sbspro.2012.01.106

Magretta, J. (2002). *Why Business Models Matter*. 14.

Malone, T. W., Weill, P., Lai, R. K., D'Urso, V. T., Herman, G., Apel, T. G., & Woerner, S. (2006). Do Some Business Models Perform Better than Others? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.920667

Mazurek, S. (2018). Strategic Orientations of the Network Business Models. *Transformations in Business and Economics*, *17*(2A), 410–425.

McCann, P., & Ortega-Argilés, R. (2016). Smart specialisation, entrepreneurship and SMEs: Issues and challenges for a results-oriented EU regional policy. *Small Business Economics*, *46*(4), 537–552. https://doi.org/10.1007/s11187-016-9707-z

Merkle, D. M., Langer, G. E., & Sussman, D. (2003). *Consumer Confidence: Measurement and Meaning*. 46.

Minniti, M., & Naudé, W. (2010). What Do We Know About The Patterns and Determinants of Female Entrepreneurship Across Countries? *The European Journal of Development Research*, *22*(3), 277–293. https://doi.org/10.1057/ejdr.2010.17

Neely, J. H. (1991). Semantic priming effects in visual word recognition: A selective review of current findings and theories. Basic processes in reading: Visual word recognition, 11(1), 264-336.

Obschonka, M., Schmitt-Rodermund, E., Silbereisen, R. K., Gosling, S. D., & Potter, J. (2013). The regional distribution and correlates of an entrepreneurship-prone personality profile in the United States, Germany, and the United Kingdom: A socioecological perspective. *Journal of Personality and Social Psychology*, *105*(1), 104–122. https://doi.org/10.1037/a0032275

Page, M. (2014). Business models as a basis for regulation of financial reporting. *Journal of Management & Governance*, *18*(3), 683–695. https://doi.org/10.1007/s10997-012-9239-0

Paniagua, J., & Sapena, J. (2015). The Effect of Systemic Banking Crises on Entrepreneurship. In M. Peris-Ortiz & J.-M. Sahut (Eds.), *New Challenges in Entrepreneurship and Finance* (pp. 195–207). Springer International Publishing. https://doi.org/10.1007/978-3-319-08888-4_14

Payne, B. K. (2001). Prejudice and perception: The role of automatic and controlled processes in misperceiving a weapon. *Journal of Personality and Social Psychology*, *81*(2), 181–192. https://doi.org/10.1037/0022-3514.81.2.181

Pfeifer, S., Oberman Peterka, S., & Stanic, M. (2017). Business Models of Micro Businesses: Empirical Evidence from Creative Industries. *Management*, *22*, 1–19.

Rammstedt, B., Kemper, C. J., Klein, M. C., Beierlein, C., & Kovaleva, A. (2017). A Short Scale for Assessing the Big Five Dimensions of Personality: 10 Item Big Five Inventory (BFI-10). *methods, data, analyses, Vol 7, No 2 (2013)*. https://doi.org/10.12758/mda.2013.013

Ratten, V. (2020). Coronavirus (COVID-19) and Entrepreneurship: Changing Life and Work Landscape. *Journal of Small Business and Entrepreneurship*, *32*(5), 503–516.

Reichardt, C. S. (2009). Quasi-experimental design. The SAGE handbook of quantitative methods in psychology, 46(71), 490-500.

Rokeach, M. (1973). The nature of human values. Free press.

Santos, S. C., Caetano, A., Spagnoli, P., Costa, S. F., & Neumeyer, X. (2017). Predictors of entrepreneurial activity before and during the European economic crisis. *International Entrepreneurship and Management Journal*, *13*(4), 1263–1288. https://doi.org/10.1007/s11365-017-0453-8

Schonlau, M., & Toepoel, V. (2015). Straightlining in Web survey panels over time. *Survey Research Methods*, *Vol 9*, 125-137 Pages. https://doi.org/10.18148/SRM/2015.V9I2.6128

32/39   #2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

Schumpeter, J. A. (1911). *Theorie der wirtschaftlichen Entwicklung: Eine Untersuchung über Unternehmergewinn, Kapital, Kredit, Zins und den Konjunkturzyklus*. Duncker & Humblot.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In Advances in experimental social psychology (Vol. 25, pp. 1-65). Academic Press.

Shepherd, D. A., & Patzelt, H. (2018). *Entrepreneurial Cognition*. Springer International Publishing. https://doi.org/10.1007/978-3-319-71782-1

Shim, J., Park, C., & Wilding, M. (2015). Identifying Policy Frames through Semantic Network Analysis: An Examination of Nuclear Energy Policy across Six Countries. *Policy Sciences*, *48*(1), 51–83.

Sirmon, D. G., Hitt, M. A., & Ireland, R. D. (2007). Managing firm resources in dynamic environments to create value: Looking inside the black box. Academy of management review, 32(1), 273-292.

Sloman, S. A. (2002). Two systems of reasoning. T. Giiovich, D. Griffin, D. Kahneman, eds. Heuristics and Biases: The Psychology of Intuitive Judgment. Cambridge University Press, New York, 379-397.

Stefan, G., Coca, O., Creanga, D. E., Mursa, G. C., & Mihai, C. (2020). The impact of the crisis generated by COVID-19 on the population concerns. A comparative study at the level of the European Union. *Transformations in Business & Economics*, *19*(2B), 703–719.

Stiglitz, J. E., Fitoussi, J.-P., & Durand, M. (2018). *Beyond GDP: Measuring What Counts for Economic and Social Performance*. OECD. https://doi.org/10.1787/9789264307292-en

Strong, M. (2013). Some Implications of Hayek's Cognitive Theory. *Critical Review*, *25*(3–4), 461–472.

Teece, D. J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, *43*(2–3), 172–194. https://doi.org/10.1016/j.lrp.2009.07.003

Vegetti, F., & Adascalitei, D. (2017). The impact of the economic crisis on latent and early entrepreneurship in Europe. *International Entrepreneurship and Management Journal*, *13*(4), 1289–1314. https://doi.org/10.1007/s11365-017-0456-5

Williams, N., & Vorley, T. (2015). The impact of institutional change on entrepreneurship in a crisis-hit economy: The case of Greece. *Entrepreneurship & Regional Development*, *27*(1–2), 28–49. https://doi.org/10.1080/08985626.2014.995723

Wittenbrink, B. (2007): Measuring attitudes through priming. Implicit measures of attitudes, 17-58.

World Bank. (2020). *The Global Economic Outlook During the COVID-19 Pandemic: A Changed World*. World Bank. https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world

Zhao, H., & Seibert, S. E. (2006). The Big Five personality dimensions and entrepreneurial status: A meta-analytical review. *Journal of Applied Psychology*, *91*(2), 259–271. https://doi.org/10.1037/0021-9010.91.2.259

#2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

Appendix

Table 7.1: Survey question regarding preferred business models
Source: Own survey question based on Malone et al. (2006)

Business models
Question type: Single choice
Instructions: Please imagine that you would like to start a business.
Question: For which type of products or services can you most likely imagine to be active as an entrepreneur?
• Physical products
• Financial products
• Intellectual property
• Human services
• Not specified
Question type: Single choice
Instructions: Please imagine that you would like to start a business.
Question: How do you imagine your role as an entrepreneur?
• You produce something/create something new (Creator)
• You refine and process existing products (Distributor)
• You use your skills, capital or property (Landlord)
• You trade with products (Broker)
• Not specified

#2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 7.2: Instruction for the reaction time task in the survey
Source: Own survey instruction

Associations
Question type: Reaction time task Instructions: Please press the "E" key with your left finger when you see the word "Neugründung" (newly founded firm). Please press the "I" button with your right finger "I" key when you see the word "Mittelstand" (mittelstand). Press the keys as fast as you can and try to make as few mistakes as possible. Two words will not ever appear at the same time. Between the words "Neugründung" and "Mittelstand", other words [see Table 3.1] will appear briefly, where you should not press any key. To start, press "E".

Table 7.3: Measurement of the crisis perceptions
Source: Own survey question

Crisis dimensions
Question type: Slider (very negative – very positive) Instructions: Please indicate how you feel about the events below. Please move the slider to the position that best matches your feeling. Question: I expect positive/negative impact in the next 12 months on... • my health. • the economic development in Germany. • my income and financial security. • my job security, or my job search

#2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 7.4: Descriptive statistics for control variables
Source: Own data collection

		N	Mean/Share	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Individual set of controls	Extraversion[23]	249	3.297	1.038	1	2.5	3.5	4	5
	Agreeableness[24]	249	3.384	0.834	1	3	3.5	4	5
	Conscientiousness[25]	249	3.742	0.806	1	3	3.5	4.5	5
	Neuroticism[26]	249	2.819	0.911	1	2	3	3.5	5
	Openness to experience[27]	249	3.554	0.993	1	3	3.5	4.5	5
	Optimism[28]	249	10.963	2.239	4	10	11	13	15
	Share of respondents holding an university degree	249	67.1%	0.471	0	0	1	1	1
	Age	249	38	16.319	20	26	30	50	85
	Share of women	247	57.1%	0.496	0	0	1	1	1
	Share of self-employed	249	8.8%	0.284	0	0	0	0	1
	Share of respondents knowing an entrepreneur	246	83.3%	0.373	0	1	1	1	1
	Share of respondents having experience with foundations	245	17.1%	0.378	0	0	0	0	1
	Share of respondents having work experience in small and new firms	243	48.6%	0.501	0	0	0	1	1
	Share of respondents watching TV shows about startups	248	25.4%	0.436	0	0	0	1	1
Corona set of controls	Share of respondents affected by short-time working	241	5.4%	0.226	0	0	0	0	1
	Share of respondents working from home	235	63.0%	0.484	0	0	1	1	1
	Share of respondents having children	244	24.6%	0.432	0	0	0	0	1
	Share of respondents satisfied with the government[29]	243	87.7%	0.330	0	1	1	1	1
	Change leisure time (1=no changes at all; 101=very much)	249	74.201	24.494	1	67	80	93	101
	Change work time (1=no changes at all; 101=very much)	227	56.493	31.311	1	25	67	81	101

[23] The value of 1 in the items of the personality profile indicate low proportion of this trait and a value of 5 indicates a high proportion of the respective trait.

[24] The value of 1 in the items of the personality profile indicate low proportion of this trait and a value of 5 indicates a high proportion of the respective trait.

[25] The value of 1 in the items of the personality profile indicate low proportion of this trait and a value of 5 indicates a high proportion of the respective trait.

[26] The value of 1 in the items of the personality profile indicate low proportion of this trait and a value of 5 indicates a high proportion of the respective trait.

[27] The value of 1 in the items of the personality profile indicate low proportion of this trait and a value of 5 indicates a high proportion of the respective trait.

[28] A higher value of 1 in this variable indicates the lowest possible degree of optimism and a value of 15 corresponds to the highest degree of optimism possible.

[29] A value of 0 indicates dissatisfaction with the governmental actions during the COVID-19 pandemic or a neutral opinion, a value of 1 corresponds to satisfaction with governmental actions.

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 7.5: Full binary logistic regression results for the main income source
Note: *p<0.1, **p<0.05, ***p<0.01 and standard errors displayed in parentheses
Source: Calculation based on own data collection

		Main income source					
		Dependent variables					
		Physical products			*Intellectual property*		
		(1)	(2)	(3)	(1)	(2)	(3)
Crisis Perception	Negative expectations - economic development	-1.067*** (0.390)	-1.264*** (0.448)	-1.291*** (0.495)	0.661* (0.386)	0.936** (0.453)	1.054** (0.485)
	Negative expectations – work place security	0.654** (0.318)	0.847** (0.384)	0.877* (0.456)	-0.511* (0.298)	-0.948** (0.369)	-0.797* (0.419)
	Negative expectations – income stability	0.353 (0.332)	0.107 (0.396)	-0.001 (0.469)	-0.324 (0.312)	0.169 (0.372)	0.170 (0.425)
	Negative expectations – health issues	-0.195 (0.329)	-0.381 (0.379)	-0.782* (0.459)	0.160 (0.309)	0.247 (0.363)	0.246 (0.420)
Individual set of controls	Extraversion		-0.155 (0.172)	-0.165 (0.207)		0.062 (0.167)	0.140 (0.196)
	Agreeableness		0.199 (0.205)	0.325 (0.237)		-0.205 (0.199)	-0.282 (0.233)
	Conscientiousness		0.501** (0.228)	0.568** (0.286)		0.131 (0.213)	-0.063 (0.254)
	Neuroticism		0.404* (0.211)	0.559** (0.251)		-0.506** (0.202)	-0.574** (0.234)
	Openness to experience		-0.032 (0.173)	-0.064 (0.189)		0.144 (0.167)	0.108 (0.184)
	Optimism		-0.158* (0.082)	-0.217** (0.096)		0.215*** (0.081)	0.297*** (0.093)
	Holding an university degree		-0.932*** (0.349)	-0.699 (0.429)		1.446*** (0.361)	1.260*** (0.439)
	Age		0.008 (0.012)	-0.013 (0.020)		-0.015 (0.012)	0.003 (0.019)
	Gender		-0.175 (0.370)	-0.158 (0.425)		0.174 (0.359)	0.232 (0.395)
	Self-employment		-0.570 (0.677)	-0.337 (0.779)		0.341 (0.652)	0.355 (0.717)
	Knowing an entrepreneur		-0.250 (0.501)	-0.315 (0.615)		0.302 (0.465)	0.259 (0.555)
	Experience with foundations		-0.221 (0.496)	0.143 (0.621)		0.651 (0.486)	0.501 (0.567)
	Work experience in small and new firms		0.248 (0.361)	0.275 (0.427)		-0.305 (0.345)	-0.312 (0.400)
	Watching TV shows about startups		0.895** (0.370)	1.107** (0.431)		-0.855** (0.378)	-0.953** (0.424)
Corona set of controls	Short-time working			-0.185 (0.870)			1.281 (0.989)
	Working from home			0.723 (0.493)			-0.086 (0.476)
	Children			-0.968 (0.738)			0.780 (0.705)
	Satisfaction with the government			-1.074* (0.606)			0.619 (0.599)
	Change leisure time			0.012 (0.009)			-0.011 (0.009)
	Change work time			-0.003 (0.007)			0.002 (0.006)
	Constant	-0.127 (0.353)	0.190 (2.264)	0.704 (3.777)	-0.261 (0.356)	-4.308** (2.170)	-7.898** (3.716)
Model fit	Observations	223	212	179	223	212	179
	Log Likelihood	-137.503	-114.372	-92.061	-150.570	-119.827	-99.673
	Akaike Inf. Crit.	285.006	266.745	234.122	311.139	277.655	249.347

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 7.6: Full binary logistic regression results for the role of the entrepreneur
Note: *p<0.1, **p<0.05, ***p<0.01 and standard errors displayed in parentheses
Source: Calculation based on own data collection

		Role of the entrepreneur						
		Dependent variables						
		Landlord			Creator			Distributor
		(1)	(2)	(3)	(1)	(2)	(3)	(1)
Crisis Perception	Negative expectations - economic development	0.784** (0.391)	0.937** (0.439)	1.052** (0.499)	-1.015*** (0.378)	-1.076** (0.426)	-1.125** (0.482)	-0.059 (0.675)
	Negative expectations – work place security	0.131 (0.303)	0.113 (0.347)	0.088 (0.404)	0.279 (0.306)	0.100 (0.346)	0.175 (0.396)	0.428 (0.600)
	Negative expectations – income stability	-0.692** (0.318)	-0.592 (0.362)	-0.535 (0.425)	0.781** (0.320)	1.162*** (0.379)	1.150*** (0.432)	-1.435** (0.690)
	Negative expectations – health issues	-0.312 (0.311)	-0.180 (0.346)	-0.263 (0.418)	0.121 (0.311)	-0.053 (0.351)	0.106 (0.402)	-0.428 (0.616)
Individual set of controls	Extraversion		0.172 (0.159)	0.274 (0.197)		-0.372** (0.168)	-0.474** (0.199)	0.062 (0.244)
	Agreeableness		-0.351* (0.196)	-0.370 (0.233)		0.291 (0.198)	0.332 (0.233)	0.442 (0.329)
	Conscientiousness		0.130 (0.207)	0.168 (0.258)		0.002 (0.205)	-0.054 (0.248)	-0.290 (0.336)
	Neuroticism		-0.401** (0.191)	-0.590** (0.235)		0.109 (0.194)	0.191 (0.230)	0.517 (0.328)
	Openness to experience		-0.048 (0.162)	-0.028 (0.187)		0.342** (0.166)	0.391** (0.185)	-0.369 (0.283)
	Optimism		0.148* (0.078)	0.168* (0.088)		-0.058 (0.077)	-0.064 (0.087)	-0.178 (0.127)
	Holding an university degree		0.796** (0.340)	0.718* (0.435)		0.449 (0.337)	0.447 (0.419)	-1.022** (0.500)
	Age		-0.021* (0.012)	-0.003 (0.020)		0.004 (0.011)	-0.001 (0.018)	0.028* (0.017)
	Gender		0.417 (0.344)	0.479 (0.395)		-0.322 (0.349)	-0.354 (0.396)	0.247 (0.577)
	Self-employment		0.382 (0.609)	0.257 (0.688)		0.533 (0.688)	0.356 (0.767)	-1.002 (1.047)
	Knowing an entrepreneur		0.100 (0.435)	0.465 (0.538)		0.070 (0.434)	-0.069 (0.527)	0.050 (0.736)
	Experience with foundations		-0.220 (0.472)	-0.393 (0.583)		1.545*** (0.551)	1.487** (0.638)	-2.055*** (0.702)
	Work experience in small and new firms		-0.401 (0.331)	-0.683* (0.398)		0.396 (0.337)	0.721* (0.399)	-0.336 (0.547)
	Watching TV shows about startups		-0.217 (0.349)	-0.555 (0.401)		-0.021 (0.353)	0.195 (0.400)	0.050 (0.572)
Corona set of controls	Short-time working			-0.984 (0.847)			1.374 (0.964)	
	Working from home			-0.519 (0.457)			0.212 (0.445)	
	Children			1.008 (0.694)			-0.519 (0.650)	
	Satisfaction with the government			1.105* (0.629)			-0.507 (0.561)	
	Change leisure time			-0.016* (0.008)			0.015* (0.008)	
	Change work time			0.008 (0.006)			-0.013** (0.006)	
	Constant	-0.674* (0.356)	-1.380 (2.072)	-1.159 (3.383)	-0.067 (0.335)	-4.633** (2.220)	-6.218* (3.503)	4.075 (3.584)
Model fit	Observations	230	221	188	230	221	188	221
	Log Likelihood	-150.575	-130.467	-102.052	-147.348	-128.250	-104.152	-61.318
	Akaike Inf. Crit.	311.150	298.933	254.103	304.696	294.500	258.305	160.635

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and Preferences of Business Models during the COVID-19 Pandemic

Table 7.7: ANCOVA results
Source: Calculation based on own data collection
Note: The probability value (F-value) is displayed

		East Germany	Regression	Progress	Experience	Experience	Role model	East Germany	Insecurity	Regression	Demand	East Germany	Progress
	Constant	**0.03**	**0.00**	**0.01**	**0.01**	**0.02**	**0.10**	**0.00**	0.15	**0.00**	0.12	**0.01**	**0.01**
Crisis perceptions	Economic development	**0.02**	**0.16**	0.19									
	Work place security				**0.06**								
	Income stability					**0.07**	**0.10**	**0.20**	0.44	**0.14**			
	Health issues										**0.02**	0.37	**0.01**
Individual control variables	Extraversion	0.34	0.50	0.78	0.29	0.33	0.12	0.37	0.52	0.61	0.40	0.34	0.52
	Agreeableness	0.78	0.84	0.49	0.57	0.55	0.55	0.82	0.37	0.65	0.20	0.75	0.35
	Conscientiousness	0.17	0.60	0.47	0.73	0.98	0.16	0.30	0.18	0.51	0.98	0.22	0.30
	Neuroticism	0.72	0.82	0.55	0.63	0.82	0.18	0.35	0.54	0.72	0.78	0.35	0.76
	Openness to experience	**0.04**	0.48	0.39	0.79	0.76	0.98	**0.06**	0.99	0.47	0.61	**0.08**	0.30
	Optimism	0.99	0.57	0.47	0.63	0.73	0.70	0.80	0.19	0.72	**0.06**	0.85	0.45
	Holding an university degree	0.20	**0.08**	0.32	0.72	0.57	0.58	0.24	0.26	0.14	0.36	0.25	042
	Age	0.39	0.90	0.56	0.08	**0.09**	0.45	0.31	0.79	0.77	0.83	0.31	0.42
	Gender	0.28	0.78	0.54	0.88	0.91	0.47	0.30	0.95	0.73	0.51	0.28	0.56
	Self-employed	0.85	0.81	0.12	0.14	0.11	0.85	0.82	0.95	0.95	0.83	0.80	**0.08**
	Knowing an entrepreneur	0.45	0.63	**0.10**	0.23	0.25	0.73	0.48	0.78	0.53	0.22	0.55	0.20
	Experience with foundations	0.82	0.44	**0.05**	0.15	0.18	0.14	0.74	0.99	0.39	0.96	0.79	**0.05**
	Work experience in small and new firms	0.39	0.38	**0.07**	0.90	0.92	0.56	0.51	**0.03**	0.27	0.37	0.59	0.13
	Watching TV shows about startups	0.47	**0.09**	0.62	0.29	0.40	0.14	0.47	0.36	0.14	0.22	0.38	0.71
Corona control variables	Short-time working	0.97	0.14	**0.07**	0.73	0.83	0.16	0.62	0.42	0.23	0.47	0.80	**0.04**
	Working from home	0.22	0.80	0.48	0.35	0.24	0.96	0.37	0.90	0.68	0.55	0.34	0.26
	Children	0.88	0.80	0.47	0.21	0.14	0.75	0.57	0.12	0.97	0.67	0.59	0.72
	Satisfaction with government	0.19	0.38	0.11	0.84	0.81	0.45	0.18	0.92	0.21	0.19	0.21	**0.09**
	Change leisure time	0.72	0.77	0.46	0.64	0.67	0.97	0.71	0.88	0.75	0.60	0.71	0.34
	Change work time	0.37	0.33	0.14	0.11	**0.10**	0.28	0.25	0.86	0.22	0.92	0.25	**0.05**

39/39

#2105 Bremen Papers on Economics & Innovation

Early Crisis Effects on Entrepreneurship Perception: Mental Representations of Entrepreneurship and
Preferences of Business Models during the COVID-19 Pandemic

Imprint

Bremen Papers on Economics & Innovation