Are the Pandemic and Innovation Twins? Perceived Financial Obstacles, Innovations, and Entrepreneurial Success

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Abstract

We investigate how pre-crisis obstacles of enterprises determine the impact of the COVID-19 pandemic in selected European countries. Moreover, we examine the effects of the coping strategies, in particular of innovation, and digitalization, to respond to the pandemic challenge. Thus, we try to contribute to a more granular understanding of the dynamics that play a pivotal role in managing a crisis. The analysis uses survey data of six European countries from the Enterprise Surveys carried out in 2018 and 2019 and their follow-up survey during the COVID-19 crisis in 2020. Overall, the results indicate that companies that had already previously (before the crisis) reported perceived difficulties with access to financial resources have been more severely constrained during the pandemic. Moreover, companies that adopt innovative approaches during the pandemic perform better. Finally, digitalization strategies are not significantly related to entrepreneurial success. Our analysis reveals the importance of strategic planning of companies and the provision of an environment conducive to innovation by policymakers.

1. Introduction

The economic development has generally been characterized by business cycles. While economic policy has always been trying to reduce their impact, they are often believed to contribute to

long-term prosperity. The Schumpeterian notice of creative destruction is one of the most popular examples. The current pandemic brought these questions back to the economic policy discussion with unprecedented urgency. The pandemic, arising due to the novel SARS-CoV-2 coronavirus, has quickly spread throughout the whole world, creating a public health emergency and economic crisis that impacts all countries to a varying degree (Ferguson et al., 2020). To control the spread of COVID-19, governments around the world have implemented strict lockdown measures, shutting down large parts of the economy (Acemoglu et al., 2020). Not only for this reason, the disease has triggered a severe economic crisis with a halt in production, consumption slumps, and rising uncertainty all over the world. The lockdown measures that cause an immediate economic shock were introduced almost simultaneously across European countries. However, they differed in severity (Juergensen et al., 2020).

In this sense, the pandemic crisis can be seen as the often-postulated black swan event, an unforeseeable event with severe economic consequences. Firms are generally not able to prepare for such an event because of its unpredictability and its sudden appearance. This, however, offers a unique opportunity to investigate determinants that influence how severe a firm is hit by the shock. In our analysis we focus on Small and Medium-sized Enterprises (SME) as these are the backbone of (Eastern) European economies and particularly afflicted by the Pandemic crisis (Etemad, 2020, Bartik et. al., 2020).

The current paper investigates determinants of European SMEs' performance and how these influence the company's ability to cope with the current coronavirus pandemic. Overall, the COVID-19 pandemic will have an immense influence on enterprises worldwide via various channels (Kraus et al., 2020; Bartik et al., 2020). Essentially, it impacts employment, investment, and growth prospects which could lead to deep structural changes in the way how companies operate as well as the way they consume (Baldwin & Weder di Mauro, 2020; Barrero et al., 2020; Barua, 20210). In particular, restructuring toward ecologically sustainable logistics will be significant and at the same time challenging (Maggazzino et. al., 2021). We focus especially on determinants that are not yet investigated to a sufficient degree, namely the previously perceived obstacles regarding the access to financial resources, the degree of innovation as well as the progress of the firm's digitalization during the crisis. Especially the access to finance is seen as a crucial determinant for a firm's success (see, for instance: Fidrmuc et al., 2018, Andrieu et al., 2018).

Our analysis intends to contribute to a better understanding of how the history of an enterprise and its coping approach during a crisis will determine the effect a crisis will have on the company. For this purpose, we use data of the World Bank Enterprise surveys (ES) and the respective Covid-19 follow-up surveys from six European countries. We investigate the effect of formerly indicated barriers in the access to financing, an innovational approach and digitalization efforts on two indicators for firms' performance. With the performance indicators, we cover two dimensions using the sales difference during the crisis and the indicated chance of falling into arrears of outstanding liabilities as a consequence.

Therefore, the contribution of this work to the existing literature is conducted in the following areas. First, we can show that perceived obstacles with access to financing in the past have a negative impact on the enterprise during the COVID-19 crisis. Second, our results underline how an innovative strategy during the pandemic can reduce the severity the COVID-19 crisis exhibits on the firm. Third, the paper provides insights into uncovering differences and commonalities between a sample of heterogeneous European countries. This paper further contributes to knowledge in the field of strategic decision-making of private sector firms during the COVID-19

crisis. It highlights the necessity of strategy changes for short-term adaption as well as long-term firm positioning and survival. Finally, the paper further contributes to research dealing with firms in the European private sector and offers fruitful insights for policymakers to support SMEs in pre-crisis environments.

The paper is organized as follows: after the introduction, the literature and the hypotheses are introduced in the next section. The third part provides an overview of the data, including descriptive statistics, a presentation of the methodology, followed by the empirical results which are backed up by various robustness checks. Finally, the limitations and the results are discussed in the last section.

2. Literature review

2.1. The impact of COVID-19 on the economy, industries and enterprises

Not only did the pandemic present an unprecedented public health emergency, but also posed a serious challenge for economic developments across different economies. As experienced in the past, the impact of Nonpharmaceutical Interventions (NPIs), i.e. quarantining and social distance measures, etc., imposed due to previous epidemics have proven to create an enormous impact on the local economy. The negative after-effects of a global pandemic cause companies, entire industries and even whole countries to suffer. (Lee et al., 2012; Anderson et al., 2020).

The reason for that is the occurrence of shocks on both the supply and the demand side of the economy. Shocks on the supply side during the COVID-19 pandemic occur, for instance, due to the closure of non-essential sectors as well as obstacles preventing the labor force to provide their services due to reasons such as travel bans, illnesses and deaths. Other reasons include the increased time necessary for childcare due to school closures (Del Rio-Chanona, et al., 2020). Baldwin and Weder di Mauro (2020) state that closures and travel bans directly decrease productivity. Additionally, the extent to which remote work is possible differs highly across different industries and sectors. This, in particular causes severe effects on the supply side (Papanikolaou & Schmidt, 2020). Furthermore, the NPIs show a similar employment shock. The fall in productivity and the fact that enterprises are running at partial capacity will cause supply chain disruptions (Baldwin & Weder di Mauro, 2020). Regarding problems with European supply chains, Baldwin and Weder di Mauro (2020) point out that supply chain contagion across European countries is highly likely to be the primary source of economic contagion. As seen in the past, logistical problems during pandemics are likely to throw companies off track (Simchi-Levi et al., 2014).

Considering the demand shocks, they can arise due to the following main reasons. On the one hand, the shocks can be traced back to the previously mentioned lockdown measures. As the NPIs restrict the opportunity to buy goods and services, their demand recedes. On the other hand, the psychological effects of a crisis include low consumer and firm confidence resulting in lower spending. Both consumers and firms delay their purchases, along with their investments as derived from previous crises (Baldwin & Weder di Mauro, 2020). Hence, epidemics and pandemics have an enormous impact on consumer and firm behavior. Demand notably decreases for non-essential goods and services (Juergensen et al., 2020).

The supply and demand-side shocks vary substantially across the many existing industries (del Rio-Chanona et al., 2020; Juergensen et al., 2020; Bartik et al., 2020; OECD, 2020a, Kapounek et

al., 2017). According to Kraus et al. (2020) and Williams and Kayaogul (2020), the COVID-19 crisis has a severe, negative effect on most industries. The restrictions implemented by the governments across Europe are leading to an extreme decrease in tourism revenues with devastating effects on related businesses. The hospitality industry i.e., hotels and restaurants had to face closure. For restaurants, only delivery services and take-aways were permitted. The closure of all leisure industry activities in culture and sports is an enormous issue for the whole industry (Kraus et al., 2020; OECD, 2020a). Del Rio-Chanona et al. (2020) express a similar viewpoint on the leisure and hospitality industry in the United States, highlighting that these industries experience enormously large shocks on both the supply and the demand side, with the demand shock being the dominant one. Bartik et al. (2020) find, that the impact varies across industries. They observe that for the retail, leisure, employment, hospitality industries, personal as well as food services, declines are much higher than for the finance, professional services, and real-estate industries. They argue that this can be traced back to the fact that in some industries working remotely is more likely than in others (Bartik et. al., 2020).

The impact of the COVID-19 pandemic on the manufacturing industry has been immense, especially in China, the United States, and Germany (Cai & Luo, 2020). The findings presented by del Rio-Chanona et al. (2020) highlight that the manufacturing industry is likely to suffer from immense immediate supply-side shocks, related to the shocks on the demand side. Their paper shows that employees with higher wages are affected less by supply and demand-side shocks while workers with lower wages are more vulnerable. This is consistent with the findings of Bartik et al. (2020), who emphasized the fact that working remotely is more common in higher-paid occupations. Stephany et al. (2020) identified that supply chain, as well as production problems, are specifically relevant for the retail and the manufacturing industry. This corresponds partly with Lu et al.'s (2020) findings. Lu et al.'s (2020) work provides insights on the impact of the pandemic on Small and Medium-Sized Enterprises (SMEs) and investigates the impacts on several industries in Sichuan, China. Here, the findings show that the manufacturing industry is most affected by issues connected to supply chain management. In contrast, the retail industry is predominantly constrained by the urgency to start or expand online services, whereas the hospitality industry is concerned with cash flows. Decreases in revenue and production as well as not being able to resume work, were issues that affected all SMEs (Lu et al., 2020). This also aligns with the expectations of Baldwin and Weder di Mauro (2020) who argue that the manufacturing industry will get hit much harder than other industries.

Even though the COVID-19 pandemic hits both large enterprises and SMEs, several analyses validate that the impact on SMEs is more severe (Bartik et al., 2020; Anan et al., 2020; OECD, 2020b). Reasons, why SMEs are more vulnerable to the coronavirus crisis, include the fact that these enterprises are overrepresented in industries that were faced direct restrictions, such as tourism-, retail-, and the mobility sector. Another reason is that in comparison to large enterprises, SMEs are less solvent and are influenced to a greater extent by human resources and capital underutilization. Consequently, large companies are less affected by the disruption of global and national supply chains (Bartik et al., 2020; Barua, 2021; OECD, 2020b). Additionally, Beglaryan and Shakhmuradyan (2020) state that in comparison with large firms, SMEs suffer from lower levels of productivity and lower-wage levels, which ultimately increases their vulnerability to external shocks.

Bartik et al., (2020) shed light on the financial fragility of small businesses, mainly operating in the retail sector of the United States. They surveyed approximately 5.800 small-sized companies, implying that most of the enterprises were not well-positioned in terms of liquidity. Thus, they are more likely to file for bankruptcy.

2.2. Hypotheses

Several studies reveal that the lack of access to financing has a negative impact on the output in terms of firm growth, strategic investment, and productivity (Nguimkeu, 2016; Osma et al., 2018, Janků and Kučerová, 2018). Osma et al.'s (2018) findings underline that pressure concerning finance poses a threat to strategic investment decisions in general. Westergård-Nielsen and Neamtu (2012) point out, that theoretically, firms that have better access to financing are less constrained by financial difficulties. Overall, the negative influences regarding barriers to access to financing lead to the assumption that firms reporting issues with access to financing at a pre-crisis period must be hit harder in times of the crisis. Therefore, the first hypothesis can be stated as follows:

H_1: Firms that report obstacles with access to financing pre-crisis have a higher probability of experiencing financial distress during the COVID-19 crisis.

To some extent, almost every enterprise has been influenced by the worldwide pandemic and responded by introducing different strategies (Kraus et al., 2020). Kraus et al. (2020) underline how firms of all sizes across various industries adjust their business approaches due to the changing situation. Changes in the environment are in fact a vital inducement for changes within a business itself (Clauß et al., 2021). A reason for this is that firms must adapt to changing needs in order to survive a crisis. Another reason is that a changing environment may lead the firms' managers to rethink their traditional business model and allow the undertaking of a strategic business plan (Kraus et al., 2020). As pointed out by Wenzel et al. (2020), even though crises come hand in hand with devastating shocks to economies, they create an opportunity for a strategic renewal. Reymen et al. (2015) show that rising uncertainty in one's environment, for example during crises, promotes the expansion of business activities and broadens the business' horizon towards new alternatives. Looking at past crises, it can be observed that those companies who maintained a focus on innovation coped better with the crisis as can be observed by their superior business performance post-crisis. During the 2008 financial crisis, those companies that put innovation at the center of their attention were able to outperform the market average and emerge stronger from the crisis (Archibugi et al., 2013a). They state that, even though the investments of firms in innovation decreased in the short run, there were a handful of firms that invested in innovation regardless of the unfavorable economic environment. Finally, Li-Ying and Nell (2020) consider innovation and entrepreneurship to be the strongest opportunity to reduce the negative impact of the COVID-19 crisis on businesses.

This ultimately builds on the core statement of Schumpeter's theory of economic development, which concentrates on the so-called "creative destruction". Thereby, he introduces a new theory of production factors: through capitalistic competition, old structures which cannot compete are replaced and eventually destroyed. Hence, innovation is necessary so that creative destruction and re-organization can take place. The trigger for creative destruction is innovation driven by businesses with the aim of market survival (Schumpeter, 1987). All in all, creative destruction can be considered to be a core mechanism of development in a capitalistic economy. Nonetheless, creative destruction diminishes inefficient and unproductive processes and forces businesses to adjust to changing environments (Caballero & Hammour, 2000).

In conclusion, several studies established that innovation can be used as an efficient and effective response to crises (see Brinckmann et al., 2019; Lee & Makhija, 2009). Therefore, the second hypothesis can be stated as follows:

H₂: Firms that follow an innovational approach cope better with the COVID-19 crisis.

It is considered vital for companies to respond as quickly as possible to crises (Bundy and Pfarrer, 2014; Williams, 2012). Furthermore, it can be relevant for the decision-makers within a firm to analyze how companies should react (Cui et al., 2016). During this highly unpredictable time, firms must be capable of quick adaptation to changes in the environment and constantly improve their strategy as a whole. Old structures must be replaced to reduce unproductive processes (Schumpeter, 1987). There is no single facet of the economy that seems to be unaffected by the emergence of new digital technologies. In the face of this challenge, enterprises must ensure business continuity by accelerating their digitalization efforts. (Soto-Acosta, 2020). Hence, digital transformation can be seen as a modern form of creative destruction.

The crisis is expected to accelerate the pace of the general digital transformation (Soto-Acosta, 2020). Besides, Guo et al. (2020) emphasize that in order to battle the crisis, Chinese SMEs have taken up numerous digital technologies. Overall, their study analyses the digitalization approach of SMEs and their coping strategy in times of the COVID-19 pandemic. Their findings show that digitalization has helped SMEs cope with the crisis more effectively through the utilization of their dynamic competencies. Additionally, they highlight that business performance can be improved through the utilization of digitalization.

Kraus et al. (2020) underline that cultural change comes hand in hand with the crisis. This cultural change leads to increasing pressure towards businesses to digitize. They observed that the COVID-19 pandemic contributes to a tentative digitalization. It highlights in particular how the crisis forces strategic changes in business models and thereby calls for a "culture of digitalization". Overall, this allows enterprises to identify new strategic opportunities. Finally, we assume that the adoption of digital technologies in the early stages, together with the allocation of resources towards digital initiatives, correlates with value creation. We use increased online activity as a proxy for the digitalization strategy as, especially for SMEs, this comes along with significant investments in digital infrastructure. Therefore, our third hypothesis can be formulated as follows:

H₃: Firms that pursue a digitalization strategy cope better with the COVID-19 crisis.

3. Empirical analysis

3.1. Data and methodology

For the analysis, twelve data sets from 6 different European countries (Greece, Italy, Portugal, Poland, Romania, and Slovenia), provided by the World Bank have been used. For each of the countries, we use two different data sets. On the one hand, we use the Enterprise surveys conducted between 2018 and 2019, before the pandemic occurred. On the other hand, we also use the Covid-19 follow-up surveys conducted in 2020. Overall, the twelve data sets are merged to build a panel of enterprise data so that the changes in the business environment can be traced.

The Enterprise Surveys use three levels of stratification: industry, firm size and country. Of these, we chose to incorporate industry and firm size as stratifications for our data set. For the industry stratification, we use three levels: manufacturing, other services and retail. The manufacturing industry serves as the base category as it represents the largest part of our sample. These are important controls as the industry has a potentially significant influence on how the firm coped with the crisis. The size stratification from the ES is also adopted and defined as follows: Size - small (5-19 employees), Size - large (100+ employees) and Size – medium (20-99 employees), which serves as base category in our estimations. We control the effects of the firm size, as smaller firms are usually more constrained in terms of access to financing than larger firms (López-Garcia & Sogorb-Mira, 2008). We further include tax rates as a perceived obstacle into our analysis, as it is known that (foreign direct) investment flows are predominantly influenced by the tax rates (for instance: Cassou, 1997), which can directly influence the financial survival of the company. Similarly, we included the perceived obstacles with business licensing as a further control variable as it also presents an adverse bureaucratic influence. The variable formation can be found in Table A.1 in the Appendix, while descriptive statistics are presented in Table 1.

The data suffers from survey non-response, due to enterprises refusing to take the survey, as well as item non-response, which is due to the participants refusing to answer specific questions asked in the survey. For our analysis we include only full datasets.

For conducting our estimations, we chose to use a probit regression model, as our dependent variable is in binary form. Thus, the following regression equation is set up:

$$P(Outstanding\ Liabilities_i = 1 \mid X) = \beta_0 + \beta_1 Obstacle\ Finance_{i,t-1} + \beta_2 New\ Product_{i,t} + \beta_3 Online\ Activity_{i,t} + \sum_{k=1}^{m} \gamma_k z_{ki,t} + \alpha_i + e_{i,t}$$

(1)

Table 1 - Descriptive statistics

Variables	N	Mean	Min	Max
Small	2803	0.43	0	1
Medium	2803	0.35	0	1
Large	2803	0.22	0	1
Greece	2803	0.18	0	1
Italy	2803	0.13	0	1
Poland	2803	0.25	0	1
Portugal	2803	0.24	0	1
Romania	2803	0.13	0	1
Slovenia	2803	0.07	0	1
Manufacturing	2803	0.67	0	1
Other Services	2803	0.21	0	1
Retail	2803	0.13	0	1
Obstacle Tax rates	2803	0.58	0	1
Obstacle Business Licensing	2803	0.19	0	1
Obstacle Finance	2803	0.18	0	1
New Product	2803	0.21	0	1
Online Activity	2803	0.17	0	1
Outstanding Liabilities	2803	0.23	0	1
Sales Change (continuous variable)	1865	-21.3	-100	250

Outstanding Liabilities is a binary variable, indicating whether the firm is about to fall into arrears of outstanding liabilities (value = 1) or not (value = 0). *Obstacle Finance* is a constructed binary variable, indicating whether the firm i reported a major perceived obstacle with access to financing in period *t-1*. In the original dataset, this variable was coded into 5 categories, which we collapsed both variables indicating the highest degree of constrained access to financing into the value 1 and the other ones into a value of 0. *New Product* is a binary variable which takes on the value 1 if the Firm i introduced a new product or service during the pandemic crisis in time t and 0 otherwise. *Online Activity* is also a binary variable, taking on the value 1 if the firm i increased its online activities during the crisis in time t and 0 otherwise. It serves as a proxy for the digitalization strategy, as usually an increase in online activity is associated with investments in the digital infrastructure. z is a vector of control variables, including the firm's size, industrial sector and whether tax rates and business licensing were perceived as obstacles before the crisis. We further include country-fixed effects α as an additional control, with the largest economy (Italy) serving as the base category.

For our probit regressions we report clustered standard errors to combat heteroscedasticity among the countries as it can be assumed that the random process of the residuals differs between countries. We further report Average Marginal Effects (AMEs) presenting a unified and intuitive way of illustrating a relationship that is estimated with binary regressions.

We complement our probit estimations with a second set of multiple linear regressions, changing the dependent variable to *Sales Change*. This variable indicates the change in sales in percent from 2019 to 2020, representing the demand-side impacts of the pandemic. Additionally, this allows us to set our conclusions on a broader base. The resulting equation takes the following form, using the same independent variables as the first set of regressions:

$$Sales\ Change_{i,t} = \beta_0 + \beta_1 Obstacle\ Finance_{i,t-1} + \beta_2 New\ Product_{i,t} + \beta_3 Online\ Activity_{i,t} + \sum_{k=1}^{m} \gamma_k z_{ki} + \alpha_i + e_{i,t},$$

(2)

We report heteroscedasticity-robust sandwich standard errors in this case.

3.2. Results

Table 2 shows the results of the probit estimation. We append the variables of interest as well as the control variables one after another. We can see from the results that firms which reported obstacles with access to financing pre-crisis have a 11-12% higher probability of falling into arrears of outstanding liabilities. This result remains nearly constant and highly significant across all model specifications. Further, we observe that the introduction of a new product decreases the probability of falling into arrears of outstanding liabilities in the specifications (3) to (6) by about 5-6% with acceptable significance levels. Finally, the third independent variable of interest, namely the online activity, shows no significant effect. Therefore, the probability of expecting to fall into arrears of outstanding liabilities in the next 6 months does not depend significantly on whether a firm has initiated or increased its online business activity during the crisis.

Table 2 - Probit estimation results for outstanding liabilities

| | Outstanding Liabilities | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Obstacle Finance	0.123***	0.124***	0.123***	0.116***	0.117***	0.115***
	(0.025)	(0.024)	(0.026)	(0.023)	(0.022)	(0.030)
New Product		-0.054	-0.066**	-0.052*	-0.051*	-0.052*
		(0.043)	(0.033)	(0.028)	(0.029)	(0.029)
Online Activity			0.044	0.056	0.056	0.055
			(0.055)	(0.049)	(0.044)	(0.043)
Size - Small				0.092**	0.089*	0.088*
				(0.045)	(0.047)	(0.046)
Size - Large				-0.098***	-0.098***	-0.096***
				(0.022)	(0.022)	(0.022)
Retail					-0.002	-0.003
					(0.044)	(0.044)
Other Services					0.027	0.028
					(0.021)	(0.02)
Obstacle Tax						0.033**
						(0.015)
Obstacle Business						-0.021
						(0.025)
Observations	2,803	2,803	2,803	2,803	2,803	2,803
Log Likelihood	-1,464.95	-1,460.83	-1,458.99	-1,414.22	-1,413.20	-1,411.37
AIC	2,943.90	2,937.65	2,935.99	2,850.43	2,852.39	2,852.75

Note: Robust standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01. Country fixed effects are not reported.

In the specifications (4) to (6) we appended our control variables to the estimation stepwise. These controls do not change the outcome for the independent variables of interest but offer additional, important insights. We can see from the estimations, that firm size is an important determinant of the coping approach of a firm. While small firms have a significantly increased probability (about 9% higher) of falling into arrears of outstanding liabilities, large firms have a significantly decreased probability of about 9-10%. Considering the other controls, there are no significant effects present, except for small negative influences for firms perceiving the tax rates as an obstacle pre-crisis. When taking into account the AIC, the specification (4) can be taken as a parsimonious model. In Table 3 we present the results for the stepwise estimations for the sales difference between 2019 and 2020. It should be noted that the sign of the regression coefficient must be understood inversely in contrast to the probit analysis. The reason for this is that the sales difference as an indicator is negatively correlated with business impairment, while outstanding liabilities as an indicator itself is positively correlated with business impairment.

We observe that firms that reported obstacles with access to financing generally exhibit a negative parameter value for the percentage change in sales. However, when appending the control variables, this effect becomes insignificant. The introduction of a new product features positive and highly significant parameter values for the change in sales across all estimations. Finally, an increase in online business activity also exhibits positive parameter values. However, the parameter is only significant in the specification (3). The significance vanishes when appending the control variables.

Table 3 - Multiple linear regression results for sales change

| | Sales Change | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Obstacle Finance	-3.139**	-3.096*	-3.080*	-2.584	-3.061*	-1.719
	(1.599)	(1.589)	(1.588)	(1.588)	(1.582)	(1.693)
New Product		5.665***	4.770***	3.910**	3.646**	3.838**
		(1.487)	(1.577)	(1.574)	(1.566)	(1.558)
Online Activity			2.746*	1.988	2.303	2.353
			(1.587)	(1.566)	(1.587)	(1.586)
Size - Small				-7.094***	-6.102***	-5.737***
				(1.441)	(1.468)	(1.481)
Size - Large				3.646**	3.349**	3.265**
				(1.575)	(1.552)	(1.552)
Retail					-1.948	-1.836
					(1.811)	(1.798)
Other Services					-8.928***	-9.009***
					(1.731)	(1.733)
Obstacle Tax						-3.610**
						(1.493)
Obstacle Business						-1.959
						(1.674)
Constant	-24.238***	-24.776***	-25.032***	-22.934***	-21.477***	-20.413***
	(1.557)	(1.564)	(1.566)	(1.806)	(1.798)	(1.83)
Observations	1,865	1,865	1,865	1,865	1,865	1,865
Adjusted R²	0.023	0.03	0.031	0.056	0.072	0.075
F Statistic	8.360***	9.281***	8.461***	12.023***	12.968***	11.826***

Note: Robust standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01. Country and sector fixed effects are not reported.

Considering the control variables, the firms' size is also a crucial determinant for success during the crisis in these estimations. We observe that smaller firms exhibit significant and large negative parameter values while large firms exhibit positive ones. Furthermore, we note that the sector also plays a role in the change in sales, where especially the services sector seems afflicted. This is in line with the presented literature. Finally, we can observe that firms which perceived tax rates as an obstacle before the crisis exhibit significant negative parameter values, confirming the results of our probit estimations.

Table 4 - Logistic regression results for outstanding liabilities

	(1)	(2)	(3)	(4)	(5)	(6)
			Outstanding Liabilities			
Obstacle Finance	0.122***	0.123***	0.123***	0.115***	0.115***	0.114***
	(0.025)	(0.023)	(0.025)	(0.022)	(0.021)	(0.028)
New Product		-0.056	-0.067**	-0.054*	-0.053*	-0.054*
		(0.041)	(0.032)	(0.028)	(0.028)	(0.028)
Online Activity			0.044	0.057	0.057	0.056
			(0.054)	(0.049)	(0.044)	(0.044)
Size - Small				0.090**	0.087*	0.086*
				(0.045)	(0.047)	(0.046)
Size - Large				-0.100***	-0.100***	-0.099***
				(0.025)	(0.025)	(0.024)
Retail					-0.003	-0.003
					(0.044)	(0.044)
Other Services					0.026	0.026
					(0.02)	(0.02)
Obstacle Tax						0.031**
						(0.015)
Obstacle Business						-0.023
						(0.022)
Observations	2,803	2,803	2,803	2,803	2,803	2,803
Log Likelihood	-1,464.92	-1,460.54	-1,458.68	-1,414.54	-1,413.58	-1,411.83
AIC	2,943.85	2,937.07	2,935.35	2,851.07	2,853.16	2,853.66

Note: Robust standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01. Country fixed effects are not reported.

Overall, both sets of estimations exhibit the same results and therefore confirm each other. When comparing the results to our hypotheses, we can fully confirm our first and second hypotheses. Firms that already reported obstacles with access to financing pre-crisis have a higher probability of experiencing financial distress during the crisis. This is in line with other empirical literature investigating the effects of financial constraints during times of crisis (Vermoesen et. al., 2013). Firms that adopted an innovation approach via introducing new products increased their chance of successfully coping with the crisis. In the literature, it seems to be commonly accepted that innovation and creative destruction are promising coping strategies during crises. However, during crises the willingness to invest into innovation is often significantly reduced (Archibugi et. al., 2013b). We must reject our third hypothesis since our results do not support the assumption that increased online activity plays a significant role in whether the firm experiences financial distress or increases its sales during times of crisis. Therefore, increased online activity seems not to play a relevant role in how a firm, deals with the pandemic crisis. However, it must remain clear that there may well be other proxies for digitalization strategies.

Table 5 - Country Subsamples for Outstanding Liabilities

| | Outstanding Liabilities | | | |
	Group 1		Group 2	
Obstacle Finance	0.117**	0.113	0.118***	0.116***
	(0.057)	(0.07)	(0.023)	(0.033)
New Product	-0.034	-0.035	-0.064*	-0.063**
	(0.055)	(0.056)	(0.033)	(0.031)
Online Activity	0.006	0.004	0.086	0.091
	(0.033)	(0.028)	(0.076)	(0.059)
Size - Small	0.058***	0.055***	0.117	0.112
	(0.014)	(0.015)	(0.086)	(0.088)
Size - Large	-0.112***	-0.111***	-0.086**	-0.083**
	(0.031)	(0.029)	(0.037)	(0.038)
Retail		0.03		-0.03
		(0.071)		(0.057)
Other Services		0.002		0.048***
		(0.051)		(0.008)
Obstacle Tax		0.028		0.032***
		(0.04)		(0.01)
Obstacle Business		-0.029***		-0.017
		(0.009)		(0.041)
Observations	1,229	1,229	1,574	1,574
Log Likelihood	-592.298	-591.184	-819.556	-815.957
AIC	1,200.60	1,206.37	1,655.11	1,655.91

Note: Robust standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01.
Country fixed effects are not reported.

3.3. Robustness checks

To further corroborate the results of our regression analysis, we conduct several additional robustness checks. First, we compare our probit estimation results with the ones of a logistic regression. As in the main analysis, the variable outstanding liabilities is used as the dependent variable. For this regression, clustered standard errors are included. To stay in line with the main analysis, the regression results are presented as AMEs instead of regression coefficients. The results of the logistic regression are shown in Table 4. All of the three independent variables point to the same results. For the variable size and industry, this robustness check shows the same results in terms of sign and significance as the ones from the main analysis. Overall, this robustness check confirms the results for obstacles with access to financing, new product, and online business activity. However, the AIC values are slightly, but not significantly, higher for the logistic than for the probit estimation. We therefore assume that the probit estimation is indeed the more appropriate model specification.

Second, we split our data into two country groups. Group 1 includes the data from Portugal, Slovenia and Italy, while group 2 consists of the data from Greece, Poland and Romania. The subsamples reflect the pandemic impact. In particular, group 1 faces higher cumulative infections per million inhabitants than group 2. Here, medical data from mid-November 2020 is used as this coincides with the time of the data collection of the COVID-19 Impact ES Follow-up Survey data sets (Ritchie et al., 2020). We repeat both estimations, our probit analysis with *Outstanding Liabilities* and our multiple linear regression with *Sales Change* as dependent variables. For the

robustness check, we only use our parsimonious model specification and the full model specification.

Table 6 - Country Subsamples for Sales Change

	Sales Change			
	Group 1		Group 2	
Obstacle Finance	-5.072	-4.98	-1.409	-0.501
	(3.528)	(3.619)	(1.762)	(1.901)
New Product	0.596	0.11	5.561***	5.772***
	(2.77)	(2.73)	(1.93)	(1.93)
Online Activity	-1.68	-0.586	4.046**	4.294**
	(2.851)	(2.823)	(1.868)	(1.91)
Size - Small	-10.943***	-9.310***	-3.934**	-2.712
	(2.209)	(2.267)	(1.893)	(1.959)
Size - Large	-0.59	-0.603	7.186***	6.546***
	(2.498)	(2.46)	(2.013)	(1.993)
Retail		-0.873		-2.70
		(2.851)		(2.343)
Other Services		-10.170***		-7.841***
		(2.794)		(2.197)
Obstacle Tax		-1.904		-4.757**
		(2.391)		(1.923)
Obstacle Business		-4.641		-1.012
		(3.271)		(1.944)
Constant	-19.125***	-16.911***	-24.311***	-20.864***
	(2.145)	(2.219)	(1.799)	(1.898)
Observations	811	811	1,054	1,054
Adjusted R²	0.047	0.067	0.053	0.07
F Statistic	6.702***	6.260***	9.353***	8.176***

Note: Robust standard errors are in parentheses. *p<0.1; **p<0.05; ***p<0.01.
Country fixed effects are not reported.

The country subsamples reveal some interesting relations. Table 5 shows the results for the subsamples using probit estimations. We can see that our main results of interest are only confirmed for group 2, the less affected countries. This is kept relevant when considering the results in Table 6 for the multiple linear regression. It seems like there are underlying mechanisms present concerning the pandemic impact on a specific country. This might be due to even stricter lockdown measures, preventing innovation and hitting all companies in such a way, that former financing obstacles lose their predictive power for experiencing financial distress. Of course, this effect could also be due to structural aspects of the respective countries, since the number of countries studied is relatively small. Nonetheless, all countries in our sample were heavily influenced by the pandemic crisis and the parameter values, even for group 1, indicate the robustness of our main analysis. However, investigating which exact structural and/or stringency environments could prevent firms from undertaking innovation measures might be a starting point for further research. This is even more important considering the topic of financial distress.

4. Conclusion

We examine the role of financial obstacles and coping strategies during the COVID-19 crisis on enterprises from the European private sector using the ES and ES follow-up Surveys on COVID-19 datasets from the World Bank. For this purpose, we conduct a two-fold regression analysis using two different dependent variables and two estimation strategies, first a probit regression and second a multiple linear regression. Our results show the negative effect of perceived obstacles with access to financing pre-crisis on how well firms are able to cope with the crisis. We are also able to reveal that innovation can help enterprises to endure the crisis better. Finally, we uncovered country-specific effects that offer an avenue for further research.

The most important findings of our work can be summarized as follows: First, the survival of a firm during the crisis can be influenced by its perceived past obstacles with access to financing. Overall, in our estimations we can see a highly significant influence of this variable on the (financial) outcome. This is in line with the literature on financial constraints and investments. There are a number of mechanisms that can explain this relationship. What all of them have in common, however, is that the companies were already restricted in their access to financing by internal or external factors and thus exhibit little resilience to short-term payment difficulties during the crisis. Second, in order to handle the shocks brought by the crisis, firms that focus on a structured innovation approach seem to cope better with the crisis than firms that do not follow such an approach. We see that there is a general understanding that especially innovative companies have an advantage coming out of a crisis, which confirms the importance of creative destruction during the pandemic. However, there is only a small percentage of firms that are actually willing to invest in innovation during a crisis. Third, the coping strategies were less efficient in countries that were more severely hit by the crisis than in countries with less severe death counts. We can think of several explanations for this. One possibility is that in the more affected countries, NPIs were taken that were so comprehensive and stringent that the coping strategies were no longer sufficient. Another possibility is the involvement of fundamental structural differences, which might be relevant due to the small number of countries in the sample. Finally, increasing online business activity alone shows no significant influence and therefore is insufficient as a response to the pandemic challenge. However, it is both a limitation of the study and a starting point for further research to test the general digitization strategy with different, additional proxies. Online business activity might not be a suitable indicator across all industries.

From our results, we can derive several implications for firms and policymakers. On the one hand, the number of firms that report perceived obstacles with access to financing can serve as a proxy for the resistance of the corporate sector as well as the whole economy. It is of special interest for future research to investigate whether these perceived obstacles are internal or external. In the case of external, structural financing constraints, policymakers should ensure that a stable and understandable infrastructure is established to reduce these issues. Furthermore, enterprises should ensure their liquidity and flexibility to access external financing to weather crises. As far as "financing obstacles" are generally identified as a precondition for stable developments, companies should look for managerial strategies ensuring access to financing sources as a precautionary measure. On the other hand, an innovation approach during crises can help firms to overcome the shock in a better way. Therefore, policymakers should seek to create an innovation-friendly environment, especially in times of crises. However, only few companies use this strategy, which is highly relevant for securing a successful economy. From the company's perspective, it is important not to lose track of innovation despite the difficulties during a crisis.

Acknowledgements

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Appendix

Table A.1 - Variable formation

Variable	Formation
Size Small	Firms with 5 to 19 employees
Size Medium	Firms with 20 to 99 employees
Size Large	Firms with 100+ employees
Country Greece	Firms that reported the Headquarter in Greece
Country Italy	Firms that reported the Headquarter in Italy
Country Poland	Firms that reported the Headquarter in Poland
Country Portugal	Firms that reported the Headquarter in Portugal
Country Romania	Firms that reported the Headquarter in Romania
Country Slovenia	Firms that reported the Headquarter in Slovenia
Industry Manufacturing	Firms that are mainly active in Manufacturing
Industry Other Services	Firms that are mainly active in other services
Industry Retail	Firms that are mainly active in Retail
Obstacle: Tax Rates	Tax rate perceived as no, minor or moderate obstacle = 0 Tax rate perceived as major or very severe obstacle = 1
Obstacle: Business Licensing	Business Licensing perceived as no, minor or moderate obstacle = 0 Business Licensing perceived as major or very severe obstacle = 1
Obstacle: Access to Finance	Access to Finance perceived as no, minor or moderate obstacle = 0 Access to Finance perceived as major or very severe obstacle = 1
New or Improved Product/ Service	Binary variable New Product/Service = 1
Started or Increased Online Business Activity	Binary variable Increased Online Business Activity = 1
Outstanding Liabilities	Is it expected that this establishment will fall in arrears in any of its outstanding liabilities in the next 6 months?
Change in Sales 19 vs. 20	Comparing this establishment's sales with the same month in 2019, how much % did the sales change?