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With a little help from my website. Firm survival and web presence in times of COVID-19 – Evidence from 10 European countries

Joachim Wagner
Leuphana University Lueneburg

Abstract

This paper uses firm level data from the World Bank Enterprise surveys conducted in 2019 and from the COVID-19 follow-up surveys conducted in 2020 in ten European countries to investigate the link between having a website before the pandemic and firm survival until 2020. The estimated effect of web presence is statistically highly significant ceteris paribus after controlling for various firm characteristics that are known to be related to survival. Furthermore, the size of this estimated effect can be considered to be large on average.

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Contact: Joachim Wagner - wagner@leuphana.de.

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1. Motivation

When the coronavirus and COVID-19 reached Europe in the first quarter of 2020 firms were hit by negative demand shocks due to quarantine and lockdown measures. Furthermore, supply chains were damaged and this led to negative supply shocks. These shocks had a negative impact on many dimensions of firm performance. Waldkirch (2021) reports evidence on the impact of the COVID-19 pandemic on firms around the world based on the so-called COVID-19 follow-up surveys to the World Bank's Enterprise Surveys conducted in 2020.

Some firms were hit so hard by these negative exogenous shocks that they decided to close down permanently. An important question is which characteristics of firms help many of them to survive the pandemic. Besides the usual suspects discussed at length in the literature on firm demographics over the past decades that include firm age, firm size, exports, productivity, and innovation (and that will be looked at in more detail in section 2 of this paper) one firm characteristic that is often considered to be important here is online presence, i.e. having a website where potential customers can learn about, and order, goods or services when personal contacts are not possible due to quarantine and lockdown.

While this is often mentioned in the business press, and business schools advertise their programs in digital marketing as a key to survival¹, to the best of my knowledge there is no micro-econometric study that looks at the role of web presence in firm survival during the COVID-19 crisis. This paper contributes to the literature by using firm level data from ten European countries collected in the World Bank's Enterprise Surveys in 2019 and from the COVID-19 follow-up surveys conducted in 2020 to investigate the link between web presence and firm survival, controlling for other determinants of firm exit.

The rest of the paper is organized as follows. Section 2 introduces the data used and discusses the variables that are included in the empirical model to test for the role of web presence in firm survival. Section 3 reports descriptive evidence and results from the econometric investigation. Section 4 concludes.

2. Data and discussion of variables

The firm level data used in this study are taken from the World Bank's Enterprise Surveys in 2019 and from the COVID-19 follow-up surveys conducted in 2020.² These surveys were conducted in a large number of countries all over the world. In this study we focus on countries from Europe. All countries with complete data for at least five firms that took part in the 2019 survey and that reported in the 2020 follow-up survey that they had permanently closed down are included in the study. This leaves us with data for ten countries: Bulgaria, Croatia, Czech Republic, Hungary, Italy, Poland, Portugal, Romania, Russia, and the Slovak Republic.³

The classification of firms as survivors or exits is based on question B.0⁴ in the follow-up survey from 2020. Firms that participated both in the regular 2019 survey and in the follow-up survey were asked "Currently is this establishment open, temporarily closed (suspended services or production), or permanently closed?" Firms that answered "permanently closed" are classified as exits, the other firms are considered to be survivors.

¹ See ESEI International Business School Barcelona - <https://www.eseibusinessschool.com/online-is-the-key-to-survival-the-future-of-business-and-marketing/>

² The data from the World Bank Enterprise surveys are available free of charge after registration from the website <https://www.enterprisesurveys.org/portal/login.aspx>.

³ Not included are Albania, Cyprus, Estonia, Greece, Latvia, Lithuania, Malta and Slovenia.

⁴ The questionnaires of the regular 2019 survey and the follow-up survey conducted in 2020 are available from the World Bank's Enterprise Survey web site referred to above.

In the regular 2019 survey firms were asked in question C22b “At present time, does this establishment have its own website or social media page?” Firms that answered “yes” are classified as firm with web presence.

Descriptive evidence on the share of firm exits and on firms with a web presence in the total sample and by country is reported in in Table I. While the overall share of firms with a website is 72 percent and the share of exits is 4.5 percent figures differ widely between the ten countries. Web presence is only around 50 percent in Bulgaria while more than 90 percent of all firms in the sample have a website in the Czech Republic. The share of exits is below 2 percent in the Czech Republic and in Hungary, compared to nearly 10 percent in Portugal. In the empirical investigation of the link between web presence and firm survival a number of firm characteristics that are known to be correlated with firm exit (and that might be related to web presence of firms as well) are controlled for. Their link to firm survival, and the way they are measured here, is discussed below.

Firm size: Audretsch (1995, p. 149) mentions as a stylized fact from many empirical studies on exits that the likelihood of firm exit apparently declines with firm size (usually measured by the number of employees in a firm). This is theoretically linked to the hypothesis of “liability of smallness” from organizational ecology. A small size can be interpreted as a proxy variable for a number of unobserved firm characteristics, including disadvantages of scale, higher restrictions on the capital market leading to a higher risk of insolvency and illiquidity, disadvantages of small firms in the competition for highly qualified employees, and lower talent of management (Strotmann 2007). For Germany, Fackler, Schnabel and Wagner (2013) show that the mortality risk falls with establishment size, which confirms the liability of smallness.

Firm size is measured as the number of permanent, full-time individuals that worked in the establishment at the end of the last complete fiscal year at the time of the regular 2019 enterprise survey (see question I.1).

Firm age: Audretsch (1995, p. 149) mentions as another stylized fact from many empirical studies on exits that the likelihood of firm exit apparently declines with firm age, too. This positive link between firm age and probability of survival is labelled “liability of newness” and it is related to the fact that older firms are “better” because they spent a longer time in the market during which they learned how to solve the range of problems facing them in day-to-day business. For Germany, Fackler, Schnabel and Wagner (2013) find that the probability of exit is substantially higher for young establishments which are not more than five years old, thus confirming the liability of newness.

Firm age is measured as follows. In question B.5 of the regular survey in 2019 firms were asked “In what year did this establishment begin operation?”. Firm age is the difference between 2019 and the founding year.

Exports: Exporting can be considered as a form of risk diversification through spread of sales over different markets with different business cycle conditions or in a different phase of the product cycle. Therefore, exports might provide a chance to substitute sales at home by sales abroad when a negative demand shock hits the home market and would force a firm to close down otherwise (see Wagner 2013). Furthermore, Baldwin and Yan (2011, p. 135) argue that non-exporters are in general less efficient than exporters (younger, smaller and less productive) and that, as a result, one expects that non-exporters are more likely to fail than exporters.

A number of recent empirical studies look at the role of international trade activities in shaping the chances for survival of firms; Wagner (2012, p. 256ff.) summarizes this literature. As a rule the estimated chance of survival is higher for exporters, and this holds after controlling for firm characteristics that are positively associated with both exports and survival (like firm size and firm age). This might point to a direct positive effect of exporting on survival.

The firm is considered as an exporter if it reports any direct exports in question D.3 of the regular enterprise survey in 2019.

Productivity: In theoretical models for the dynamics of industries with heterogeneous firms productivity differentials play a central role for entry, growth, and exit of firms. In equilibrium growing and shrinking, exiting and entering firms that have different productivities are found in an industry. These models lead to hypotheses that can be tested empirically. Hopenhayn (1992) considers a long-run equilibrium in an industry with many price-taking firms producing a homogeneous good. Output is a function of inputs and a random variable that models a firm specific productivity shock. These shocks are independent between firms, and are the reason for the heterogeneity of firms. There are sunk costs to be paid at entry, and entrants do not know their specific shock in advance. Incumbents can choose between exiting or staying in the market. When firms realize their productivity shock they decide about the profit maximizing volume of production. The model assumes that a higher shock in $t+1$ has a higher probability the higher the shock is in t . In equilibrium firms will exit if for given prices of output and inputs the productivity shock is smaller than a critical value, and production is no longer profitable.

Farinas und Ruano (2005, p. 507f.) argue that this model leads to the following testable hypothesis: Firms that exit in year t were in $t-1$ less productive than firms that continue to produce in t . They test this hypothesis using panel data for Spanish firms. The hypothesis is supported by the data. Wagner (2009) replicates the study by Farinas and Ruano with panel data for West and East German firms from manufacturing industries. For the cohorts of exit from 1997 to 2002 the results are in line with the results for Spain. Unfortunately, however, there is no suitable measure of productivity in the World Bank Enterprise survey, so productivity cannot be controlled for in the empirical models that test for a link between web presence and firm survival. However, productivity is controlled for indirectly by the inclusion of the information on the exporter status of the firm, because it is a stylized fact that has been found in hundreds of empirical studies from countries all over the world that exporters tend to be much more productive than non-exporters from the same narrowly defined industry (see Wagner 2007 for a survey).

Foreign ownership: Baldwin and Yan (2011) argue that from a theoretical point of view the relationship that should be expected between foreign ownership and firm exit is not clear. On the one hand, foreign owned firms may have access to superior technologies belonging to their foreign owners that might increase their efficiency and lower the risk of exit. Their greater propensity to invest in R&D might lead to more innovations, improve the competitiveness in home and on foreign markets and might therefore increase the chance to survive. On the other hand, Baldwin and Yan (2011) point out that foreign owned firms are less rooted in the host country economy and that they can shift their activities to another country when the local economy deteriorates. This should increase the probability of shutdown compared to nationally owned firms.

With a view on the COVID-19 pandemic Waldkirch (2021, p. 4) argues that “on the one hand, multinational companies may be better able to weather the storm, as they are more financially stable or have access to multiple sources of inputs, thereby minimizing disruptions to the supply chain. On the other hand, these firms may also be exposed to the pandemic’s impacts on a larger scale, in multiple countries, and at different times given the differential timing of the virus’s spread and mandated quarantines and shutdowns in different countries.”

A number of recent micro-econometric studies use firm level data for foreign owned firms and domestically controlled firms to investigate the (*ceteris paribus*) relationship between foreign ownership and firm survival. Wagner and Weche Gelübcke (2012) survey 26 mainly country specific studies that use data from 17 developed and developing countries, two of which use data on affiliates worldwide. The big picture emerging from the findings from these studies can be summarized as follows. Results are highly country-dependent.

Foreign affiliates were found to be more likely to exit as compared to their domestic counterparts in Ireland, Belgium, Spain, and Indonesia, but less likely to exit in Canada, Italy, Taiwan, and the US. No significant differences in closure rates due to foreign ownership could be revealed for Japan, Turkey and the UK.

In the regular survey in 2019 firms were asked what percentage of this firm is owned by private foreign individuals, companies or organizations (see question B2). Firms that reported a positive amount here are considered as (partly) foreign owned firms.

Innovation: Josef Schumpeter (1942, p. 84) argued some 80 years ago that innovation plays a key role for the survival of firms, because it “strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives”. Baumol (2002, p. 1) called innovative activity “a life-and-death matter for the firm.” This positive link between innovation and firm survival is found in a number of empirical studies. For example, Cefis and Marsili (2005) show that firms benefit from an innovation premium that *ceteris paribus* extends their life expectancy; process innovation in particular seems to have a positive effect on firm survival.

In the regular survey in 2019 firms were asked whether during the last three years this establishment has introduced new or improved products and services (see question H1). Firms that answered in the affirmative are considered as product innovators. Similarly, firms were asked whether during the last three years this establishment introduced any new or improved process, including methods of manufacturing products or offering services; logistics, delivery, or distribution methods for inputs, products or services; or supporting activities for processes (see question H5). Firms that answered in the affirmative are considered as process innovators.

Furthermore, firms are divided by broad sectors of activity (manufacturing, retail/wholesale, construction, hotel/restaurant, and services) based on their answer to the question for the establishment’s main activity and product, measured by the largest proportion of annual sales (see question D1a1).

Descriptive statistics for all variables are reported for the whole sample used in the empirical investigation in the appendix table.

3. Testing for the role of web presence in firm survival

To test for the role of web presence in firm survival empirical models are estimated with an indicator variable for firm survival or not until 2000 as the endogenous variable, an indicator variable for the presence of a web site or not in the firm in 2019 as the exogenous variable and various sets of control variables. All models are estimated by Probit, and average marginal effects with prob-values to indicate their statistical significance are reported.

Four different variants of empirical models are estimated. Model 1 has only the indicator variable for web presence as exogenous variable; Model 2 adds a set of country dummy variables, Model 3 furthermore adds a set of sector dummy variables, and Model 4 includes all control variables detailed in section 2, too. Results are reported in table 2.

The most important result is that the estimated average marginal effect of the presence of a website on firm survival is positive and statistically significant in all four empirical models. Irrespective of the control variables included in the model the presence of a web site in 2019 reduces the probability of firm exit until 2020.

As regards the control variables included in Model 4, all of the estimated average marginal effects have the theoretically expected sign (as discussed in section 2 above) and are statistically different from zero at an error level of 7 percent or much better, the only exception being the indicator for a foreign owned firm (where no clear theoretical hypothesis is found in the literature according to the discussion in section 2 above).

Note that the estimated average marginal effect of a web presence on the chance to survive is about constant over the first three models, so adding control variables for country and sector of economic activity does not change the results, but that this effect is cut by about half when the control variables that are expected to be positively related with firm survival ceteris paribus are added. The estimated effect of having a website, however, is still positive for firm survival and statistically highly significant ceteris paribus. Furthermore, the size of this estimated effect can be considered to be large on average – the estimated average reduction in the probability of exit is 2.8 percentage points, and this is really large compared to the overall exit probability of 4.6 percent in the sample reported in Table II.

4. Concluding remarks

This paper demonstrates that having a website is positively related to the probability of survival for firms facing negative demand and supply shocks during the COVID-19 pandemic. The estimated effect is statistically highly significant ceteris paribus after controlling for various firm characteristics that are known to be positively related to survival. Furthermore, the size of this estimated effect can be considered to be large on average. Therefore, a website might have helped firms to survive, but it should be kept in mind that this conclusion is somewhat preliminary because the data at hand does not allow to isolate a causal effect of website presence that might well be correlated with unobservable firm characteristics. Testing for causal effects of website presence and the investigation of industry heterogeneity in the relationship between owning a website and firm survival, therefore, are important topics for future research.

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Table I: Descriptive evidence on share of firms with web presence and firm exit in 10 European countries, 2019/20

Country	Number of firms	Share of firms with website (percent)	Share of exits in firms (percent)
All countries	6,046	72.10	4.57
Bulgaria	553	56.06	6.69
Croatia	351	83.76	2.56
Czech Republic	403	91.81	1.74
Hungary	625	74.88	1.76
Italy	439	71.75	7.74
Poland	889	69.85	2.92
Portugal	808	73.51	9.53
Romania	522	64.37	3.45
Russia	1,120	67.95	3.93
Slovak Republic	336	86.31	3.87

Source: Own calculations based on the World Bank Enterprise surveys; for details, see text.

Table II: Web presence and firm exit in 10 European countries, 2019/20: Results from econometric models

Method: Probit (Average Marginal Effects); Dependent variable: Firm exit (1 = yes)

Model		1	2	3	4
Variable					
Web-presence (Dummy; 1 = yes)	Average marginal effect	-0.048	-0.044	-0.044	-0.028
	p-value	0.000	0.000	0.000	0.000
Firm age (Years)	Average marginal effect				-0.00076
	p-value				0.001
Firm size (Number of employees)	Average marginal effect				-0.00010
	p-value				0.010
Exporter (Dummy; 1 = yes)	Average marginal effect				-0.017
	p-value				0.008
Foreign owned firm (Dummy; 1 = yes)	Av. marg.l effect				0.011
	p-value				0.432
Product innovator (Dummy; 1 = yes)	Av. marg. effect				-0.012
	p-value				0.072
Process innovator (Dummy; 1 = yes)	Av. marg. effect				-0.022
	p-value				0.004
Country dummy variables		no	yes	yes	yes
Sector dummy variables		no	no	yes	yes
Number of observations		6,046	6,046	6,046	6,046

Source: Own calculations with data from World Bank Enterprise surveys; for details see text.

Appendix : Descriptive statistics for sample used in estimations

Variable	Mean	Std. Dev.
Firm exit (Dummy; 1 = yes)	0.046	0.209
Web-presence (Dummy; 1 = yes)	0.721	0.449
Firm age (Years)	21.07	15.29
Firm size (Number of employees)	82.11	354.07
Product innovator (Dummy; 1 = yes)	0.221	0.415
Process innovator (Dummy; 1 = yes)	0.128	0.334
Foreign owned firm (Dummy; 1 = yes)	0.073	0.260
Exporter (Dummy; 1 = yes)	0.256	0.437
Manufacturing (Dummy; 1 = yes)	0.632	0.482
Retail / Wholesale (Dummy; 1 = yes)	0.200	0.400
Construction (Dummy; 1 = yes)	0.055	0.228
Hotel / Restaurant (Dummy; 1 = yes)	0.035	0.184
Services (Dummy; 1 = yes)	0.077	0.267
Number of observations	6,046	

Source: Own calculations with data from World Bank Enterprise surveys; for details see text.