

A large blue and red container ship, named "E.R. RIGA", is docked at a pier on a wide river. The ship is heavily loaded with colorful shipping containers. In the background, a bridge spans the river, and the sky is clear and blue. A purple and green gradient bar is overlaid at the bottom of the image, containing the text "KCG Working Paper".

KCG Working Paper

Exports and firm survival in times of COVID-19 – Evidence from eight European countries

Joachim Wagner

[This version: October 17, 2023]

Exports and firm survival in times of COVID-19 – Evidence from eight European countries

Joachim Wagner

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 eight European countries to investigate the link between exporting before the pandemic and firm survival until 2020. The estimated effect of exports is positive and statistically significant *ceteris paribus* after controlling for various firm characteristics that are known to be related to firm survival. Furthermore, the size of this estimated effect can be considered to be large on average. Exporting helped firms to survive.

Keywords: Exports, firm survival, COVID-19, World Bank Enterprise Surveys, Robit regression

JEL Classification: D22, F14, L20, L25, L29

Joachim Wagner
Leuphana University Lüneburg and
Kiel Centre for Globalization
D-21314 Lüneburg
Germany
joachim.wagner@leuphana.de

Acknowledgement: The data from the World Bank Enterprise surveys used in this paper are available after registration from the website <https://www.enterprisesurveys.org/portal/login.aspx>.

About the Kiel Centre for Globalization (KCG): KCG, initiated by Christian-Albrechts University of Kiel and Kiel Institute for the World Economy, works on an interdisciplinary research agenda that evaluates the proliferation of global supply chains as an important aspect of globalization. To this end, KCG brings together researchers from economics, ethics and management science. More information about KCG can be found here: www.kcg-kiel.org.

The responsibility for the contents of this publication rests with the authors, not the Institute. Since KCG Working Paper is of a preliminary nature, it may be useful to contact the authors of a particular issue about results or caveats before referring to, or quoting, a paper. Any comments should be sent directly to the authors.

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. Empirical studies are surveyed in Belitski et al. (2022) and Muzi et al. (2023).

Some firms were hit so hard by these negative exogenous shocks that they decided to close down permanently. An important question that is investigated in a number of papers is which characteristics of firms help many of them to survive the pandemic. Empirical studies that use the World Bank's Enterprise surveys to study firm exit during the COVID-19 pandemic include Wagner (2021) and Cariolle and Léon (2022) with a focus on the role of having a website; Khan et al. (2022) who study the role of innovations; Muzi et al. (2023) who look at productivity; Grover and Karplus (2021) with a focus on management practices; and Wagner (2022) who looks at the role of the gender of firm owners.

None of these studies investigates the role of exports in exit or survival of firms over the pandemic (although some include an exporter dummy variable among other control variables in empirical models). This comes as a surprise, because 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.

This paper contributes to the literature by using firm level data from the World Bank Enterprise surveys conducted in 2019 and from the COVID-19 follow-up surveys conducted in 2020 in eight European countries to investigate the link between exporting before the pandemic and firm survival until 2020. In the econometric investigation an estimator that is robust against extreme observations, or outliers, namely Robit regression, is applied besides the standard Probit estimator.

To anticipate the most important result, we find that exporting helped firms to survive. The estimated effect of exports is positive and statistically significant *ceteris paribus* after controlling for various firm characteristics that are known to be related to firm survival. Furthermore, the size of this estimated effect can be considered to be large on average.

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 exports in firm survival. Section 3 reports descriptive evidence and results from the econometric investigation. Section 4 concludes.

1 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 2020.¹ 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 suitable data from the third follow-up survey are included in the study. This leaves us with data for eight countries: Bulgaria, Croatia, Czech Republic, Hungary, Italy, Poland, Portugal, and Romania.

The classification of firms as survivors or exits is based on question B.0² in the follow-up survey from 2020. Firms that participated both in the regular 2019 survey and in the follow-up surveys were asked "Currently is this establishment open, temporarily closed (suspended services or production), or permanently closed?" Firms that answered "permanently closed" in one of the follow-up surveys are classified as exits; firms that answered "open" in the third wave of the follow-up survey are considered to be survivors.

The firm is considered as an exporter if it reports any direct exports in question D.3 of the regular enterprise survey in 2019.³

Descriptive evidence on the share of firm exits and on firms with exports in the total sample and by country is reported in in table 1. While the overall share of firms with exports is 30.34 percent and the share of exits is 6.08 percent figures differ widely between the eight countries. Exporters are only ca.17.5 percent in Poland while nearly 60 percent of all firms in the sample exported in the Czech Republic. The share of exits is below 3 percent in the Czech Republic and in Hungary, compared to 12.5 percent in Italy and nearly 10 percent in Bulgaria

[Table 1 near here]

In the empirical investigation of the link between exports and firm survival a number of firm characteristics that are known to be correlated with firm exit (and that might be related to exports 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

¹ 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>.

² 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.

³ Note that the survey asked for the percentage share of exports in total sales, too. This information is not used here. A closer look at the answers reveals that the numbers reported have to be considered as "guesstimates" at best with many firms reporting numbers like 10, 20, 30 etc..

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.

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.

Website: One firm characteristic that is often considered to be important for firm survival 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. Wagner (2021) uses 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. He reports a positive effect of web presence on firm survival.

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.

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.

2 Testing for the role of exports in firm survival

To test for the role of exports in firm survival empirical models are estimated with an indicator variable for firm survival or not until 2020 as the endogenous variable, an indicator variable for exporting or not of the firm in 2019 as the exogenous variable and various control variables (discussed in detail above).

To estimate the empirical model two different methods are used. First, the model is estimated by Probit, and average marginal effects with prob-values to indicate their statistical significance are reported. Second, an estimator that is robust against extreme observations, or outliers, is applied, namely Robit regression. While a discussion of any details of this estimator (see Newson and Falcaro 2023) is beyond the scope of this note, it should be noted that Robit regression is considered to be a simple alternative to the Probit model which replaces the Normal distribution used in Probit by a Student t-distribution. The heavier tails of this t-distribution mean that outliers are less influential for the estimation results. Given that the choice of degrees of freedom (df) for Robit models still seems to be an open question, and that in general Robit models with fewer df are influenced less by outliers than those with more df (see Newson and Falcaro 2023), we use a Robit link function with 1 df here. Both the Probit and the Robit model are estimated using Stata (version 18).

Results are reported in table 2, where results from the Probit estimation are reported in column 1 and results from the Robit estimation are reported in column 2.

[Table 2 near here]

The most important result is that the estimated average marginal effect of exports on firm exit is negative and statistically significant at an error level of 7 percent in the Probit model and 3 percent in the robust Robit model, respectively. Exporting in 2019 before the pandemic reduces the probability of firm exit until 2020.

Note that the estimated average marginal effect of exports on the chance to exit can be considered to be large on average – the estimated average reduction in the probability of exit is 1.65 percentage points in the model estimated by Probit and 2.44 percentage points in the model estimated by Robit, compared to the overall exit probability of 6.08 percent in the sample reported in table 1. Exporting helped firms to survive the negative shocks during the pandemic.

3 Concluding remarks

This paper demonstrates that exporting 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 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. Exporting before the pandemic helped firms to survive

References

- Audretsch, D.B. (1995), *Innovation and industry evolution*. Cambridge, MA: Cambridge University Press.
- Baldwin, J., and Y. Beiling (2011). The death of Canadian manufacturing plants: heterogeneous responses to changes in tariffs and real exchange rates. *Review of World Economics* 147(1): 131–167.
- Baumol, W.J. (2002). *The Free-market innovation machine: Analyzing the growth miracle of capitalism*. Princeton: Princeton University Press.
- Belitzki, M., C. Guenther, A.S. Kritikos, and R. Thurik (2022). Economic effects of the COVID-19 pandemic on entrepreneurship and small businesses. *Small Business Economics* 58: 593–609.
- Cefis, E., and O. Marsili (2005). A matter of life and death: innovation and firm survival. *Industrial and Corporate Change* 14(6): 1167–1192.
- Fackler, D., C. Schnabel, and J. Wagner (2013). Establishment exits in Germany: the role of size and age. *Small Business Economics* 41(3): 683–700.
- Grover, A., and V.J. Karplus (2021). Coping with COVID-19. Does management make firms more resilient? *Policy Research Working Paper* 9514, World Bank Group.
- Khan, K., S. Liu, B. Xiong, L. Zhang, and C. Li (2022). Innovation to Immune: Empirical Evidence From COVID-19 Focused Enterprise Surveys. *Frontiers in Psychology* 13: 850842.
- Muzi, S., F. Jolevski, K. Ueda, and D. Viganola (2023). Productivity and firm exit during the COVID-19 crisis: cross-country evidence. *Small Business Economics* 60: 1719–1760.
- Newson, R. B., and M. Falcaro (2023). Robit regression in Stata. *The Stata Journal* 23(3): 658–682.
- Schumpeter, J.A. (1942). *Capitalism, socialism and democracy*. New York: Harper & Row.
- Strotmann, H. (2007). Entrepreneurial survival. *Small Business Economics* 28(1): 87–104.
- Wagner, J. (2012). International trade and firm performance: a survey of empirical studies since 2006. *Review of World Economics* 148(2): 235–267.
- Wagner, J. (2013). Exports, imports and firm survival: First evidence for manufacturing enterprises in Germany. *Review of World Economics* 149(1): 113–130.
- Wagner, J. (2021). With a little help from my website. Firm survival and web presence in times of COVID-19 – Evidence from 10 European countries. *Economics Bulletin* 41(3): 1898–1906.
- Wagner, J. (2022). Firm Survival and gender of firm owner in times of COVID-19: Evidence from 10 European countries. *Economies* 10: 98.
- Waldkirch, A. (2021). Firms around the world during the COVID-19 pandemic, *Journal of Economic Integration* 16(1): 1–19.

Table 1: Descriptive evidence on share of firms with exports and firm exit in eight European countries, 2019/20

Country	Number of firms	Share of firms with exports (percent)	Share of exits in firms (percent)
All countries	4406	30.34	6.08
Bulgaria	537	25.88	9.68
Croatia	332	38.86	4.22
Czech Republic	408	58.33	2.94
Hungary	478	34.94	2.72
Italy	455	30.11	12.53
Poland	801	17.48	3.75
Portugal	887	31.00	6.43
Romania	508	22.05	6.50

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

Table 2: Exports and firm exit in eight European countries, 2019/20: Results from econometric models

Model		1	2
Variable			
Exporter (Dummy; 1 = yes)	Average marginal effect	-0.0165	-0.0244
	p-value	0.072	0.029
Web-presence (Dummy; 1 = yes)	Average marginal effect	-0.0372	-0.0185
	p-value	0.000	0.018
Firm age (Years)	Average marginal effect	-0.0011	-0.0008
	p-value	0.001	0.087
Firm size (Number of employees)	Average marginal effect	-0.000043	-0.0008
	p-value	0.468	0.080
Product innovator (Dummy; 1 = yes)	Average marginal effect	-0.0141	-0.012
	p-value	0.111	0.341
Process innovator (Dummy; 1 = yes)	Average marginal effect	-0.0188	-0.0054
	p-value	0.089	0.0686
Country dummy variables		yes	yes
Sector dummy variables		yes	yes
Number of observations		4,406	4,406

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)	0.0608	0.239
Exporter (Dummy; 1 = yes)	0.3034	0.4598
Web-presence (Dummy; 1 = yes)	0.7179	0.4501
Firm age (Years)	23.0	17.00
Firm size (Number of employees)	71.33	150.28
Product innovator (Dummy; 1 = yes)	0.2204	0.4146
Process innovator (Dummy; 1 = yes)	0.1055	0.3073
Manufacturing (Dummy; 1 = yes)	0.6425	0.4793
Retail / Wholesale (Dummy; 1 = yes)	0.1861	0.3892
Construction (Dummy; 1 = yes)	0.0547	0.2274
Hotel / Restaurant (Dummy; 1 = yes)	0.035	0.1837
Services (Dummy; 1 = yes)	0.0817	0.2739
Number of observations	4,406	

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