WORKING PAPER

Online Channels Sales Premia in Times of COVID-19: First Evidence from Germany

by

Joachim Wagner

University of Lüneburg
Working Paper Series in Economics

No. 415

November 2022

www.leuphana.de/institute/ivwl/working-papers.html

ISSN 1860 - 5508

Online Channels Sales Premia in Times of COVID-19: First Evidence from Germany

Joachim Wagner

Leuphana University Lüneburg and Kiel Institute for the World Economy

[joachim.wagner@leuphana.de]

This version: November 12, 2022

Abstract:

Presence on the web tends to be important for firms. Empirical studies show that firms with a better performance along various dimensions, and firms that are more internationally active, tend to have a website. Furthermore, a website helped firms to survive in times of the COVID-19 pandemic. An open question that is not discussed in this literature is how the use of online channels for sales is related to various dimensions of firm performance. This note contributes to the literature by using a unique recently released set of firm level data from Germany to investigate for the first time the links between online channels sales and firm characteristics.

Keywords: Online channels sales; firm performance; COVID-19; Germany 2021 Enterprise Survey Data Set

JEL classification: D22; L25

1. Motivation

Presence on the web is today considered as an important part of a firm's strategy to successfully make a living. This tends to be even more important in times of the COVID-19 pandemic when quarantines and lockdowns increase the costs of face-to-face contacts with (potential) buyers and sellers. Several recent empirical studies report findings that support this view:

Wagner (2022a) shows that in 2019 firms from 18 European countries that have a website are larger, older, more productive, and more often exporters, product innovators, process innovators and (partly) foreign owned firms compared to firms without a website. Good firms tend to have a website.

Wagner (2022b) uses firm level data from the Flash Eurobarometer 421 survey conducted in June 2015 in 34 European countries to investigate the link between having a website and international firm activities in small and medium sized enterprises (SMEs). He reports that firms which are present in the web do more often export, import, engage in research and development cooperation with international partners, work as subcontractors for firms from other countries, use firms in other countries as subcontractors, and perform foreign direct investments – both inside and outside the European Union. The estimated website premia are statistically highly significant after controlling for firm size, country, and sector of economic activity. Furthermore, the size of these premia can be considered to be large. Internationally active firms tend to have a website.

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 ten European countries Wagner (2021) investigates the link between having a website before the pandemic and firm survival until 2020. The estimated positive effect of web presence is statistically highly 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. Similarly, Muzi et al. (2022) report based on firm-level data collected for 34 economies up to 18 months into the COVID-19 crisis that businesses that have a website are more likely to continue existing. A web site helps firms to survive.

An open question that is not discussed in the literature on web presence and firm performance is how the use of online channels for sales is related to various dimensions of firm performance. Do better (larger, more innovative, more exporting) firms sell more using the web? Obviously, having a website does not mean that the owner uses it to sell goods and services – just think of yourself and your homepage on the web. This note contributes to the literature by using a unique recently released set of firm level data from Germany to investigate for the first time the links between online channels sales and firm characteristics.

The rest of the paper is organized as follows. Section 2 describes the data used and gives the definition of the variables in the empirical investigation. Section 3 reports results from the econometric investigation of the size of online channels sales premia in the firms. Section 4 concludes.

2. Data and definition of variables

The firm level data used in this study are taken from the World Bank's "The Germany 2021 Enterprise Surveys Data Set". This survey was conducted between October 2020 and June 2022; data were released in July 2022.[1]

In the survey firms were asked in question C22b "At present time, does this establishment have its own website or social media page?" Firms that answered

[1] The data and the questionnaire used are available free of charge after registration from the website https://www.enterprisesurveys.org/portal/login.aspx.

"yes" are classified as firm with a web presence. 91.3 percent of all German firms in the sample said that they do have a web presence – a much larger share than is reported for other countries in 2019 (see Wagner 2022a). This demonstrates that nearly all firms in Germany do have a website today, and that it does not make sense to look for any website premia here.

Furthermore, question EUD.1 asked for the percentage of the establishment's sales that was sold by using online channels (web-based platforms, social-media platforms, establishment's website, smartphone app). 72.5 percent of all firms in the sample reported zero online sales. This documents that by far not all of the 91.3 percent of firms with a website use it for online sales – a large fraction of firms with a website report a share of online channels sales of zero percent. Table 1 documents in detail the reported percentage of the establishment's sales that was sold by using online channels.

In the empirical investigation the link between the percentage of sales of a firm using online channels and a number of firm characteristics are looked at. The selection of these characteristics is not based on a theoretical model – it is motivated by the results of empirical studies that look at the difference in firm characteristics between firms with and without a website (summarized in the introductory section). The firm characteristics considered and the way they are measured here are listed below.

Firm size: 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 survey (see question I.1).

Firm age: Firm age is measured as follows. In question B.5 of the survey firms were asked "In what year did this establishment begin operation?". Firm age is the

difference between the year of the survey (reported in variable a15y) and the founding year.

Productivity: Productivity is measured as labor productivity, defined as the amount of total annual sales for all products and services (recorded in question d2) over 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 survey (see question I.1). Given that information on value added and on the capital stock used in a firm is missing in the data from the World Bank Enterprise Survey, more elaborate measures of productivity at the firm level like total factor productivity cannot be used.

Exports: In the survey the firms were asked for the percentage share of direct exports in total sales (see variable d3c) This variable is used asa measures for the export share in total sales.

Innovation: In the survey firms were asked whether during the last three years this establishment has introduced new of 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 online channels sales premia in firm characteristics

To test for the link between firm characteristics listed in section 2 and the intensity of the use of online channels for sales an empirical approach is applied that modifies a standard approach used in hundreds of empirical investigations on the differences between exporters and non-exporters that has been introduced by Bernard and Jensen (1995, 1999). Studies of this type use data for firms to compute so-called exporter premia, defined as the ceteris paribus percentage difference of a firm characteristic - e.g. labour productivity - between exporters and non-exporters. These premia are computed from a regression of log labour productivity on the current export status dummy and a set of control variables:

$$(1)\ \ln LP_i = a + ß\ Export_i + c\ Control_i + e_i$$

where i is the index of the firm, LP is labour productivity, Export is a dummy variable for current export status (1 if the firm exports, 0 else), Control is a vector of control variables, and e is an error term. The exporter premium, computed from the estimated coefficient ß as 100(exp(ß)-1), shows the average percentage difference between exporters and non-exporters controlling for the characteristics included in the vector Control (see Wagner (2007) for a more complete exposition of this method).

Here we look at differences between firms with various intensities of use of online channels in sales (instead of differences between exporters and non-

exporters) and are interested in the existence and size of online channels sales premia (instead of exporter premia). Therefore, (1) becomes (2)

(2) $\ln LP_i = a + ß\ Onlinesales_i + c\ Control_i + e_i$

where i is the index of the firm, LP is labour productivity, Onlinesales is the percentage share of sales of the firm sold using online channels, Control is a vector of control variables (that consists of dummy variables for sectors of economic activity), and e is an error term. The online channels sales premium ß shows the difference between firms with different intensities of using online channels for firm sales controlling for the broad economic sector the firm is active in.

Here, ß is computed by OLS for firm characteristics that are measured by continuous variables (firm size, firm age, labour productivity, export intensity). Firm size, firm age and labour productivity are measured in logs, while export intensity is measured as the percentage of exports in totel sales.

For firm characteristics that are measured by dummy variables (product innovator, process innovator) the empirical models are estimated by Probit instead. Therefore, (2) becomes (3)

(3) $Indicator_i = a + ß\ Onlinesales_i + c\ Control_i + e_i$

and the online channels sales premia are computed as the estimated average marginal effects of the percentage of online channels sales shares.

Standard errors are robust standard errors adjusted for clusters in the six broad sectors of economic activity of the firms.

Results are reported in Table 2. For firm size, firm age, productivity and export share the reported premium is the estimated percentage increase that is associated with an increase in the share of online channels sales of a firm in its total sales by one percentage point (controlling for the broad sector of economic activity of the firm). For product innovator and process innovator the premium is the estimated average marginal effect of an increase in the share of online channels sales by one percentage point on the probability that the firm is an innovator (controlling for the broad sector of economic activity of the firm).

We find that firms that use online channels more intensively for their sales tend to be larger, younger, more active in exports, and more innovative, while there is no link between labour productivity and intensity of use of online channels for sales. While some of these links can be considered to be quite strong – a one percent increase in the share of online channels sales in total sales is associated with an estimated increase in firm size by 0.37 percent, a decrease in firm age by 0,41 percent, and an increase in the export share by 0.057 percent – this is not the case for innovation activities. When averaged across firms, an increase in the share of online channels sales by one percentage point is associated with an estimated 0.001 percent increase in the probability of being a product innovator and an 0.0012 percent increase in the probability of being a process innovator.

4. Concluding remarks

This note reports premia for important firm characteristics for a more intensive use of online channels for sales. However, it is an open question (that is asked the same way when exporter premia are discussed) whether these premia are due to self-selection of firms into online channels sales or whether they are the effect of using online channels sales more intensively. This issue cannot be investigated with the

data at hand. To answer this important question longitudinal data for firms are needed that cover several years and that include a sufficiently large number of firms with various intensities of the use of online channels for sales over time. To the best of my knowledge such data are not available as of today. Let's collect it!

References

Bernard, Andrew B. and J. Bradford Jensen (1995),Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987. *Brookings Papers on Economic Activity: Microeconomics* 67-119.

Bernard, Andrew B. and J. Bradford Jensen (1999), Exceptional exporter performance: cause, effect, or both? *Journal of International Economics* 47 (1), 1-25.

Muzi, Silvia, Filip Jolevski, Khei Ueda and Domenico Viganola (2022), Productivity and firm exit during the COVID-19 crisis: cross-country evidence. *Small Business Economics* (in press).

Wagner, Joachim (2007), Exports and Productivity: A survey of the evidence from firm level data. *The World Economy* 30 (1), 5-32.

Wagner, Joachim (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, Joachim (2022a), The Good have a Website. Evidence on website premia for firms from 18 European countries. In: Joachim Wagner, Microeconometric Studies on Firm Behavior and Performance. Port Louis, Mauritius: Eliva Press, p. 63-72.

Wagner, Joachim (2022b), Website Premia for Extensive Margins of International Firm Activities: Evidence for SMEs from 34 Countries. *Economies* 10, 250, 1-7.

Table 1: Share of establishment's sales sold by using oline channels

Percentage	Number of firms	Percent
0	1.030	72.54
1	19	
2	13	
3	9	
4	5	
5	47	
6	1	
7	1	
8	4	
9	1	
10	68	
12	2	
13	1	
14	2	
15	14	
17	1	
19	2	
20	30	
24	1	
25	15	
30	24	
34	2	
35	4	
40	11	
45	5	
47	1	
50	28	
55	4	
60	15	
52	1	
70	13	
75	3	
80	11	
84	1	
85	2	
90	5	
93	1	
95	2	
96	1	
98	1	
100	19	
	1.420	

Source: The World Bank's "The Germany 2021 Enterprise Survey Data Set"

Table 2: Estmated online channels sales premia for firm characteristics

Firm characteristic	Premium	t-value
Firm size	0.37	2,12
Firm age	-0.41	-3,44
Productivity	0.032	0.29
Export share	0.057	2.56
Product innovator	0.0010	1.63
Process innovator	0.0012	3.46

Source: Own calculations with data from the World Bank's "The Germany 2021 Enterprise Survey Data set". The premium is the estimated percentage increase in firm characteristic for an increase in the share of online channels sales in total sales of the firm (controlling for broad sector of economic activity of the firm). T-values are based on robust standard errors, adjusted for clusters in sectors. For details see text.

Appendix : Descriptive statistics for sample (N = 1,420) used in estimations

Variable	Mean	Std. Dev.
Firm size (Number of employees)	73.84	485.41
Firm age (Years)	36.40	34.46
Productivity (total sales per employee)	289,617.8	776,437.1
Export share (percentage)	11.93	22.02
Product innovator (Dummy; 1 = yes)	53.24	
Process Innovator (Dummy; 1 = yes)	38.17	
Manufacturing (Dummy; 1 = yes)	40-07	
Retail / Wholesale (Dummy; 1 = yes)	18.73	
Construction (Dummy; 1 = yes)	12.46	
Hotel / Restaurant (Dummy; 1 = yes)	10.92	
Services (Dummy; 1 = yes)	17.82	

Source: Own calculations with data from The World Bank's "The Germany 2021 Enterprise Survey Data Set"; for details see text.

Working Paper Series in Economics

(recent issues)

No. 414 *Boris Hirsch, Elke J. Jahn, Alan Manning, and Michael Oberfichtner*: The wage elasticity of recruitment, Oktober 2022

No. 413 *Lukas Tohoff and Mario Mechtel*: Fading Shooting Stars – The Relative Age Effect, Misallocation of Talent, and Returns to Training in German Elite Youth Soccer, September 2022

No. 412 *Joachim Wagner*: The first 50 contributions to the Data Observer Series – An overview, May 2022

No. 411 *Mats Petter Kahl and Thomas Wein*: How to Reach the Land of Cockaigne? Edgeworth Cycle Theory and Why a Gasoline Station is the First to Raise Its Price, April 2022

No. 410 *Joachim Wagner:* Website premia for extensive margins of international firm activities Evidence for SMEs from 34 countries; April 2022

No. 409 *Joachim Wagner:* Firm survival and gender of firm owner in times of COVID-19 Evidence from 10 European countries, March 2022

No. 408 *Boris Hirsch, Philipp Lentge and Claus Schnabel*: Uncovered workers in plants covered by collective bargaining: Who are they and how do they fare?, February 2022

No. 407 *Lena Dräger, Michael J. Lamla and Damjan Pfajfar:* How to limit the Spillover from the 2021 Inflation Surge to Inflation Expectations?, February 2022

No. 406 *Institut für Volkswirtschaftslehre:* Forschungsbericht 2021, Januar 2022

No. 405 *Leif Jacobs, Lara Quack and Mario Mechtel:* Distributional Effects of Carbon Pricing by Transport Fuel Taxation, December 2021

No. 404 *Boris Hirsch and Philipp Lentge:* Non-Base Compensation and the Gender Pay Gap, July 2021

No. 403 *Michael J. Lamla and Dmitri V. Vinogradov:* Is the Word of a Gentleman as Good as His Tweet? Policy communications of the Bank of England, May 2021

No. 402 *Lena Dräger, Michael J. Lamla and Damjan Pfajfar:* The Hidden Heterogeneity of Inflation and Interest Rate Expectations: The Role of Preferences, May 2021

No. 401 *Joachim Wagner:* The Good have a Website Evidence on website premia for firms from 18 European countries, April 2021

No. 400 *Luise Görges:* Of housewives and feminists: Gender norms and intra-household division of labour, April 2021

No. 399 *Joachim Wagner:* With a little help from my website. Firm survival and web presence in times of COVID-19 – Evidence from 10 European countries, April 2021

No. 398 *Katja Seidel:* The transition from School to Post-Secondary Education – What factors affect educational decisions?, March 2021

No. 397 *Institut für Volkswirtschaftslehre:* Forschungsbericht 2020, Januar 2021

No. 396 *Sabien Dobbelaere, Boris Hirsch, Steffen Mueller and Georg Neuschaeffer:* Organised Labour, Labour Market Imperfections, and Employer Wage Premia, December 2020

No. 395 *Stjepan Srhoj, Vanja Vitezić and Joachim Wagner:* Export boosting policies and firm behaviour: Review of empirical evidence around the world, November 2020

No. 394 *Thomas Wein:* Why abandoning the paradise? Stations incentives to reduce gasoline prices at first, August 2020

No. 393 *Sarah Geschonke and Thomas Wein:* Privacy Paradox –Economic Uncertainty Theory and Legal Consequences, August 2020

No. 392 *Mats P. Kahl:* Impact of Cross-Border Competition on the German Retail Gasoline Market – German-Polish Border, July 2020

No. 391 *John P. Weche and Joachim Wagner:* Markups and Concentration in the Context of Digitization: Evidence from German Manufacturing Industries, July 2020

No. 390 *Thomas Wein:* Cartel behavior and efficient sanctioning by criminal sentences, July 2020

No. 389 *Christoph Kleineberg:* Market definition of the German retail gasoline industry on highways and those in the immediate vicinity, July 2020

No. 388 *Institut für Volkswirtschaftslehre:* Forschungsbericht 2019, Januar 2020

No. 387 *Boris Hirsch, Elke J. Jahn, and Thomas Zwick:* Birds, Birds, Birds: Co-worker Similarity, Workplace Diversity, and Voluntary Turnover, May 2019

No. 386 *Joachim Wagner:* Transaction data for Germany's exports and imports of goods, May 2019

No. 385 *Joachim Wagner:* Export Scope and Characteristics of Destination Countries: Evidence from German Transaction Data, May 2019

No. 384 *Antonia Arsova:* Exchange rate pass-through to import prices in Europe: A panel cointegration approach, February 2019

No. 383 *Institut für Volkswirtschaftslehre:* Forschungsbericht 2018, Januar 2019

No. 382 *Jörg Schwiebert*: A Sample Selection Model for Fractional Response Variables, April 2018

No. 381 *Jörg Schwiebert*: A Bivarate Fractional Probit Model, April 2018

No. 380 *Boris Hirsch and Steffen Mueller:* Firm wage premia, industrial relations, and rent sharing in Germany, February 2018

No. 379 *John P. Weche and Achim Wambach:* The fall and rise of market power in Europe, January 2018

No.378: *Institut für Volkswirtschaftslehre:* Forschungsbericht 2017, Januar 2018

No.377: *Inna Petrunyk and Christian Pfeifer:* Shortening the potential duration of unemployment benefits and labor market outcomes: Evidence from a natural experiment in Germany, January 2018

No.376: *Katharina Rogge, Markus Groth und Roland Schuhr:* Offenlegung von CO2-Emissionen und Klimastrategien der CDAX-Unternehmen – eine statistische Analyse erklärender Faktoren am Beispiel der CDP-Klimaberichterstattung, Oktober 2017

No.375: *Christoph Kleineberg und Thomas Wein:* Verdrängungspreise an Tankstellen?, September 2017

No.374: *Markus Groth, Laura Schäfer und Pia Scholz*: 200 Jahre „On the Principles of Political Economy and Taxation“ – Eine historische Einordnung und Würdigung, März 2017

No.373: *Joachim Wagner:* It pays to be active on many foreign markets - Profitability in German multi-market exporters and importers from manufacturing industries, March 2017

No.372: *Joachim Wagner:* Productivity premia for many modes of internationalization - A replication study of Békes / Muraközy, Economics Letters (2016), March 2017 [published in: International Journal for Re-Views in Empirical Economics - IREE, Vol. 1 (2017-4)]

No.371: *Marius Stankoweit, Markus Groth and Daniela Jacob:* On the Heterogeneity of the Economic Value of Electricity Distribution Networks: an Application to Germany, March 2017

No.370: *Joachim Wagner:* Firm size and the use of export intermediaries. A replication study of Abel-Koch, The World Economy (2013), January 2017 [published in: International Journal for Re-Views in Empirical Economics - IREE, Vol. 1 (2017-1)]

No.369: *Joachim Wagner:* Multiple import sourcing First evidence for German enterprises from manufacturing industries, January 2017 [published in : Open Economies Review 29 (2018), 1, 165-175]

No.368: *Joachim Wagner:* Active on many foreign markets A portrait of German multi-market exporters and importers from manufacturing industries, January 2017 [published in: Jahrbücher für Nationalökonomie und Statistik 238 (2018), 2, 157-182]

No.367: *Institut für Volkswirtschaftslehre:* Forschungsbericht 2016, Januar 2017

No.366: *Tim W. Dornis and Thomas Wein:* Trademarks, Comparative Advertising, and Product Imitations: An Untold Story of Law and Economics, September 2016

No.365: *Joachim Wagner:* Intra-good trade in Germany: A first look at the evidence, August 2016 [published in: Applied Economics 49 (2017), 57, 5753-5761]

No.364: *Markus Groth and Annette Brunsmeier:* A cross-sectoral analysis of climate change risk drivers based on companies’ responses to the CDP’s climate change information request, June 2016

No.363: *Arne Neukirch and Thomas Wein:* Collusive Upward Gasoline Price Movements in Medium-Sized German Cities, June 2016

No.362: *Katja Seidel:* Job Characteristics and their Effect on the Intention to Quit Apprenticeship., May 2016

No.361: *Katja Seidel:* Apprenticeship: The Intention to Quit and the Role of Secondary Jobs in It., May 2016

No.360: *Joachim Wagner:* Trade costs shocks and lumpiness of imports: Evidence from the Fukushima disaster, May 2016 [published in: Economics Bulletin 37 (2017), 1, 149-155]

No.359: *Joachim Wagner:* The Lumpiness of German Exports and Imports of Goods, April 2016 [published in: Economics - The Open-Access, Open-Assessment E-Journal 10, 2016-21]

(see www.leuphana.de/institute/ivwl/working-papers.html for a complete list)

Leuphana Universität Lüneburg
Institut für Volkswirtschaftslehre
Postfach 2440
D-21314 Lüneburg
Tel.: ++49 4131 677 2321
email: christina.korf@leuphana.de
www.leuphana.de/institute/ivwl/working-papers.html