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COVID-19 government support and productivity: Micro-based cross-country evidence[1]

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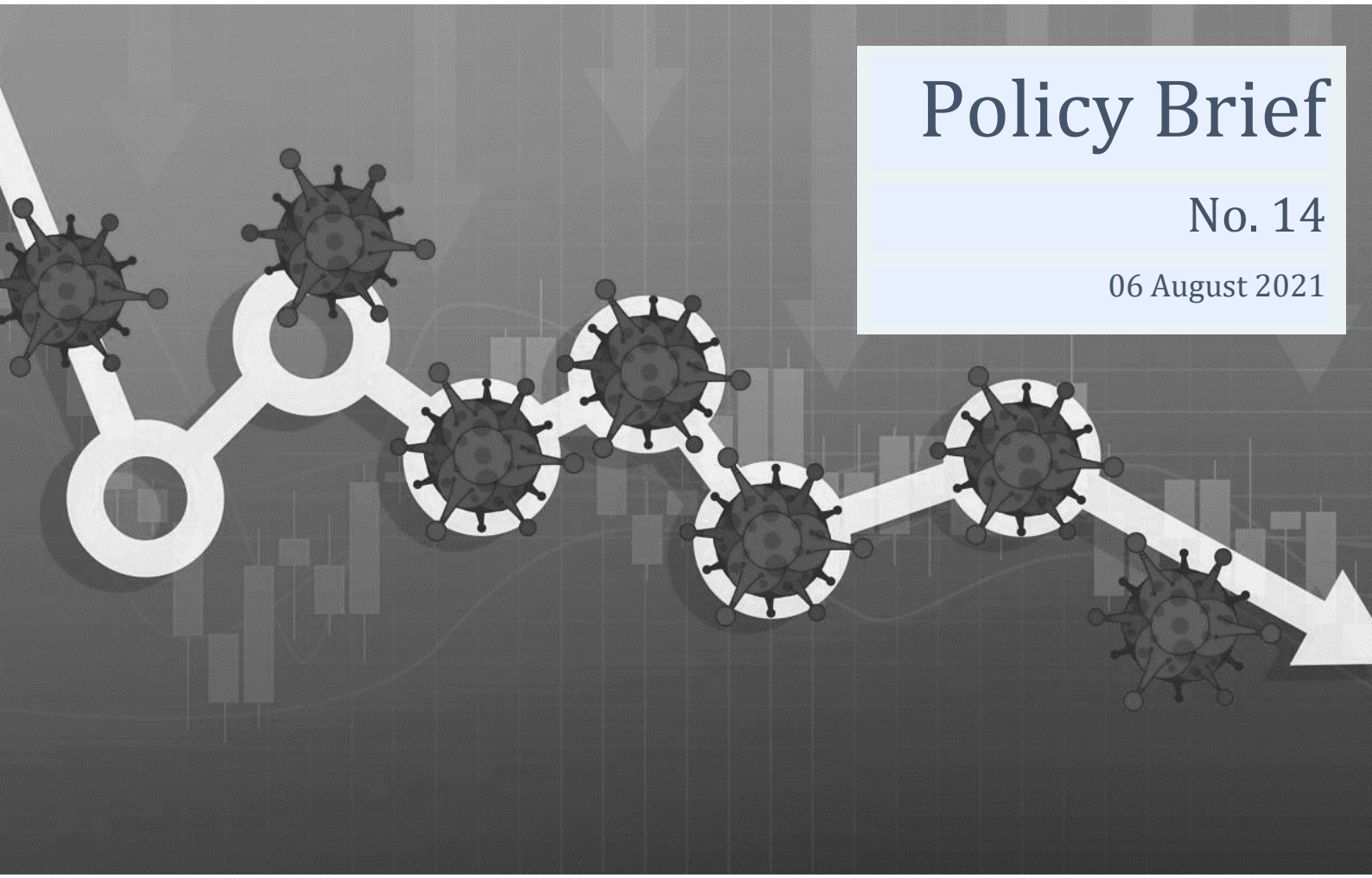

Policy Brief

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Since 2017, CompNet is an independently funded and regulated network, hosted at the Halle Institute for Economic Research (IWH). Members are contributing to the Network via financial support (Funding institutions) or provision and elaboration of data (Data providers). All Members are engaged in research and policy work related to productivity and are committed to improve granular data and knowledge to understand its drivers.

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Abstract

This policy brief studies the likely consequences of the COVID-19 pandemic on productivity by employing historical business outcomes matched with corresponding firm-level information on government support. Our cross-country evidence for four small EU countries shows that the pandemic led to a significant short-term decline in productivity predominantly driven by the within-firm growth component. The support appears to be distributed rather efficiently, i.e., towards medium productive firms and only marginally towards "zombie" firms. However, government subsidies appear to have a very limited effect on aggregate productivity.

Keywords: Covid-19, productivity, firm-level data, government support, cross-country analysis

Introduction

The Coronavirus pandemic and related containment measures led to the deepest disruption in the global economic activity since the Second World War. It has required complex government support interventions, unprecedented in terms of type and size. As fiscal support to firms was necessary to limit bankruptcies, capital disruption and job losses, its longer-term effect on aggregate productivity is unclear. This policy brief adds to the debate by providing comparable firm-level evidence for four EU countries along three dimensions. First, we cluster firms according to their pre-pandemic performance to evaluate the amount of government subsidies allocated to each cluster. Second, we document a significant short-term decline in productivity due to the pandemic. Third, we quantify the impact of subsidies on productivity, and we find that it has only negligibly offset the large negative shock.

While being huge by now, the literature on the economic impact of Covid-19 is still hampered by the fact that business data for 2020 are not yet available and the Covid support data originates from different sources. In addition, the cross-country analysis faces the additional challenge that the micro-level data are typically not harmonized across countries making cross country comparisons difficult. We contribute to the available literature by (i) combining firm-level data on Covid support with firm-level data measuring the pre-pandemic firm performance and (ii) providing cross-country evidence for four small EU countries (Croatia, Finland, Slovakia, Slovenia). Our data preparation and analysis benefit from the established CompNet (The Competitiveness Research Network) infrastructure (www.comp-net.org). The common code distributed and independently executed by data providers on their respective national

firm level information ensures high coverage, cross-country comparability and access to sensitive information without breaching confidentiality rules.[5]

The subsidies under our consideration refer predominantly to the first and the most damaging wave of the Covid pandemic. Although, our calculations are based on subsidies provided over the entire year 2020, more granular data shows that subsidies assigned for the period between March and June 2020 represent between 50% to 75% of overall resources allocated in 2020. For Croatia, Slovakia and Slovenia we consider solely "wage" subsidies, i.e., support received by a firm related to employment contracts kept by the firm even if the work had been suspended. For Finland a broader set of subsidies is included, i.e., all direct grants except the support for self-employed persons.

Our analysis brings more empirical evidence to the literature on Covid-19 and productivity. It builds on the early considerations by di Mauro and Syverson (2020) which highlight the main channels through which the crisis may affect productivity growth. The Covid pandemic shock affects production inputs and consequently overall productivity. With respect to labour inputs, we might expect significant impacts on human capital. Although its quality and availability vary across countries, despite a huge progress in distance learning, school closures and increased difficulties in integrating young people into the labour market, may have long-term negative effect on human capital (Martin et al., 2021). In addition to distance learning, we could observe a historic increase in teleworking (considered e.g., by Bartik et al., 2020), that may also have consequences for productivity. The pandemic uncertainty and lack of financial resources influences capital inputs and investments. As suggested by Calligaris et al. (2021), lower investments may result in a long-term reduction in productivity.

The Covid pandemic brings two additional phenomena related to the extensive government support. First, as reported by Wang et al. (2020) for the United States, or Müller (2021) for Germany, during the crisis, when one would expect more firm defaults, countries are experiencing lower numbers of bankruptcies compared to the pre-pandemic period. Second, despite fears and policy suggestions (e.g., Laeven et al., 2021), we do not observe an immediate increase in Zombie firms.

Like Benassy-Quere et al. (2021), Demmou et al. (2021), or Lalinsky and Pal (2021), we benefit from micro data originating from balance sheet and income statements to compute productivity decomposition and projection; in addition, we also use administrative records on government subsidies. Our productivity decomposition builds on Bloom et al. (2020), who distinguish between within and between firm productivity growth and using UK data show that the pandemic has negative impact on productivity growth driven mainly by the within firm margin.

1. Data and methodology

We combine firm-level administrative data on firm-performance during 2019 with firm-level information on subsidies received by each firm during 2020. For each firm we observe characteristics like age, revenues, value-added, as well as financial variables. The data originate from the national sources and represent fairly exhaustive samples of all non-financial firms. They are harmonised using CompNet approach (CompNet, 2020). The government

[5] See the CompNet User Guide (CompNet, 2020) for a detailed description of the data collection.

support data refers to Covid-19 related employment subsidies allocated to firms in 2020 in Croatia, Slovakia and Slovenia. In the case of Finland, the analysis builds on overall firm direct subsidies allocated in 2020.

In order to understand the distribution of the Covid-19 related support, we start with employing logit models to assess the conditional relationships between firm characteristics and corresponding support. We continue with conditional OLS analysis to find out to what extent the size of the support at the firm level depends on the firm's characteristics.[6] We conclude with the assessment of the overall amount of the support allocated to selected firm clusters based on the performance of firms before the pandemic. This exercise allows us to (i) quantify the share of subsidies allocated to "deserving" firms and thus to (ii) assess the impact of the Covid pandemic on aggregate productivity, its distribution and growth margins.

2. Which firms got supported?

We start by estimating a logit model to quantify the probability of a firm to receive government support. We regress the dependent variable - binary dummy variable equal 1 for supported firm and 0 otherwise – on different explanatory variables of our interest and a set of covariates.

$$\Pr(Y_t = 1|X_{t-n}) = \frac{1}{1+\exp(-X_{t-n}\beta)} \qquad (1)$$

where $\Pr(Y_t=1|X_{t-n})$ denotes the probability of receiving support for a given firm in period *t* given X_{t-n} , where X_{t-n} is a row vector of explanatory variables (including sector and size controls) and β is the corresponding column vector of regression coefficients.

In the results presented below we refer to average marginal effects resulting from estimating equation (1). Our estimation results suggest that despite several similarities, the distribution of the support varies across countries and firm characteristics. The baseline estimates are presented in Appendix A.

By sector

In line with the nature of the corona crisis that hit mostly in-person services, our analysis shows that firms supplying accommodation and food service have highest chance to be supported in all four countries. Conditional on firm size and productivity they have up to 30% higher probability to be supported than manufacturing firms.

By firm size

When focusing on firm size, we see that in countries like Slovakia or Slovenia the larger firms were supported with higher probability. These economies tend to rely more on larger industrial firms' performance also in goods times. In contrast, in Croatia or Finland – countries with more dominant services – we observe a different distribution of support across size classes. In Croatia medium size firms tend to be supported more frequently and in Finland it is the smallest firms.

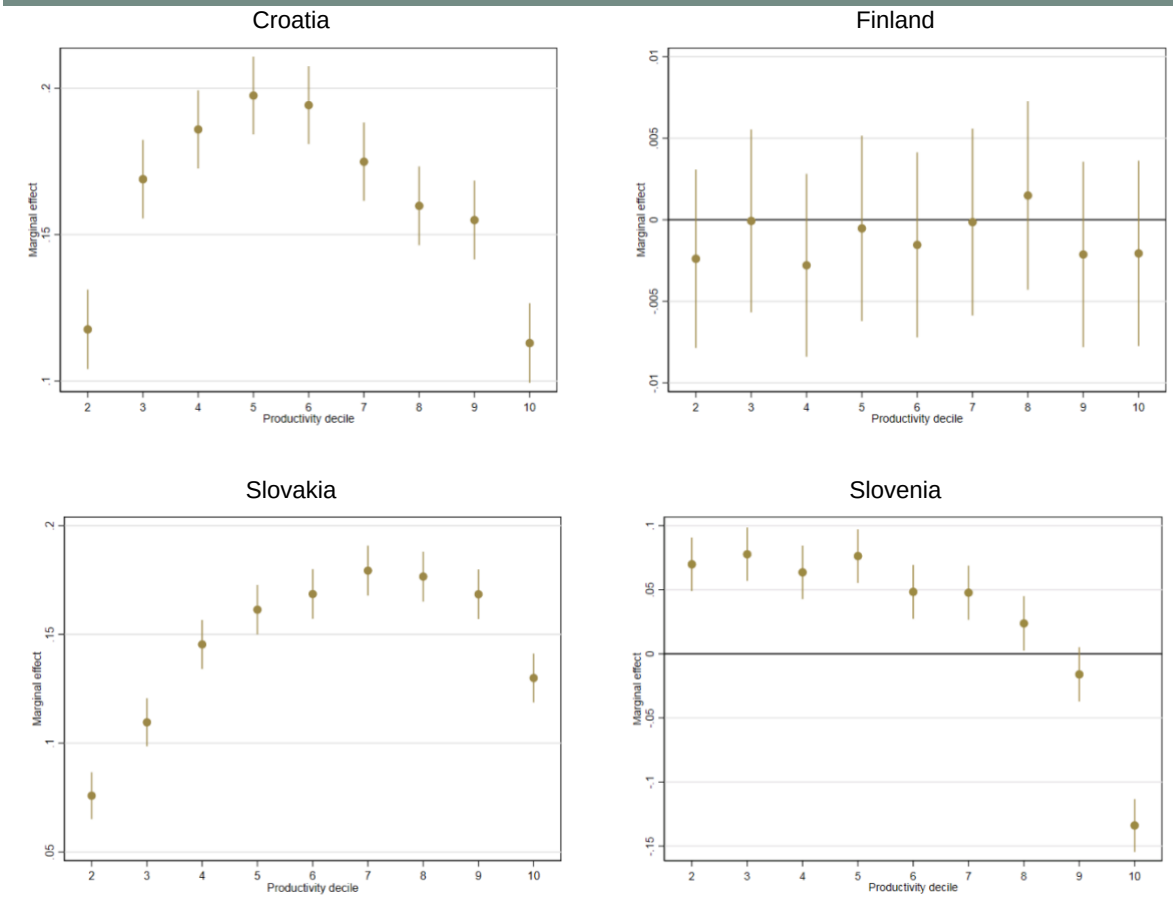
By firm productivity

As shown in Figure 1, for Croatia or Slovakia, we find that the chance of being supported increases with firm productivity and it holds for both labour productivities based on value added or total factor productivity. In Slovenia we observe negative relationship between the

[6] See Bighelli et al. (2021) for more details and model specifications.

probability to receive wage subsidy and firm productivity. However, as suggested by Figure 1, these relationships are not linear. In Finland, similarly to the firm size, state aid seems to reach firms equally across productivity deciles.

Figure 1: Firm probability of being supported – by productivity decile



Note: Marginal effects of control variables with respect to base value – the lowest labour productivity decile – shown in the graphs. The effects are conditional, the control variables for sectors and size classes were included in the model.
Source: Authors' calculations based on micro-data from Croatia, Finland, Slovakia and Slovenia.

3. How large support did they receive?

We also analyse how the size of the support allocated to a firm relates to its characteristics estimating equation (2) by OLS.

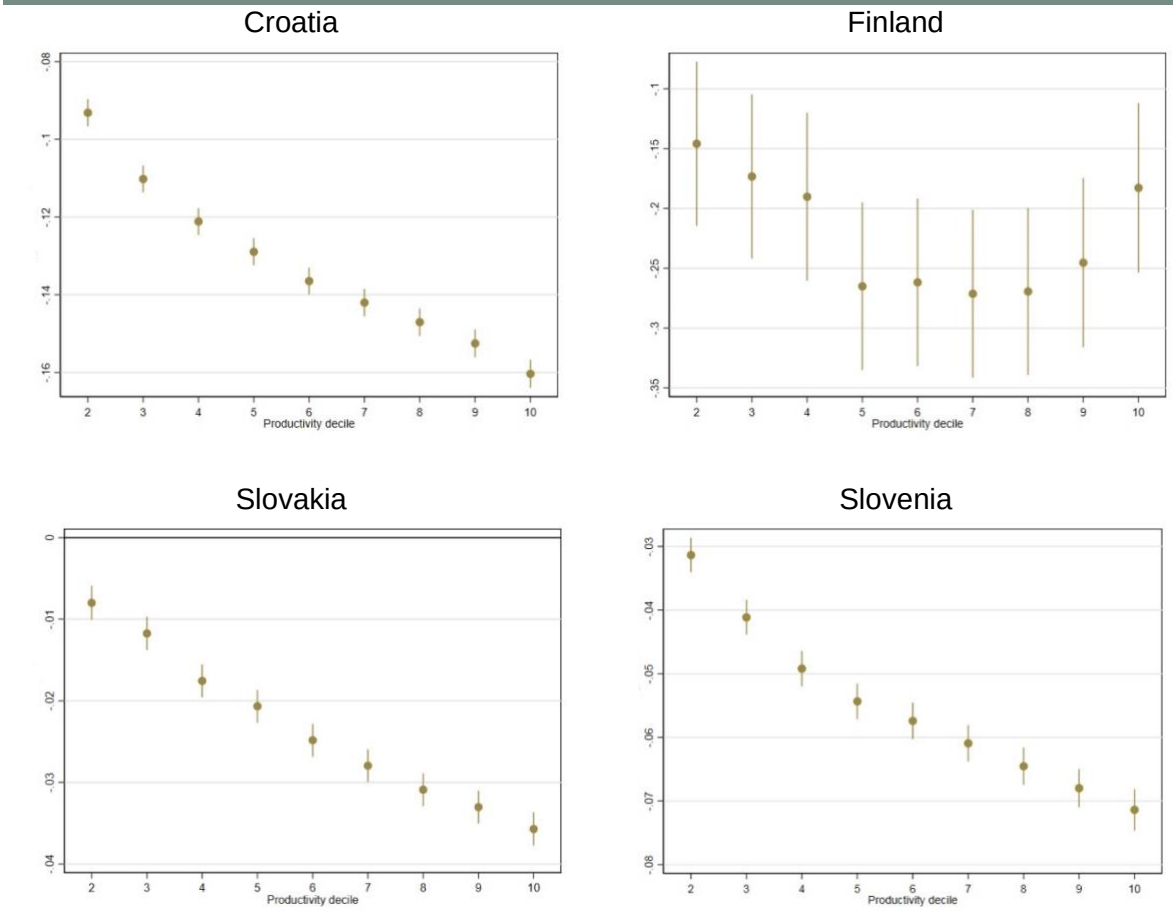
$$Y_t = \alpha + \beta X_{t-n} \qquad (2)$$

where Y_t denotes the relative size of the firm-level subsidy with respect to revenue and X_{t-n} is a row vector of explanatory variables (including sector and size controls) and β is the corresponding column vector of regression coefficients.

We find that more productive firms receive lower relative amounts of subsidies. The magnitude of the differences between productivity deciles is more significant for targeted direct subsidies in Finland than for wage subsidies in Croatia, Slovakia and Slovenia. A firm in the third quartile (in the 5th to the 8th decile) of productivity receives about 27% lower targeted direct subsidy

and not less than 15% lower wage subsidy with respect to the firm in the first decile of the productivity distribution.

Figure 2: Relative firm size of the support – by productivity decile



Note: Effects of control variables with respect to base value – the lowest labour productivity decile. The effects are conditional, the control variables for sectors and size classes were included in the model. Results for the share of wage subsidies on revenue, except Finland, for which the results based on the share of overall direct subsidies on revenue are presented.
Source: Authors' calculations based on micro-data from Croatia, Finland, Slovakia and Slovenia.

Alternative estimates based on the relative size of the firm-level subsidies with respect to firm labour costs presented in Appendix B support our baseline results.

4. Was the support efficiently distributed?

One of the main concerns related to the huge amount of Covid public support is whether this support was received by viable and productive firms in a temporary need. Or in other words: to what extent is government supporting firms that would (or should) quit the market even without Covid and the related subsidies?

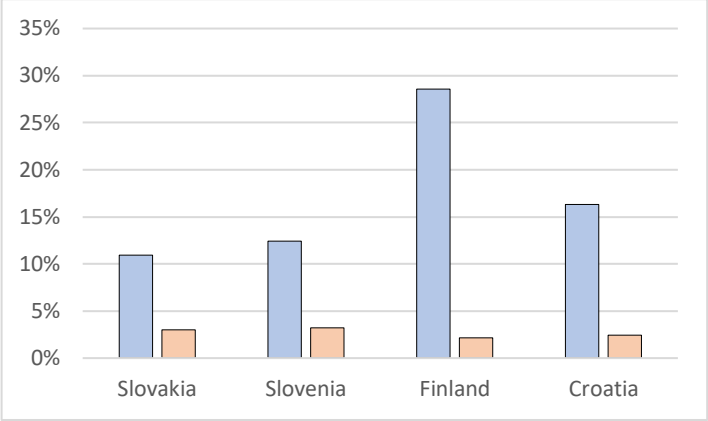
We define several clusters, and we assign firms to the clusters based on their performance in the years preceding the Covid-19 pandemic. An overview of the clusters can be found in Appendix C.
We find that around one third of the wage subsidies in Croatia, Slovakia and Slovenia was allocated to productive firms, defined as firms that belonged to the highest quintile of the labour productivity distribution in 2019. However, only a very small share, less than 3%, went to young productive start-ups, defined as firms in the highest quintile of productivity distribution and active for less than three years.

With respect to the long-term sustainability of the future economic growth, one might find it important to know to what extent the Covid-19 aid supports innovative or technologically advanced firms. Our preliminary calculations show that a relatively low share of subsides was distributed to high-tech or knowledge intensive firms. The majority of the subsidies (between 54% and 76% depending on a country) was allocated to low-tech or low knowledge intensive firms.

A relatively frequently mentioned concern highlights possible excessive misallocation of the Covid related support to financially distressed or zombie firms. However, we find that in all countries under review, only a small share of subsidies went to firms recording negative profits for three consecutive years and not high labour growth prior the pandemic (i.e., to zombie firms).
Similarly, a relatively low rate of misallocation of the support to non-viable firms can be confirmed by the amount of subsidies allocated to growing or declining firms. As shown in Figure 3, the firms that in 2019 were among the firms which experienced the largest growth in labour productivity and largest growth in number of employees (first quartile of the two growth distributions) received between up to 28% of subsidies. In the contrary, firms from the lowest quartile of the two growth distributions, called declining firms, received negligible share of the subsidies.[7]

[7] By combining a pre-pandemic firm performance (based on 2019 and earlier data) with a pandemic support (allocated in 2020), the presented results may be subject to a composition effect. Especially, in the case of declining firms, when some of them could exit the market before receiving a subsidy. However, the size of the effect is very small. For example, in Slovakia only 0.04% of firms identified as declining in the pre-pandemic year 2019 exited the market in 2020.

Figure 3: Share of subsidies allocated to growing (blue) and declining (red) firms



Note: Growing firms are defined as firms in the highest quartile of the rate of change of labour productivity distribution and in the highest quartile of the rate of change of size distribution. Declining firms are defined as firms in the lowest quartile of the rate of change of labour productivity distribution and in the lowest quartile of the rate of change of size distribution.

Source: Authors' calculations based on micro-data from Croatia, Finland, Slovakia and Slovenia.

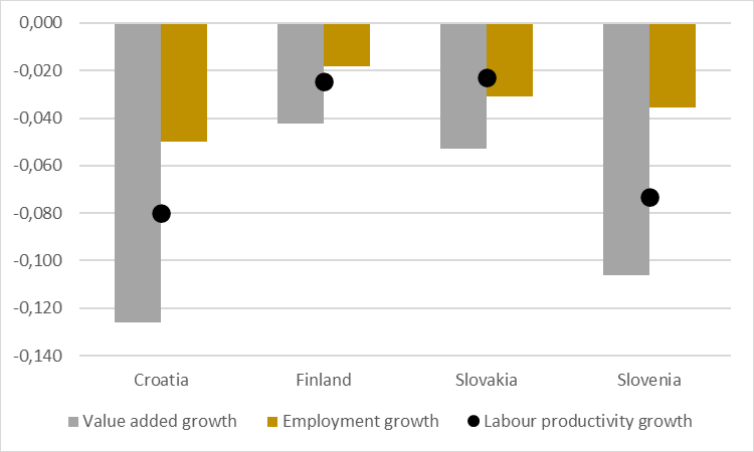
5. What are consequences of the pandemic on productivity?

Covid-19 related lockdowns and temporary supply chains disruptions resulted in significant annual declines in sales in most of the developed countries. Although, firms tried to compensate the gaps in revenue by adjusting their costs, most of the industries experienced declines in value added. With generally lower elasticities of labour costs or employment than elasticities of material costs to sales, the majority of firms recorded lower labour productivity in 2020. Based on Eurostat estimates, the aggregate EU labour productivity declined by 4.7% in 2020.[8] All countries analysed in the paper recorded smaller declines, only Croatia faced somewhat steeper drop in overall labour productivity.[9]

To shed more light on the granular consequences of the pandemic on productivity, we follow Lalinsky and Pal (2021) and utilize cost elasticities to sales estimated by Maurin and Pal (2020). Our projections employing pre-pandemic firm-level value-added figures, together with industry level sales developments in 2020 and industry level cost elasticities to sales, suggest that significant pandemic drops in sales and value added were accompanied by reductions in number of employees.[10]

[8] Following labour productivity based on real gross value added and employment from nama_10_a10 downloaded in May 31, 2021.
[9] Finland (-1.3%), Slovakia (-2,9%), Netherlands (-3,3%), Slovenia (-4,0%) and Croatia (-5,1%).
[10] Here we assume that the decline in number of employees equal the decline in labour costs.

Figure 4 Micro-aggregated labour productivity growth in the pandemic year



Note: Based on projected firm-level values calculated using cost elasticities to sales and sectoral turnover index.

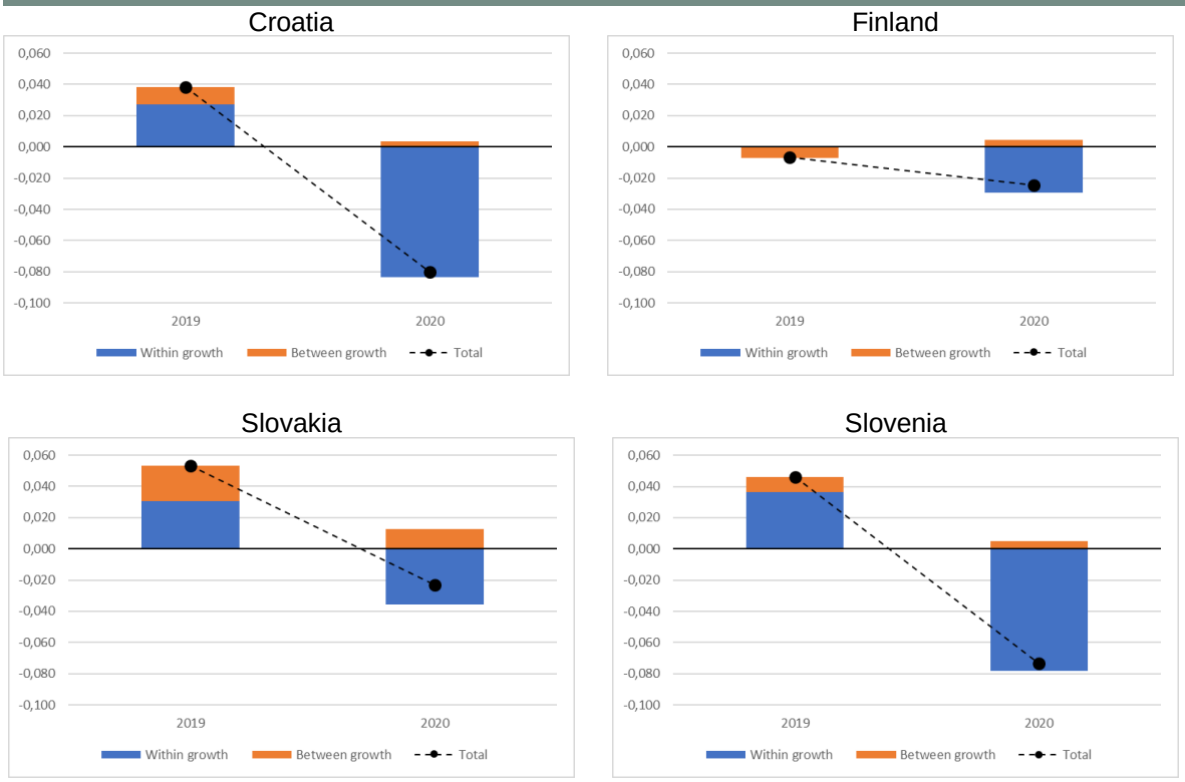
Source: Author's calculations Authors' calculations based on micro-data from Croatia, Finland, Slovakia and Slovenia.

Besides the standard accounting framework, one might find it important to learn to what extent the pandemic decline in productivity is driven by individual firm behaviour and to what extent it can be explained by reallocation of resources and productivity between firms.

When decomposing the overall productivity growth, our calculations for all four countries confirm the main findings for the UK economy presented by Bloom et al. (2020). We find large reduction in productivity within firms that is partially offset by a positive between effect.
Similarly, to Bloom et al. (2020), we start with Baily et al. (1992) that decompose the overall productivity growth to the within firm growth, reallocation between surviving firms, reallocation to new firms and reallocation from exiting firms. Our analysis builds on the pre-pandemic values of productivity. The estimates of the between components abstract from the effects arising from the firm entries or exits, because true firm-level entries and exits are not available at the time of the analysis. However, available information on firm dynamism in the EU suggest a significant reduction in both entries and exits during the pandemic, which makes their potential contribution to the between firm reallocation even smaller than previously observed and suggests a negligible effect on our estimates of the between-growth in productivity.

Figure 5 summarizes our estimates of the within and between-firm productivity growth. As expected, given the drop in sales and the employment hoarding, the Covid-19 pandemic led to a significant decline in the overall productivity across all analysed countries. The drop in productivity was predominantly driven by a huge temporary deterioration in the within-firm productivity. The highest impact was in Croatia, the smallest in Finland. The pandemic also reduced the reallocation of resources to more productive firms, but due to generally higher burden faced by less productive firms, the between-firm term contributed positively to the overall productivity growth during the pandemic year. This positive impact however was very limited if one excludes possibly Slovakia.

Figure 5: Within and between-firm productivity growth in the pandemic year



Note: The decomposition follows Bloom et al. (2020).

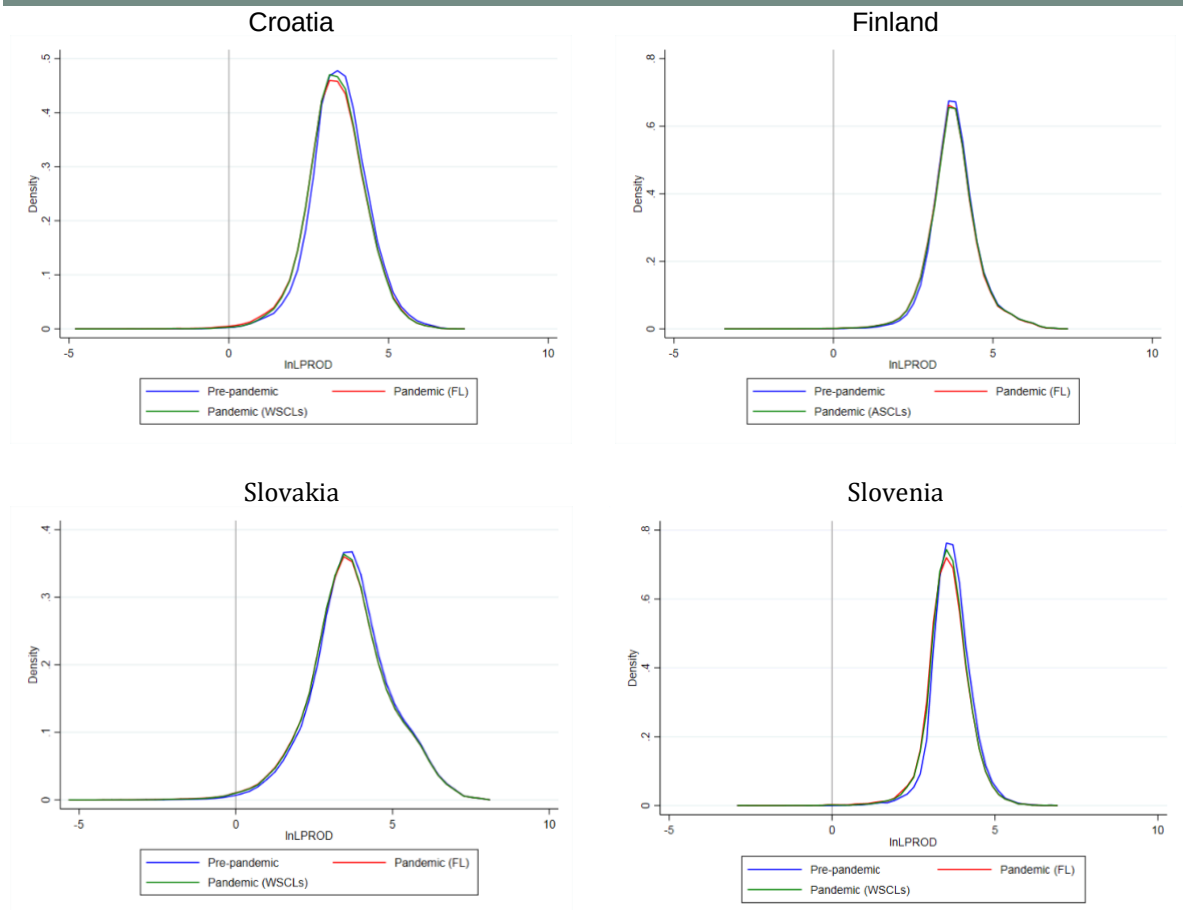
Source: Author's calculations Authors' calculations based on micro-data from Croatia, Finland, Slovakia and Slovenia.

6. How does support shapes productivity distribution?

In order to quantify the effect of support on productivity, we start with the pre-pandemic distribution of labour productivity in 2019. By employing sectoral information on sales in 2020 and employment and cost elasticities to sales, we estimate productivity distribution in the pandemic year 2020.[11] Our results suggest that the pandemic economic decline resulted in temporary shifts in productivity distributions, visible not only in the most adversely affected sectors, but also at the country level.

[11] The sectoral information on sales is proxied by STS Index of turnover originating from Eurostat. Cost elasticities to sales originate from Maurin and Pal (2020).

Figure 6: Distribution of the labour productivity with and without support



Source: Author's calculations Authors' calculations based on micro-data from Croatia, Finland, Slovakia and Slovenia.

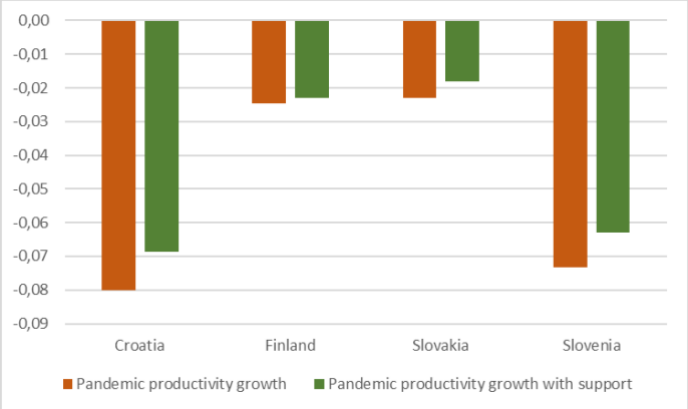
In the next step, we incorporate firm-level Covid-19 subsidies. We may expect them to increase firm revenue, but usually at the cost of keeping the affected employment stable. As a result, a firm's pandemic productivity after receiving subsidy may be higher, but also lower than the pandemic productivity without support. The overall effect will depend on the individual proportions of labour and material costs, their elasticities and the size of the firm-level support.

As documented in Figure 6, our simulations suggest that the distribution of the productivity after receiving government subsidies lies somewhere between the pre-pandemic productivity and pandemic productivity without support. In Croatia, with larger pandemic shock due to higher reliance on tourism related services, but also larger relative support, we may observe stronger shifts in productivity distribution.

After aggregating projected firm-level labour productivities (in 2020) with and without Covid-19 subsidies and comparing them with the aggregate pre-pandemic labour productivity (in 2019), we may quantify overall pandemic productivity growths in the analysed countries. The results for micro-aggregated changes in productivity with and without government support show that

the overall impact of Covid-19 subsidies on productivity was positive, but relatively mild with respect to the pandemic shock in all our countries.

Figure 7: Micro-aggregated productivity growth with and without government support in the pandemic year



Source: Author's calculations Authors' calculations based on micro-data from Croatia, Finland, Slovakia and Slovenia.

Conclusion

By employing actual business developments and early available firm-level information on the distribution of the state aid, we contribute to the discussion on the impact of the Covid-19 pandemic and government support on productivity.

We analyse the experience of four small EU countries, and we find the pandemic led to a significant short-term decline in productivity mainly driven by the within-firm growth component.

We also analyse the allocation of government support. We find reassuring results: more productive firms had higher probability to be supported, though with a lower amount. A relatively large share of subsidies has been allocated to productive and growing firms, while only a small share to zombie or declining firms.

Our estimation suggests that Covid state aid positively affects productivity, but it only partially offsets the large negative effect of the pandemic.

These results underscore important policy consequences. Once the pandemic comes closer to its end, the governments should soften their focus on safeguarding jobs and reconsider the role of productivity in boosting economic growth by strengthening supporting schemes for innovating, productive and growing firms in order to smooth the transition to the new normal.

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Appendix A: Baseline regression results for firm-level probability of being supported during COVID-19 pandemic

VARIABLES	Croatia	Finland	Slovakia	Slovenia
Labour productivity	0.0202***	-0.0003	0.0213***	-0.0673***
	(0.0020)	(0.0010)	(0.0013)	(0.0045)
Macro-sectors				
Construction	-0.1249***	-0.0002	-0.0724***	-0.1229***
	(0.0070)	(0.0028)	(0.0066)	(0.0102)
Wholesale and retail trade	-0.0138**	0.0014	0.0344***	0.0784***
	(0.0061)	(0.0029)	(0.0057)	(0.0091)
Transportation and storage	-0.0733***	-0.0021	-0.0179**	-0.0550***
	(0.0089)	(0.0032)	(0.0081)	(0.0122)
Accommodation and food service activities	0.1447***	0.0036	0.2647***	0.3059***
	(0.0066)	(0.0037)	(0.0092)	(0.0121)
Information and communication	-0.2225***	-0.0064*	-0.1217***	-0.1322***
	(0.0093)	(0.0037)	(0.0076)	(0.0134)
Real estate activities	-0.1246***	-	-0.0885***	-0.0545***
	(0.0134)	-	(0.0085)	(0.0195)
Professional, scientific and technical activities	-0.0865***	-0.0036	-0.0613***	-0.0824***
	(0.0066)	(0.0029)	(0.0059)	(0.0096)
Administrative and support service activities	0.0322***	-0.0027	-0.0367***	0.0866***
	(0.0091)	(0.0036)	(0.0068)	(0.0164)
Size classes				
10 to 19 employees	0.0852***	-0.0009	0.2004***	0.0805***
	(0.0060)	(0.0024)	(0.0067)	(0.0090)
20 to 49 employees	0.0830***	-0.0015	0.2464***	0.1117***
	(0.0081)	(0.0030)	(0.0085)	(0.0113)
50 to 249 employees	0.0727***	-0.0084**	0.3041***	0.1587***
	(0.0116)	(0.0040)	(0.0111)	(0.0149)
250 and more employees	0.0027	-0.0004	0.3313***	0.2323***
	(0.0257)	(0.0093)	(0.0233)	(0.0313)
Observations	71,180	90,855	76,005	30,701

Note: The table shows average marginal effects from the logit regression for binary dummy representing firms that received COVID-19 government support in 2020. Lagged explanatory variables from year 2019. Standard errors in parentheses. The lowest size class (from 0 to 9 employees) and Manufacturing macro-sector used as base values for control variables.

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations based on firm-level datasets.

Appendix B: Alternative regression results for the relative firm-level size of COVID-19 support

VARIABLES	Croatia	Finland	Slovakia	Slovenia
Labour productivity – 2nd decile	-0.2009***	-0.6651*	-0.0835***	-0.0298***
	(0.0057)	(0.3545)	(0.0260)	(0.0034)
Labour productivity – 3rd decile	-0.2226***	-0.7086**	-0.1217***	-0.0379***
	(0.0057)	(0.3548)	(0.0254)	(0.0034)
Labour productivity – 4th decile	-0.2341***	-0.7700**	-0.1366***	-0.0473***
	(0.0057)	(0.3630)	(0.0251)	(0.0035)
Labour productivity – 5th decile	-0.2373***	-0.8648**	-0.1387***	-0.0503***
	(0.0057)	(0.3616)	(0.0250)	(0.0035)
Labour productivity – 6th decile	-0.2454***	-0.9189**	-0.1475***	-0.0545***
	(0.0057)	(0.3621)	(0.0251)	(0.0036)
Labour productivity – 7th decile	-0.2517***	-0.8347**	-0.1595***	-0.0578***
	(0.0058)	(0.3624)	(0.0250)	(0.0037)
Labour productivity – 8th decile	-0.2540***	-1.0021***	-0.1611***	-0.0624***
	(0.0058)	(0.3604)	(0.0251)	(0.0037)
Labour productivity – 9th decile	-0.2602***	-0.3846	-0.1610***	-0.0656***
	(0.0059)	(0.3653)	(0.0251)	(0.0038)
Labour productivity – 10th decile	-0.2621***	-0.8707**	-0.1677***	-0.0671***
	(0.0060)	(0.3729)	(0.0255)	(0.0041)
Constant	0.4042***	2.6386***	0.2792***	0.1679***
	(0.0054)	(0.3622)	(0.0243)	(0.0033)
Controls variables:				
Sector	Yes	Yes	Yes	Yes
Size class	Yes	Yes	Yes	Yes
Observations	44,523	4,849	23,961	14,838
R-squared	0.1120	0.0518	0.0060	0.1850

Note: The table shows results of OLS regressions with relative size of support as dependent variable. The relative size of support is calculated as the share of wage subsidies on labour costs, except Finland, for which the results are based on the share of overall direct subsidies on labour costs. The first decile of labour productivity is used as base value. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculations based on firm-level from Croatia, Finland, Slovakia and Slovenia.

Appendix C: Allocation of subsidies to selected firm clusters

Cluster	Croatia (1)	Finland (2)	Slovakia (3)	Slovenia (4)
High productive	33,91%	24,35%	32,16%	30,16%
Low Productive	7,03%	10,65%	5,82%	9,65%
Young and high productive	2,79%	-	1,10%	1,32%
Zombie	3,47%	2,15%	4,55%	2,37%
High-tech, knowledge intensive	15,60%	24,25%	32,71%	22,62%
Low-tech, not knowledge intensive	76,18%	54,01%	61,93%	70,94%
Growing	16,30%	28,60%	10,91%	12,40%
Declining	2,45%	2,17%	3,03%	3,22%

Note: All figures refer to cluster shares of wage subsidies, except for Finland where only overall subsidies were available. Clusters are not mutually exclusive.

Appendix D: Eurostat Classification of sectors according to technology and knowledge intensity

Industry classification	Nace 2-digit industry	Description
High-medium technology and knowledge intensive services	20-21	Manufacture of basic pharmaceutical products and pharmaceutical preparations; Manufacture of chemicals and chemical products
	26 - 30	Manufacture of computer, electronic and optical products; Manufacture of electrical equipment; Manufacture of machinery and equipment n.e.c.; Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment
	50-51	Water transport; Air transport;
	58-63	Publishing activities: Motion picture, video and television program production, sound recording, and music publish activities; Programming and broadcasting activities; Telecommunications; computer programming, consultancy and related activities; Information service activities
	64-66	Financial and insurance activities
	69-75	Legal and accounting activities; Activities of head offices, management consultancy activities; Architectural and engineering activities, technical testing and analysis; Scientific research and development; Advertising and market research; Other professional, scientific and technical activities; Veterinary activities
	78,80,84-93	Employment activities; Security and investigation activities; Public administration and defence, compulsory social security; Education, Human health and social work activities; Arts, entertainment and recreation.
Medium-low technology and less knowledge intensive services	19	Manufacture of coke and refined petroleum products
	22-25	Manufacture of rubber and plastic products; Manufacture of other non-metallic mineral products; Manufacture of basic metals; Manufacture of fabricated metals products, excepts machinery and equipment
	33	Repair and installation of machinery and equipment
	10-18	Manufacture of food products, beverages, tobacco products, textile, wearing apparel, leather and related products, wood and of products of wood, paper and paper products, printing and reproduction of recorded media
	31-32	Manufacture of furniture; Other manufacturing
	45-47,49,52-53,55-56	Wholesale and retail trade; Repair of motor vehicles and motorcycles (section G); Land transport and transport via pipelines; Warehousing and support activities for transportation; Postal and courier activities; Accommodation and food service activities (section I)
	68,77,79,81,82	Real estate activities; Rental and leasing activities; Travel agency, tour operator reservation service and related activities; Services to buildings and landscape activities; Office administrative, office support and other business support activities;
	94-99	Activities of membership organization; Repair of computers and personal and household goods; Other personal service activities; Activities of households as employers of domestic personnel; Undifferentiated goods- and services-producing activities of private households for own use; Activities of extraterritorial organizations and bodies

Notes: The shows the classification of NACE Rev.2 2-digit sectors according to technology and knowledge intensity. The classification is from Eurostat.