The Productivity Puzzle Revisited: Firm Performance After COVID-19

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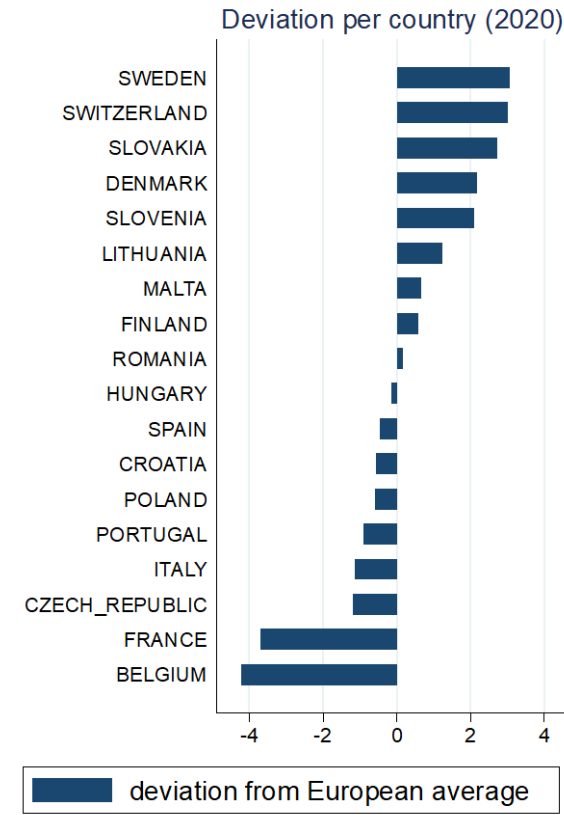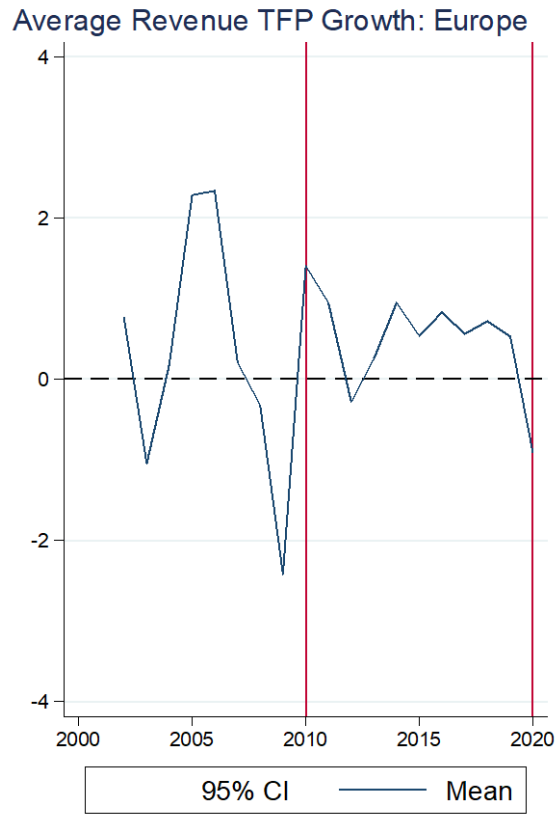
Overview

- Investigating short-term changes in firm performance post-COVID.

- Highlighting the heterogeneity in firm performance by country, sector, firm size, technology- & knowledge-intensity.

- Benchmarking the performance of European "frontier" & "laggard" firms post-COVID.

- Estimating the Phillips curve for firms in different productivity quintiles.

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1.1a Post-COVID TFP Growth

Average Revenue TFP Growth: Europe

Deviation per country (2020)

95% CI — Mean

deviation from European average

- Weak average growth in TFP growth since 2002 and close to zero since 2010

- Immediate decline in TFP post-COVID in 2020; about half the size compared to the Global Financial Crisis (2008)

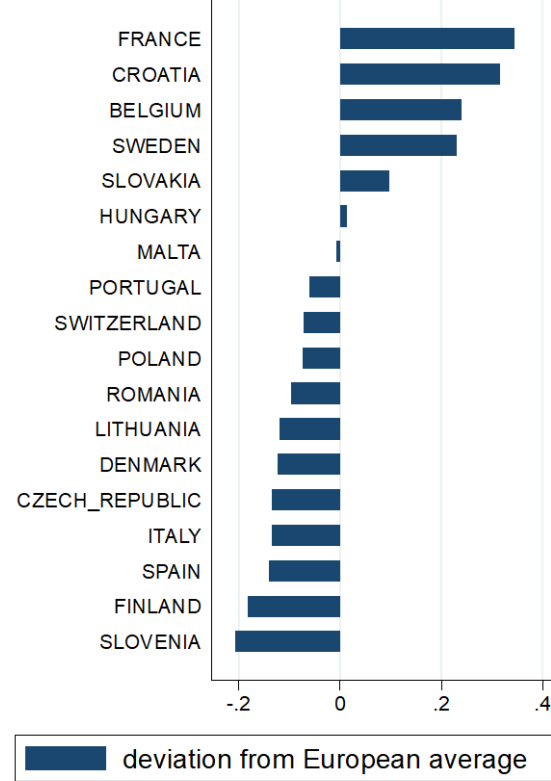- Wide differences in TFP growth across countries in 2020

Source: CompNet 9th Vintage, op_decomp_industry2d_20e_weighted.dta
Note: Average predicted revenue-based TFP growth in Europe for each year, derived from OLS regressions of the TFP growth rate on a full set of year dummies and country-industry pair dummies. Standard errors are clustered on the country-industry level. All available 2-digit industries and countries are pooled. Note that the coverage of countries and sectors changes over time. Between 2010 and 2020, we have a balanced country sample of 18 countries indicated by the vertical red lines. Germany, Latvia & Netherlands are excluded due to unavailability of 2020 data. On the right-hand side, the respective deviations per country from the European average in 2020 are depicted for the balanced sample. Note that the European average excludes Switzerland.

1.1b Post-COVID TFP Dispersion

Dispersion in Average Revenue TFP: Europe

Deviation per country (2020)

95% CI — Mean

deviation from European average
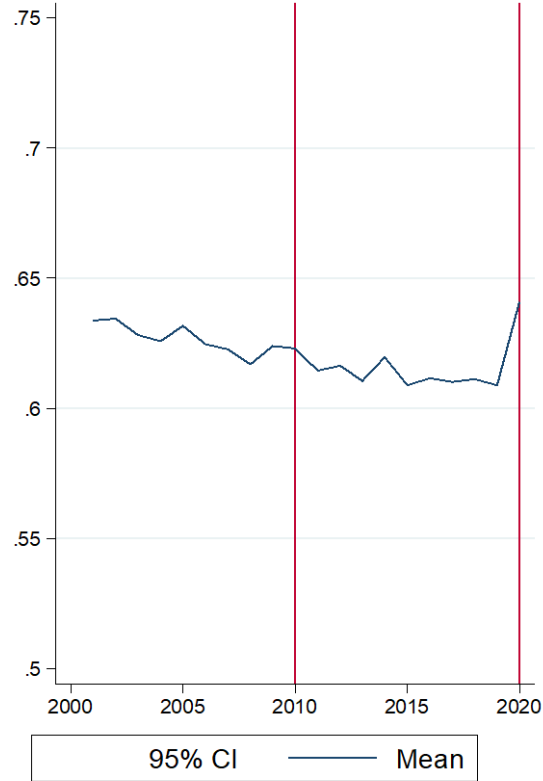
- Large, unprecedented increase in TFP dispersion across Europe in 2020

- Wide variation across countries in within-country TFP dispersion in 2020

Source: CompNet 9th Vintage, unconditional_country_20e_weighted.dta
Note: Average predicted 90th-10th percentile range of revenue-based TFP for Europe for each year, derived from OLS regressions of the 90th-10th percentile range on a full set of year dummies and country-industry pair dummies, with standard errors clustered on the country-industry level. All available sectors and countries are pooled. Between 2010 and 2020, we have a balanced country sample of 18 countries indicated by the vertical red lines. Germany, Latvia & Netherlands are excluded due to unavailability of 2020 data. On the right-hand side, the respective deviations per country from the European average in 2020 are depicted for the balanced sample. Note that the European average excludes Switzerland.

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1.1c Heterogeneity by sector and firm size

- Disproportional impact on some sectors:

  - Sharpest decline in labor productivity in the accommodation and food service activities sector;
    - Within this sector, the largest firms experienced the sharpest decline.

  - Increase in labor productivity in the wholesale and retail and information and communication services sectors;
    - Within these sectors, firms with more than 50 employees reported the largest increase.

1.2 Heterogeneity by technology intensity
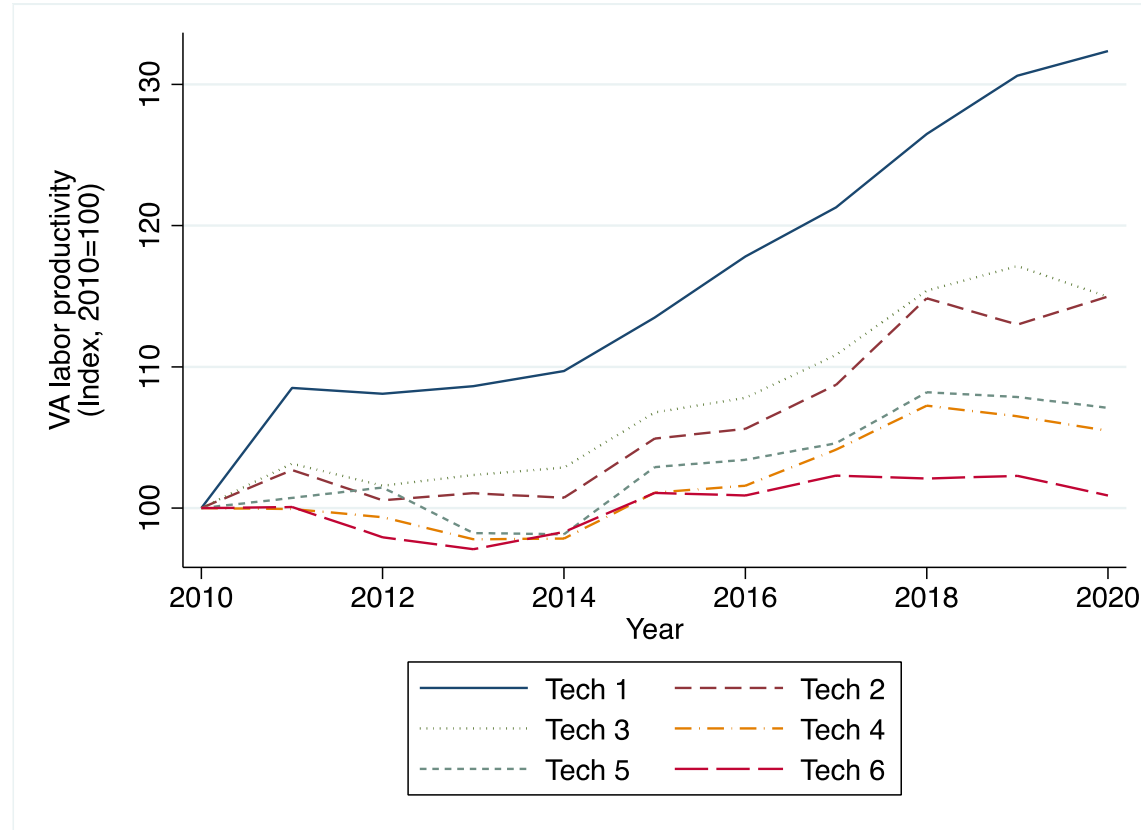
- Increase in labor productivity for firms in high-technology-intensity manufacturing industries.

- In services, productivity declined for firms in both high- & low-knowledge-intensity industries.

- Widening of the productivity gap post-COVID between high-technology intensity firms and the rest.

Source: CompNet 9th Vintage unconditional_techknol_20e_weighted.dta
Note: Categories 1-4 refer to technology sophistication in manufacturing industries (1 being more technology-intensive), while categories 5-6 to knowledge intensity in service industries (5 being more knowledge-intensive) based on EUROSTAT's classification of activities. The chart is based on a balanced sample of 18 countries between 2010 & 2020.

Predicted labor productivity
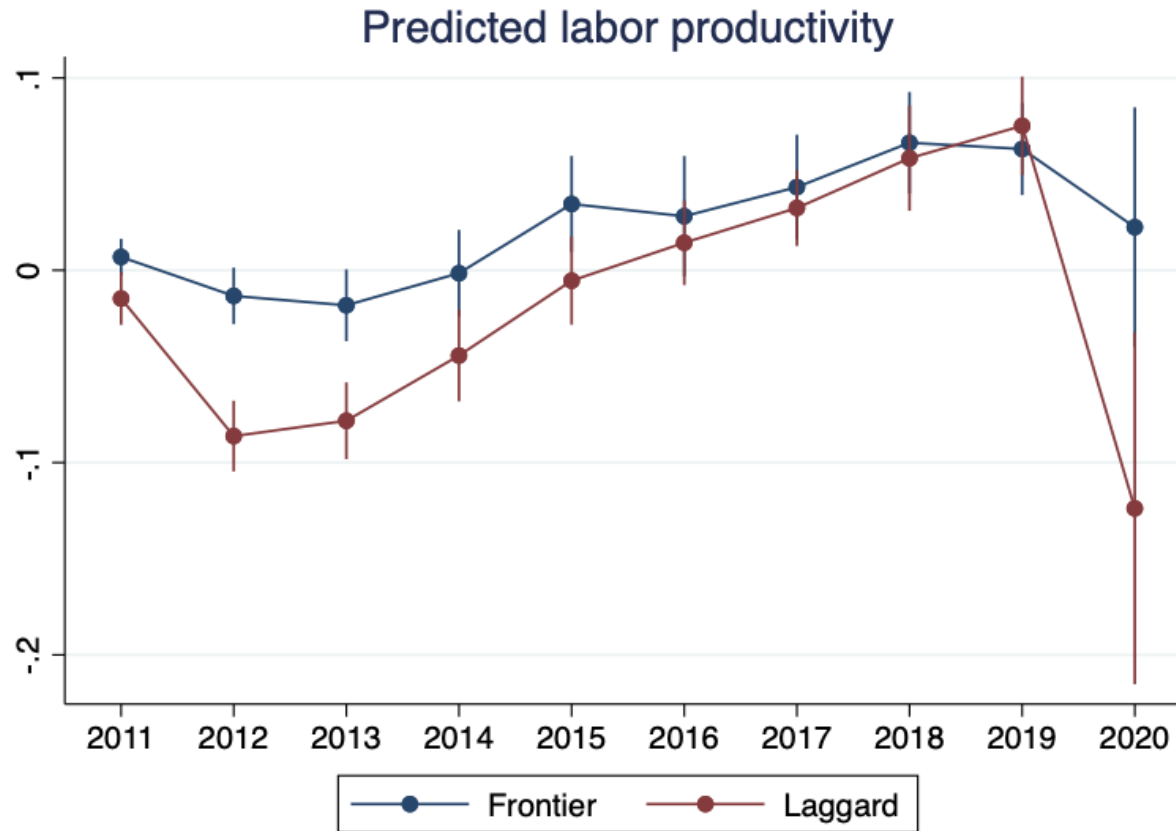
- Widest productivity gap between frontier and laggard firms in 2012; and has since narrowed.

- Evidence of "catch-up" in line with OECD (2020)

- Worsening of the productivity gap between frontier & laggard firms following the COVID-19 shock.

Source: CompNet 9th Vintage, unconditional_industry2d_all_weighted.dta
Note: Frontier firms are firms in the top 10% of the log value-added labor productivity distribution in a sector for a given year. Laggard firms are firms in the bottom 10% of the log value-added labor productivity distribution in a sector for a given year. The vertical axis measures predicted within-industry labor productivity growth from size-weighted regressions of labor productivity on year dummies & country-industry pair dummies for a balanced sample of 14 countries from 2010 to 2020. The weighted regressions also control for capital intensity. Standard errors are clustered at the 2-digit industry level.

1.3 Frontier and laggard firms
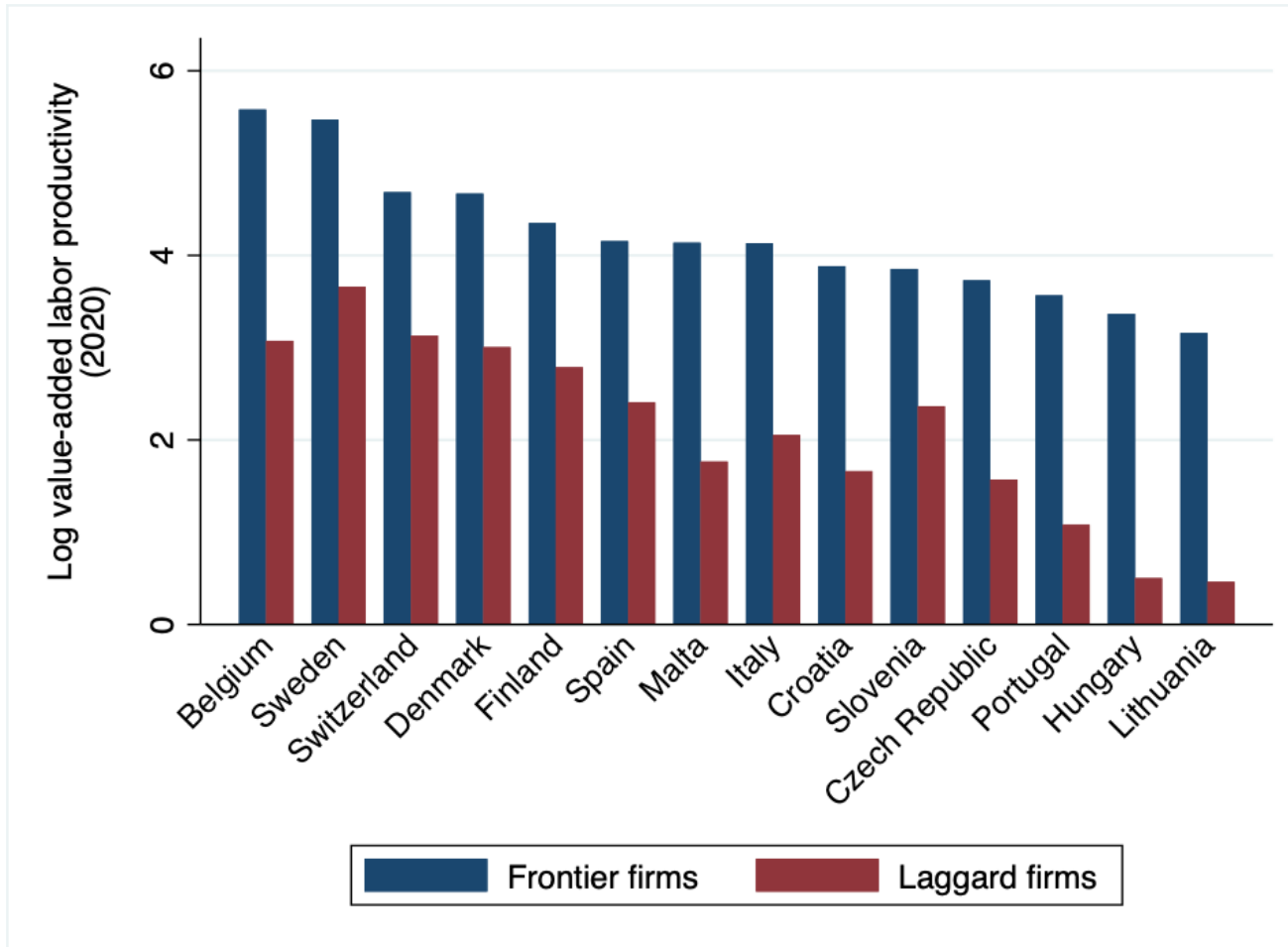
- Smallest productivity gap between frontier & laggard firms: SE, CH, DK, BE

- Largest productivity gap between frontier & laggard firms: LT, HU, PT

- Also large differences in size, real value-added output and real wages between frontier & laggard firms (results available upon request)

Source: CompNet 9th Vintage, unconditional_industry2d_all_weighted.dta
Note: Frontier firms are defined as the firms in the top 10% of the log value-added labor productivity distribution in a sector for a given year. Laggard firms are defined as the firms in the bottom 10% of the log value-added labor productivity distribution in a sector for a given year. Vertical axis measures the average log value-added labor productivity pooled across all sectors for a balanced sample of 14 countries in the year 2020.

Looking ahead

- Continue research in collaboration with Slovenian NPB.

- Estimate a productivity convergence model to investigate the driving factors behind this "catch-up".

- Heterogeneity by country, sector, firm age and technology intensity.

- Check how the productivity gap changes 2021 onwards with the availability of newer data.

1.4 Output gaps and the Phillips Curve for heterogeneous firms

- We find that the slope of a Phillips curve varies by productivity quintile. → Firm-level heterogeneity in the macroeconomic relationship between price changes and market tightness. → CompNet data to align macro and micro.

- Panel regressions on the model:

$$\Delta\%W_{cidt} = \alpha + \beta OutputGap_{cidt} + \beta X_{cidt} + \gamma_{cid} + \sigma_t + \epsilon_{cidt}$$

- Potential output in each country, 2-digit industry, productivity quintile, and year using a standard frontier production function model. → The output gap as the log of actual real sales minus the log potential output.

- Change in real wages slope → of marginal costs of firms. Productivity and costs are inversely related.

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The Phillips curve for Δ% real wages

Models	(1)	(2)
Output Gap	0.136***	0.123***
	(0.007)	(0.008)
Δ% Real Wages$_{t-1}$	-0.311***	-0.313***
	(0.009)	(0.010)
Country Inflation$_{t-1}$		0.119***
		(0.042)
Constant	0.0548***	0.0481***
	(0.006)	(0.0108)
Country-Industry-Quintile FE	Yes	Yes
Year FE	Yes	Yes
Observations	35,600	27,611
R-squared	0.167	0.163

- On average, for a 1 percentage point rise in output gap, wages increase by around 0.13 percentage points. Period 2001-2021.

- The closer firms are to potential output, the higher the inflationary pressure through an increase in real wages.

- Real wages, not inflation → findings are not directly comparable to macro estimates, but in line with them.
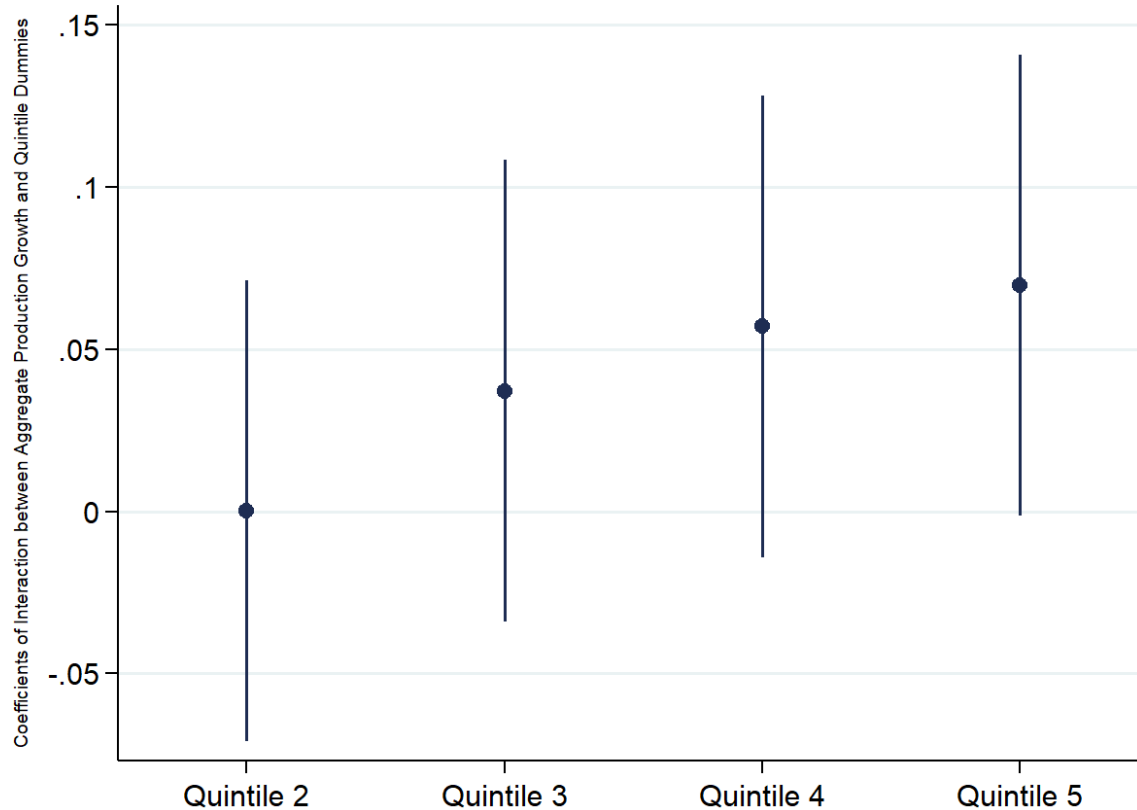
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Slope of the Phillips curve by productivity quintile
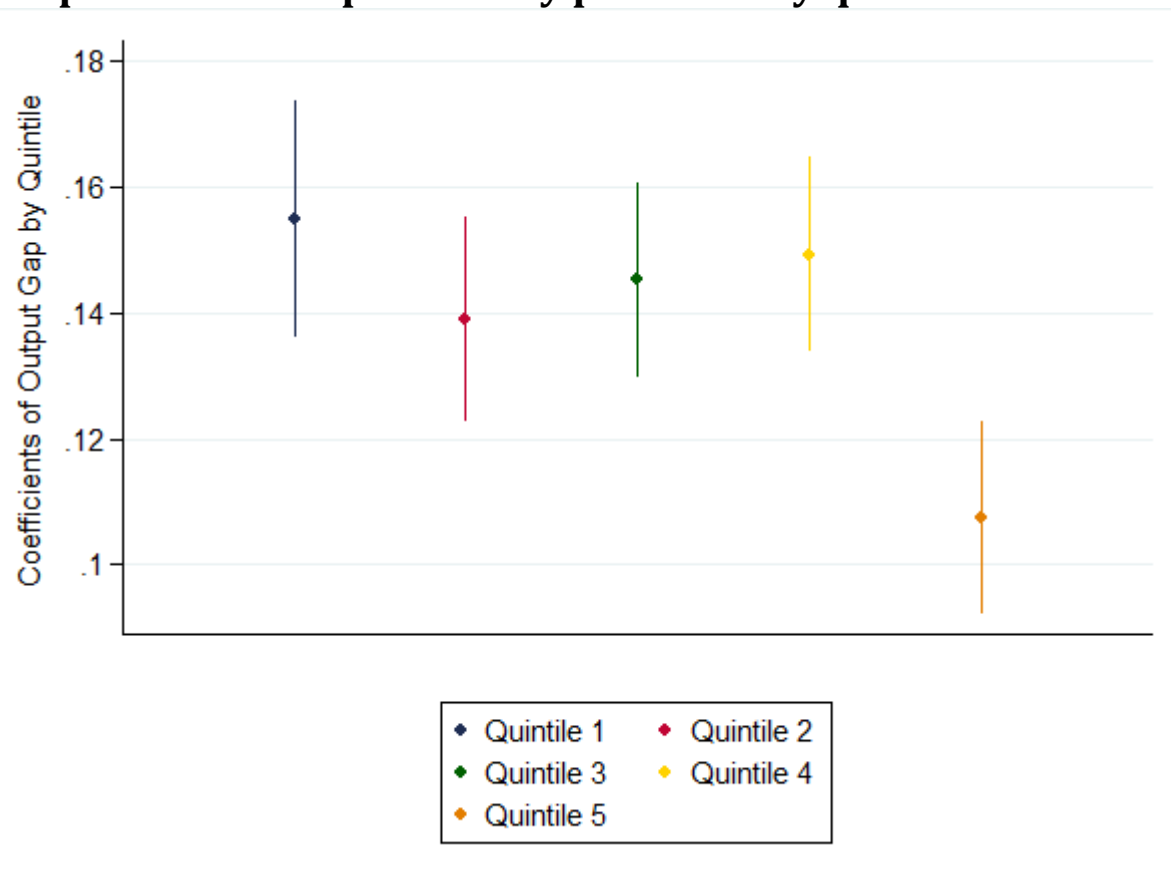
- The Phillips curve is flatter for the most productive firms.

Increase in production by productivity quintile (quintile 1 as reference)

- The most productive firms are the ones that increase their sales the most when aggregate demand increases.

- If demand is disproportionately supplied by the highest productivity (lowest cost) firms, industry prices may rise less than if the demand is met by low-productivity firms, *ceteris paribus*.

- Firm heterogeneity can lead to different inflationary pressure due to varying marginal costs along the productivity distribution.

Thank you!

The floor is now open for discussion.

Appendix

Firm characteristics: frontier & laggard firms

Country	Labor Productivity	Value-added	Real wage	Size
Belgium	2.59	109.58	2.85	3.13
Croatia	3.67	64.19	2.49	2.93
Czech Republic	6.83	35.16	3.11	1.23
Denmark	2.04	29.00	3.65	1.75
Finland	2.05	33.37	3.17	2.34
Italy	3.58	48.31	3.90	2.49
Lithuania	8.00	40.52	2.05	1.30
Malta	4.09	37.68	3.26	1.50
Portugal	9.75	92.03	3.12	3.00
Slovenia	2.56	37.92	2.02	3.71
Spain	2.81	68.91	3.46	2.91
Sweden	1.76	19.87	4.02	1.54
Switzerland	1.88	33.83	3.25	2.30
Full sample	3.00	37.73	3.24	2.20

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