Productivity dynamics in Italy: learning and selection

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Background

- ✓ Micro-sources of Aggregate Productivity and Productivity Slowdown
- ✓ Revival of the topic since the slowdown was noted over the last decade (even pre-COVID) in advanced countries, notably the US (Syverson, 2017)
- ✓ Long-lasting issue in Italy: productivity stagnation more than slowdown (never took off since the '90s, couldn't slow down)

Related literature (huge!)

- ✓ Two ways of tackling micro-sources of aggregate productivity

1. Identify the hampering or favoring factors, and design policies to reduce the former while fostering the latter:
   - ✓ Firm characteristics: innovativeness, technological adoption, organizational capabilities, managerial practices, . . .
   - ✓ Interplay with environment: labour market, finance, regulation of varies kind, market structure, innovation systems, public subsidies/policies, . . .
   - ✓ Italy: labour cost lead competition; low innovation; small size; family ownership; reliance on (bank) credit; limited scope of industrial policy; . . .

2. This paper: productivity decomposition

Productivity decompositions I

- Define aggregate productivity (in a sector or economy-wide) as a weighted average of productivity of business units (firms):

$$\Pi_t = \sum_{i=1}^{N_t} s_{it}\pi_{it}$$

where:

- π_i is productivity of unit i
- s_i is unit's i share in the industry (or in the economy)
- N is the number of firms in the industry (or in the economy)

Productivity decompositions II

1. **Static decomposition** (Olley and Pakes, 1996):

$$\Pi_t = \tilde{\Pi}_t + \sum_{i,t} (s_{i,t} - \tilde{s}_t)(\pi_{i,t} - \tilde{\Pi}_t)$$

where $\tilde{\Pi}_t = \frac{1}{N_t} \sum_{i=1}^{N_t} \pi_{i,t}$ and $\tilde{s}_t = 1/N_t$

✓ First term (unweighted productivity $\tilde{\Pi}_t$): the productivity that would emerge under equal shares, "neglecting" that market shares are in fact unevenly distributed across differently productive units

✓ Second term: deviations from the hypothetical "equal share situation" captured by the first term

⇒ Measure of allocative efficiency/inefficiency of markets: extent to which relatively more productive units enjoy comparatively larger market shares

Productivity decompositions III

2. **Dynamic decomposition**:

✓ Decompose $\Delta\Pi_t$ ($= \Pi_t$ - Π_{t-1}), i.e. aggregate productivity change over time

✓ Micro-level changes underlying aggregate change: (a) $\Delta\pi_i$ and Δs_i experienced by continuing firms; (b) entry and exit

✓ Alternative approaches (Griliches and Regev, 1995; Foster et al., 2001; Melitz and Polanec, 2015) with a common logic:

- WITHIN COMPONENT (focus on $\Delta\pi_i$): changes in unit's level productivities, keeping somehow "fixed" the shares
  $\Longrightarrow$ measuring LEARNING
- BETWEEN and/or COVARIANCE COMPONENTS (focus on Δs_i): changes in market shares across differently productive units
  $\Longrightarrow$ measuring MARKET SELECTION / EFFICIENT REALLOCATION
- NET-ENTRY COMPONENT (when info on entry/exit available)

Productivity decompositions IV

✓ Wrap up:

– Purely math/stat methods to decompose an aggregate quantity

– They are attached a meaning in terms of empirical measures of market selection and market efficiency, by "super-imposing" the theoretical prediction that market forces rewards more productive units with larger shares, statically or over time

– In this interpretation, the level of sectoral aggregation is key (despite often disregarded): one implicitly assumes to describe firms actually competing in the market

$\Longrightarrow$ Having large data is central! And here is where the ISTAT-SSA project becomes crucial

This paper

- ✓ Key point: disaggregated analysis by 5-digit industries, exploiting access to SBS-FRAME data by ISTAT
- ✓ Other features:
  - Analysis of Labour Productivity, as Real Value addedd per employee (full time equivalent)
  - Period 2012-2018
  - Combined use of different decomposition techniques: OP static and FHK/GR dynamic
  - No entry/exit

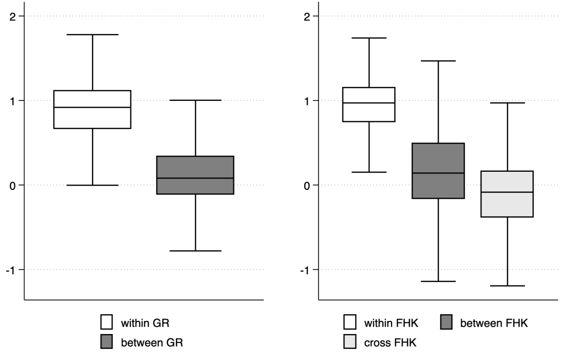
FRAME-SBS data

- Central to the new system of ISTAT integrated data, provides rich register/balance-sheet info
- Quasi-population of firms, thus allowing 5-digit level disaggregation

Year	Total			Manufacturing			Services		
	# 5-digit sectors	# firms	$\overline{\Pi}$	# 5-digit sectors	# firms	$\overline{\Pi}$	N	n	$\overline{\Pi}$
2012	613	2.484.833	34.789,35	280	339.216	43.163,42	333	2.145.617	29.019,20
2013	613	2.418.302	35.441,69	280	323.969	44.714,48	333	2.094.333	29.150,45
2014	613	2.418.418	36.778,78	280	323.536	47.389,56	333	2.094.882	29.718,90
2015	613	2.430.713	38.642,65	280	320.346	50.397,88	333	2.110.367	30.908,64
2016	613	2.440.266	40.303,70	280	315.680	53.146,72	333	2.124.586	31.939,88
2017	613	2.482.292	41.604,49	280	317.857	54.495,13	333	2.164.435	33.157,28
2018	613	2.498.099	43.379,99	280	309.911	56.559,45	333	2.188.188	34.706,54

Selected results: Dynamic decompositions

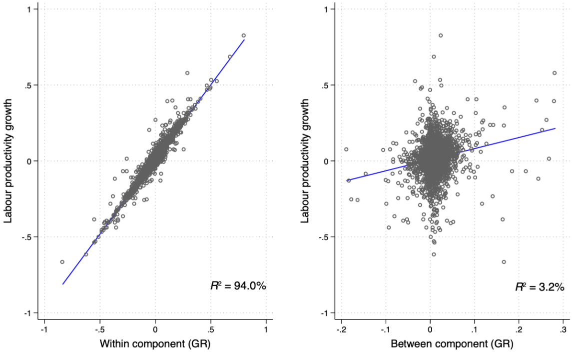
✓ Pooling over sectors and time:



⟹ Within component dominates

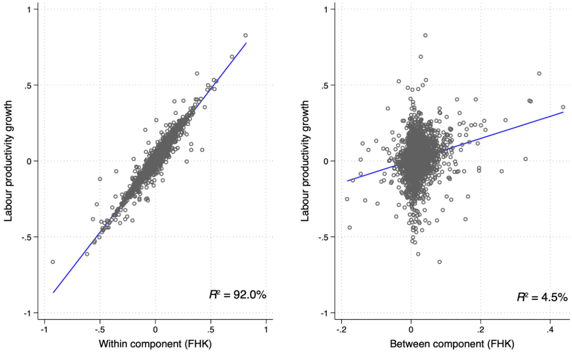
– Same result by year and within Manufacturing and Services

Selected results: Dynamic decompositions



$\Longrightarrow$ Stronger association/predictive power of WITHIN

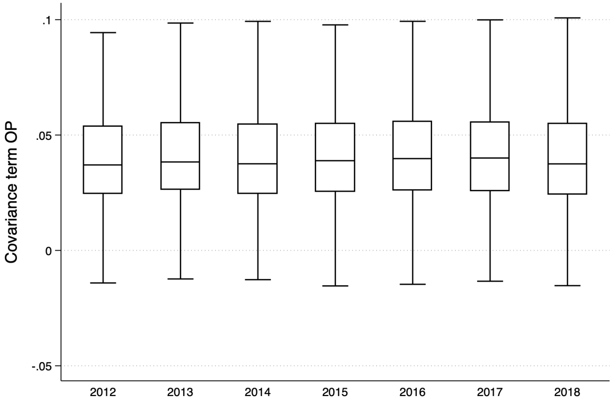
Selected results: Dynamic decompositions



⟹ Stronger association/predictive power of WITHIN

Selected results: Static OP decomposition

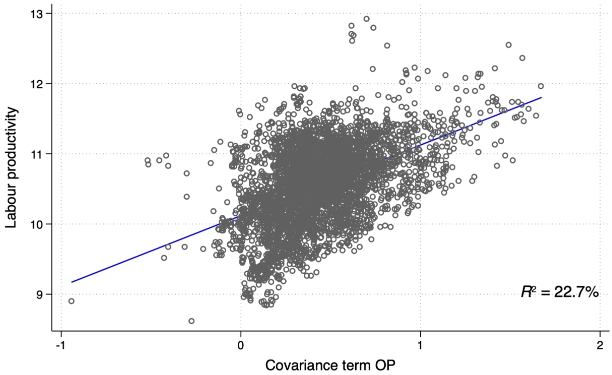
✓ Allocative efficiency component, over time:



⟹ Quite low!

Selected results: Static OP decomposition

✓ Correlation with sectoral productivity:



⟹ Relatively weak association

Concluding

✓ Sum-up of results:

- Learning is more important driver of aggregate productivity
- Allocative efficiency and market selection are weak
- In line with previous studies by SSSA group, not only for Italy Bottazzi et al. (2010); Dosi et al. (2015)
- Here we confirm the results at a much finer grained level of sectoral aggregation: more meaningful to interpret the analysis as revealing about competitive selection

✓ Future developments:

- Add entry/exit
- Explore which firms “drive” the components: large vs. small; dualism between best and the rest; taxonomy of firms based on organizational-technological capabilities identified in the ISTAT-SSSA project

THANK YOU!

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