Understanding Local Productivity Disparities

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Background

- We know that global frontier firms have seen significantly more rapid productivity growth when compared with non-frontier firms. This has remained robust since 2000s.

- The same can be said about UK frontier firms, where the top 10% in the productivity distribution are ten times more productive than those at the bottom 10%.

- **This dispersion remains persistent and impacts the way current measures of productivity, both aggregate and firm-level, should be interpreted….with caution!**

How should productivity be measured?

- This combination of dispersion plus persistence would yield meaningless average (mean) productivity estimates using firm-level data.

- There is a lack of understanding what explains large productivity differences between local areas outside of the "aggregate" productivity level measure.

- We need to consider points across the distribution during comparative analysis over time and area.

Main Research Question

- What explains productivity differences between local LEP areas?

  1. Differently shaped productivity distributions?
  2. Sectoral composition?
  3. Firm size distribution?

- Focusing on the first point…

Data

- Using data from the ONS IDBR (BSD and/or the refreshed BEIS version), we compare productivity at the: 25%; 50% and 75% points of the distribution for firms in each LEP area.

- Whilst such an approach will generate a considerable volume of data, the gains from taking a more nuanced view will allow us to form a more accurate and robust picture of the extent of productivity differences between LEPs.

- Firm vs local unit data at this level of spatial analysis will be a challenge.

Method (1)

- To create points to select for the productivity (turnover per job) distribution for each LEP, quantiles were estimated at 2.5% intervals - initially done for one year.

- LEP's were then ordered by the 50th, 25th and 75th percentile to give an overview of high and low productivity LEP areas.

- We look at the medians (this is the average median due to disclosure issues which meant that we couldn't output the true median itself but rather +- 5 observations averaged) for each year between 2013-2017.

- What we want to know is if these LEP productivity distributions are significantly different from one another….

Median productivity by LEP from 2013-2017
(Ordered by 2017 estimates)
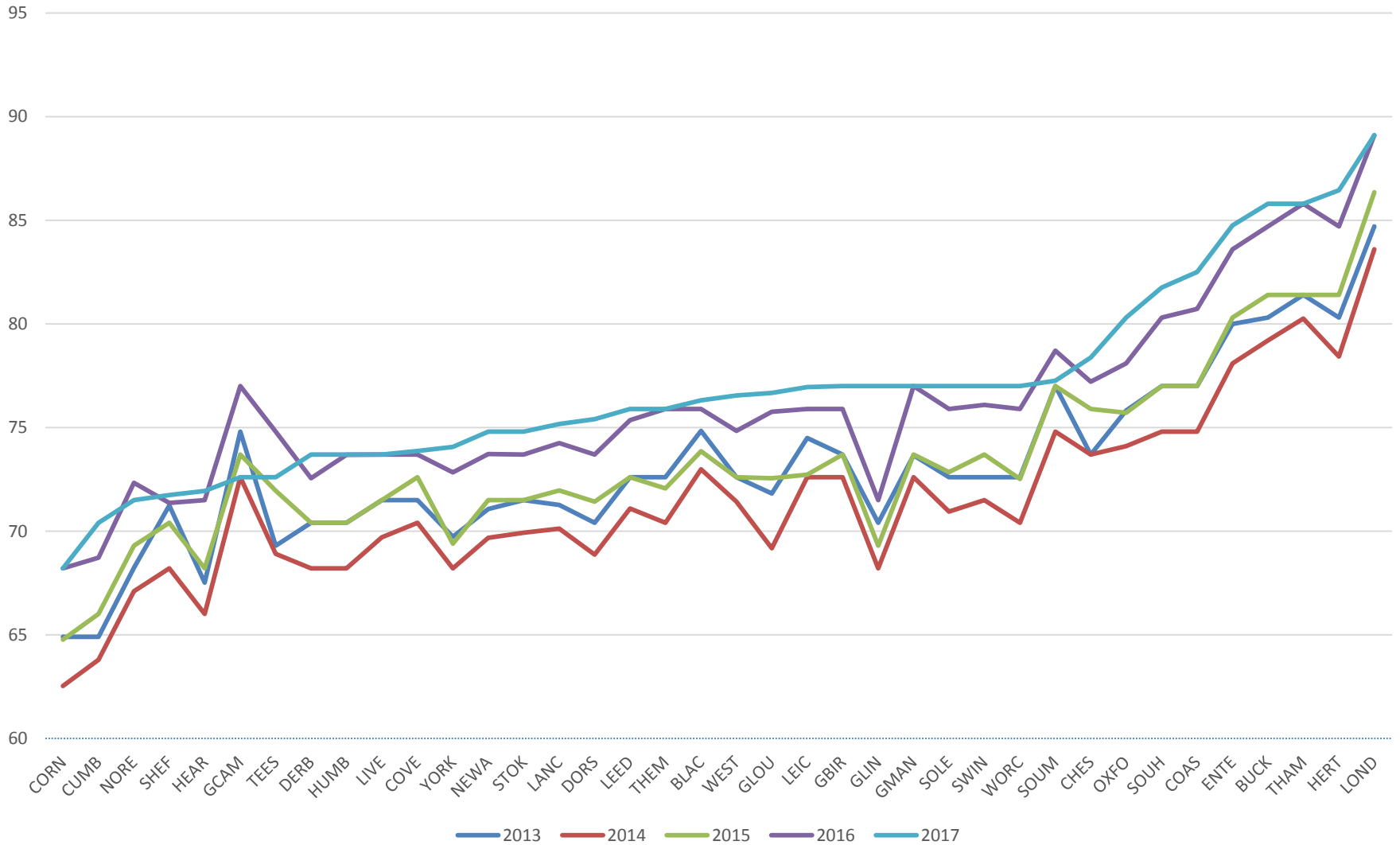
Productivity Variations

- No major productivity distribution differences year to year for each LEP

- Same top LEPs for productivity – London, Thames Valley, Hertfordshire (South East concentration)

- Same bottom LEPs – Cornwall, Cumbria, North East etc

- Using consensus ranking we can see these top and low productivity LEPs…

Consensus Ranking using 2013-2017 median productivity values

LEP	Consensus Ranking	LEP	Consensus Ranking	LEP	Consensus Ranking
LOND	1	LEIC	11	GLIN	19
THAM	2	SOLE	11	HUMB	19
BUCK	3	LEED	12	SHEF	19
HERT	3	THEM	12	YORK	19
ENTE	4	WEST	12	NORE	20
COAS	5	WORC	12	HEAR	21
SOUH	5	GLOU	13	CUMB	22
SOUM	5	COVE	14	CORN	23
OXFO	6	LANC	15		
CHES	7	LIVE	16		
BLAC	8	NEWA	16		
GBIR	9	STOK	16		
GCAM	9	TEES	17		
GMAN	9	DORS	18		
SWIN	10	DERB	19		

Method (2)

- We can see that the distribution of LEPs across time in terms of productivity does not change.

- We now want to test whether LEPs next to each other (i.e. London and Thames Valley), once ordered, have significantly different distributions, as well as, LEPs on opposite ends of the productivity order (i.e. London and Cumbria).

- A simple way to view this is by plotting the quantiles against productivity levels, however, statistical testing is better.

- We use the two sample Kolmogorov-Smirnov (K-S) test which compares whether the empirical distribution function of the same variable from two datasets differ significantly.

- This was the chosen test as there is no prior assumption on the distribution of the data and is nonparametric.

- We do this analysis for LEP pairs for each year between 2013-2018
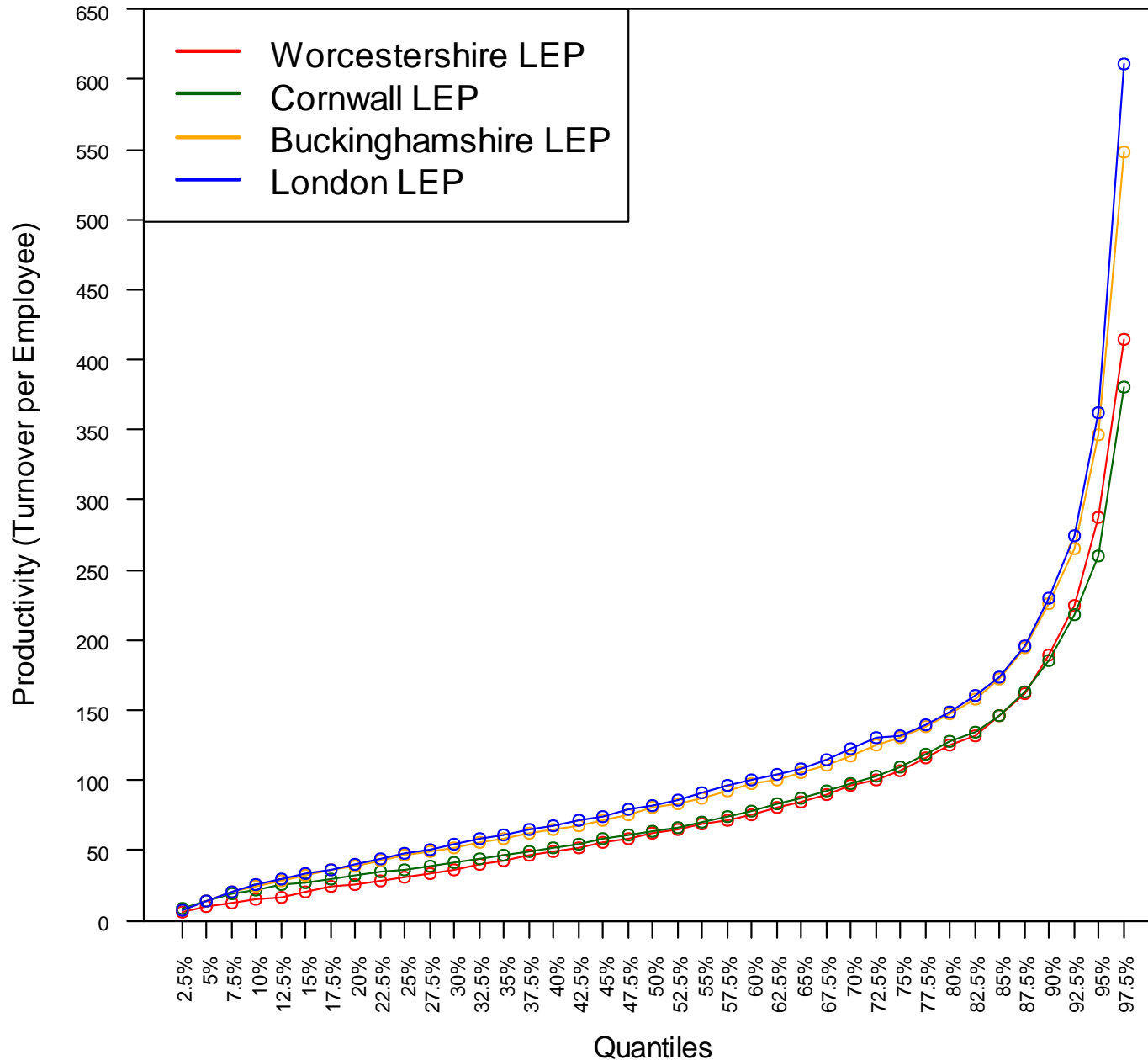
This is the top two preforming LEPs (Buckinghamshire and London) and the two bottom preforming LEPs (Worcestershire and Cornwall) for 2018.

Distributions look very similar, which is confirmed through the KS test.

Results

- We find that there are no significant differences between productivity distribution across LEP pairs.

- This also holds when looking at LEPs at the opposite sides of the productivity order.

- In fact, results suggest no evidence of productivity distribution differences between any LEP pairs.

- So we can rule out overall productivity distribution differences as a possible explanation to local (LEP-level) disparities in productivity.

- However, this may change when looking at subsamples by size and sector….

Early Results from looking at size

- Distribution of productivity in different sized firms has also been estimated.

- Early results indicate that micro firms (1-9 employees) have no statistical difference in productivity distribution between LEPs.

- Medium and large sized firms, however, appear to have a statistical difference when looking at the opposite ends of productivity when LEPs are ordered by their 50th, 75th and 25th percentile.

- These early results suggest that larger sized firms in more/less productive LEPs have other factors (outside of sector and size) that make them more/less productive to the extent that their productivity distributions are affected.

- Residual analysis – where we factor out sector fixed effects using an OLS estimation – was also undertaken and results were the same.

Ongoing work

- Next step….what could be causing the differences in distribution of productivity?

- Will also control for age of firms, legal ownership and other firm characteristics using residuals (or the "unexplained" productivity) from running an OLS regression and looking at the distribution by LEP.

- Sectorial differences may be limited due to disclosure issues in outputting data but aggregating certain sectors will still enable us to hash whether sector plays an important part in the productivity story as well.

Thank you!

Questions/Comments?

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