Spatial Economics and Productivity

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Presentation

By

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Great Britain data, 2010-16

Table 2: Means and 80th and 90th percentiles of ln TFP 2010-16 by administrative region

Region	All Sectors			Manufacturing + High-tech KI Market Services			Services – High-tech KI Market Services		
	Mean[a]	p80	p90	Mean[b]	p80	p90	Mean[b]	p80	p90
London	0.561	1.272	1.941	1.028	1.985	2.721	0.468	1.154	1.700
South East	0.415	1.086	1.616	0.818	1.612	2.226	0.338	0.974	1.459
Scotland	0.391	1.042	1.550	0.779	1.516	2.098	0.336	0.962	1.447
Eastern	0.338	1.005	1.480	0.715	1.476	2.068	0.271	0.893	1.345
North East	0.337	0.980	1.394	0.745	1.474	2.083	0.277	0.907	1.300
West Midlands	0.332	0.961	1.406	0.670	1.351	1.891	0.267	0.869	1.290
North West	0.321	0.980	1.398	0.734	1.450	2.030	0.257	0.901	1.290
East Midlands	0.321	0.942	1.369	0.662	1.373	1.931	0.254	0.833	1.259
Yorkshire-Humberside	0.313	0.936	1.348	0.687	1.379	1.901	0.247	0.845	1.234
South West	0.287	0.908	1.356	0.662	1.412	1.924	0.225	0.811	1.239
Wales	0.267	0.871	1.285	0.601	1.367	1.886	0.218	0.788	1.184
Gap (highest-to-lowest)	0.294	0.401	0.656	0.427	0.618	0.835	0.250	0.366	0.516
Gap (London with South East)	0.146	0.186	0.325	0.210	0.373	0.495	0.130	0.180	0.241

[a] mean values are all significantly less (at the 1% level) than that of the South East except London (which is significantly larger at 1% level)

[b] mean values are all significantly less (at the 1% level) than that of the South East except Scotland (not significant) and London (which is significantly larger at 1% level)

Table 3: Relative mean ln TFP 2010-16 by city and sector

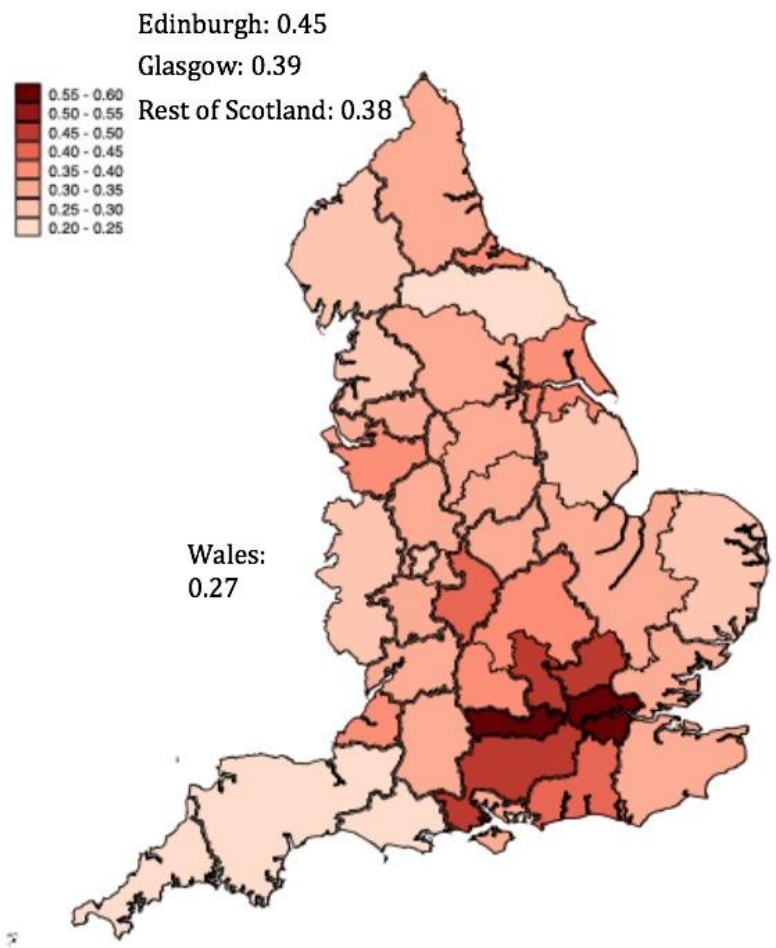
City	All Sectors		Manufacturing + High-tech KI Market Services		Services – High-tech KI Market Services	
	City – South East[a]	City – rest of region	City – South East	City – rest of region	City – South East	City – rest of region
London	0.145***		0.209***		0.129***	
Edinburgh	0.044*	0.076***	0.082	0.180***	0.046*	0.048*
Glasgow	-0.032	0.000	0.181***	0.279***	-0.052**	-0.050**
Nottingham	-0.042	0.055*	0.107	0.285***	-0.061**	0.020
Liverpool	-0.046**	0.054**	0.012	0.131*	-0.027	0.056**
Coventry	-0.056*	0.026	0.031	0.191**	-0.072**	-0.002
Bristol	-0.057*	0.078***	-0.056	0.111	-0.062**	0.056*
Manchester	-0.067***	0.033	0.230***	0.349***	-0.098***	-0.015
Cardiff	-0.068**	0.093***	-0.050	0.195*	-0.056**	0.074***
Birmingham	-0.091***	-0.009	-0.134***	0.026	-0.080***	-0.010
Tyneside	-0.092***	-0.018	-0.048	0.032	-0.077***	-0.021
Leicester	-0.118***	-0.021	-0.111	0.067	-0.150***	-0.069**

[a] Administrative region (not LEP). Note, mean productivity in the South east was 0.415, 0.818, and 0.338, respectively for all sectors, manufacturing (plus HT KI market services) and the rest of services (Table 2)

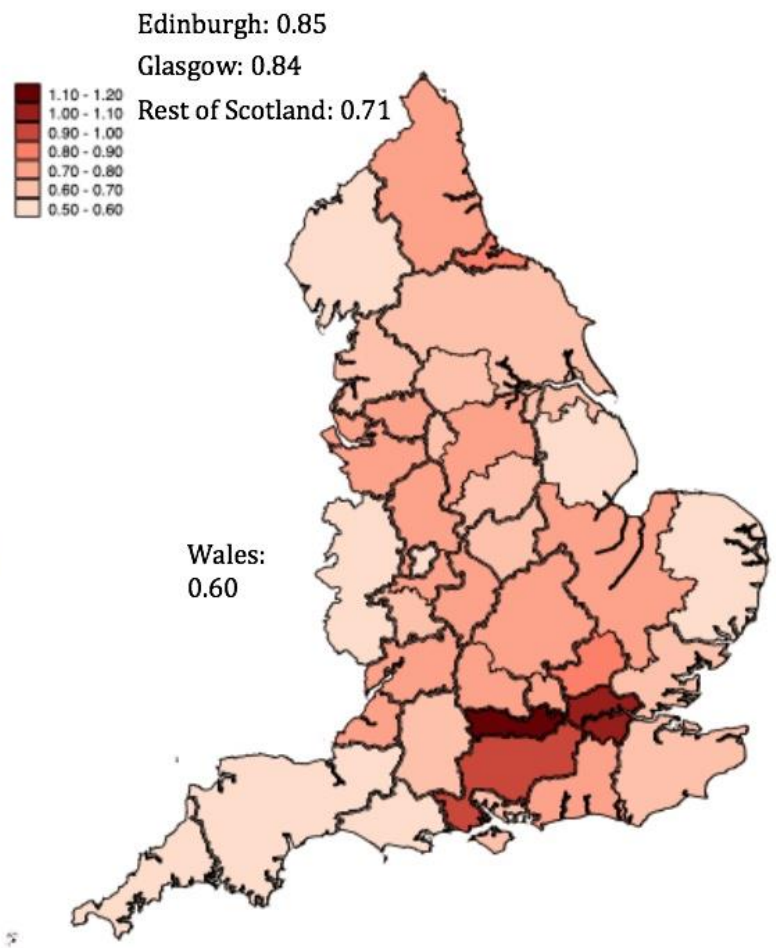
***/**/* statistically significant (based on *t*-tests) at 1/5/10% levels.

Figure 1: Mean ln TFP 2010-16 by LEP

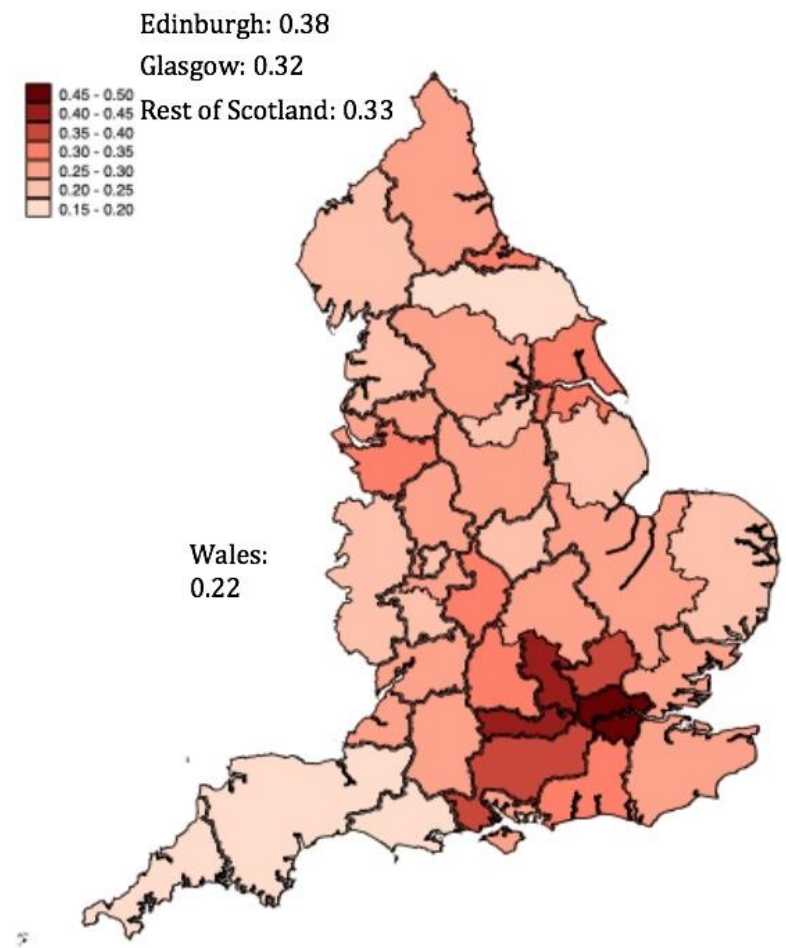
(a) All sectors



(b) Manufacturing + high-tech KI market services

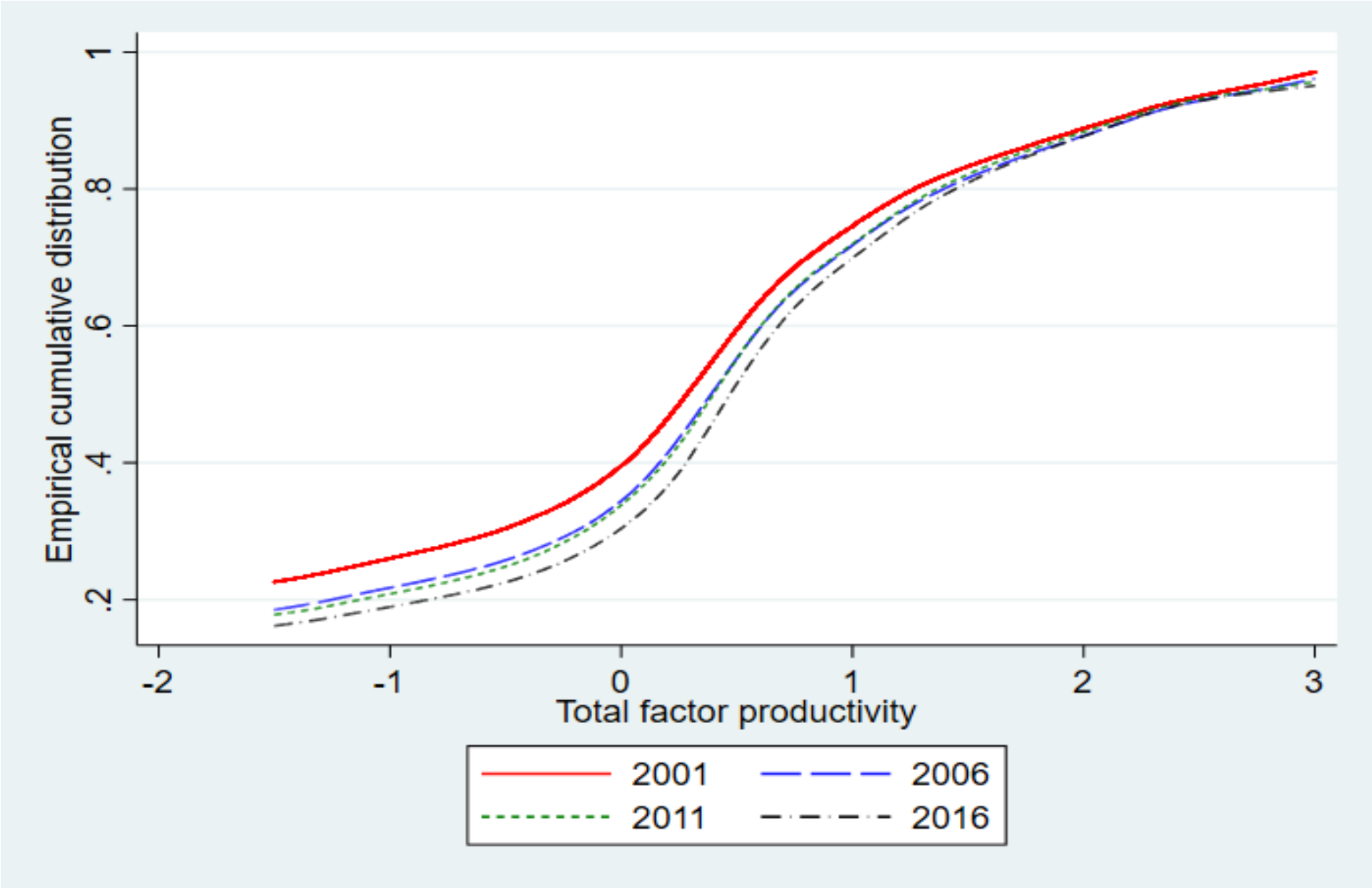


(c) Services minus high-tech KI market services

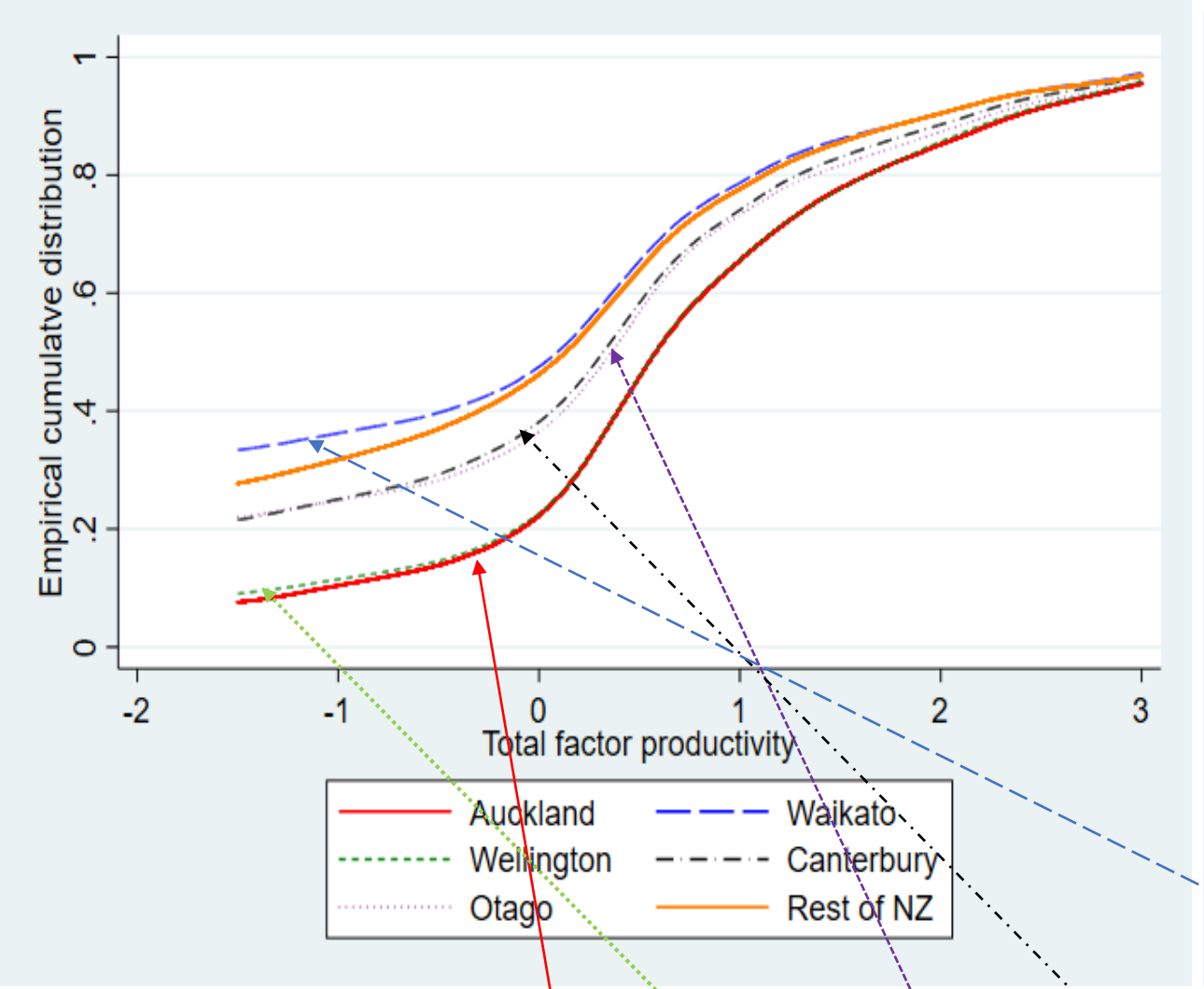


Source: Table U.5

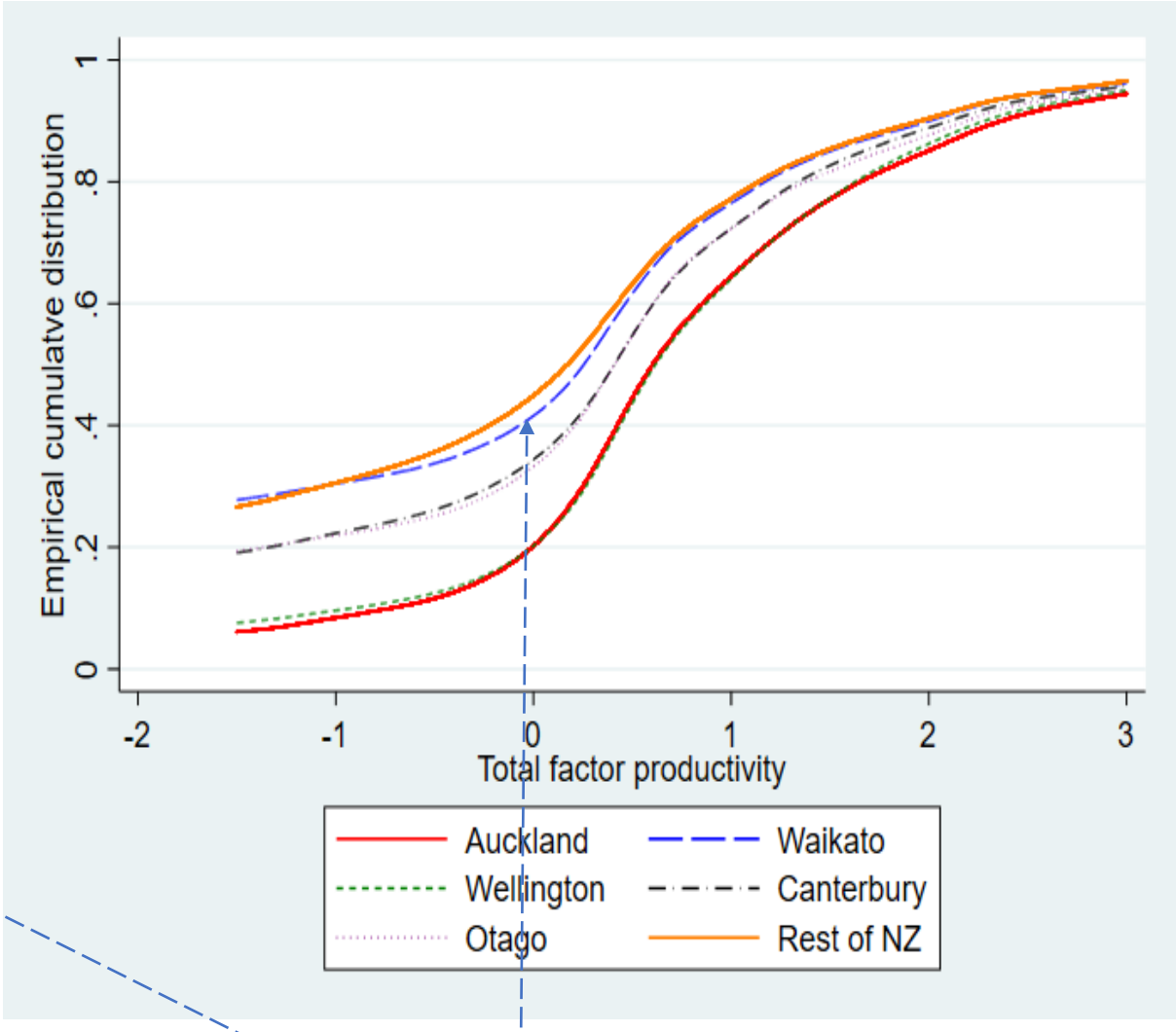
(b) Over time New Zealand firm data 2001-2016



(c) Regions 2001-07



(d) Regions 2008-16



	Auckland	Wellington	Otago	Canterbury	Upper North	Waikato	Lower North	South Isla
2001-2007	0.525	0.478	-0.027	-0.103	-0.239	-0.677	-0.697	-0.611
2008-2016	0.627	0.587	0.099	0.04	-0.076	-0.431	-0.467	-0.593

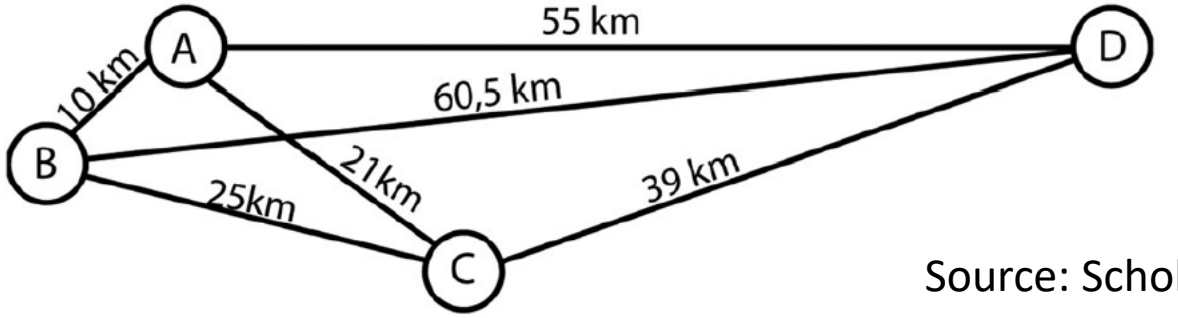
Impact of agglomeration - Measuring proximity

- Use a Distance index
  - based on mapping the location of every plant to every other plant in an industry
- Obtained by calculating the distance in kilometres between all pairs of (weighted by employment) plants in each of 64 industries, using the plant's located in 2,020 area units and the following formula:

$$D_i = \frac{1}{J-1}\sum_{j=1,j\neq i}^{J}\left(e^{-0.05(d_{i,j})} \times \frac{E_j}{\sum_{k=1,k\neq i} E_k}\right)$$

  - where D_i is the sum of inverted distances from plant *i* to all other plants in the same 4-digit industry;
  - *J* is the number of observations;
  - $d_{i,j}$ is the distance between plant *i* and *j*;
  - E_j is the number of employees in plant *j*; and
  - $\sum_{k=1,k\neq i} E_k$ is the total employment in all other plants, except plant *i*, in the observed industry.

Simple example



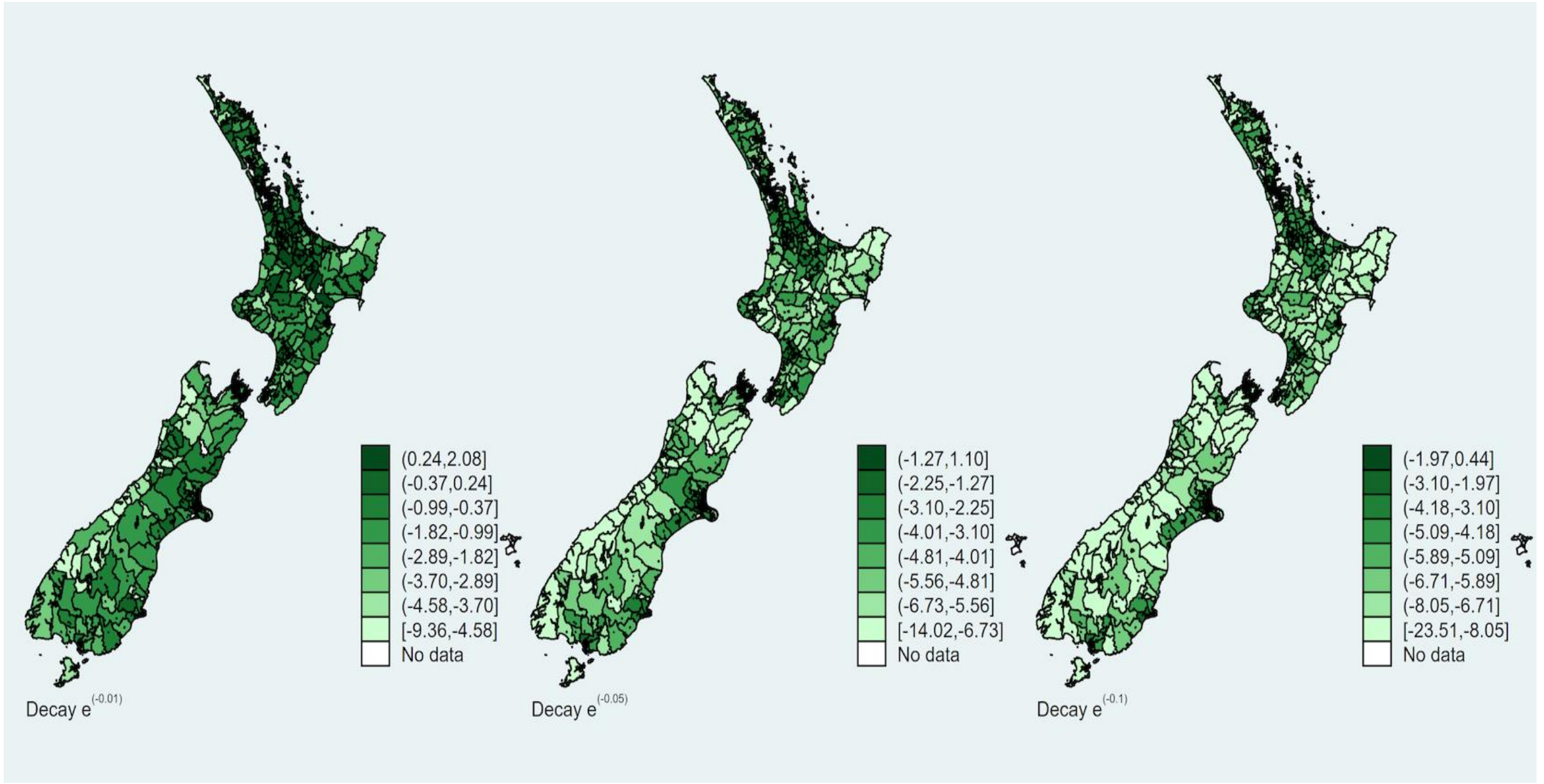
Source: Scholl and Brenner (2016)

- Consider 4 plants (A-D). Assuming all plants are of equal size, for plant *A* its D_i value is:

$$\frac{1}{3}\left(e^{-0.05(10)} + e^{-0.05(21)} + e^{-0.05(55)}\right) = 0.34$$

- The values for plants *B, C, D* are: 0.31, 0.26 and 0.08, respectively.
- The higher is D_i value, the more a plant is located in spatial proximity to other plants in the same industry.

Average *ln* Distance by area unit code (2013 boundaries), 2016 all 64 NZSIOC industries (2,020 area units are covered including small islands)



Low decay

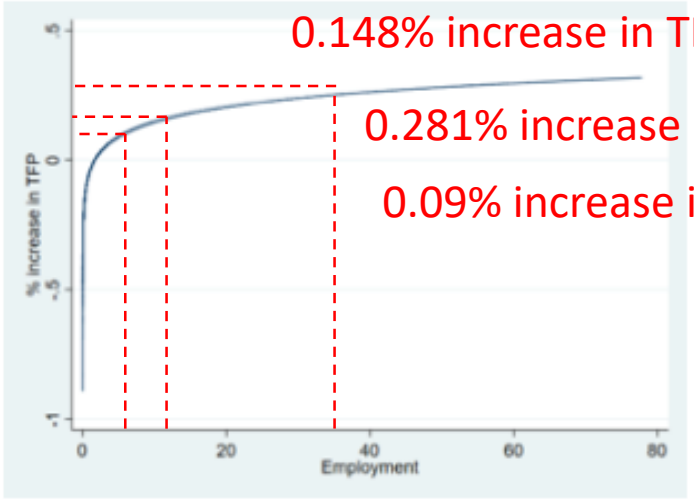
Medium decay

High decay

Effect of a 1% increase in distance index on TFP for different sized firms, 2001-16

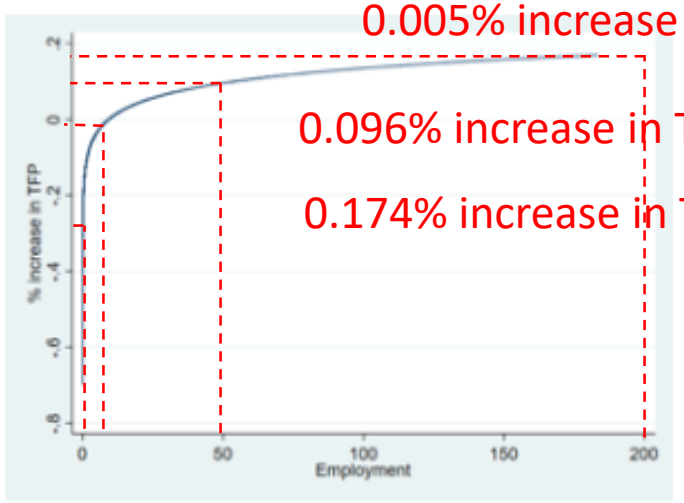
0.09% increase in TFP

(a) Sheep, Beef cattle and grain farming (AA12)



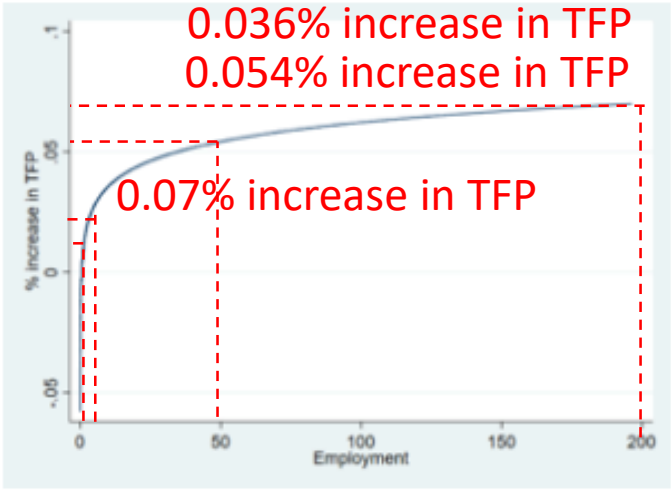
0.035% ***de***crease in TFP

(b) Forestry & logging (AA21)



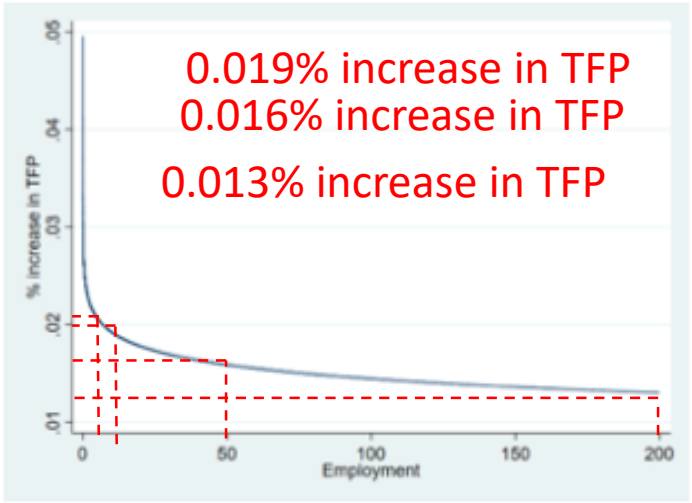
0.028% increase in TFP

(c) Mining (BB11)



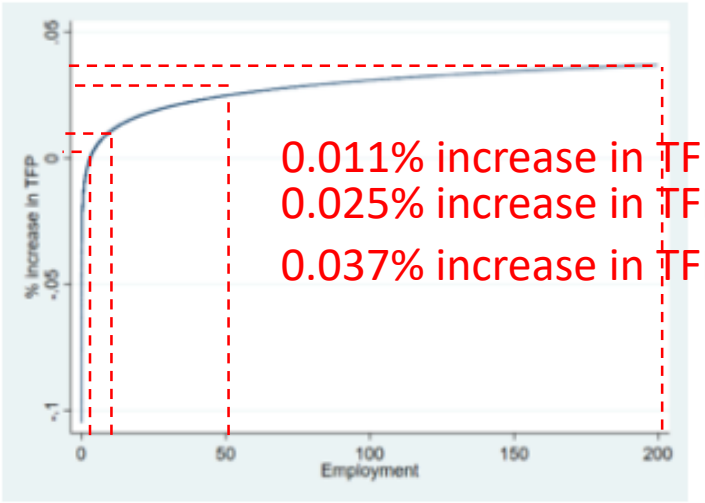
0.017% increase in TFP

(d) Textile, leather & clothing (CC21)



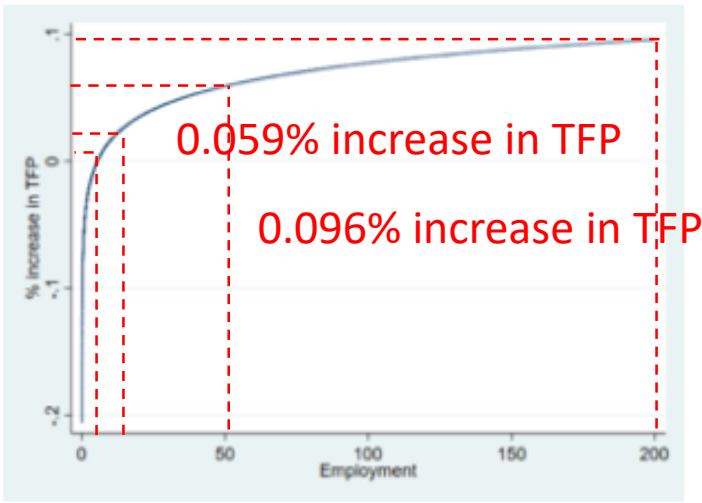
0.021% increase in TFP

(e) Printing (CC41)



0.005% increase in TFP

(f) Transport equipment (CC81)



0.002% ***de***crease in TFP

Summary of distance results

- In 26 out of 37 industries more agglomerated plants belonging to larger firms had significantly higher TFP
  - The results are statistically significant in 16 industries (in 10 not statistically significant)
  - especially important in:
    - forestry & logging; printing; transport equipment; heavy & civil engineering construction; motor retail; other retailing; finance & insurance
- only 6 out of 37 industries there was no relationship between agglomeration and TFP
  - Food, beverage & tobacco; petrol, chemicals & rubber; non-metallic minerals; supermarkets; rail, water, air transport; professional, technical & scientific services
- In 5 out of 37 industries more agglomerated plants belonging to smaller firms had higher TFP
  - Significant in 3: textiles, leather, clothing; road transport; and administration & support services
  - Not statistically significant in 2: information media; and telecoms, internet & library services