City Dimensions of the Great Productivity Slowdown

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(www.cityevolutions.org.uk)

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The Productivity Problem

"Productivity isn't everything, but in the long run it is almost everything". (**Paul Krugman, 1994**)

"Productivity is the challenge of our time…The UK has a long-term productivity problem, which has been made worse by the financial crisis. (**UK Treasury, 2015**)

"The productivity puzzle is among the most pressing public policy issues today". (**Andy Haldane, Bank of England, 2017**)

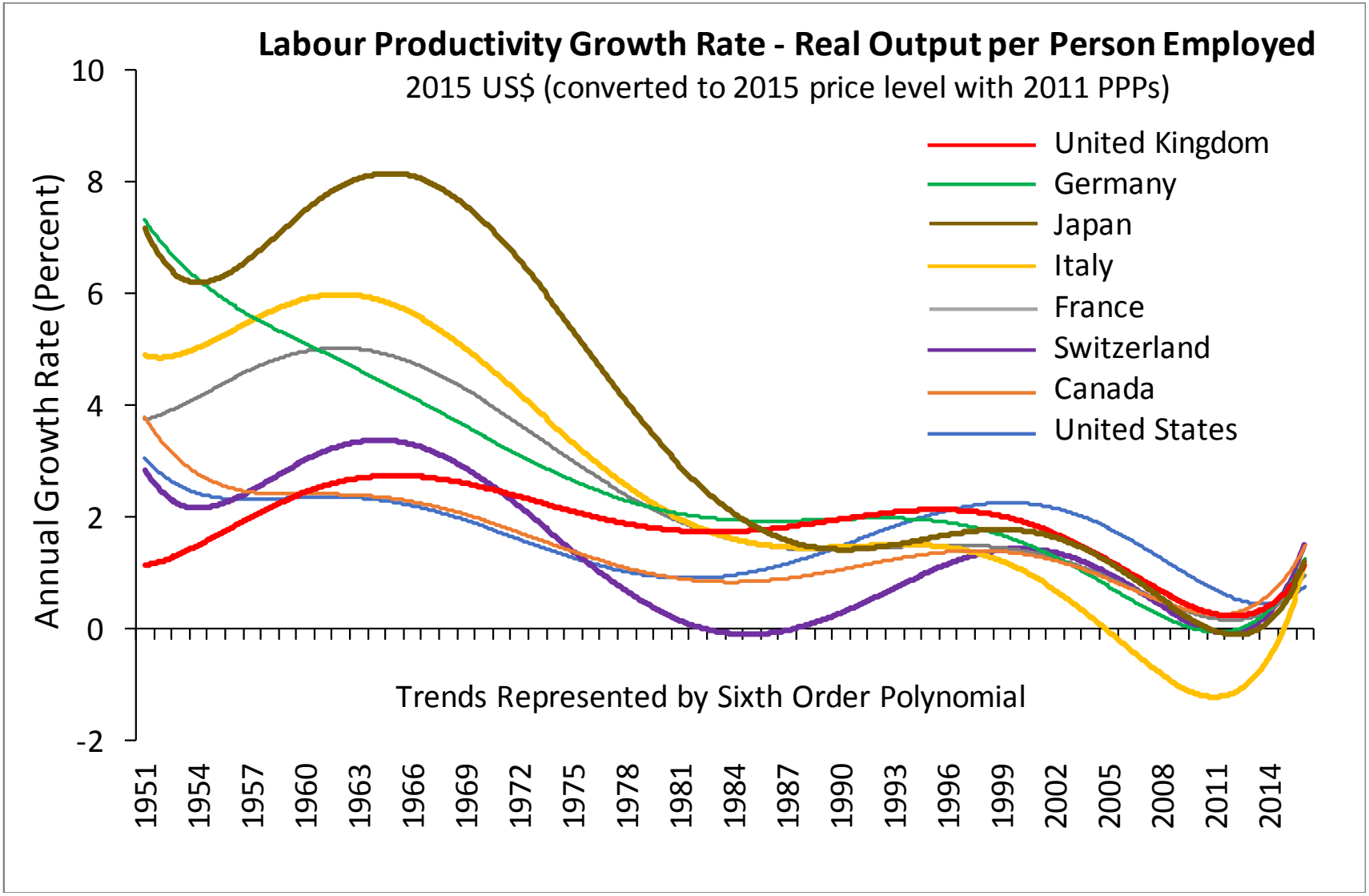
Why Productivity Matters

- Although not unproblematic (definition and measurements issues), productivity matters
- Productivity is not everything, but as Krugman stresses, it does shape much else in an economy
- **Productivity growth influences**:
- Competitiveness in international markets
- Real wage growth and hence living standards
- Household incomes and consumption
- Taxes and resources for public services

The Concern over Productivity

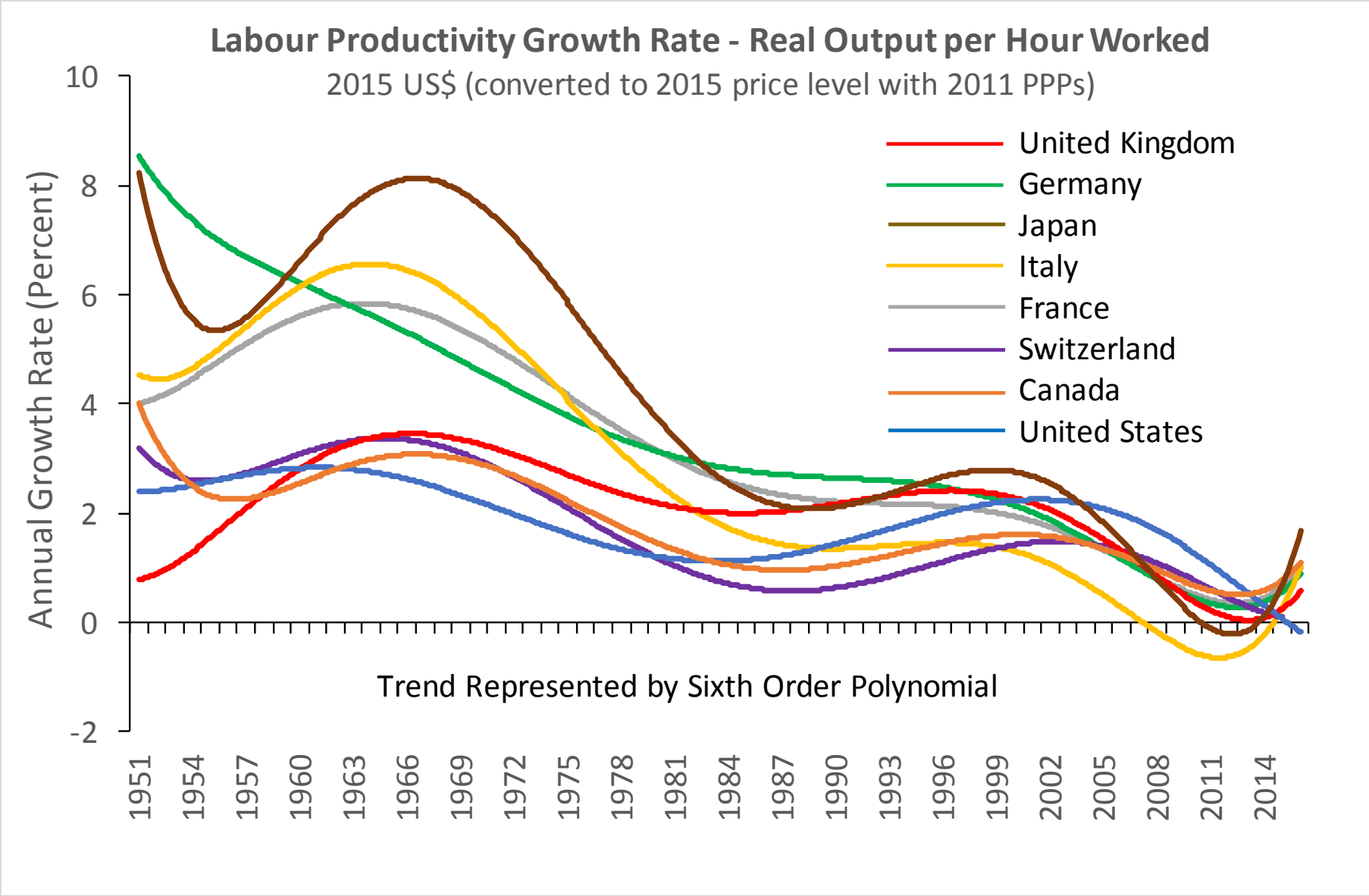
- Much concern and debate over ‘recent stagnation’ of productivity since the global financial crisis, especially in US and UK
- But in fact, ‘productivity problem’ long predates the crisis
- In most advanced economies, productivity **growth** seems to have peaked in the late-1960s and has been on a declining trend since, allowing for cyclical movements

The Productivity Problem, 1951-2016



Source: Conference Board Total Data Base (Productivity converted to 2015 US$, 2011 PPP)

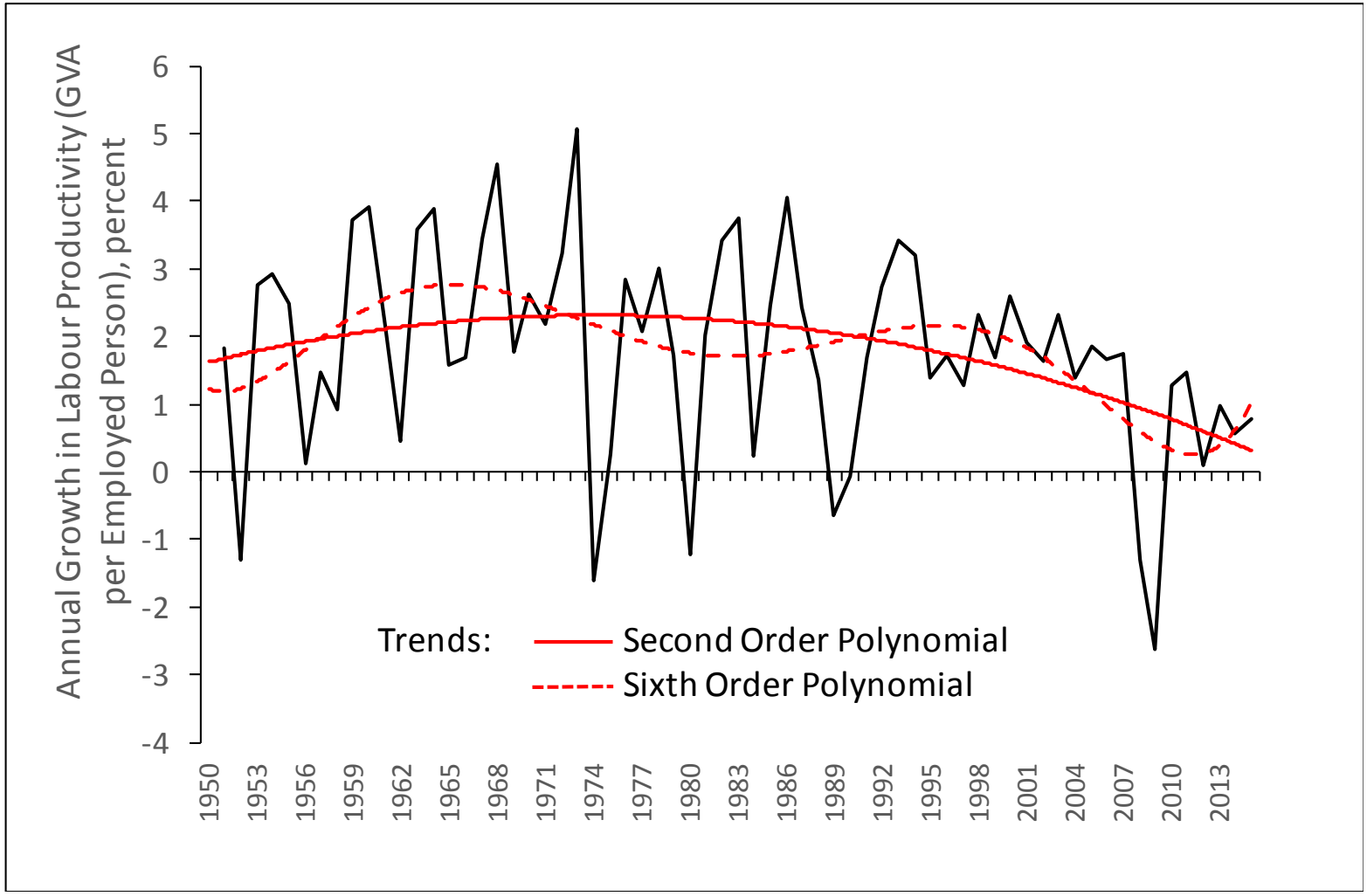
The Productivity Problem, 1951-2016



Source: Conference Board Total Data Base (Productivity converted to 2015 US$, 2011 PPP)

The UK Productivity Problem

Annual Growth Rate of Real Output Per Worker, 1951-2016



Source: Conference Board Total Data Base (Productivity converted to 2015 US$, 2011 PPP)

The Great Slowdown in Productivity Growth

Average Annual Growth in Labour Productivity (percent per annum)

	1950-1980	1980-2016
United States	2.49	1.93
Canada	2.77	1.18
Germany	8.35	1.61
France	7.26	1.45
Italy	9.82	0.78
UK	2.81	2.02
Switzerland	3.32	0.61

Source: Conference Board Total Data Base (Productivity converted to 2015 US$, 2011 PPP)

The Slowdown in Productivity

- Debate over causes
- **1. Technological advances no longer show up in measures of productivity**
  - The ‘Solow Paradox’ – despite diffusion of computers and ICT, these don’t seem to show up in productivity figures (Triplett, 1999; Crafts, 2002)
  - ICT and Internet increase ‘consumer surplus’ rather than labour productivity?
- **2. Innovation has stalled**
  - Past three industrial-technological revolutions resulted in peak of productivity growth in middle of 20thC, few remaining opportunities for improving pace of productivity advance (Gordon, 2012, 2016)
  - Advanced economies have reached historical technological plateau (Cowen, 2011)

The Slowdown in Productivity

- Debate over causes
- **3. Fall in business dynamism and 'ageing business structure'**
  - Rate of new firm formation has stalled over recent decades, and new small firms tend to have faster productivity growth than large firms (Brookings Institution, 2014; European Central Bank, 2016)
- **4. Over-regulation of markets**
  - Increasing regulation of labour and product markets from 1960s onwards slowed productivity advance
  - Deregulation in 1980s and 1990s led to a partial resurgence of productivity but not sustained (Conway and Nicoletti, 2017)

The Slowdown in Productivity

- Debate over causes
- **5. Monopolisation of ICT technologies**
  - Domination of ICT by handful of global corporations
  - Has limited competition in emergent e-economy, and and restricted diffusion and application of technologies
- **6. Lack of investment in public capital**
  - Public capital formation is key to economic growth
  - Widespread slowdown in investment in public capital formation and infrastructural investment after 1970s (Aschauer, 1989; Munnell, 1990; Tatom, 1993**)**

The Slowdown in Productivity

- Debate over causes
- **7. Shift to post-industrial economy**
  - Manufacturing main source of productivity advance
  - Many services have limited scope for productivity growth
  - These services have grown rapidly as share of national economies (Baumol et al 1985; Williamson, 1991, Kim, 2006), hence slowed down overall productivity growth
- **8. The geographical dimension**
  - Copious evidence that productivity varies between regions and cities (OECD, USA)
  - Is it because the above causes are themselves geographically uneven?
  - Are there also place-specific effects?

Cities and the Productivity Problem

"While the pundits are right to debate the facts and causes of slowing productivity growth at the national level, they would do well also to explore the local dimension of the problem. After all, while many of the proposed causes of malaise—less competition in industries and fewer technological breakthroughs, among others—remain national, many of them may be distinctly local". **(*Why Some US Cities Are So Much More Productive Than Others*, Marc Muro and Joseph Parilla, 2017)**

- Convergence of city productivity across US cities up to 2000, divergence since

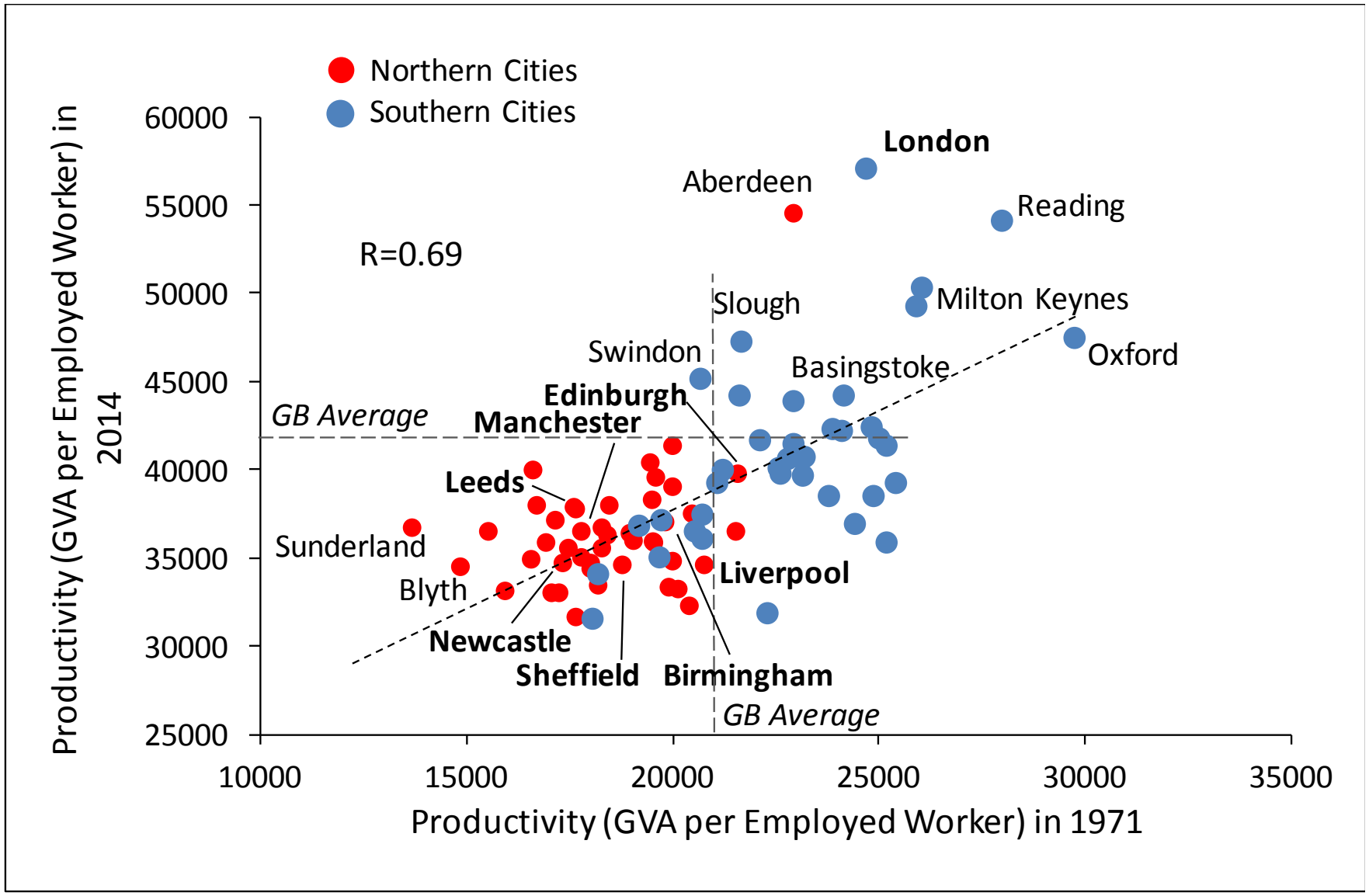
Constructing an Empirical Base for UK Cities

- No officially produced regular data on city productivity in UK
- Our ESRC project has constructed new unique yearly data set on 85 British cities over 1971-2015
- Cities defined as travel-to-work areas (2011 boundaries)
- Employment, gross value added (GVA), and GVA per employed worker (labour productivity), 2015 prices
- For 45, 82 and 249 (from 1981) sectors for each city
- Also time series data for each city on population (since 1977), 25 occupations (since 1981), patents (since 1981), and firm demographics (since 1997)

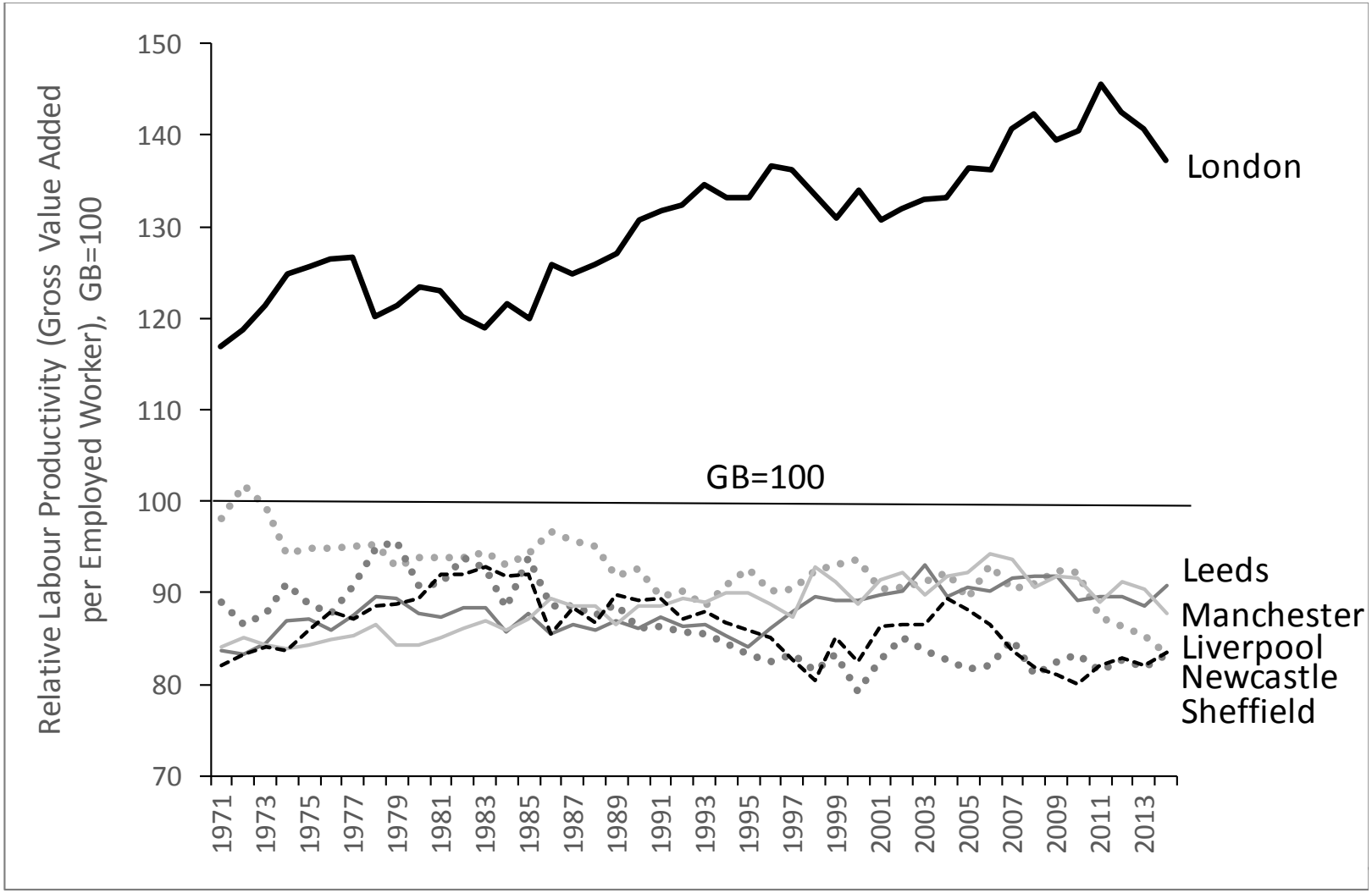
The Productivity of British Cities

- Marked and persistent differences between southern and northern cities (correlation between labour productivity levels in 1971 and 2014 of R=0.686)
- Almost all northern cities have below national average productivity in both 1971 and 2014
- Majority of southern cities have above national average productivity in both 1971 and 2014
- With exception of London and Edinburgh, all other major cities have below national average productivity
- London has pulled away from other cities

Labour Productivity across 85 British Cities, 1971 and 2014



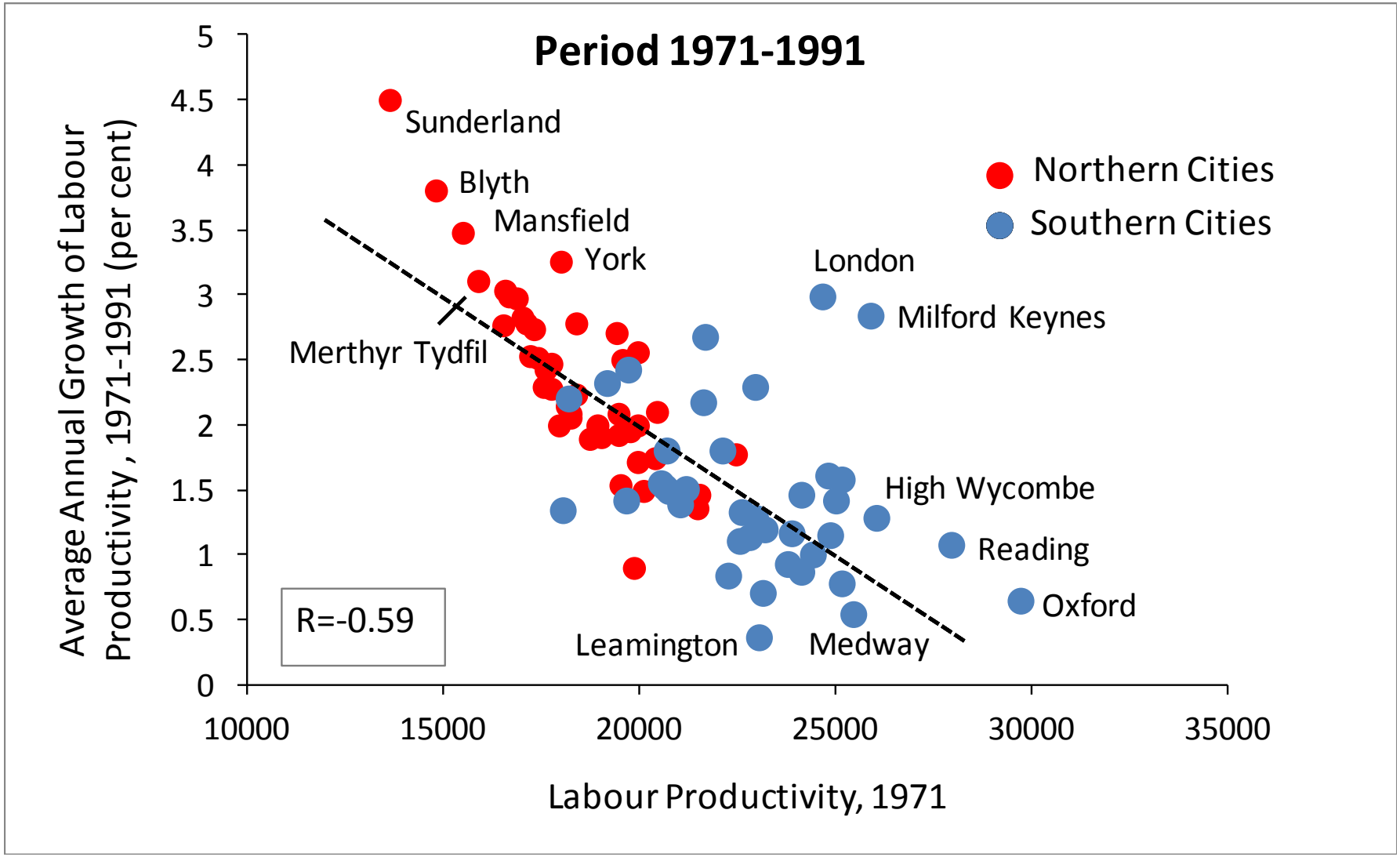
Labour Productivity in London and Major 'Northern Powerhouse' Cities, 1971-2014 (GB=100)



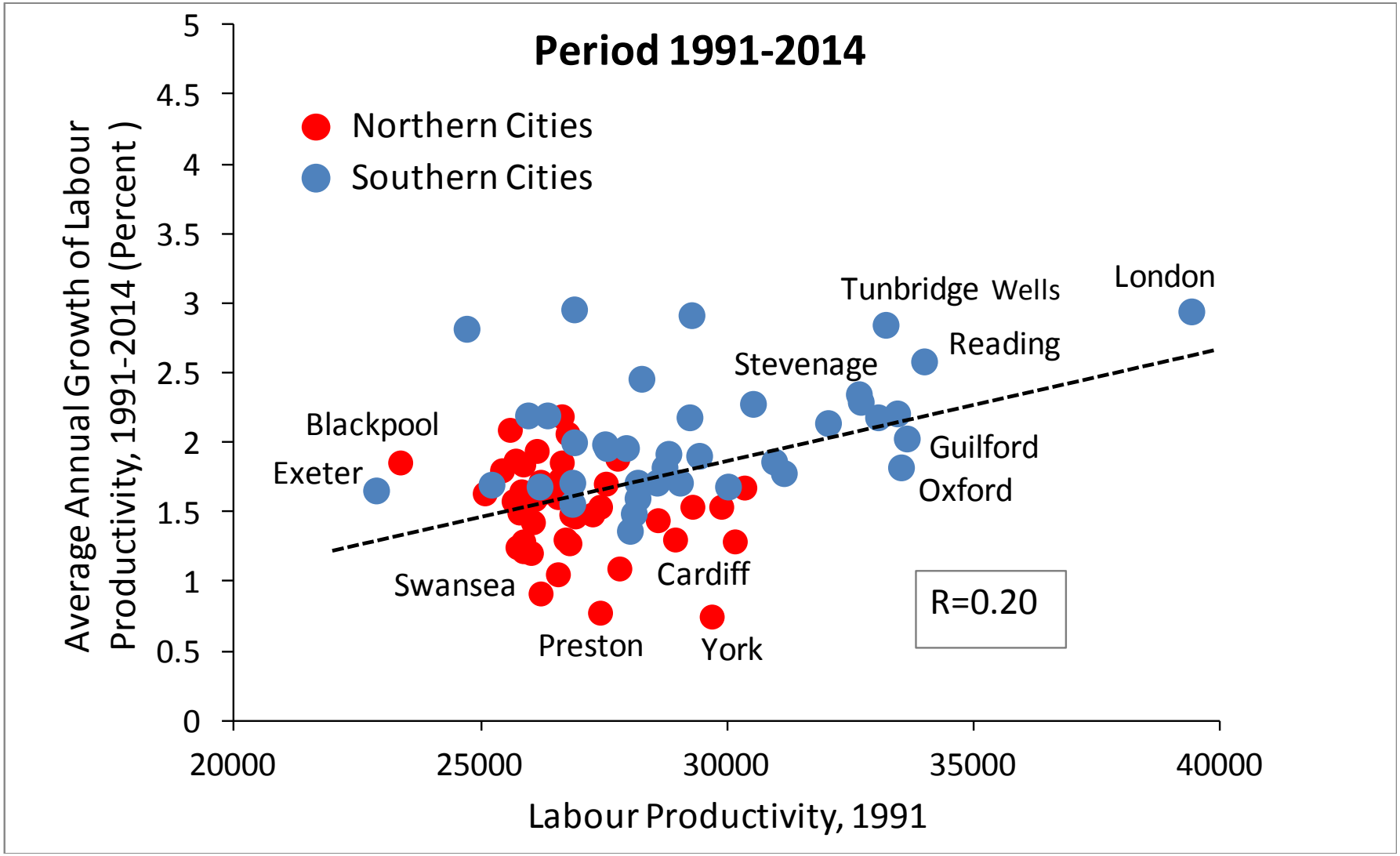
The Productivity of British Cities

- However, growth over two subperiods, 1971-1991 and 1991-2014 suggests a change in dynamics occurred around 1990
- Convergence over 1971-1991 (Higher productivity growth rates in Northern cities – productivity catching up with Southern cities)
- But divergence over 1991-2014 (Southern cities grew faster – productivity pulling ahead of Northern cities)
- And productivity growth in Northern cities in 1991-2014 period also slower than in 1971-1991 period

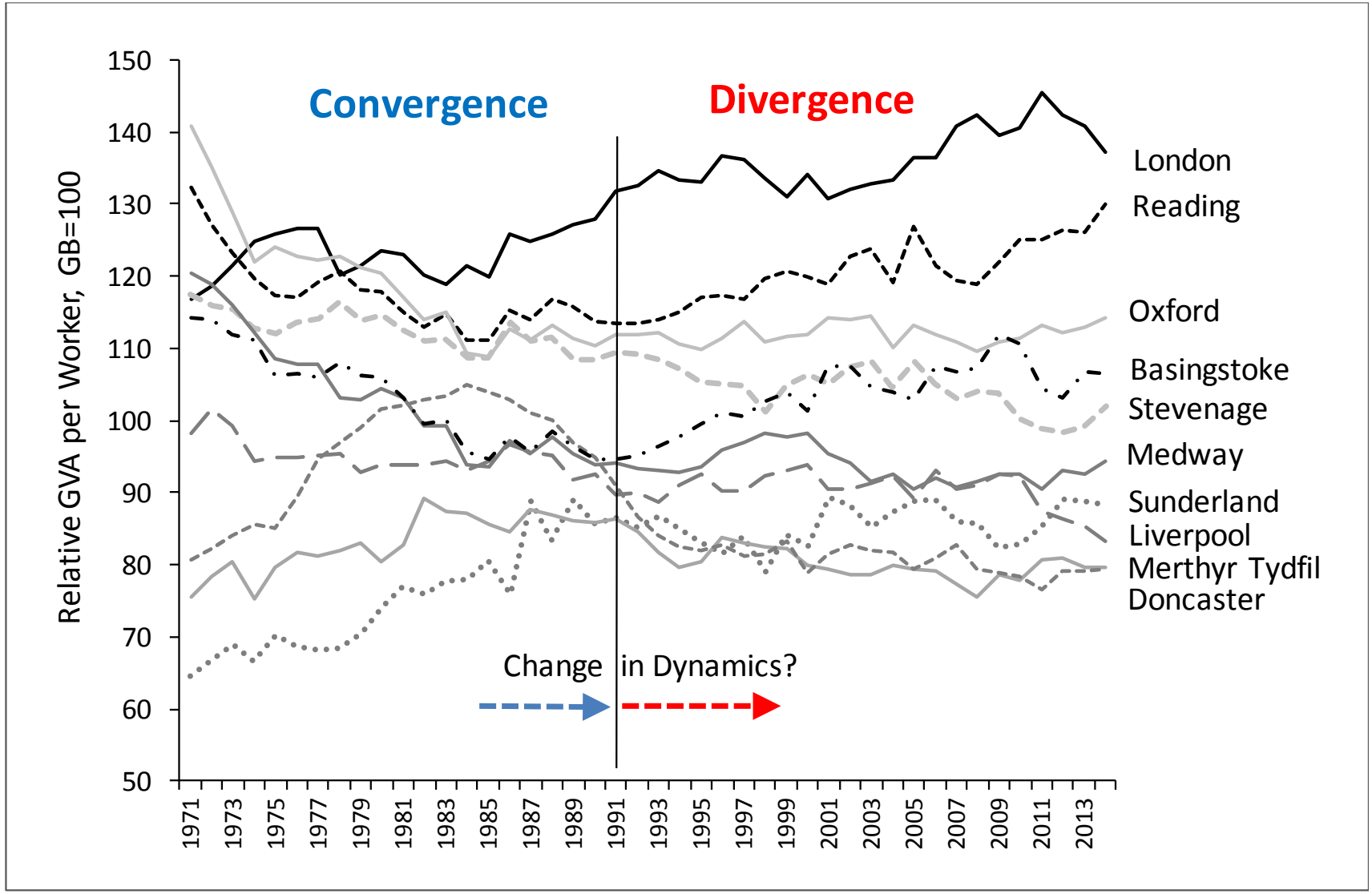
Northern Cities Grow Faster in Productivity, 1971-1991



Southern Cities Grow Faster in Productivity, 1991-2014



A Shift in Geographical Dynamics? Relative Productivity Paths of Selected Cities, 1971-2014, GB=100



The Geographical Switch in Productivity Growth across British Cities

Labour Productivity Growth in Northern and Southern Cities
(Average Annual Growth, percent per annum)
1971-1991 and 1991-2014

	1971-1991	1991-2014
Southern Cities	1.84	**2.05**
Northern Cities	**2.28**	1.51
London	2.99	2.75
Manchester	2.45	1.63
Great Britain	**2.08**	**1.69**

What Determines Productivity Growth in Cities?

- Various explanations advanced:
- **Economic Structure** - (export) specialisation or diversity? Both argued to increase productivity
- **Agglomeration** - 'mass' (size/density) confers positive externalities and increasing returns effects that raise productivity
- **Connectivity** – linkages and accessibility boosts labour markets, product markets and knowledge transfers; idea of 'clusters' of cities, and integrated regional systems of cities

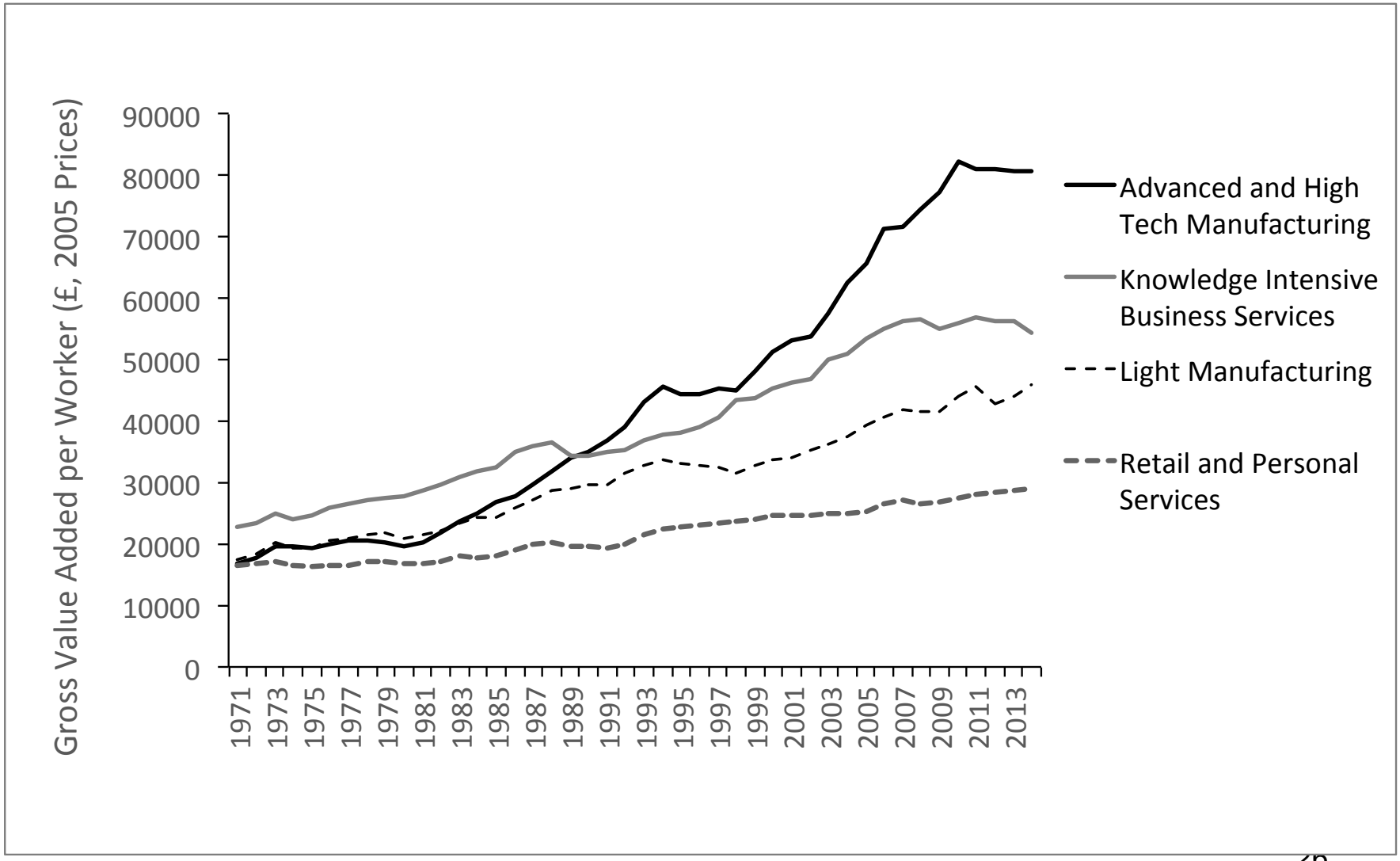
What Determines Productivity Growth in Cities?

- **Innovation** – local innovation systems, close university-business interactions promote technological advance, thence productivity
- **Human Capital -** production, attraction and retention of educated and skilled workers is key
- **Local Infrastructure** – modern and efficient physical, informational, cultural and social capital
- **Governance –** coherent system of local institutions with common strategic purpose in promoting business, and fiscal powers over revenue and spending on housing, skills, infrastructure, etc

The Case of Structure

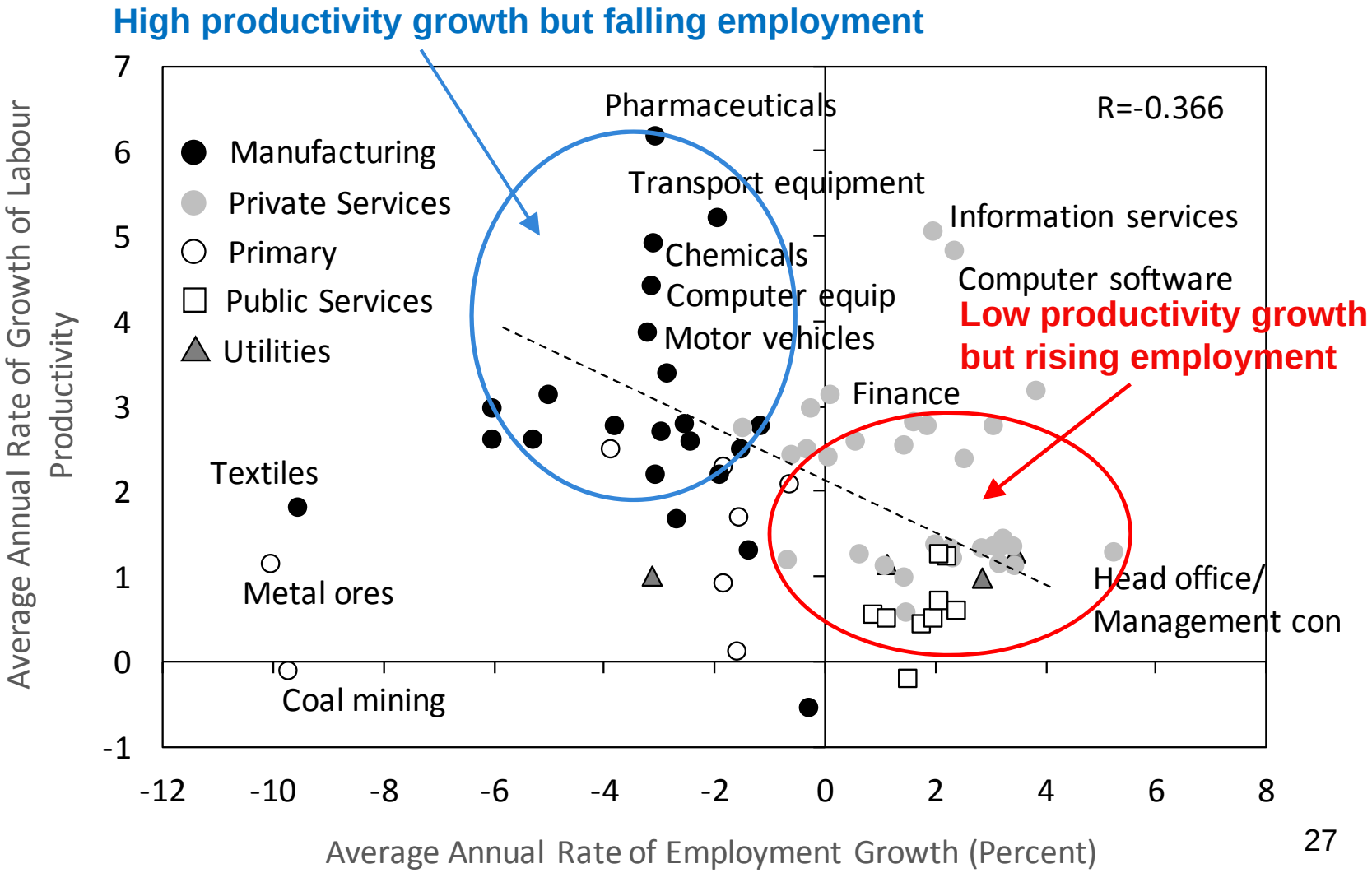
- Much is made in regional studies literature about key role of economic structure – specialised v. diversified v. related variety
- Most British cities have become **less** specialised over past 40 years – convergence of economic structures
- Northern cities have lost their former manufacturing tradable (export) base
- So has London, but…
- London has replaced it with high-value professional, business and technology related KIBS, while northern cities have lagged in this respect (and have more lower-value services)

Labour Productivity in Selected Sectors of UK Economy, 1971-2014

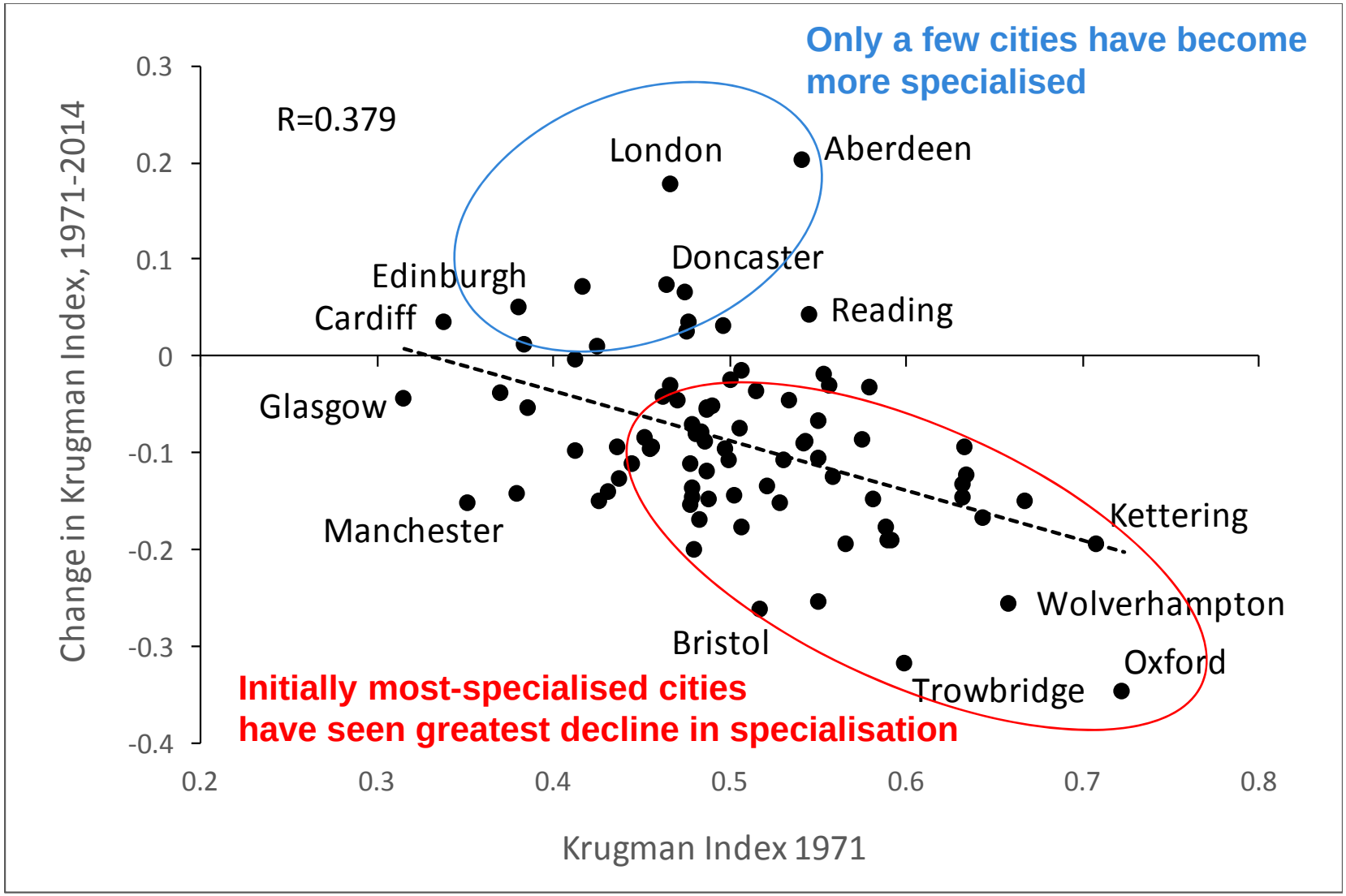


Source: ONS

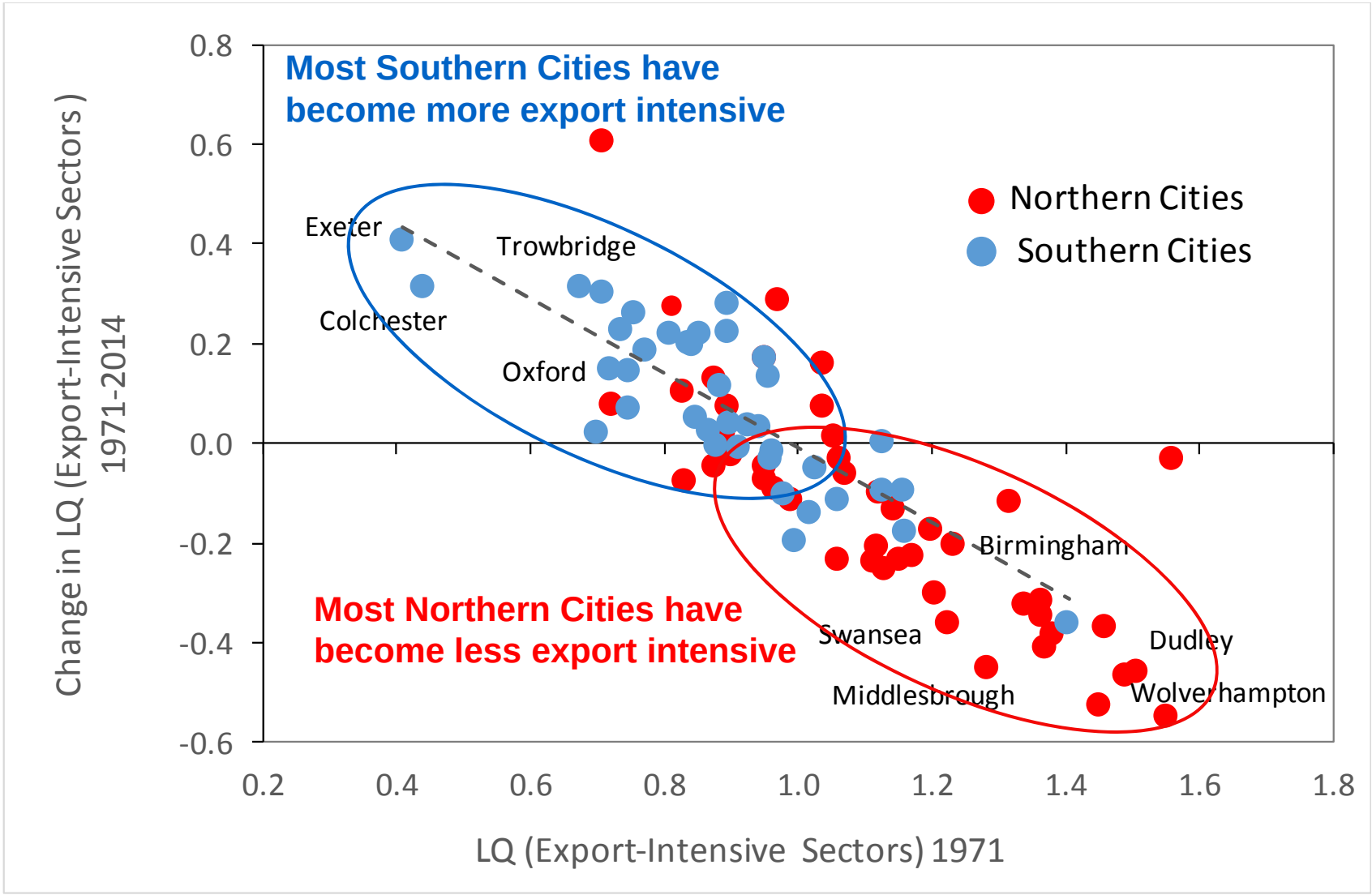
Fastest Employment Growth has been in Low Productivity Services, 1971-2014



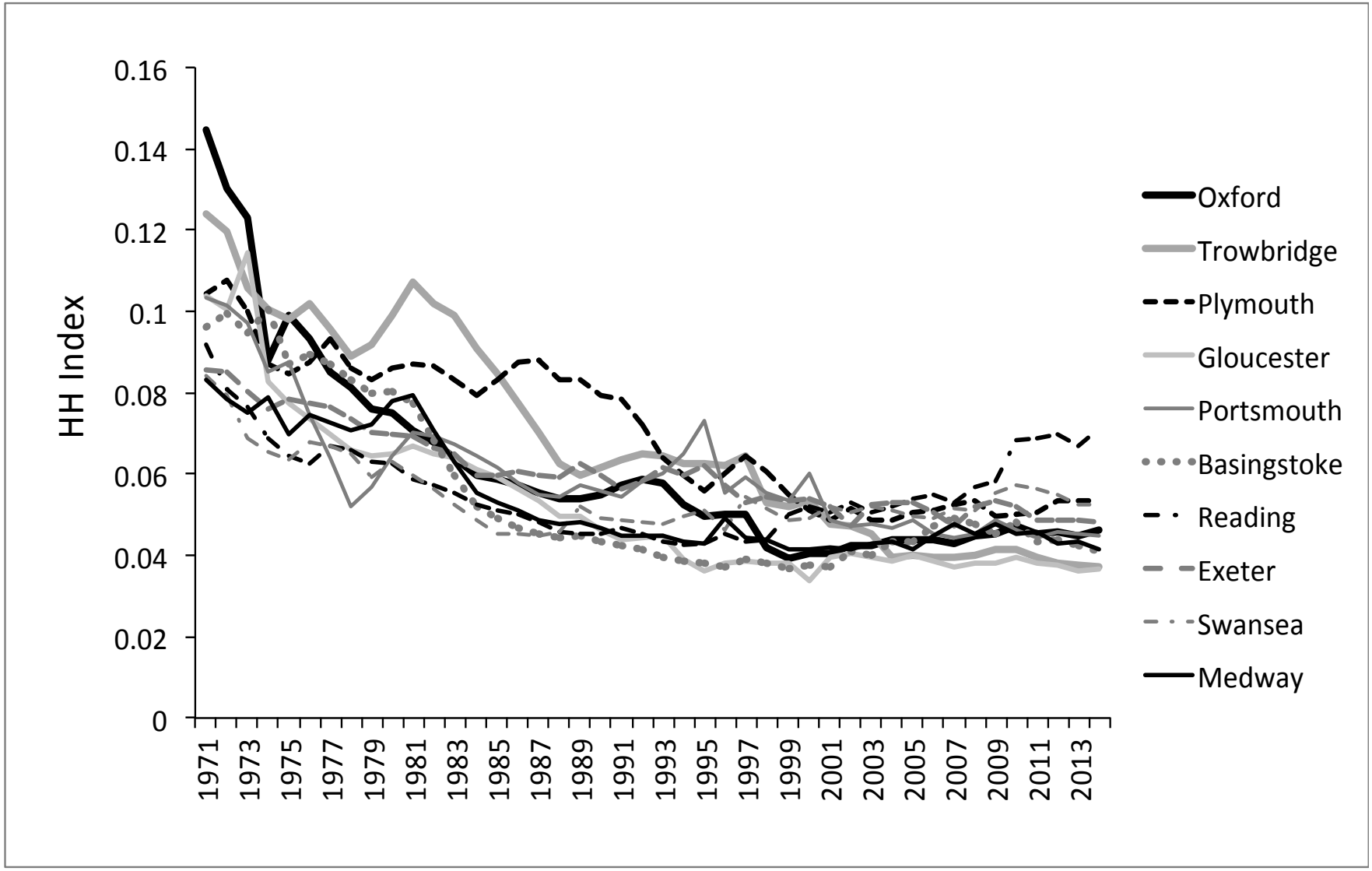
Sectoral Convergence in Output Structures across Cities, Krugman Index, 1971-2014



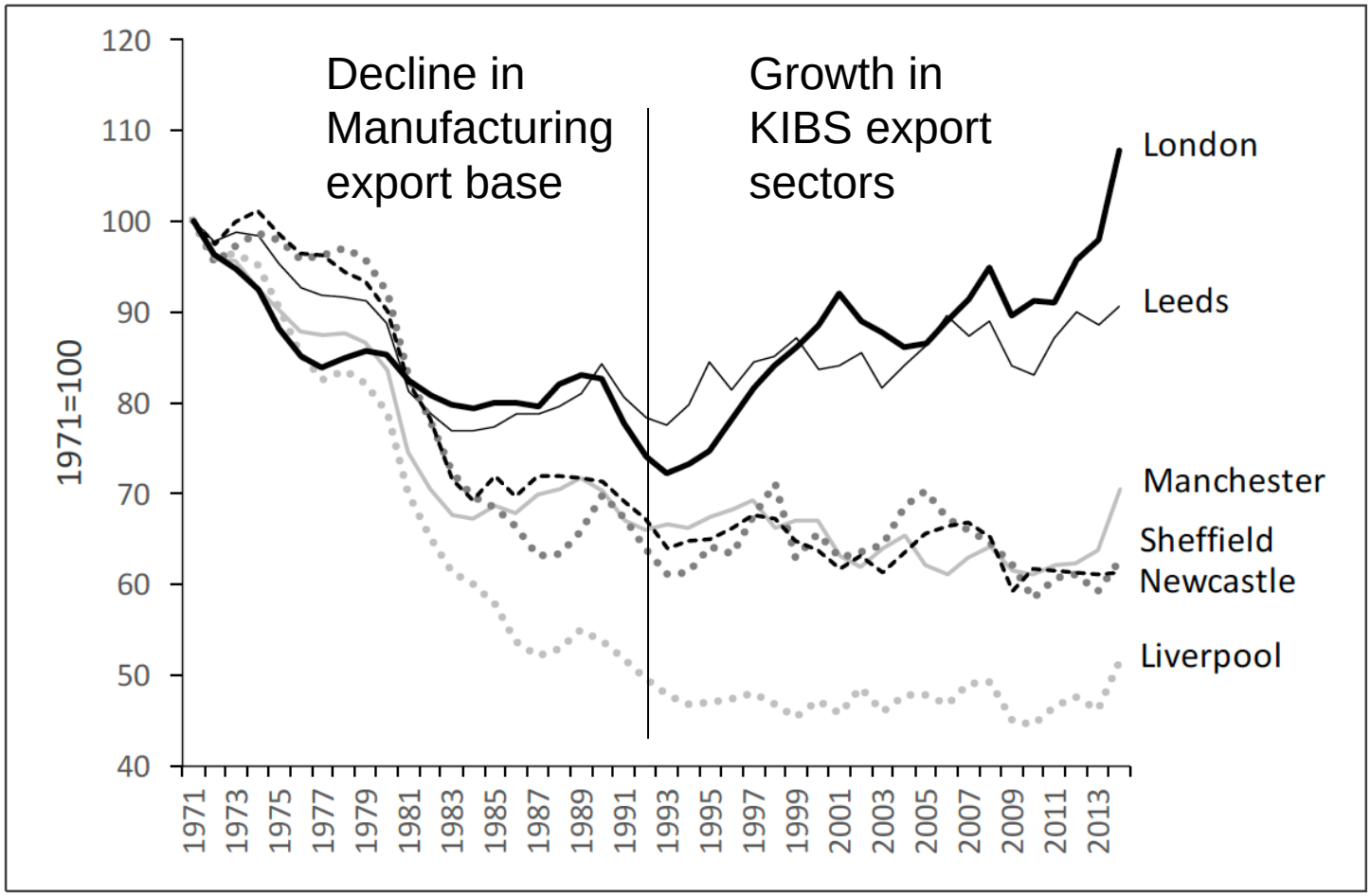
Convergence in Export Intensity, 1971-2014



Decline in Output Specialisation (Herfindahl-Hirschman Index): Selected Cities, 1971-2014



Export Base Employment in London and Major Northern Cities, 1971-2014 (1971=100)



Source of data: Martin et al (2016, 2017)

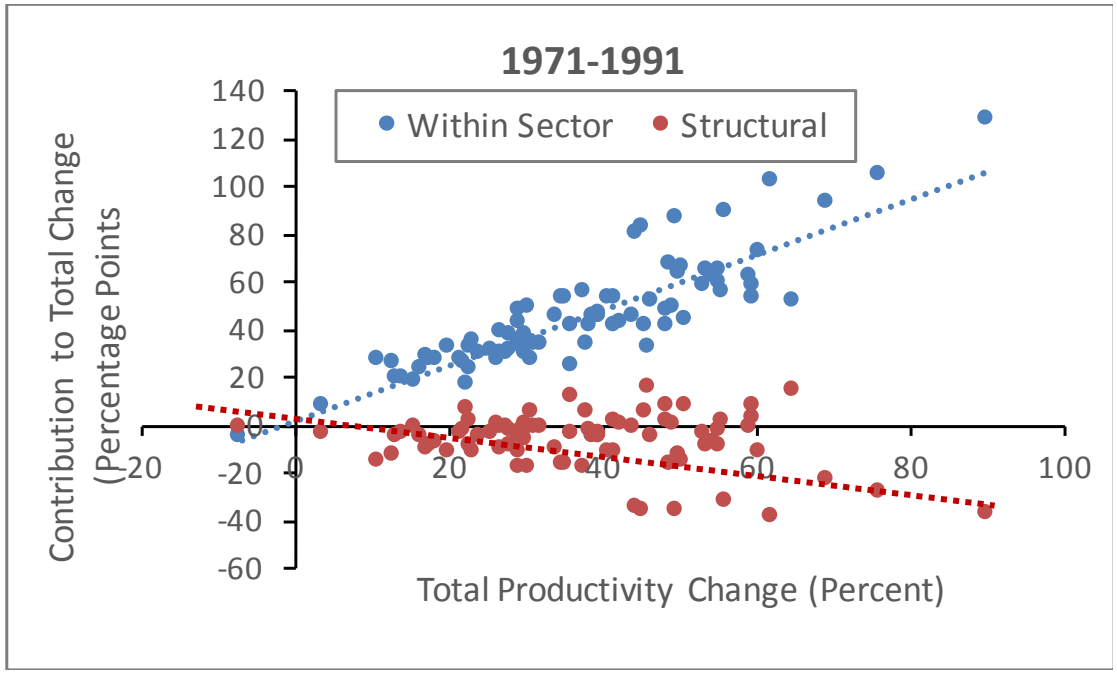
Contribution of Structural Change to City Productivity Growth

Total Growth **Within Sector Growth**

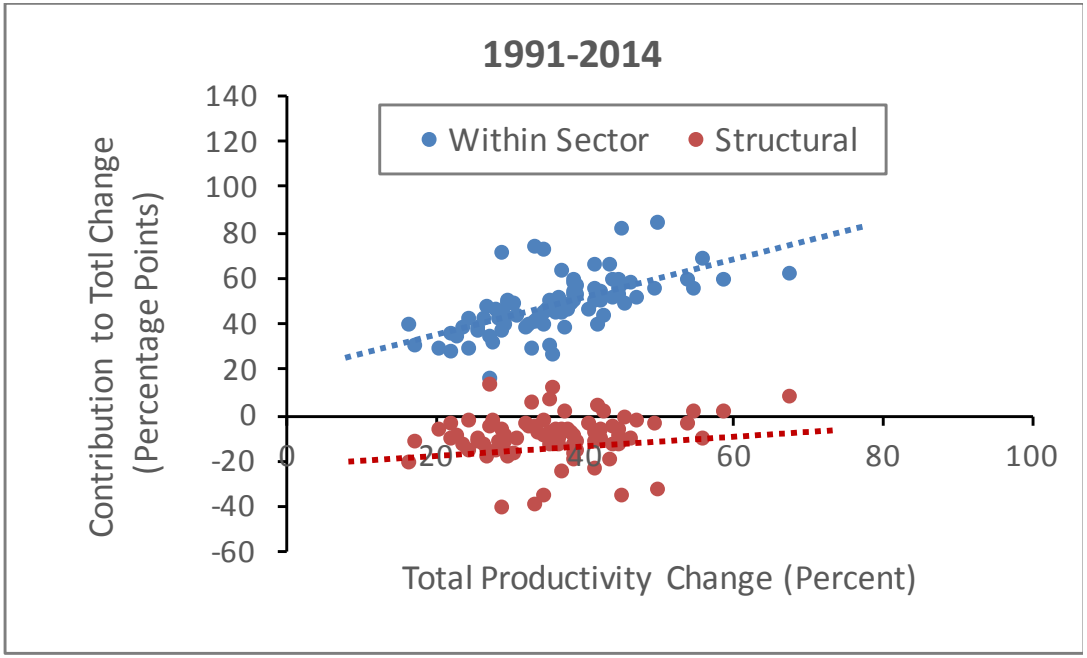
$$\frac{\Delta Y_{jt+k}}{Y_{jt}} = \frac{\sum_{i=1}^{n} s_{ijt}\Delta y_{ijt+k}}{Y_{jt}} + \underbrace{\frac{\sum_{i=1}^{n} \Delta s_{ijt}(y_{ijt} - Y_{jt})}{Y_{jt}} + \frac{\sum_{i=1}^{n} \Delta s_{ijt+k}\Delta y_{ijt+k}}{Y_{jt}}}$$

Growth due to Structural Change

Within-Sector and Structural-Change Contributions to City Productivity Growth



Structural change contribution mainly **negative** - cities have shifted to lower productivity growth sectors - but within-sector contribution **dominates** in both periods



Summary of Findings

- Over 1971-1991, productivity growth in northern cities faster than in southern cities
- Productivity growth slowed almost everywhere in between 1971-1991 and 1991-2014
- Especially in northern cities
- By beginning of 1990s,these cities had lost their historic manufacturing export base
- Shift to services everywhere has led to structural convergence, but has favoured southern cities,
- However, many service sectors have lower productivity growth than manufacturing

Summary of Findings

- Negative structural change component of total city productivity growth indicates that, overall, cities have shifted their employment structures to slower productivity growth sectors – the ‘post-industrial argument
- But ....Within-sector component of city productivity growth outweighs structural change component
- Differences across cities in this within-sector component accounts for most of city differences in total productivity growth
- The key issue is that structure is not main determinant of city differences in productivity growth

What Determines this Inter-City Variation in Within-Sector Productivity Growth?

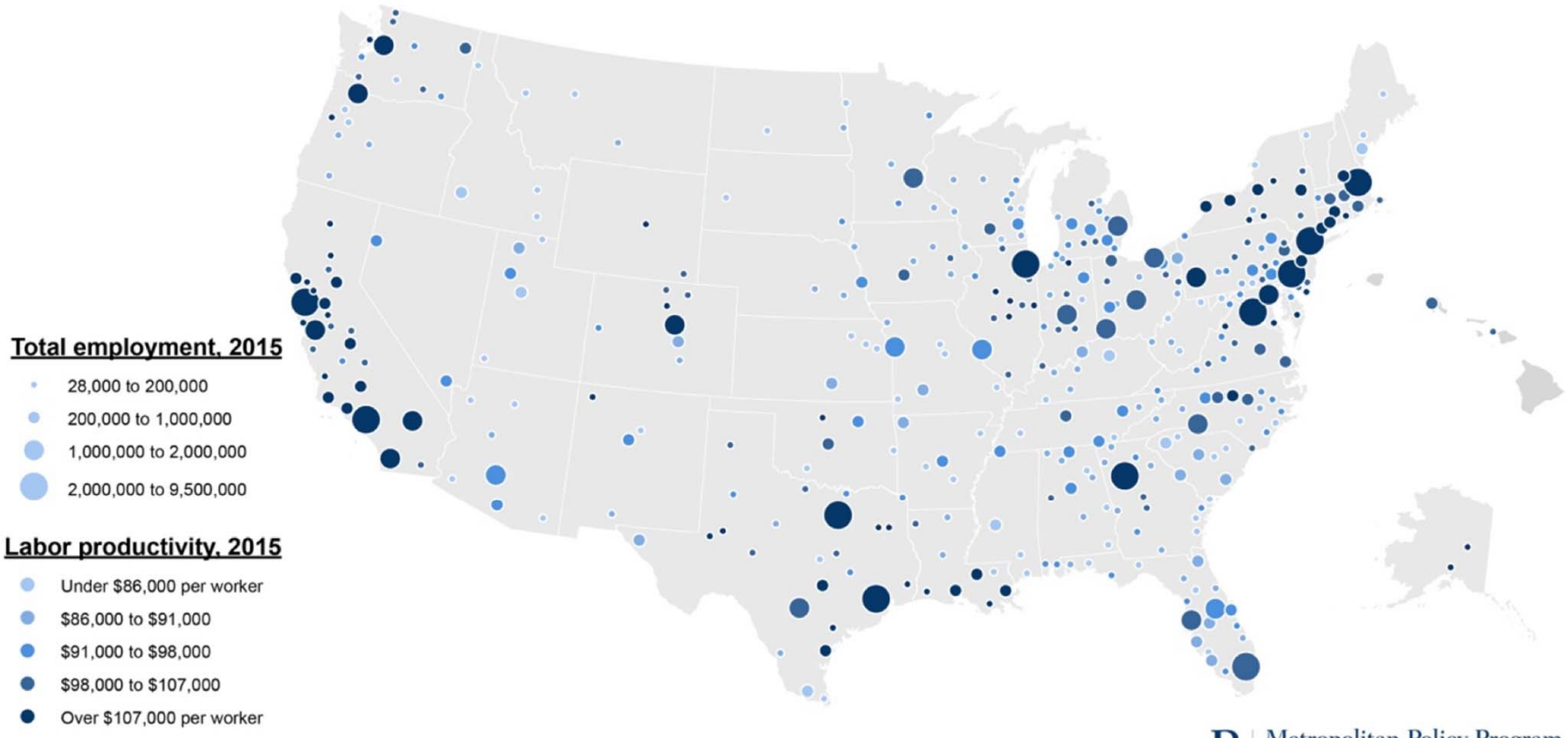
- Indicates that sector specific productivity growth varies across cities – Why?
- Do best performing cities have certain sectors that outperform their counterparts elsewhere? This might suggest functional differences in given sector across cities, or different supply chain roles, etc (Baldwin, 2016)
- Are best performing cities those that have higher productivity growth across all of their sectors? This suggests role for city-specific factors, such as agglomeration, skills, infrastructure, linkages, etc (Glaeser, 2010; Simon and Nardinelli, 1996, 2002)

Policy Relevance

- City dimension has a role in explaining slowdown in productivity growth
- Research project has attracted close attention of UK Government and cities themselves (Core Cities, Key Cities, Greater London Authority)
- Our work reinforces new focus on ‘place’ in UK Government’s emerging New Industrial Strategy
- Also relevant for new city-region devolution deals
- But more analysis is sorely needed to inform policy
- Currently exploring different models of city productivity growth

Labour Productivity Levels (Output per Worker) across US Cities, 2015

Map 1. Labor productivity varies significantly across metropolitan America



Source: Brookings analysis of Moody's Analytics data. Labor productivity defined as output per worker.

Metropolitan Policy Program at BROOKINGS

Unequal and Divergent Growth

- British cities have exhibited marked differences in economic growth (employment, output) over past 45 years
- Cumulative growth gaps are substantial
- Most southern cities have grown consistently faster than northern cities
- A key dimension of the ‘spatial imbalance’ problem that characterises the British economy
- Up to early-1990s, London part of the ‘north’ – turnaround since
- Largest, core, cities have lagged national growth

Structural Change and City Productivity Growth

- City productivity growth can be decomposed into three components (eg Kruger, 2008; Rodrik, 2011):
- **Within-sector** growth (firm dynamics)
- **Between-sector** growth (shifts into higher or lower productivity sectors)
- **Interaction** (**Covariance**) of Within and Between effects
- Results indicate that **within-sector effects have dominated –**
- **Same sector performs differently across different cities**

Sources of Within- and Between-Sector City Productivity Growth

Within sector developments (firm dynamics)	Between sector developments (cross sectoral structural shifts and reallocations)
Death of low productivity firms and birth of new higher-productivity firms	Broad switch from Primary Industry to Manufacturing to Services
Adoption of new organizational and operational methods and technological innovations	Decline of low productivity activities and birth and development of high productivity activities
Production of new higher-value products and services and switch into new markets	Industry restructuring – mixing and new combinations with other sectors to produce higher productivity industries

What Determines this Inter-City Variation in Within-Sector productivity Growth?

- 'Functional' structures may matter more than sectoral structures
  - Occupational mix (Simon and Nardinelli, 1996, 2002)
  - Supply chains and networks may differ between cities
- Agglomeration effects
  - Early results indicate that size/density not significant (especially once London is excluded)
- Export orientation/base (Rowthorn, 2010; Moretti, 2013)
  - Found some evidence for this
- Market accessibility/connectivity
  - 'City clusters' and city linkages