Coal Phaseout and Local Jobs
WORK IN PROGRESS

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Introduction

- Over the past several decades, coal employment has been declining in various advanced economies
- Coal decline → particularly painful effects on some places (given spatial concentration of industry; Fothergill et al., 2024).
  - Gelsenkirchen (GER); areas in North East England, South Wales.

Background

- Coal: quintessential fossil industry; environmental transition requires fast phaseout of fossil fuels
- Increased attention on 'affected' local labour markets (LLMs)
- Government support for environmental transition is substantial; place-based policy dimension
  - EU Just Transition Fund: EUR 17.5 billion for 2021 to 2027. These funds can be complemented with the European Regional Development Fund
  - UK: 'Levelling-Up' linked with 'Hitting Next Zero'
  - US: Inflation Reduction Act: at least $370 billion over the next decade

Motivation and Research Questions

- Key point: it is not clear whether the best-known examples of decline are representative of *all* affected local labour markets (LLMs)
- LLMs are not static entities; in some cases they are able to adapt to negative shocks (Glaeser '05, Gagliardi et al '24)
- Limited empirical evidence on the spatial *heterogeneity*
  1. Are there sizable differences in total job growth across the affected LLMs?
  2. And if there is spatial heterogeneity, what explains it?

In This Project

- We study the employment consequences of coal phaseout for LLMs
- PART 1: Descriptive account of geographical heterogeneity in total job growth following the permanent labor demand shock (Gagliardi et al '24)
  - We focus on 'affected' LLMs in Great Britain since 1985
  - May '79 (Thatcher PM) - March '85 (end of miners' strike): crucial period; after union's loss vs. National Coal Board: swift dissolution of the industry

Data

- Employment and Industry:
  - Business Register and Employment Survey (BRES 1984+)
  - Granularity: ward level
  - "Coalfields cover a wider range of places than just 'pit villages'. This reflects the geography of mining, which took place in and around towns such as Sunderland and Barnsley as well as in smaller places." (Foden et al., 2014)
  - Local Labor Market (LLM): an area where most of the residents both live and work
  - 322 GB Travel To Work Areas (TTWAs) - ENG 228 (8489 wards); SCO 60; WAL 34.
  - We use geographical definition in 1981 and keep it fixed
    - UK data Service Census Support + Open Geography Portal shape files
- Proximity to Universities:
  - European Tertiary Education Register

Definitions

- Total Jobs: total number of jobs recorded by Business Register and Employment Survey (BRES) within a place
- Coal Jobs: number of jobs in 'Coal extraction/manufacture: solid fuels ' (3-digit 1980 SIC category which includes the 4-digit subcategories 'deep coal mines', 'opencast coal working', 'manufacture: solid fuels').
- Yearly Percent Change in Total Jobs: Percent change in total jobs experienced by a place on average *per year* 1985 - 2023

Figure: Spatial Distribution of the 1984 Share of Coal Jobs.

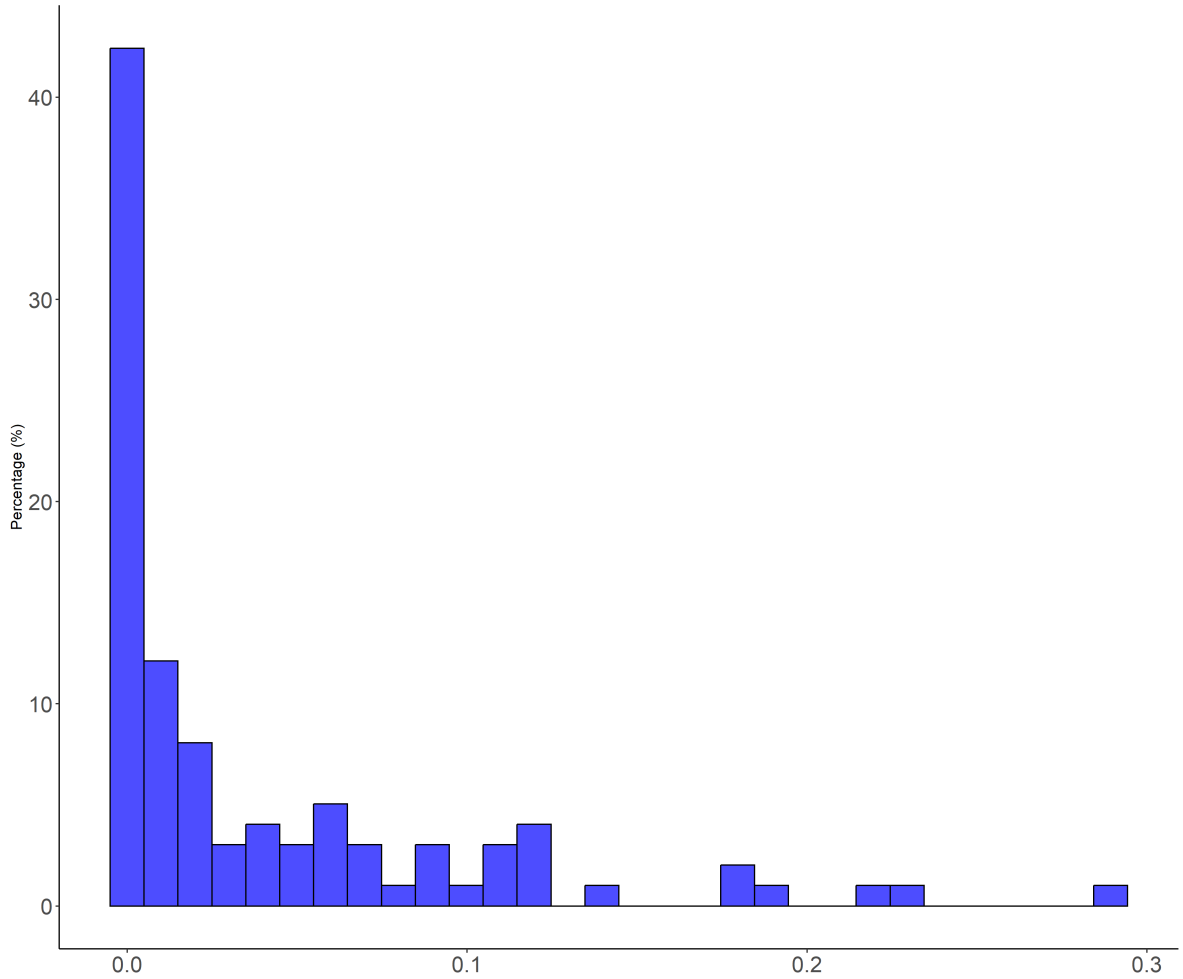
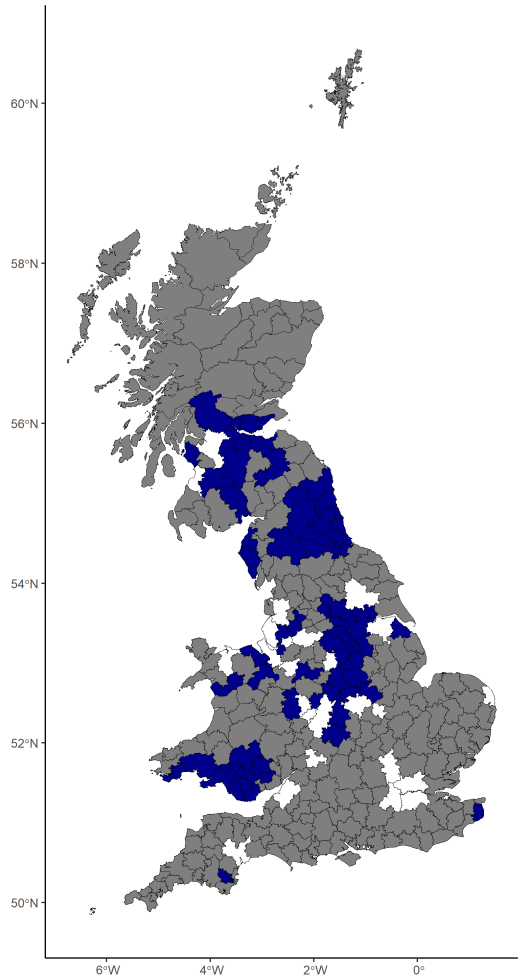
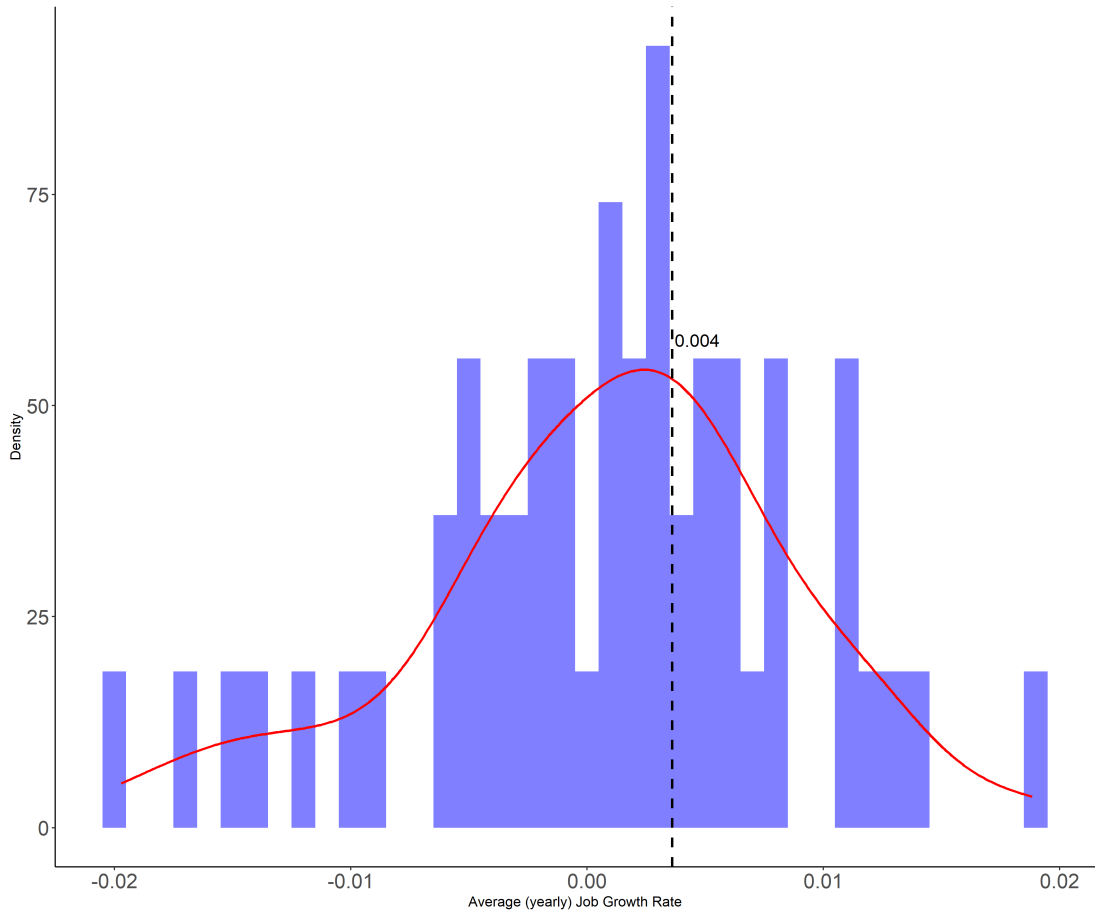


Figure: Affected LLMs



Sample: 322 LLMs. Blue: 'affected' LLMs, i.e. those (54) with 1984 coal jobs share above the median (among those with positive coal jobs); White: below median; Grey: zero jobs.

Figure: Distribution of Yearly Percent Change in Total Jobs, by LLM



Sample: 54 affected LLMs. Dotted line: average value for all (322) LLMs

Table: Share of affected LLMs with Positive Growth and Geographical Variation in Yearly Percent Change in Total Jobs

% Absolute Positive Growth	57.41
% Relative Positive Growth	35.19
P90-P10	0.02
P75-P25	0.01
Std Dev	0.01

PART 2

- What explains the heterogeneity?
- We focus on proximity to universities (Valero & Van Reenen 19; Kantor & Whalley 14, 19; Nimier-David 22; Howard et al 24)
- Opening date before 1984

Table: Initial Distance to University and Subsequent Job Growth

	Dependent variable		
	(1) Baseline	(2) With Coal Empl Share	(3) With Age Uni FE
Distance (100 Km)	-0.0244***	-0.0231**	-0.0207**
	(0.00898)	(0.00955)	(0.00867)
1984 Log Total Jobs	-0.00583***	-0.00582***	-0.00581***
	(0.000507)	(0.000512)	(0.000491)
1984 Share Coal Employment		-0.00406	0.00436
		(0.0146)	(0.0163)
Observations	1866	1866	1866
R-squared	0.0672	0.0672	0.0720
Region FE	Yes	Yes	Yes
University Age FE	No	No	Yes

Sample: 54 affected LLMs. Dependent Variable: Yearly Percent Change in Total Jobs. Unit of observation: ward. Distance: distance to the nearest university (median distance among the wards in a LLM). Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

- A decrease in distance is associated with a higher rate of job growth
- 25th vs. 75th pctile in distance: 0.28 % faster employment growth per year
- This compares to a mean Yearly Percent Change in Total Jobs of 0.4 %

Conclusions

- Sizable spatial heterogeneity in total job growth following coal phaseout
- NEXT: Further work needed regarding proximity to universities
  - e.g. control for 1984 share of high-tech employment
  - Pre-trends: 1961/1971 Census (1951?)
  - Distance measured further back in time

Setting

Arnold '23, Edgerton '19, Helm '04

- Decline in coal employment since the late 50s
- During the '70s more positive expectations regarding future of industry in GB
- May 1979: Thatcher becomes PM
- Aggressive restructuring plan for the industry; initial clash with the miners' union in 1981; the government reversed its position
- March 1984: National Coal Board announced the closure of 20 collieries with the loss of 20,000 jobs. National Union of Mineworkers calls for a general strike

- 'Miners were not doomed' (due to modernity of GB coal industry)
- Successful early weeks of picketing + potential tipping in points in July-September: solidarity action of the dockers' union and 'deputy' (supervisor, safety official) union's successful strike ballot
- By November 'war of attrition' was inexorably turning against miners (deputy union calls off threat of strike; sequestration of miners union' funds)
- Strike ends in March without negotiated agreement
- 1985 onwards: swift dissolution of the industry following the union's defeat
- Employment went from around 250,000 in May 1979 to almost complete disappearance in the early 90s

Figure: Employment in Coal Industry and Number of Mines in Britain

Source: UK Department for Business, Energy and Industrial Strategy (BEIS).

Coal Phaseout and the LLM

- Direct and indirect effects
  - Direct employment losses in coal industry
  - Indirect employment losses from de-agglomeration effects
  - Indirect employment losses in non-tradable industries:
    - Retail, construction, restaurants; health services, etc.
  - Offsetting general equilibrium effects

Universities and the LLM

- Universities increase supply of skilled workers
  - Creating some
  - Attracting others from outside
- Business created as results of academic research
- Knowledge spillovers

Some Related Literature and Contribution

1. Economic effects of resource shocks (Marchand 12; Michaels 11; Cust, Harding, and Vézina 19; Toews & Vézina 22)
   - Decline of coal industry
     - Effect on individual economics outcomes: employment (by gender), earnings and health on British data (Aragon et al 18; Rud et al 24; Brey & Rueda 24); on German/U.S. data (Colmer et al 24, Haywood et al 24)
     - Krause 25 on selective migration and economic decline in Appalachian counties, extending early research (Black et al 02, 05)
2. Industry turnover and evolution of local economies (Duranton 07; Findeisen & Suedekum 08)

- We combine insights/approaches from these two streams
- Employment consequences of phaseout, LLM approach, spatial heterogeneity; proximity to universities (Valero & Van Reenen 19; Kantor & Whalley 14, 19; Nimier-David 22; Howard et al 24)

Econometric Framework

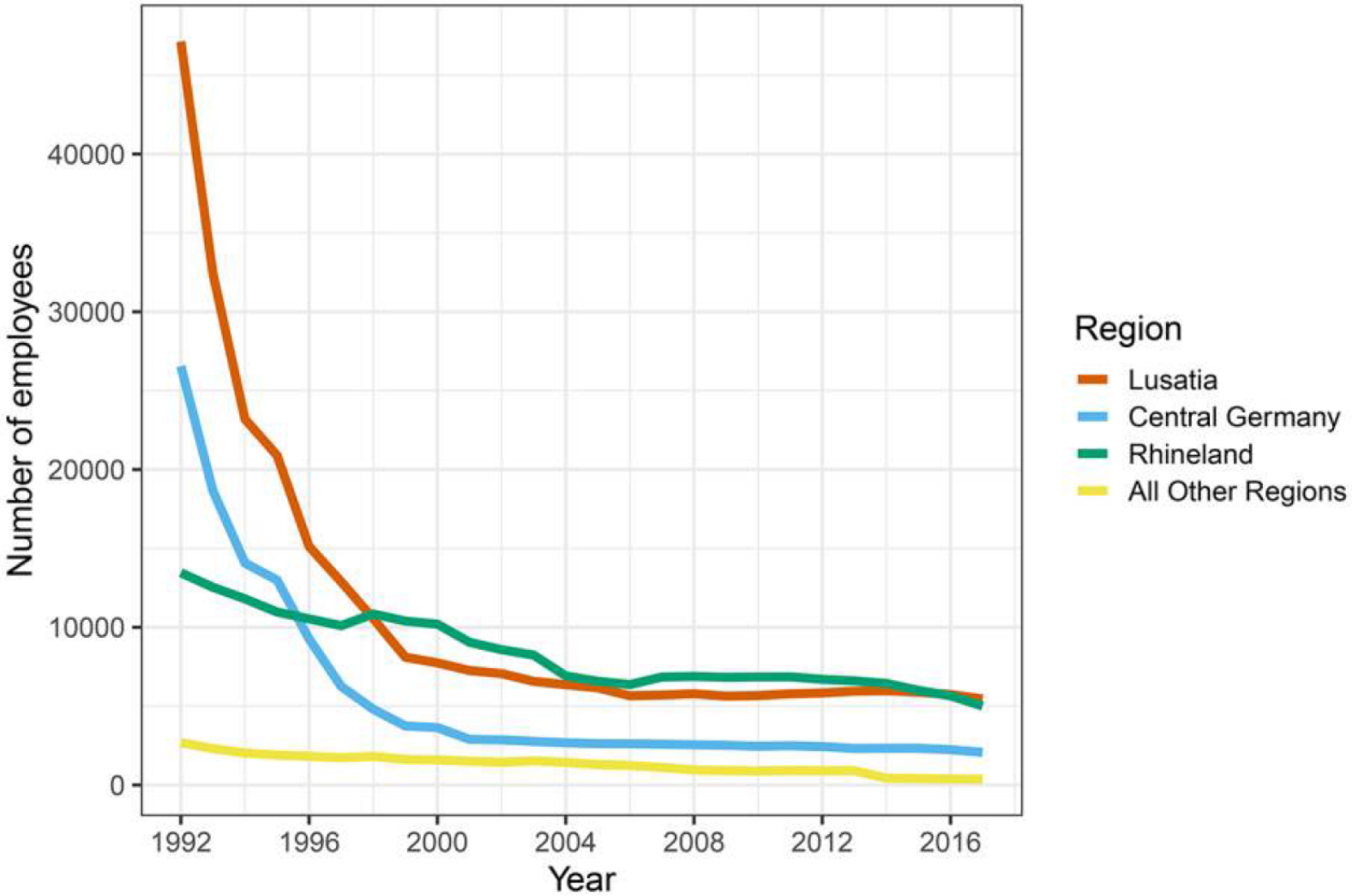
$$\Delta Y_w = \beta_d Distance_l + \gamma X_w + \alpha_r + u_w$$

- unit of analysis: ward (w)
- ΔY_w: post-phaseout job growth (Yearly Percent Change in Total Jobs)
- Distance: distance to the nearest university (median distance among the wards in a TTWA)
- sample: affected LLMs
- X_w: 1984 Log Total Jobs, 1984 Share Coal Employment, University Age FE
- α_r: vector of region fixed effects (12)

Identifying Assumption and Threats to Validity

- Identifying assumption: distance is orthogonal to shocks to employment taking place between 1984 and 2022 caused by shifts in the unobserved determinants of local labor demand or supply
- Violations
  - If universities are located in areas with unobserved characteristics that are improving, or are constant but increasingly attractive to workers or firms
  - If new universities tend to locate in LLMs where demand for higher education is rising, and demand for education is correlated with omitted factors that increase growth.

Figure: Germany



Affected LLMs (N=54): Summary Stats

Statistic	Variable	Value
Min	Coal Jobs	100
Max	Coal Jobs	17180
Median	Coal Jobs	2875
Mean	Coal Jobs	4183.52
Std Dev	Coal Jobs	4105.74
Min	Total Jobs	3100
Max	Total Jobs	302900
Median	Total Jobs	46600
Mean	Total Jobs	75436.11
Std Dev	Total Jobs	72654.42
Min	Share of Coal Jobs	0.01
Max	Share of Coal Jobs	0.29
Median	Share of Coal Jobs	0.05
Mean	Share of Coal Jobs	0.07
Std Dev	Share of Coal Jobs	0.07
Min	Avg Yearly Job Growth	-0.02
Max	Avg Yearly Job Growth	0.02
Median	Avg Yearly Job Growth	0.002
Mean	Avg Yearly Job Growth	0.001
Std Dev	Avg Yearly Job Growth	0.01

LLM Name	1984 Coal Share	Yearly Percent Change in Total Jobs
Goole and Selby	0.103	0.011
Chesterfield	0.106	-0.005
Alnwick and Amble	0.107	-0.012
Castleford and Pontefract	0.112	0.011
Sunderland	0.115	0.001
Wakefield and Dewsbury	0.115	0.005
Doncaster	0.116	0.002
Merthyr and Rhymney	0.119	-0.006
Rotherham and Mexborough	0.139	-0.001
Alfreton and Ashfield	0.178	0.006
Morpeth and Ashington	0.183	-0.005
Worksop	0.192	0.008
Barnsley	0.217	-0.003
Mansfield	0.231	0.008
Cumnock and Sanquhar	0.289	-0.014