

Resilience after Local Economic Shocks

Summary

The rapid closure of pits during the 1980s in the UK is an example of an economic shock which is not only specific to a particular industry but also to local economic areas. In 1983, in only 29 of the 459 local authority areas in the UK was coal mining more than 10 per cent of total employment.

Over the 20 year period 1983-2002, average percentage employment growth in these areas was less than the UK as a whole. But the key feature is the huge diversity across areas, with 3 showing employment falls of nearly 20 per cent and 3 exhibiting employment gains of more than 30 per cent. Some areas showed great resilience in the face of a serious shock.

Two general factors account for over half the variability of this experience. First, the greater the percentage in coal mining in 1983, the lower was 20 year employment growth. Second, the more militant an area was during the miners' strike of 1984/85, the lower also was employment growth.

1. Introduction

There is a very large literature on the impact of shocks on the Western economies at an aggregate level. There are also many empirical examples to study. Using the data set in Maddison (1995)¹, for example, Ormerod (2004)² calculates that there were 336 instances of recession across 17 Western economies over the 1871-1994 period, defining a recession as a year in which real GDP growth was less than zero.

There is considerably less material on the effect of shocks which are specific to either specific industries or to small local areas. The recent economic history of the UK does in fact provide an example of both, with the rapid closure of most of the coal mining industry during the 1980s.

¹ A Maddison, *Monitoring the World Economy 1820-1992*, OECD, Paris, 1995

² P Ormerod, 'Information Cascades and the Distribution of Economic Recessions in Capitalist Economies', *Physica A*, 2004

Beatty et.al.(2005)³ examine the experience of the labour market in the coalfield areas for men over the 1981-2004 period. In an earlier 1996 study the same authors defined a coal field area as one in which more than 10 per cent of resident men worked in the coal industry.

They conclude that ‘there is incontrovertible evidence that the labour market in the coalfields is bouncing back from the hammer-blow of coal job losses’. However, this conclusion is strongly qualified by the scale of the recovery, their assessment being that ‘the economy of the coalfields is perhaps a little over half way towards full recovery’.

The main purpose of this short paper is two-fold. First, to examine the resilience of local economic areas over the longer term to a specific shock. Second, to offer an initial explanation of the wide variety of total employment changes over a 20 year period in what used to be the coal field areas.

Section 2 sets out the data, section 3 discusses the reasons for the variability of experience, and section 4 offers a short discussion and conclusion.

2. The data

The focus of this study differs from Beatty et.al. in two main respects. First, my interest is in resilience after specific shocks. The starting year for the analysis is therefore 1983, the year in which the severe economic recession in the UK of the early 1980s ended. Beatty et.al. begin their analysis in 1981. Given that the 1981-82 recession affected many traditional manufacturing industries, there were heavy job losses in the coalfield areas 1981-83 due to the *general* shock of the recession. Subsequent losses through the pit closure programme were, in contrast, a *specific* shock.

³ C Beatty, S Fothergill, R Powell , ‘Twenty Years on: has the economy of the coalfields recovered?’ *Regional Studies Association International Conference*, 2005

The second difference is that I focus on total employment changes rather than simply on male employment. I take the 20 year period 1983-2002.

Data is available in the Census of Employment for employment⁴ at the level of the 2-digit SIC level industries for each of the 459 pre-1996 local authority economic areas in England, Wales and Scotland. There are 58 such industries. The numbers employed in the various industries in any given area as a percentage of total employment in the area is the basic information which I analyse. In 1983, coal mining accounted for more than 10 per cent of total employment in 29 of these areas. By the early 1990s, the coal mining industry had effectively ceased to exist, with only a small number of pits remaining open.

Beatty et.al. note that the experience of individual coalfield areas has varied a great deal, even in terms just of male employment. The experience of total employment changes in these areas over the medium term confirms this view. In three of the areas, even by 2002 total employment was almost 20 per cent less than it had been in 1983. In contrast, in three other areas, employment in 2002 was over 30 per cent higher than it had been twenty years previously, in one of these nearly 45 per cent higher.

Figure 1 below plots percentage change in total employment in the coalfield areas 1983-2002.

⁴ The data is available for male and female employment, both full- and part-time. These are aggregated into a single series for overall employment. The distinction between full and part-time employment has become increasingly blurred in recent years.

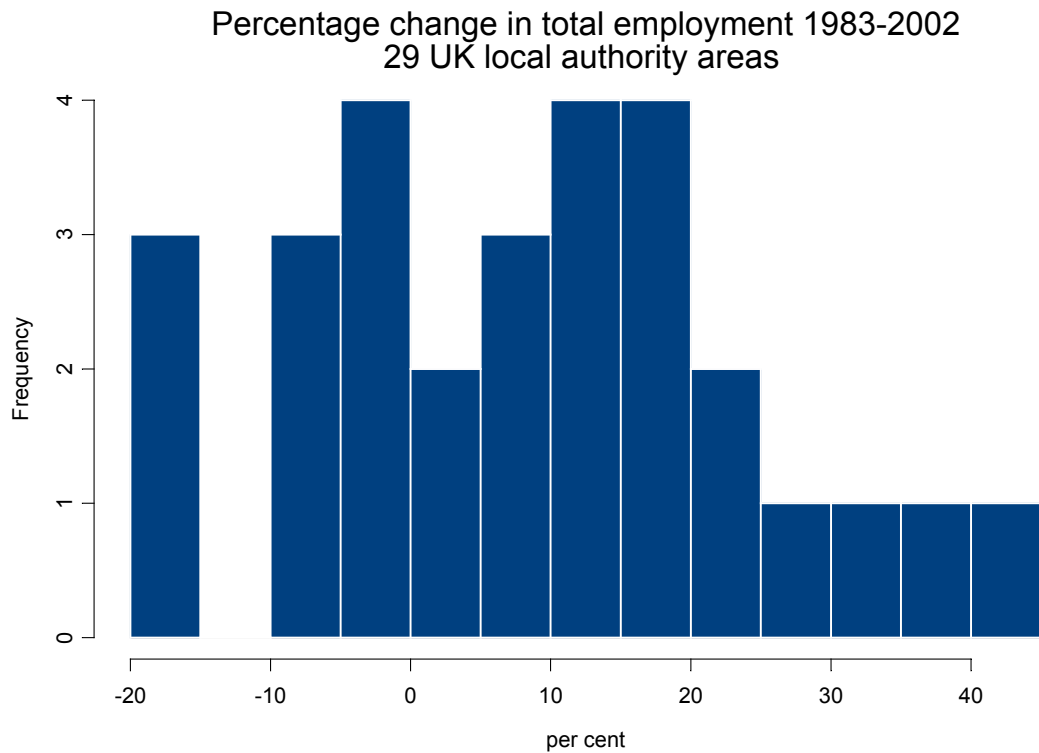


Figure 1 *Percentage change 1983-2002 in total employment in the 29 local authority areas in which coal mining was more than 10 per cent of total employment in 1983*

The effects of the industry specific shock did persist over a long period, because over the 1983-2002 period total UK employment grew by 22.9 per cent, compared to only 8.9 per cent in the 29 mining areas. However, some mining areas recovered well.

The *unweighted* summary statistics of percentage employment change for the 459 local authorities in the UK and the 29 mining ones are as follows:

	Min	1 st Quartile	Median	Mean	3 rd Quart	Max
UK	-26.8	13.1	25.2	28.4	40.3	139.6
Mining areas	-19.5	-0.8	9.4	8.9	19.5	44.7

In 10 of the 29 areas, total employment in 2002 was still lower than it was in 1983, but the increase in the 3 of the areas was above the UK average, and one was in the top quartile of employment growth across the UK.

3 Why has long-term resilience been so different across the coal mining areas?

Much of this very wide range of experience will reflect factors specific to individual areas which only a very detailed local analysis could potentially recover. The aim here is to look for systematic effects on this experience.

One such factor is clearly the percentage employed in coal mining in 1983, as Figures 2 and 3 make clear.

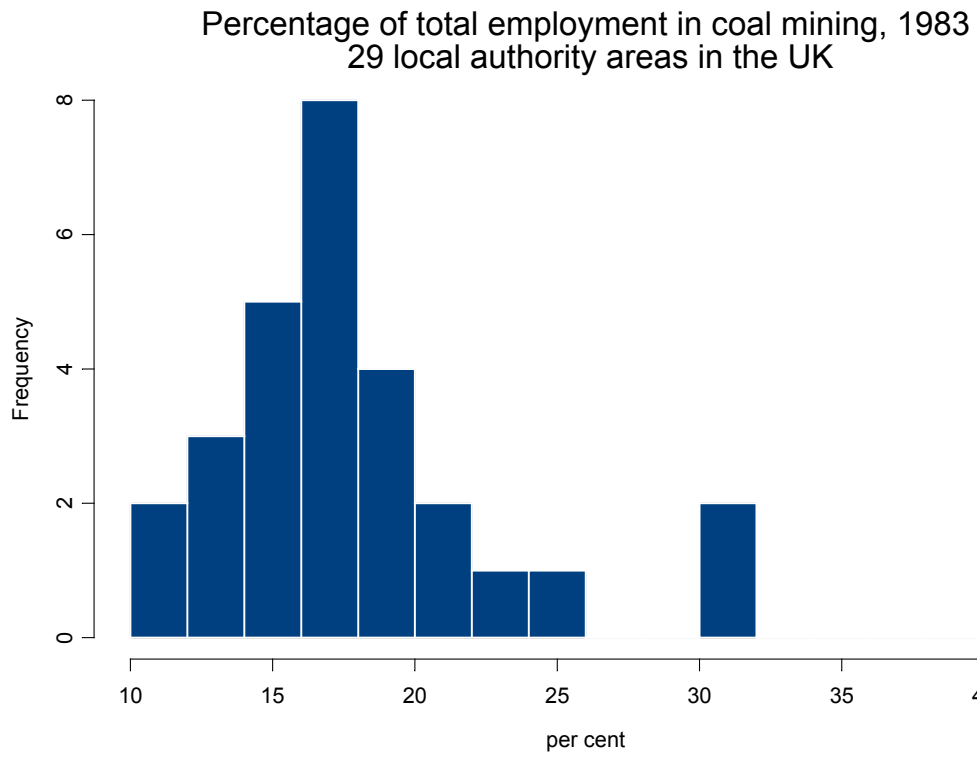


Figure 2 *Percentage of total employment in coal mining in 1983, the 29 local authority areas in the UK where the percentage was greater than 10*

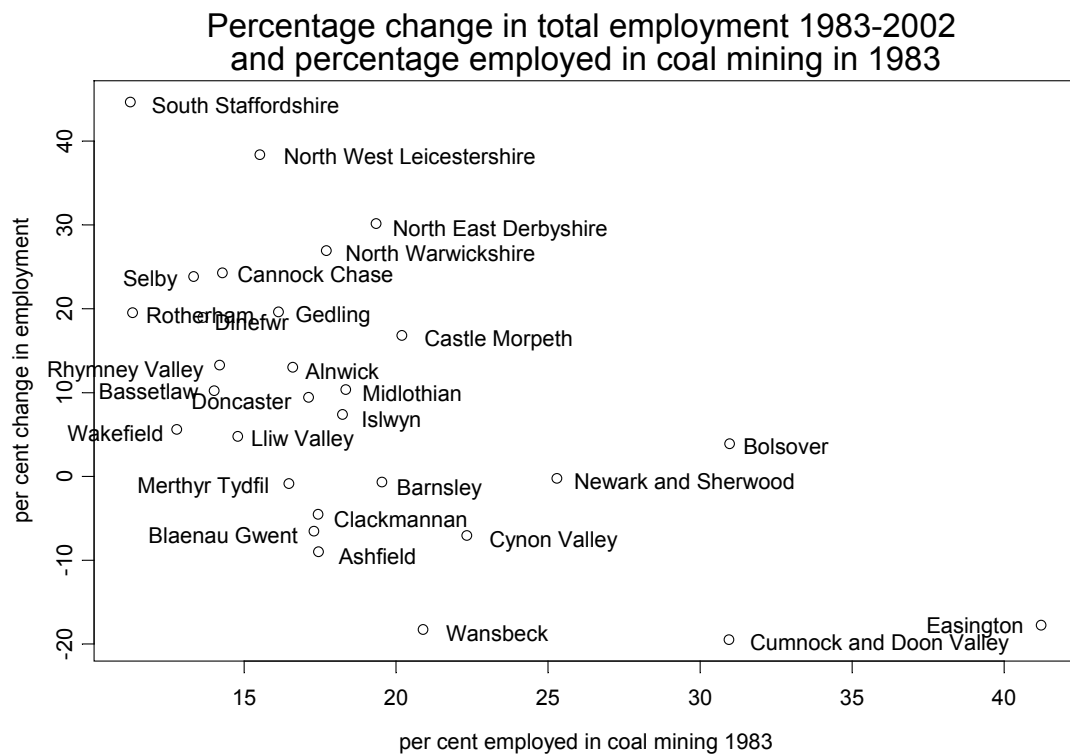


Figure 3 *Percentage change in employment 1983-2002 in 29 local authority areas where coal mining was more than 10 per cent of total employment in 1983*

The simple correlation is -0.598.

The industry was marked by a bitter and controversial strike in the winter of 1984/85. Estimates of the percent still on strike in the various mining regions are given by Richards⁵. These are regional rather than specific to each individual area, so the figure for the region in which the area is in has to be used. In Leicestershire, even at the outset of the strike, only 10 per cent supported it, and the same number are estimated to have still been on strike in March 1985. In contrast, in South Wales initial support was very close to 100 per cent, and even by March 1985 93 per cent were still on strike.

⁵ Andrew J Richards, *Miners on Strike*, Berg, Oxford and New York, 1996

The correlation between the percent still on strike in March 1985 and employment growth 1983-2002 is -0.37, significantly different from zero at $p = 0.024$. This relationship admits of a number of interpretations, but an obvious one is a cultural willingness to compromise and adapt to changed circumstances. The more militant the area, the worse its subsequent employment experience.

The next issue to consider is the potential impact of the economic structure of the immediate neighbours of the area on the medium-term economic experience. I defined neighbours as those local authorities which shared a political boundary with one of the coal mining authorities.

I examined the influence of the diversity of economic activity *within* each of the neighbouring local authority areas. Data is available at the 58 industry SIC level 2. For each area, employment in each of the 58 industries is calculated as a percentage of the total.

The Euclidean norm of a vector $\mathbf{x} = [x_1, x_2, \dots, x_n]$ is defined by the formula

$$[(x_1)^p + (x_2)^p + \dots + (x_n)^p]^{(1/p)}, \text{ where } p = 2$$

So the more equal are the individual components of the vector, the lower the value of its Euclidean norm. This is the square root of the Herfindahl index, a concept perhaps more familiar to economists.

For each coal mining area, I calculate the Herfindahl index of the vector of the proportions of employment in each of the 58 sectors in its neighbours combined. In other words, total employment in each the industries in the neighbours, divided by total employment in the neighbours.

The simple correlation between total change in employment 1983-2002 and the Euclidean norm of the neighbours is -0.373, though there is a slightly higher correlation

with the inverse, at 0.392. Both of these are statistically significantly different from zero at a p value of less than 0.025.

So the more concentrated was the industrial structure of a coal mining area's geographic neighbours in 1983, the lower was the growth in employment in the area 1983-2002.

I also examined the degree of difference between a mining area and its neighbours in terms of industrial structure in 1983, using both the Euclidean and Manhattan distances between the vectors of industrial structure. The Euclidean measure gives more weight to a few large differences, and the Manhattan to lots of small differences. The simple correlation between the two was statistically significantly different from zero, but the significance did not survive in a multiple regression.

Ordinary Least Squares: Percentage change in total employment 1983-2002, 29 local authority areas in the UK where coal mining was more than 10 per cent of employment in 1983

$$\text{Percent change} = 11.80 - 1.509 * \text{pcoal1983} - 0.180 * \text{strike} + 1.783(1/H)$$

$$(24.8) \quad (0.33) \quad (0.078) \quad (1.042)$$

$$\text{s.e.} = 11.17; R\text{bar}^2 = 0.527; \text{White}(9) = 4.94; \text{KS} = 0.113; \text{Ramsey}(3,22) = 0.99$$

where pcoal1983 is the percent employed in coal mining in the area in 1983, strike is the percent in the region still on strike in March 1983 and H is the Herfindahl index of industrial concentration in its geographic neighbours in 1983.

The figures in brackets are the standard errors of the coefficients, s.e is the standard error of the equation, White is the White test of the null hypothesis that the residuals are homoscedastic, distributed as a chi-square variable with 5 degrees of freedom; KS is the Kolmogorov-Smirnov test of the null hypothesis that the residuals are normally distributed; Ramsey is the Ramsey RESET test of the null hypothesis that the model has

no omitted variables, the F-statistic has (3,22) degrees of freedom. The null hypotheses are only rejected at the following p-values; 0.84, 0.44, 0.44

The equation is therefore well specified.

3 *Discussion and Conclusion*

- An industry-specific shock to coal mining destroyed more than 10 per cent of total employment in 29 local authority areas in the UK during the 1980s
- The medium-term employment growth experience over the 1983-2002 period of these areas was very diverse, ranging from a fall of almost 20 per cent to growth of almost 45 per cent. In 19 out of the 29 areas employment was higher in 2002 than in 1983
- Areas have the capacity to recover well even after serious shocks
- However, the effect of shocks can persist over long periods and employment growth 1983-2002 was lower in the mining areas than in the UK as whole
- Quantitatively, the most important factor determining subsequent employment growth was the importance of coal mining in an area; the larger the proportion of total employment in mining in the area, the lower was subsequent employment growth
- An ‘attitudinal’ variable, namely the percentage on strike in March 1985, is also an important explanatory factor
- In addition, there is a small but systematic influence from the degree of industrial concentration in an area’s immediate geographic neighbours. The less concentrated the distribution of industry in an area’s neighbours, the higher its subsequent employment growth.

**Paul Ormerod Volterra Consulting and Institute of Advanced Study,
University of Durham, November 2007**