Book Section:

Steel City: Deindustrialisation and Peripheralisation in Sheffield, UK

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Abstract:
This chapter focuses on processes of deindustrialisation and peripheralisation in the steel city of Sheffield, UK. In many respects archetypal of the trajectories of many deindustrialising cities of the Global North, Sheffield developed around the steel and mining industries and subsequently declined when redundancies and closures hit those industries concurrently from the late 1970s. Throughout successive phases of industrialisation, deindustrialisation, and post-industrial restructuring, Sheffield has undergone multiple processes of peripheralisation and centralisation that have (re)shaped economic and social geographies. This chapter sketches the contours of principle peripheralising processes in the city over the last two centuries, focussing on the period from the 1970s to the present day. We draw on both historical analysis and quantitative data analysis of employment and deprivation to understand the depth of urban inequalities and emphasise the geographic and affective scope of the problem. We do this through historicizing two concepts: economic scarring and social segregation. It is argued that, despite repeated and varied attempts to reimagine the political economy of Sheffield, closures in the steel and coal industries entrenched socio-spatial inequalities ranging across economic, social and cultural indicators that have endured and, in some cases, intensified since. Contributing to a growing literature appreciating the long term effects of deindustrialisation, our analysis suggests that the effects of deindustrialisation are readable *within* cities, as well as between.

1   Introduction

This chapter focuses on processes of deindustrialisation and peripheralisation in the steel city of Sheffield, UK. In many respects, Sheffield is archetypal of the trajectories of many deindustrialising cities of the Global North. While coal mining was an important local industry, the demographics, social relations and built environment of the city developed primarily around advances in iron and steel manufacturing. As a centre of metallurgy, Sheffield's products were exported in vast quantities nationally and internationally from the mid-18th century to the late 1970s. During this period the industrial landscape of Sheffield merged with that of the neighbouring town of Rotherham to become a continuous area of steel and iron mills, foundries and forgeries to the east of Sheffield and west of Rotherham.[1] Situated on Savile Street, The Atlas Works alone occupied a site measuring over 121,000 square metres, sharing its border with many other similar industrial enterprises. Competition from imports, coupled with an anti-working class political economy, led to widespread deindustrialisation of the steel industry from the late 1970s, compounded by redundancies and closures in the coal industry from 1985. Though steel remains a critical part of the local economy, the specialised and automated nature of the modern industry in Sheffield keeps employment numbers low and highly skilled. Gone are the many thousands of steelworkers filing out of workplaces, as well as the smells, sounds, light and materialities of the steel industry.[2]

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[1] Though Sheffield and Rotherham are separate localities, they are tightly bound in terms of the processes discussed in this chapter. Therefore, data from both Sheffield and Rotherham have been included; however, unless relevant to draw a distinction, 'Sheffield' will be used in the text to refer to both Sheffield and Rotherham to avoid repetition.

[2] British Film Institute, *Employees Leaving Brown's Atlas Works*, Sheffield (1901), at *https://player.bfi.org.uk/free/film/watch-employees-leaving-browns-atlas-works-sheffield-1901-1901-online*, accessed 10 May 2022.

In a period of extensive industrial ruination, public-private initiatives have sought to regenerate around post-industrial economies. Phases of urban economic reimagining have focused on sport, the Higher Education sector, services, retail and the creative industries. Results in economic recovery have been mixed at best, impacted by both the historical effects of deindustrialisation and post-GFC austerity from 2010. A 2017 report by the Resolution Foundation think tank highlighted Sheffield's low pay comparative to other cities, and campaigns drawing on the city's rich labour movement traditions, such as «Sheffield Needs a Pay Rise», strive to correct the economic and labour injustices of the contemporary post-industrial city.[3] This chapter contends that these injustices are rooted in the widespread deindustrialisation that began over forty years ago. Closures in the steel and coal industries entrenched socio-spatial inequalities ranging across economic, social and cultural indicators that have endured and, in some cases, intensified since.

Throughout successive phases of industrialisation, deindustrialisation, and post-industrial restructuring, Sheffield has undergone multiple processes of peripheralisation and centralisation that have (re)shaped economic and social geographies. This chapter sketches the contours of principle peripheralising processes in the city over the last two centuries, focussing on the period from the 1970s to the present day. The intention is to connect multiple social, cultural and economic dynamics in a broad historicized account of the city and its people in order to capture and elucidate a multifaceted sense of postindustrial urbanism that is simultaneously specific and comparable. We do this as scholars from different scholarly and methodological orientations, one being aligned to social analysis using archival research and ethnography and two more practiced in quantitative data science and GIS. It is our general contention that ontological divisions between these traditions continue to pervade and that the old critiques remain salient. Large statistical data sets can act to anonymise places and people, abstracting them to numbers and data points that decontextualises real lives and the places they call home from their meaningful histories and socialities. Conversely, historical and social analysis can be overly nuanced and specified, disembedded from the macro city-level processes reshaping urbanities and people.[4] Such divisions must be surmounted if we are to properly understand the depth of urban inequalities and emphasise the geographic and affective scope of the problem.

Following, we claim that, while deindustrialisation did not originate socio-spatial inequalities in the city, closures and redundancies with the intensity and depth in which Sheffield experienced did worsen and entrench processes of peripheralisation that are readily readable and measurable in contemporary urban geographies. We mainly develop and examine these arguments around two related processes: (i) *economic scarring*, which refers to effects of economic shocks on a range of factors including labour markets, investment, income and building occupancy, and; (ii) *social segregation*, the spatial, material and symbolic demarcation of social groups along lines of class, race and/or gender, intentionally or otherwise, that produce socio-spatial inequalities. Drawing on a range of time-series quantitative, the analysis of economic scarring and social segregation makes both an empirical and conceptual contribution to growing work that recognises and traces the long-

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[3] Stephen Clarke, *Forging Ahead or Falling Behind? Devolution and the Future of Living Standards in the Sheffield City Region.* Resolution Foundation, London 2017; Peter Thomas, David Etherington, Bob Jeffery, Ruth Beresford, David Beel and Martin Jones, *Tackling Labour Market Injustice and Organising Workers: The View From a Northern Heartland*, 2020, at *https://sheffieldtuc.co.uk/wp-content/uploads/2020/09/SNAP-report-Tackling-Labour-Market-Injustice-and-Organising-Workers-The-View-form-a-Northern-Heartland.pdf*, accessed 16 June 2022.

[4] Loïc Wacquant, *Urban Outcasts: A Comparative Sociology Of Advanced Marginality*, Polity, London, 2008.

term effects of (de)industrialisation on socio-spatial inequality.[5] We do this by visualising and mapping the two concepts, capturing the varied and processual impacts of industrial decline at the level of the city, as opposed to the macro analysis of intracities, regions and nations common to existing studies.

Additionally, historicizing economic processes provides geographical and social specificity to processes of peripheralisation and socio-spatial inequality, enriching and repopulating quantitative analysis toward an ethical and political imperative.[6] To paraphrase the social historian E.P. Thompson, historical contexts rescue those that lived through the violence and injuries of class from the condescension of posterity. We, thus, begin with a social account of Sheffield's industrial development, deindustrialisation, industrial ruination and attempts of recovery, drawn from historical analysis of archival material, such as photographs, local government reports and cultural sources, and secondary texts.[7] This foregrounds the subsequent quantitative and GIS work. We end by discussing the interrelations between the two forms of analysis and re-embedding them in work of deindustrialising cities .

2   The making and unmaking of Steel City

Sheffield is a UK city of around 550,000 people in the English county of South Yorkshire. As with the development of many industrial cities, the specialist enterprises of Sheffield owe themself to the geology and topography of the surrounding area. Iron ore deposits in the proximate geology were smelted in workshops and mills powered by several fast-flowing rivers – principally the Sheaf, Rother and Don – running from the seven hills on which the city expanded. Another critical factor to Sheffield's establishment as a centre of steel manufacturing was technological innovation in smelting, namely the crucible and Bessemer methods, and their early introduction in the city. From the sixteenth to mid-nineteenth century, relatively small workshops producing cutlery and blades, using the crucible method, were increasingly, and irregularly, located along the main rivers in the historic district of Hallamshire. Cutlers' workshops became numerous enough in the district to warrant formal organisation and governance in the form of The Company of Cutlers in Hallamshire established in 1624.

The introduction in the 1860s of the Bessemer smelting process, which could produce much larger quantities of steel at a time, transformed the material and social infrastructures of Sheffield. Vast steelworks and steel rolling mills were built in the Lower Don Valley, swelling the populations of the settlements of Attercliffe, Tinsley, Neepsend, Burngreave, Darnall, Brightside and around Kelham Island which subsequently together became known as the city's East End. Sprawling steelworks included the Philadelphia Works in Neepsend, Globe Works in Kelham Island and East Hecia Works, now the site of Meadowhall, a large shopping centre built in the 1990s.[8]

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[5] Christina Beatty and Stephen Fothergill, *Jobs, Welfare And Austerity: How The Destruction Of Industrial Britain Casts A Shadow Over The Present-Day Public Finances*. Project report. Centre for Regional, Economic and Social Research. Sheffield Hallam University, 2016; Patricia G. Rice and Anthony J. Venables, *The Persistent Consequences of Adverse Shocks: How The 1970s Shaped UK Regional Inequality*, in «Oxford Review of Economic Policy», 37(1), (2021).

[6] Jay Emery, *Geographies Of Deindustrialization And The Working-class: Industrial Ruination, Legacies, And Affect*, in «Geography Compass», 13(2) (2019).

[7] Alice Mah, *Industrial Ruination, Community, And Place: Landscapes And Legacies Of Urban Decline*, University of Toronto Press, Toronto, 2012.

[8] Yorkshire Film Archive, FIRTH BROWN - A TOUR OF THE WORKS, at *https://www.yfanefa.com/record/6573*, accessed 10th May 2022.

The «dual economy» of steel manufacturing and the more skilled production of steel products were closely related; however, with important distinctions in skill levels, pay and workplace conditions.[9] Cutlery workshops often rented space to comparatively small numbers of artisan craftworkers, referred to locally as «little mesters», a reference which has carried on in Sheffield in the names of businesses. Whereas the steelworks and rolling mills employed thousands of workers. The aforementioned Atlas Works, for example, employed 15000 workers alone in 1901. By 1921, approximately 105000 workers in Sheffield were dependent on the dual economy:

[...] about 65,000 people were employed in iron and steel melting, refining and rolling and in engineering and construction work directly dependent on steel manufacture with a further 40,000 people employed in cutlery and hand-tool manufacture, screw making or in the production of bone, horn or ivory making for the cutlery trade.[10]

This was male dominated industry, though more so in the steelworks and rolling mills, where women made up six percent of the workforce in 1921, than in the artisanal works, where they totalled 33 percent.[11] The most notable among the female workforce were the «Buffer Girls», tasked with polishing cutlery, recognisable by their red cloth hats who became something of a symbol of the city. Male dominance continued at similar levels The exception were the World Wars, whereby women largely replaced conscripted men between 1914-1918 and 1939-1945. A statue, *Women of Steel*, placed outside Sheffield City Hall in 2016 commemorates the female workers that filled the steel industry in these years.

Such large numbers of workers resulted in large-scale migration to the East End of Sheffield, with rows upon rows of terraced housing surrounding the steelworks laid out from the 1860s. Class-based inequalities between the East and West of the city began to emerge, with working-class steelworking families living close to the steelworks and a growing middle-class of industrialists and merchants moving to the West away from the pollution of their factories. As will be discussed in later sections, the east-west polarisation of Sheffield continues.

The concentration and quantity of Sheffield's working-class in the East End was partly responsible, as were workplace conditions, for the extent and militancy of trade unionism and labour movement organisation in the city. The urban working-class movement of the late nineteenth and twentieth centuries inherited memories of conditions in the early steel industry and the militant traditions used in attempts to ameliorate exploitation. As discussed in Friedrich Engels's canonical study of labour in the middle of the nineteenth century, health related diseases and conditions specific to the steel industry, such as Grinders' Asthma, which occurred from the build up of metal shavings on the lungs resulting in shortness of breath, coughing up blood and premature death and was endemic among workers, were addressed through frequent violent attacks on employers and workplaces including makeshift bombs.[12] The city was also a centre of the Chartist movement, which campaigned for the enfranchisement of the industrial working-class, and large, often violent, gatherings were common features in the spaces around the town hall. Simmering tensions

[9] Karen Evans, Penny Fraser and Ian Taylor. *A Tale Of Two Cities: Global Change, Local Feeling And Everyday Life in the North of England,* Routledge, Abingdon, 2002.

[10] Bethan Thomas, John Pritchard, Dimitris Ballas, Dan Vickers and Danny Dorling, *A Tale of Two Cities: The Sheffield Project*, The University of Sheffield, 2009, at *https://www.dannydorling.org/wp-content/files/dannydorling_publication_id2016.pdf.*

[11] K. Evans et al. *A Tale Of Two Cities,* cit., p. 43.

[12] Friedrich Engels, *The Condition of the Working-Class in England in 1844*, George Allen Unwin, London, 1943 [1887].

between labour and capital culminated in a series of events known as the «Sheffield Outrages» from the 1850s to the 1860s, which involved acts of violence against employers and non-unionised workers ranging from «rattenings», which encompassed smaller acts of disobedience such as petty theft and vandalism, to serious instances of murder and arson.[13] The «Sheffield Outrages» were met with a strong response by central government, local authorities and the law courts. However, the strength of labour in the city, organised around the amalgamated labour institutions representing workers in the steel industry, eventually agitated for local government representation. Bolstered by the wider labour movement, Sheffield Town Council was notable for its staunchly left-wing representation and policies throughout the twentieth century. Such was the level of labour militancy, the city was dubbed the «Socialist Republic of South Yorkshire».

Postwar municipal socialism was particularly instrumental in transforming the built environment of Sheffield, aiming to reimagine the city as future proof and forward-looking. This was partly in response to the need for postwar reconstruction.By the beginning of the 20th Century, the Sheffield steel industry had become a major centre of armaments manufacturing, providing much of the weaponry, artillery and bombs to Allied Forces in World War II. The concentration of factories in the East End, thus, made the area a target for Nazi bombing campaigns. Over two nights in December 1940, the «Sheffield Blitz» heavily damaged buildings in the East End and city centre, leaving 660 people dead, 1500 injured and 40,000 homeless. The destruction of housing in Sheffield's East End brought further focus to the poor living conditions to the city's working-class and contributed to the growing view that new housing was needed to replace the 19th Century tenement terracing. Post-war housing development largely entailed the building of expansive multi-storey flats. The Park Hill flats, a brutalist local landmark of 995 flats spread over four buildings connected by walkways and based on the Le Corbusier Unité d'habitation, are emblematic of such housing. Another modernist architecture emblematic of Sheffield's attempted reinvention as a city directed at the future was the «hole-in-the-road» shopping precinct, built under a roundabout with a concourse for socialising. The promotional film *City on the Move*, produced by the City Council in 1972 to promote Sheffield as a centre of commerce, industry and leisure, represents this sense of enthusiasm and future-oriented outlook within the city.[14] However, the sense of optimism captured in *City on the Move* also emphasises the sense of shock that engulfed the city just a few years later, veiling the looming crisis in Sheffield's major industries.

The UK steel industry in the post-war period was characterised by disruption and contraction. Nationalised in 1949, the industry was part of the postwar Labour Party Government's programme of public ownership of key industries only to be privatised again two years later in 1951 by the incoming Conservative Government. Ninety percent of the industry was again brought into public ownership in 1967 under the guise of the British Steel Corporation to safeguard steel production and jobs against foreign imports and low demand. Production and employment peaked at the turn of the 1970s, with around 320000 directly employed in the industry. Across Europe from the early 1970s national steel industries were concentrated in their most productive regions.[15] In the UK, South Yorkshire was one such

[13] Arthur Downing, *The 'Sheffield Outrages': Violence, Class And Trade Unionism, 1850–70*, in «Social History», 38 (2013), pp. 162-182.

[14] Sheffield City Council [video], *City on the Move*, 1972. Available at *https://www.youtube.com/watch?v=-v1-mT9afP4*.

[15] Ray Hudson and David Sadler, *Communities in crisis: The social and political effects of steel closures in France, West Germany, and the United Kingdom*, in «Urban Affairs Quarterly», 21(2) (1985), pp. 171–186.

region. By 1978, 49000 jobs, fifteen percent from the peak, had been lost in the industry; however, Sheffield had mostly evaded the redundancies of the mid-1970s.

The election of Margaret Thatcher's Conservative Government in 1979, and the pursuit of monetarist policies and reprivatisation, brought an end to protectionist strategies, however piecemeal these were. In 1980, steel workers across the UK went on strike for fourteen weeks over pay. The Thatcher Government capitalised on fractures in support to usher in huge cuts to the workforce, eventually privatising the hollowed out industry in 1988.[16] By 1991, 227000 jobs had been lost, a reduction of 86.25 per cent of the workforce in two decades.[17] Though South Yorkshire was one of the areas where steel was earmarked for concentration, Sheffield's heavy industry did not escape closures and layoffs. Over 40000 jobs were lost in the city's steel industry between June 1971 and December 1993, the vast majority from 1980 onward. This represented a reduction from sixteen percent of Sheffield's workforce to just 2.2 per cent. Job losses primarily came from plant closures, as opposed to contractions. Closures spread throughout the large steel industry in South Yorkshire as well as in Sheffield itself. From 1979 to 1985, the number of workplaces employing more than 100 workers reduced by 124 from 350 to 226.[18]

The crisis in the Sheffield steel industry was further exacerbated by the wide scale closures in the nationalised coal industry across the UK from 1985. Prior to the outset of the 1984-85 Miners' Strike, the National Union of Mineworkers (NUM) were planning to relocate from London to a large new premises prominently located next to Sheffield City Hall. Sheffield was the major city of the South Yorkshire coalfield, the largest remaining coalfield in the UK by the 1980s, and economically benefited from this position in terms of employment, as a retail centre and from the proximate supply of coal to the steelworks. What was once named the Sheffield City Region, an administrative area of local government (now named South Yorkshire Mayoral Combined Authority), included in its surrounds the coal mining towns of Rotherham, Barnsley, Doncaster, Chesterfield and Worksop, as well as the areas of North East Derbyshire, Bolsover and Bassetlaw. There were over sixty collieries across this area in 1984; however, a raft of closures and redundancies followed the NUM's defeat in the 1984-85 Miners' Strike with another raft coming in 1993.[19]

Various strategies have been pursued at the city and national level to stem or reverse the impacts of deindustrialisation in Sheffield. Following the urban regeneration policy of intra-city competition and identity, toward the end of the 1980s a place branding and reinvention policy sought to transform Sheffield from Steel City to the «City of Sport». Instrumental to the reimagination was the hosting of the World Student Games in 1991. Several sporting venues were built around the city in anticipation – Don Valley Stadium for athletics, Ponds Forge for swimming events and Sheffield Arena for indoor events. Some of these – most prominently Don Valley Stadium in Attercliffe – were built on land reclaimed from closed steelworks. The costs involved to stage the Games were controversial at the time and continue to be deeply contested in public and political discourse of the city.

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[16] Jonathan Aylen, *Privatisation Of The British Steel Corporation*, in «Fiscal Studies», 9(3) (1988), pp. 1–25; David Sadler, *Works Closure At British Steel And The Nature Of The State*, in «Political Geography Quarterly», 3(4) (1984), pp. 297–311.

[17] Aaron Atteridge and Claudia Strambo, *Decline of the United Kingdom's Steel Industry: Lessons from Industrial Transitions*, Stockholm Environment Institute, July 2021, at *https://cdn.sei.org/wp-content/uploads/2021/07/decline-of-the-steel-industry-in-the-uk.pdf*, accessed 12 May 2022.

[18] *Business Monitor 1979 and 1985*, quoted in Doug H. Watts, *Plant Closures, Multilocational Firms, and The Urban Economy: Sheffield, UK*, in «Environment and Planning A», 23(1) (1991), p. 44

[19] *NCB Collieries – England*, in Northern Mine Research Society, at, *https://www.nmrs.org.uk/resources/britains-nationalised-coal-mines-from-1947/ncb-collieries-england/*, accessed 16 June 2022.

Approximately £130 million of loans were taken out by Sheffield City Council to finance the building of venues. These loans were subsequently refinanced during a period of austerity following the GFC. According to Sheffield City Council, the debts incurred will total £658 million once they are eventually paid off in 2024, over thirty years after the event. Moreover, some of the venues built have subsequently closed and the Don Valley Stadium was demolished in 2014 after shortfalls reached £750,000 a year.

Controversy also surrounds Meadowhall, built on the fringes of the city outside the centre. While Meadowhall was a success in terms of attracting visitors from a wide catchment area, the retail development drew shoppers away from the city centre, impacting the vitality of Sheffield's main streets. In a different approach to the past, in recent years there has been a drive to utilise the aesthetics and cultural capital of Sheffield's built industrial heritage toward economic purposes. Indeed, the industrial heritage of steel is written all over the city in its naming practices: Sheffield Steelers ice hockey team, The Blades, nickname of Sheffield United Football Club, the Bessemer public house, the Crucible theatre. The decision was made in the 1980s by the council and building owners to demolish much of the built industrial heritage along the River Don in the East End, leaving Kelham Island and Neepsend as the centre for industrial heritage-led regeneration.

Built heritage of the steel and cutlery industries is prominent in the Kelham Island and Neepsend area, with an industrial museum and redevelopment of many abandoned industrial workplaces into residential accommodation and business space for hospitality and creative industries. However, the commercial and residential development of Kelham Island and Neepsend are the focus point of changing class dynamics in the city. In the deindustrialising city of the twentieth century's end, the area surrounding Kelham Island became notorious for the ills of industrial ruination. An enclave for the city's most marginalised, by day the streets and the few remaining occupied buildings around Kelham Island were home to small businesses in need of cheap premises, and by night became the city's red light district. The internationally successful Sheffield band, *Arctic Monkeys*, recorded their first album in rented studio space in the area in 2005. The lyrics to their song, *When the Sun Goes Down*, were written about the elicit afterdark activities the area became to be associated with.[20] The City Council's Kelham Island/Neepsend Action Plan, approved in 2008, sought to redevelop the area, attracting developers to the affordable properties which trade on a sanitised industrial chic.[21] For many, this is a clear case of gentrification at the edge of the city centre. For its supporters, the redevelopment of Kelham Island has allowed Sheffield to again reimagine itself as a centre of creativity, saving its built industrial heritage from further demolition and attracting investment to the city.

Through the many interventions and agendas, Sheffield local government has managed to replace and grow the number of jobs lost through declines to the city's industrial base. However, analysis of job creation and economic reinvention by the think tank Centre for Cities found that Sheffield was among the poorest UK cities in terms of reinventing its economy toward knowledge-based, high-skilled and high-paying jobs.[22] Instead, the types of jobs lost by deindustrialisation have been largely replicated in those created in the last 40 years – lower skilled, lower knowledge, more routinized and lower paid. As seen in other industrial places, low-skilled service sector jobs carry less social capital and meaningful

[20] Arctic Monkeys, *When the Sun Goes Down* [song], Domino Recording Company, 2006.

[21] Sheffield City Council, *Kelham Neepsend Action Plan 2008 – 2018*, at *Islandwww.sheffield.gov.uk/sites/default/files/docs/planning-and-development/city-wide-plans-and-reports/Kelham-Island-and-Neepsend-Action-Plan.pdf*, accessed 9 June 2022.

[22] Paul Swinney and Elli Thomas, *A Century of Cities: Urban Economic Change since 1911*, Centre for Cities, March 2015

resources for the production of identity and belonging. The 1997 film *The Full Monty* brought the plights of Sheffield's former steelworkers and their attempts to navigate deindustrialising landscapes to align locally-valued masculine identities with waged employment to an international audience.[23] Such transformations and intensifications are readable in the spatialities of Sheffield across multiple indicators and processes, to which we now turn.

3   Processes of peripheralisation: economic scarring, decentralisation of poverty and social segregation

Here, the overarching concept of peripheralisation refers to the dynamic and multidimensional process of producing peripheries. Our approach follows Kuhn's synthesis of existing literature in that we see peripheralization as comprising five theoretical and empirical orientations.[24] Peripheralization is (i) *relational* to centralization and the concurrent production of a centre or core; (ii) *multidimensional*, comprising interlinked economic, social, cultural, political and symbolic dimensions; (iii) *multi-scalar,* recognisable at global and national scales but also at the level of the city, district, region or other more local spatial units; (iv) *temporal*, proceeding over time and subject to change through reverse processes of, for example, de-peripheralization or decentralization, and; (v) relatedly, peripheralization is inherently *process-centred* grounded in investigations of spatial change and transformation. We, thus, see the utility of peripheralisation as being an umbrella concept encompassing other, related, urban processes that have peripheralizing effects, but which take on more nuanced and discrete forms. There is, therefore, a need to identify more closely, conceptually and empirically, the process*es* of peripheralisation within the broader process of peripheralisation/centralisation.

Here we identify two such processes of peripheralisation that have been particularly apparent in the experience of Sheffield: economic scarring and social segregation. Our analysis of these processes in Sheffield uses several ideas developed by Patricia Rice and Anthony Venables, in which they explore how the effect of economic shocks in the 1970s are still affecting the UK today.[25] Like Rice and Venables, we use employment and labour market data derived from the UK Census conducted every decade and which we have reliable open source data for 1971, 1981, 1991, 2001 and 2011 from the UK Data Service.[26] Spatial unit-level data from the 2021 Census is not yet available; however, the Indices of Multiple Deprivation (IMD) provides more up-to-date statistics on a range of indicators under the domains of income, employment, health, education, crime, housing and environment. The IMD developed as an initiative to synthesise multiple indicators of deprivation at the regional and local-level to produce a uniform index of deprivation at the national level. Each domain is given a weighting relative to its significance as determined through consultation with key stakeholders and data users. These domain weightings are calculated into an overall score for each spatial unit, which provides a ranking of all units in England. The IMD set a new standard in measuring deprivation at the national level and has been updated every three to five years from 2004. We use the most up-to-date version, published in 2019.

[23] Peter Cattaneo, *The Full Monty* [film], Channel Four Films, 1998

[24] Manfred Kühn, *Peripheralization: Theoretical Concepts Explaining Socio-spatial Inequalities*, in «European Planning Studies»*, 23*(2), 2015, pp. 367-378.

[25] P.G. Rice and A.J. Venables, *The Persistent Consequences of Adverse Shocks*, cit.

[26] The 1971, 1981, 1991 and 2001 censuses are available from: UK Data Service, CASWEB, at https://casweb.mimas.ac.uk//; the 2011 census is available from: UK Data Service, InFuse, at http://infuse.ukdataservice.ac.uk/.

For their national-level analyses, Rice and Venables use as their spatial unit Local Authority Districts (LADs). These are relatively large spatial units, useful for comparing the economic performance and conditions *between* regional areas at the national level. Here, we are able to use a much finer-grained geography, allowing us to examine employment change *within* areas and cities, rather than just comparing areas. The top-level spatial units we use are called Travel to Work Areas (TTWAs). TTWAs aim to capture labour market areas, reflecting zones in which most people both live and work, rather than administrative boundaries. They tend to centre on major towns and cities, including their surrounding commute areas, and give a better representation of labour market and (un)employment. Below this level, for example, when looking at Sheffield and Rotherham in detail, we use electoral wards, of which there are 8,694 in the UK. Though populations vary between electoral wards, their boundaries have stayed relatively stable over time. Thus, electoral wards provide a reliable smaller spatial unit to measure long term effects from 1971 to present day.

With this data we aimed to conceive and measure the impacts of deindustrialisation and industrial job losses on the contemporary city in terms of economic scarring effects and social segregation. It is worthwhile placing Sheffield in the national context in order to draw out and emphasise its uniqueness to (inter)national political economy, as well as looking at what is happening within Sheffield itself. Our analysis is, thus, relative to the UK as well as relative to internal spaces of the city and captures two experiences and imaginaries, that of to the nation and to the city.

3.1   Economic Scarring Effects on the Post-industrial City

Broadly conceived, economic shocks, such as recessions, can have scarring effects whereby urban economies continue to be negatively impacted in the medium and long term. We are principally concerned here with the economic shock of deindustrialisation and its enduring legacies on Sheffield's economy. At the broader level, the decade from 1971 to 1981 saw employment decrease in every single TTWA in the UK. As Rice and Venables note, «[i]t is not the case that the LADs that suffered the largest negative employment shocks in the 1970s were performing poorly in 1971».[27] This is certainly true for Sheffield.

To give an overview of the employment change pattern from 1971 to 2011, and how Sheffield fits into that pattern, figure 1 plots the employment percentage in ten TTWAs – plus Sheffield – in each of the five Census decades in our data. The five TTWAs in red are those that experienced the largest drops in employment between 1971 to 1981. Those in green are the opposite, experiencing the smallest drops in employment between 1971 to 1981. Sheffield is shown in blue. The red TTWAs are examples of the point Rice and Venables make: many areas in the UK that had very high employment levels in 1971 were hit hardest in the following ten years, seeing huge changes in their employment fortunes. Sheffield is one such place, with strong employment in 1971, hit very hard. Importantly, all the TTWAs in this figure marked red, with the largest employment decrease from 1971 to 1981, also experienced some recovery in the subsequent decade 1981 to 1991. This is what Rice and Venables suggest should be expected if there is no economic 'scarring': adjustment should take place through, for example, migration – both internal within the UK, and via non-UK migrants moving to areas – leading to employment equilibrium, geographically. However, almost exactly fifty percent of the UK's TTWAs saw their employment *drop* from 1981 to 1991. As can be seen in figure 1, Sheffield is part of a cluster of areas that suffered from this two-decade-long economic decline, and is notable for having both a steep decline in years

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[27] *Ibidem*, p. 133.

1971 to 1981 *and* a continuing reduction in 1981 to 1991. This is due to the double shock of deindustrialisation in steel and coal, which Sheffield was dependent on.
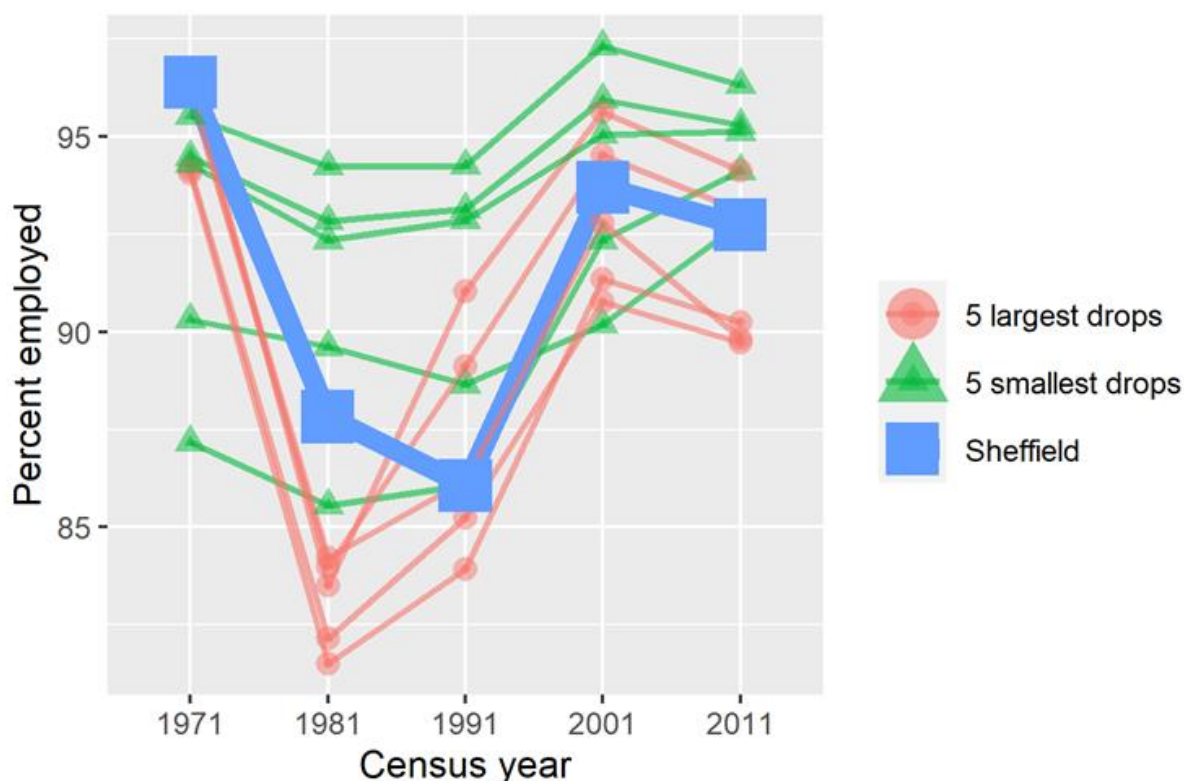

Figure 1: TTWAs with five largest and smallest decreases in employment 1971-2011 with Sheffield and Sheffield overlaid.

This point is emphasised further, but in greater detail, by figure 2, which shows the raw employment percent numbers for each of the electoral wards in the UK, with one Census on the x axis and the subsequent decade on the y axis. A line of slope 1 passing through zero is overlaid in green, and Sheffield's wards are overlaid in red. Figure 2(a) shows the change between 1971 and 1981. Any wards below the slope line had higher employment in 1971 than 1981. As can be seen, very few wards saw an increase in employment percentage in that decade. Notably, all of Sheffield's wards were affected by the economic shocks of 1971 to 1981 more strongly than others in the UK (they are at the lower side of the plot). Figure 2(b) shows the same for the transition in employment from 1981 to 1991, a decade later. The slope line divides wards fairly evenly between those that (re)gained employment within that decade and those that lost, supporting the point above that around fifty percent of areas saw employment drop for a further decade. The majority of Sheffield's wards are on the lower side of the line – their employment level dropped again – though there are four to five wards that gained a little.
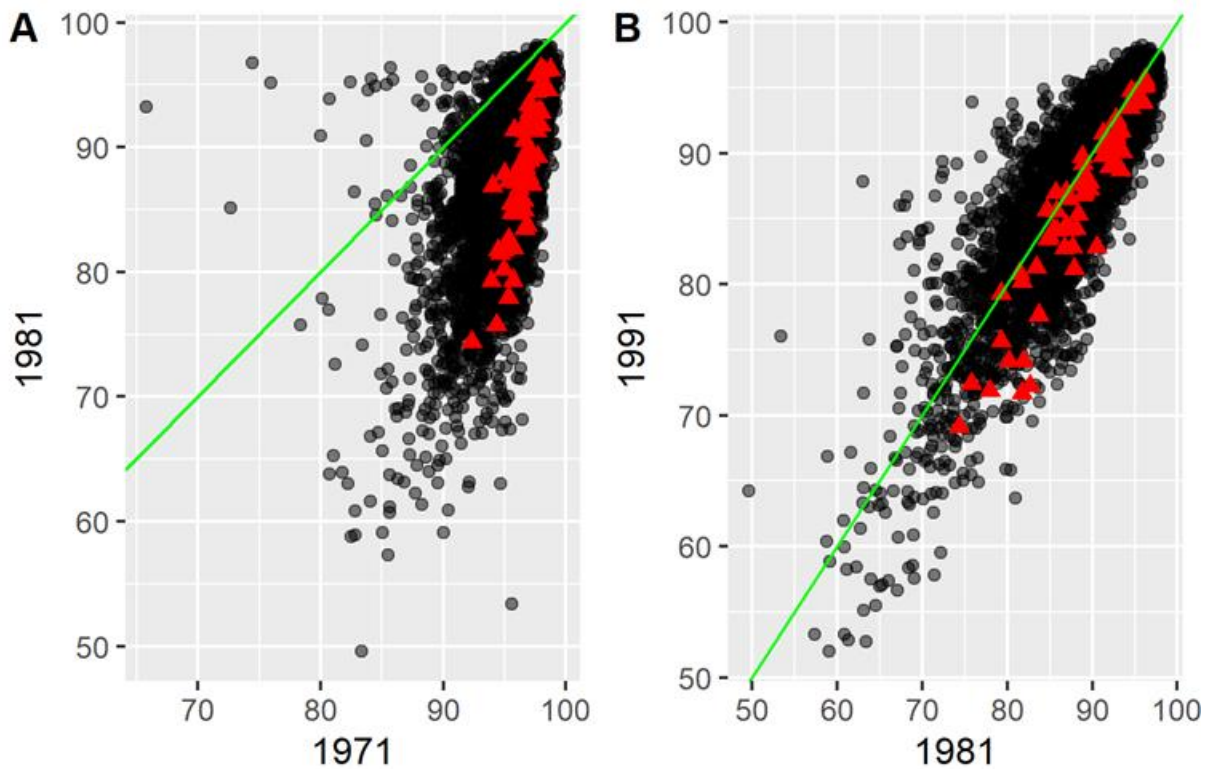
Figure 2: Raw employment percentages per electoral ward in UK. Earlier census on the x axis. Subsequent census on the y axis. Sheffield wards in red. Wards below the line had higher employment at the earlier census.

Lastly, we examine whether the 1971-81 shock had a lasting effect on deprivation in Sheffield. To do this, we re-create a figure from Rice and Venables which plots the 2011 employment percentages of all electoral wards against their population weighted ranking in the 2019 IMD. For the deprivation rank, we use the 2019 IMD, finding the population-weighted average deprivation score per ward before re-ranking. In figure 4, this rank is on the y axis: lower values at the bottom are more deprived wards. We then overlay what we label the *shock decile*. The shock decile puts all wards into a decile based on how negative the effect of the 1971-81 shock was on their employment levels. Wards in decile 1 were the ten percent worst affected, decile 2 the second worst affected, and so on. The plot marks wards in deciles 1 and 2, thus showing where those worst impacted in 1971-81 found themselves in the deprivation rank. The plot includes Sheffield and London, for comparison. Shock decile 1 wards (those most negatively impacted in 1971-81) are shown in red circles. Decile 2 (second most negatively impacted) are green triangles. It is clear that Sheffield wards worst affected in 1971-81 have both lower employment levels in 2011, and are more deprived than others in the region. The graph for London confirms this pattern is repeated.
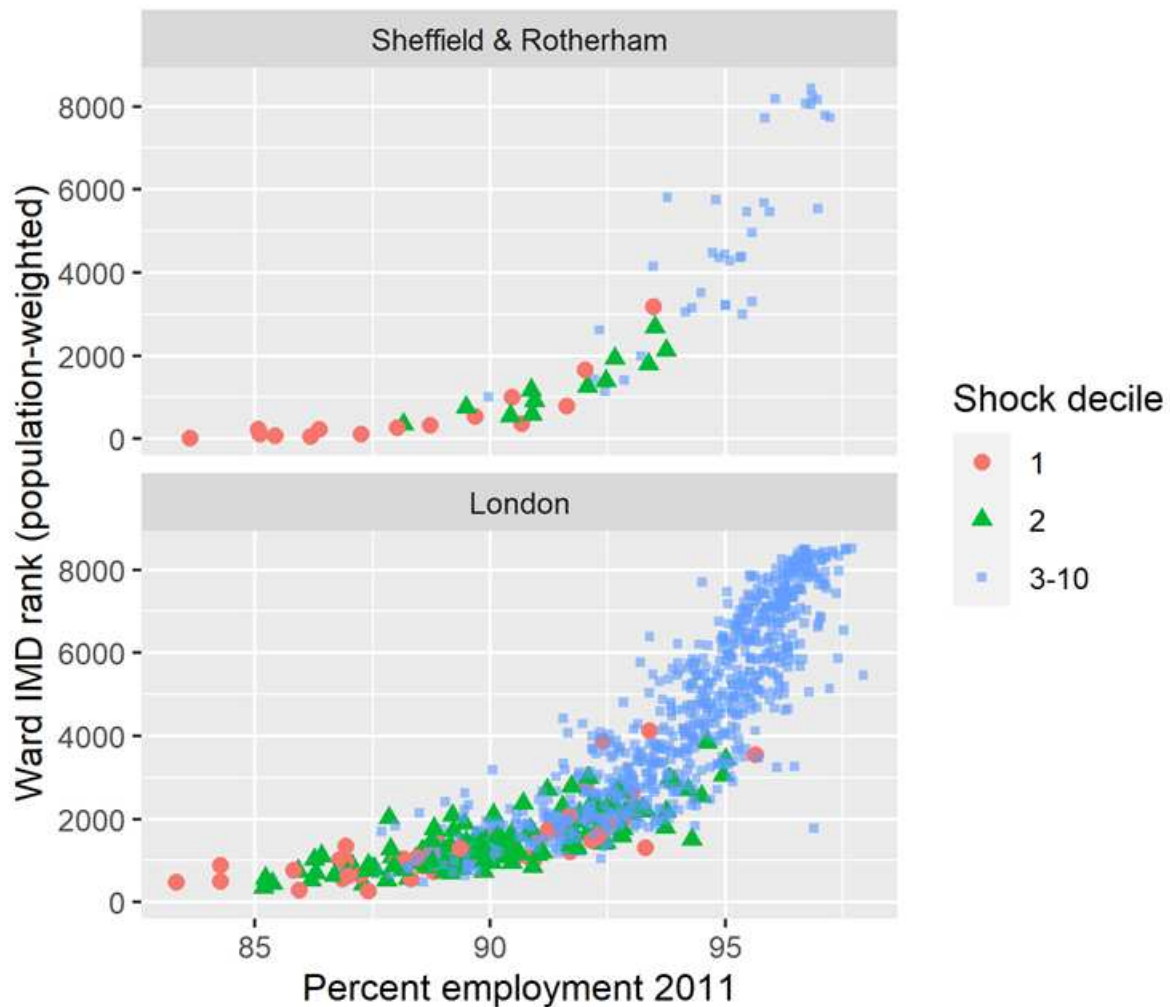
Figure 3: 2011 employment percent vs. IMD 2019 population-weighted average per ward. Shock deciles 1 (red circles) and 2 (green triangles) overlaid. Top: Sheffield. Bottom: London.

3.2   Social Segregation

As previously noted, there exists an historically-rooted east-west polarization in Sheffield, with the idea of «two cities» apparent in local imaginaries and understandings of the city. The east-west dividing line is commonly understood to be the Wicker Arches, a 600-metre set of railway arches that run north-west from Walker Street south-east to the Sheffield and Tinsley Canal built in 1848. To the east of the Wicker Arches are the former industrial areas associated with the steel industry, such as Attercliffe, Burngreave and Brightside. The Wicker Arches, then, are the boundary of the East End. The polarisation has empirical foundations and is picked up in previous research on life-expectancy, incomes and life chances. For example, a Sheffield Fairness Commission report writes:

The 65 minute journey on the 83 bus shows these stark differences in life expectancy across the city. The journey starts at Millhouses, in Ecclesall ward where female life expectancy is 86.3 years. By the time the bus has travelled down Ecclesall Road and into the city centre, female life expectancy has dropped to 81.6 years, and by the time it makes its way into

Burngreave ward just 40 minutes from the start of the journey female life expectancy is only 76.9 years.[28]

While this example may appear shocking, it also alludes to nuances of sociodemographic segregation, drawing attention to both the graduality and intensity of socio-spatial inequality in the post-industrial city.

Figure 4: The Wicker Arches, Creative Commons (CC BY-SA 2.0). Phot taken by Dave Hudson.

The concept of social frontiers «can be thought of as clear-cut boundaries with relatively high edge intensity in a particular socio-demographic dimension».[29] Social frontiers exist along multiple axis of group identity – race, ethnicity, class, age, religion, etc – and can also be intersectional in the sense that social frontiers may demarcate, for example, a multiracial class composition. Alternatively, prominent social frontiers may be overlaid by internal social frontiers, segregating a similarly deprived group along racial lines, for instance. Though social frontiers is an emergent field of study, it is claimed that «there may be potent impacts of social frontiers for human relations, social coherence and wellbeing».[30]

Taking the prominence of the east-west polarisation of Sheffield as a foundation, in this section we map the long-term presence and enaction of social frontiers in Sheffield, as well as posit some of the consequences arising from social frontiers. Figure 5 uses GIS to visualise the relationship between the employment shocks of the 1970s and 1980s and contemporary spatialities of multiple deprivation. The areas marked with solid black lines are the wards in Sheffield that ranked in the top decile (ten percent) of all English wards most negatively affected by falling employment in the period 1971 to 1981. As the map illustrates, Sheffield had fifteen wards among the top ten percent of those with the greatest decreases in employment nationally. Areas marked with dotted lines indicate the wards in the second

[28] Sheffield Fairness Commission, *Making Sheffield Fairer*, 2014, p. 13, at *https://www.sheffield.gov.uk/fairnesscommission*, accessed 17 June 2022.

[29] Aarti Iyer and Gwilym Pryce (In preparation), *Theorising the Causal Impacts of Social Frontiers: The Social and Psychological Implications of Discontinuities in the Geography of Residential Mix*.

[30] A. Iyer and G. Pryce, *Theorising the Causal Impacts of Social Frontiers,* cit.

decile most affected, of which there are twelve wards. The internal shading indicates where each ward falls within the deprivation ranking of all wards in England (n = 8429) split into six indicative brackets.
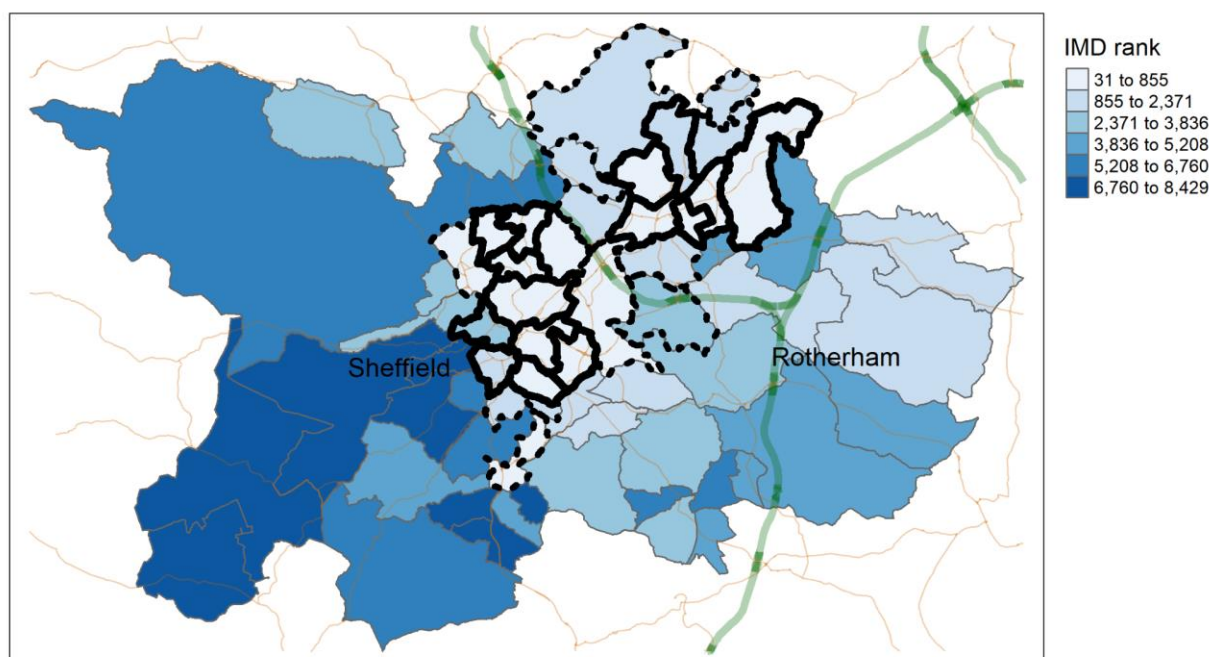

Figure 5: Choropleth map of IMD 2019 with six groupings of electoral wards based on all English wards ranked. Lighter shading = higher rank of deprivation. Individual wards overlaid with either thick black solid line and dotted line. Thick black line = decile 1 of employment decrease 1971-1981. Dotted line = decile 2 of employment decrease 1971-1981.

The first important finding here is that the overwhelming majority of wards (all except one) are in the top decile for employment decrease 1971 to 1981 are also in the top bracket of wards experiencing multiple deprivation. This pattern of prolonged segregation is repeated for decile two of employment decrease 1971 to 1981, whereby all of the twelve wards except one is in the top two brackets. It bears repeating that these spatial units are all concentrated in the areas of the former steel industry. Clearly, the effects of deindustrialisation continue to have marked effects on the contemporary landscapes of deprivation across socio-economic indicators. The notable exception to this trend is the electoral ward which covers the city centre, the only spatial unit from decile one to be lower than the uppermost two brackets of deprivation. The city centre lost a high percentage of jobs between 1971 to 1981 and appears to be the outstanding area for bounceback.

The map also emphasises several important aspects regarding the long-standing socio-spatial inequalities that exist in Sheffield. Large swathes to the west of Sheffield rank among the least deprived nationally, shaded in darker blue. Moreover, these are also spaces that fared better in terms of employment decreases in the period 1971-1981. These are the areas settled by the industrial middle-class of the nineteenth century who established a housing stock of villas and grand, tree-lined boulevards only accessible today by the city's more affluent, professional classes. Most notable, though, is that the most affluent areas across both Sheffield and Rotherham are contiguous with those most deprived, forming a marked edge or frontier running almost north to south through the most populous areas of the city. There is not a graduality to this peripheralisation, but a sharp edge. Moreover, the Wicker Arches, the local symbolic threshold or gateway between the two cities, is fairly accurate as a landmark demarcating the frontier, though there are areas to the south that spill around this frontier. Importantly, these are also the areas where large postwar housing estates were built, such as

the aforementioned Park Hill flats, though that particular estate has undergone significant gentrification. From postwar urban idealism, continues to be post-industrial marginality.

4 Discussion/Conclusion

Our analysis supports and adds to the growing body of political economy literature appreciating the ongoing impacts of industrialisation and deindustrialisation in constituting contemporary urban inequalities.[31] In the UK, the share of manufacturing and construction employment has fallen from a peak of 40.2 per cent in 1966 to 15.1 percent in 2015. Most salient to Sheffield, the number of jobs in the UK steel industry total five to ten percent of those 320000 it did in 1971. We still live with the economic and social consequences of these shocks and transformations. For instance, in an analysis that has informed ours, but of LADs, Rice and Venables found that shocks to male unemployment from 1971 to 1981 are yet to recover and are «a major correlate of the spatial distribution of deprivation even after the passage of more than three decades».[32] What our work adds is a city-level examination of spatial distribution of deprivation, documenting how urbanities continue to be shaped by the aftershocks of events predating the lives of many of their occupants. Measuring economic scarring is thus significant for a number of reasons, as studies of health inequalities demonstrate. Norman et al. found that Disability-Free Life Expectancy is notably shorter in the «main and old industrial/coalfield areas».[33] Our analysis indicates that not only have economic scars remained unhealed by successive interventions, but that these scars pervade multiple deprivations in the same spaces of injury.

It is also important to recognise liveability and socioeconomic conditions before deindustrialisation, something that this chapter has sought to emphasise. In some respects, our analysis of social segregation supports the long-held assumptions of east-west dynamics of post-industrial cities. The pattern across Europe and the US is that socio-spatial inequalities tend to favour the west of cities, with the east more socioeconomically marginalised. Notable examples include Chicago, London and Paris. A tentative theory suggested that wind direction may be a determining factor, with prevailing winds blowing smoke and pollution from industrial workplaces toward the east. Thus, socio-spatial inequalities developed during the industrial period on an east-west axis as those more mobile moved upwind and poorer districts were established in the polluted east nearest to chimneys. A major recent study mapping industrial chimneys and working-class neighbourhoods across UK cities goes some way to confirm this «neighbourhood sorting».[34] The exception to this is, of course, Rotherham, which lies to the west of Sheffield. The urban and industrial merging of Sheffield of Rotherham has resulted in a clustering of deprivation in the Lower Don Valley at the border of the two places which was once where the working-class of both localities jointly laboured in the steel mills and forgeries. Though still cartographically central, this area and its people have subsequently been symbolically and materially peripheralized.

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[31] C. Beatty and S. Fothergill, *Jobs, Welfare And Austerity*, cit.

[32] P.G. Rice and A.J. Venables, *The Persistent Consequences of Adverse Shocks: How The 1970s Shaped UK Regional Inequality*, cit., p. 133.

[33] Paul Norman, Dan Exeter, Nicola Shelton, Jenny Head and Emily Murray, *(Un-)healthy ageing: Geographic inequalities in disability-free life expectancy in England and Wales*, in «Health & Place», 76, 2022, p. 3.

[34] Stephan Heblich, Alex Trew and Yanos Zylberberg, *East-Side Story: Historical Pollution and Persistent Neighborhood Sorting*, in «Journal of Political Economy», 129(5), 2021, pp. 1508–1552.

It must also be noted that social scientists have long understood the lingering qualitative effects of (de)industrialisation in terms of culture, sociality and place. Linkon, for example, notes the «half-life» of deindustrialisation, suggesting that industrial decline:

[...] generates psychological and social forms of disease, as individuals and communities struggle with questions about their identities and their place in a global economy that has devalued workers and their labor.[35]

Much research has drawn on interviews with former industrial workers and their families to conceptualise the social fissures, senses of loss and nostalgia and contested social, geographical and intergenerational identities that industrial ruination gave rise to.[36] What quantitative and GIS analysis, such as here and that of others, contributes to this literature is a broader narrative at the level of the city, region or nation that compliments, underpins and contextualises the personal and community stories of loss, struggle and transformation. It also provides an explanatory framework for why senses of loss persist. The scarring and peripheralisation left by deindustrialisation are not all cultural and affective related to notions of identity and belonging that can be explained away or dismissed as nostalgia. They are material and related to the economic means to make a life and living in the post-industrial city.

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[36] Jay Emery, *After Coal: Affective-Temporal Processes Of Belonging And Alienation In The Deindustrializing Nottinghamshire Coalfield, Uk*, in «Frontiers in Sociology», 5 (2020); Lars Meier, *Encounters With Haunted Industrial Workplaces And Emotions Of Loss: Class-Related Senses Of Place Within The Memories Of Metalworkers*, in «Cultural Geographies», 20(4) (2013), pp. 467-483; Alistair Fraser and Andy Clark, *Damaged Hardmen: Organized Crime And The Half-life Of Deindustrialization*, in «The British Journal of Sociology» 72(4) (2021), pp. 1062-1076.

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