

Levelling up left-behind places: East Germany between ‘long-neoliberalism’ and state-capitalist cures

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Abstract

The intensification of regional inequality has sparked growing interest in left-behind regions and adequate forms of regional development policy. Based on a case study on East German de-/ and re-industrialisation, this paper contributes to these debates pointing to the role of regional policy in nurturing agglomerating forces in the form of regional anchor firms. After reunification, the East German economy deindustrialised at historically unprecedented speed and sectoral breadth. By 1992, the East German industrial base reduced to under 30% of its 1989 levels, while 46% of the entire East German workforce were either un- or underemployed. With about 70% of the East German manufacturing base classified as viable prior to privatisation, the extent of deindustrialisation can be attributed to the neoliberal principles which structured the privatisation process. In 1992/93, a policy reversal occurred attempting to support the preservation of industrial cores. This article investigates the extent to and the conditions under which the East German manufacturing sector recovered from the neoliberal shock. Using natural breaks and Getis-Ord G_i^* geospatial analysis techniques, the article shows, that despite some degree of reindustrialisation, the East German manufacturing sector suffers from ‘long-neoliberalism’, including a persistent gap in manufacturing density and persistent peripheral position in German production structures as evidenced by lower shares of value captured by East German firms and persisting gaps in technology-intensive manufacturing. Industrial recovery in high-value added sectors, where successful, relied on capabilities in high-tech sectors built in the socialist era and on active regional industrial policy including the recreation of anchor firm functions in state-ownership. These points are illustrated at the example of the opto-electronics cluster around Jenoptik and Zeiss in Jena and surroundings.

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Introduction

Since the 1980s, socio-economic polarisation has been increasing across all geographical scales—international, national, regional, and local (Rodríguez-Pose, Bartalucci, et al., 2024; Fiorentino et al., 2024). At the regional scale, this trend has sparked a growing body of research on topics such as left-behind places (Pike et al., 2024), regional development traps (Diemer et al., 2022), and sub-national peripheralization (Kühn, 2015). A growing body of empirical evidence highlights the existence, persistence and significance of left-behind places (Fiorentino et al., 2024). Left-behind places matter, not least because economic and political geography overlap, as exemplified by the strong correlation between being left behind and political discontent (Dijkstra et al., 2020, Rodríguez-Pose et al., 2023; Rodríguez-Pose, Dijkstra, et al., 2024).

Theoretical research suggests that regional inequality is socially constructed and structurally conditioned. In particular, the process leading into development traps and peripheralisation is *relational*, in the sense that the growth of the core and the stagnation of the periphery are linked or even contingent on one another; *multi-dimensional* involving economic, political and sociological dimensions; *multi-scalar*, i.e. being observable at different geographical scales from global to sub-national and *temporal*, meaning that agency has the potential to alter the structural conditions which constrain peripheralized regions (Kühn, 2015). Less is known on the concrete processes that lead to peripheralization. It has been acknowledged that these vary considerably across different national contexts (Pike et al., 2024) and have had different triggers including but not limited to globalisation, skills biased technological change and austerity (Leyshon, 2021). More remains to be uncovered about the mechanisms through which such trigger events can result in the formation of structurally disadvantaged production conditions that lock regions into lower growth paths or trap them in vicious cycles of low incomes and poor job opportunities. In addition, more remains to be uncovered on the type of agency that allows to alter structurally disadvantaging conditions, i.e. the policies that can support resilience to shocks (Boschma, 2015) and ‘levelling-up’. *Place-sensitive* approaches to regional development emphasize tailoring policies and interventions to the specific characteristics and needs of different regions (Iammarino et al., 2019; Rodríguez-Pose, Bartalucci, et al., 2024). *Place-based, people centred* approaches propose post-growth, foundational-economy centred regional policy agenda centred around community well-being and sense of belonging (MacKinnon et al., 2022; Kinossian, 2018).

This paper aims to empirically contribute to the study of peripheralisation and its cures through a case study on East Germany. It argues that place-sensitive and place-based regional development agendas should not be viewed as mutually exclusive but rather complementary options. However, place-sensitive approaches need to be refined with a deeper understanding of the structural economic conditions driving spatial polarisation. Drawing on structuralist theories of cumulative causation, the paper argues that the formation or creation of anchor firms, which create an independent pull into the region and structure its productive activities is critical in supporting regional development economically. What is critical to the poly-centric emergence of agglomeration economies is not just the removal of barriers to agglomeration economies as emphasised by place-sensitive approaches but also the nurturing of an agglomerating force in the form of regional anchor firms in the first place.

This point is illustrated at the example of the de-/ and re-industrialisation process unfolding in East Germany after reunification. The transition shock in East Germany was particularly severe, deindustrialisation unfolding at historically unprecedented speed and breadth after reunification. Despite equally historically unprecedented fiscal transfers, the lasting consequences of the transition shock are still measurable today. Using natural breaks and Getis-Ord G_i^* geospatial analysis techniques, the paper documents a persistent if narrowing gap in manufacturing density and a persistent peripheral

productive integration into West German production structures as evidenced by lower shares of value captured by East German firms and persisting gaps in technology-intensive manufacturing. Other and related dimensions of peripheralization such as demographic shrinkage (Lang, 2012; Velthuis et al., 2023), a persistent wage gap (Dickey & Widmaier, 2021) and stigmatisation (Leibert & Golinski, 2017) have been empirically documented elsewhere.

Given the persistence of dependent production structures despite unprecedented fiscal transfers, the East German case helps to identify some of the fundamental drivers of spatial polarisation. It is shown that the destruction of anchor firms in the privatisation process led to a peripheral integration of the remaining East German manufacturing base into West German production structures. East German manufacturing firms served as extended workbenches and peripheral suppliers with consequences for value added and linkage formation. At the same time, there were some pockets of recovery as evidenced empirically by the emergence of individual hotspots in high-tech industries building on capabilities in micro- and opto-electronics formed in socialist era. Hence, the East German case also helps to identify the types of regional industrial policy, which can help to revert structurally dependent productive positions. It is shown that where industrial recovery in high-value added sectors was successful, it relied on the recreation of anchor firm functions in state-ownership. The paper thereby contributes empirically to the understanding of the structural economic drivers of peripheralisation in transition economies and the types of agency, which can alter such structurally disadvantaging conditions.

The article is structured as follows: Section 1 reviews the literature on why left-behind places exist and persist and how regional development can be supported by policy. Section 2 situates the case study of East Germany as an extreme case and reviews the transition shock, focussing on the dynamics of de-industrialisation and peripheral integration into West German production structures. Section 3 documents the lasting consequences of the transition shock in terms of a persisting gap in manufacturing density and a persistent peripheral position in German production structures. Section 4 reviews a pocket of resilience in the opto-electronics cluster around Jenoptik and Zeiss in Jena and surrounding regions.

1. The intensification, persistence and significance of spatially uneven development

Left-behind places exist, have intensified, persist and they matter.

The economic geography literature has made important observations on the intensification, persistence and significance of spatially uneven regional development within the EU. First, a growing body of evidence demonstrates why left-behind places matter. On the one hand, spatially uneven regional development is also a problem in itself, given the challenges it poses in managing demographic dynamics, provision of health, education, and social care services and the need it imposes for redistribution (Fiorentino et al., 2024; Leyshon, 2021). On the other hand, economic geography and political geography overlap, manifesting as high levels of political discontent and increased support for populist parties in regions that have been left behind. In Europe, the most significant factor behind the rise of far-right populism is economic decline (Dijkstra et al., 2020; Rodríguez-Pose et al., 2023; Rodríguez-Pose, Dijkstra, et al., 2024)

Second, spatial inequalities in economic performance and prosperity have increased almost everywhere within high income economies since the early to mid-1980s (Iammarino et al., 2019; Fiorentino et al., 2024; Kemeny & Storper, 2024) informing a growing body of literature on peripheralization (Kühn et al., 2017; Kühn, 2015), regional development traps (Diemer et al., 2022;

Rodríguez-Pose, Dijkstra, et al., 2024; and left-behind places (Pike et al., 2024). Increasing unevenness is observable at different geographical scales whether global, national, regional or local, coincides with fundamental changes to global productive systems over the past forty years including the vertical disintegration of production in Global Value Chains with attendant competition in low-wage productive activities and skills-biased technological change; the growing weight of finance in and over productive activities (financialisation), and the demise of socialist production systems (Fiorentino et al., 2024; Martin et al., 2021). The impact of these global economic transformations on spatial unevenness has been intensified by shifting dominant macroeconomic policy paradigms toward neoliberalism, including varying degrees of deregulation, privatization, austerity, and the promotion of finance within productive systems (Fiorentino et al., 2024; Leyshon, 2021).

Third, spatially uneven regional development is not just *multi-dimensional* involving economic, political and sociological dimensions; *multi-scalar*, i.e. being observable at different geographical scales from global to sub-national, it is also *relational* in the sense that the growth of the core and the stagnation of the periphery are linked or even causally related (Kühn, 2015). The impact of global economic transformations and policy shocks therefore has not just been spatially uneven, favouring certain cities and regions whilst leaving others marginalized and 'left behind' from the economic progress but has also been self-reinforcing meaning that gaps in economic performance can persist and amplify. Yet, peripheralization is also *temporal*, meaning that agency has the potential to alter the structural conditions which constrain peripheralized regions (Kühn, 2015). This is understood in evolutionary economic geography in terms of varying levels of regional resilience (Di Tommaso et al., 2023; Martin & Gardiner, 2019; Martin et al., 2016), considering both their short-term capacity to absorb shocks and their long-term ability to establish new growth trajectories. Here, short-term and long-term aspects of regional resilience are linked in that shocks can have a permanent effect on the capacity of regional productive systems to develop new growth paths (Boschma, 2015).

There is ongoing debate about how to support regional economic development in left-behind places

The dominant regional development policy approach draws on the theoretical foundations of New Economic Geography (NEG). The central argument of NEG is that the clustering of economic activity in cities promotes innovation and productivity growth. This occurs because concentrations of firms and skilled workers facilitate knowledge spill-overs, economies of scale and scope. Policy should therefore focus on encouraging urban and regional clusters to harness these benefits. Yet, it has been recognised that policies capitalising on agglomeration effects as suggested by NEG frameworks, have actually amplified regional economic divergence (Fiorentino et al., 2024; Rodríguez-Pose, Bartalucci, et al., 2024; MacKinnon et al., 2022; Rodríguez-Pose, 2018) sparking debates about alternatives.

Advocates of a so-called *place-sensitive* approach (Rodríguez-Pose, Bartalucci, et al., 2024; Iammarino et al., 2019), emphasise that such polarising effects of agglomeration enhancing regional policy framework stem from numerous market-failures in the spatial diffusion of agglomeration effects, including barriers in physical connectivity (distance decay) or barriers to labour migration. With that in mind, place-sensitive approaches propose growth-based frameworks, which focus on addressing the challenges faced by various types or 'clubs' of underperforming regional economies in Europe. Regional development policy should both be sensitive to the needs of agglomeration economies and create the conditions for them to occur in as many places as possible. For low performing regions, it is argued that regional development policy needs to focus on removing the barriers to agglomeration economies by improving institutional quality, connectivity and labour force skills (Rodríguez-Pose, Bartalucci, et al., 2024; Iammarino et al., 2019; Rodríguez-Pose, 2018).

By contrast, *place-based, people-centred* approaches (MacKinnon et al., 2022; Kinossian, 2018) propose that political discontent, collective feelings of embitterment and exclusion go much beyond economic factors. 'Left behind' places encompass economic, social, demographic, political, and cultural dimensions. They face relative economic underperformance, lower educational qualifications, higher poverty, out-migration, demographic shrinkage, poor health, limited connectivity, reduced services, political disengagement, and a lack of civic assets and community facilities (Pike et al., 2024). The collective dissatisfaction in left-behind regions ultimately stems from a shared grievance over the decline in their economic, political, and cultural standing *relative to* more prosperous regions. The ultimate drivers of discontent being relational and multi-dimensional, place-based approaches propose a post-growth, foundational-economy centred regional policy agenda to rebuild a sense of belonging and attachment, including a focus on housing, utilities, transport and social infrastructure (MacKinnon et al., 2022; Kinossian, 2018).

Why does left-behindness persist: the drivers of regional development traps.

In what follows, this paper argues that growth-oriented and foundational economy-oriented approaches can be seen as complementary policy options. However, the economic growth-oriented approaches require further theorisation beyond market failure in the diffusion of agglomeration economies. Drawing on structuralist theories of cumulative causation, it is argued that the emergence of polycentric agglomeration economies is not just a question of addressing barriers to the diffusion of agglomeration economies but to nurture or create agglomerating forces in the first place.

Structuralist theories stress that increasing returns to scale (IRS) have broader and more significant implications than those suggested by NEG. In fact, the flipside of an accumulation regime based on IRS is spatial polarisation because the circular cumulative relationship between output and productivity growth allows first movers to accumulate resources and capabilities at an increasingly faster rate. Myrdal (1957) has conceptualised this as 'backwash' and 'spread' effects: whilst IRS in agglomeration economies can benefit peripheries through extended markets and or access to improved technologies (spread-effects), first movers in the centre can accumulate at an ever faster rate and through their progressively dominant position also hold-back the development of the periphery (back-wash effects).

In the production of spatial polarisation, large lead firms play a key role. Hymer (1972) argues that multinational corporations (MNCs) tend to produce a hierarchical division of labour across geographical regions, mirroring the vertical division of labour within the firm. In this setup, the highest value-added activities remain near the headquarters. Consequently, as functions such as goal setting, planning, and research and development are concentrated near the headquarters, polarisation effects prevail. This implies spatial concentration and hierarchies in value creation, with value creation being polarised in certain cities and regions in advanced economies paired with a widespread diffusion of low-tier activities concentrated in lagging-behind regions (Iammarino & McCann, 2018).

Regional polarization through backwash effects is a self-reinforcing process economically, politically and sociologically. 'Spread-effects' may partially offset these negative backwash effects, but are typically not strong enough to counterbalance them. As economies of scale and scope enable core regions to achieve cost reductions and productivity gains, and as innovation generates new markets in the centre, these core areas become hubs of economic, technological, and social innovation. This accelerates the decline of peripheral regions by draining capital and labour (usually of the younger, highly qualified and better educated sections of the population) away from the periphery. The dependence of the periphery on the core reduces the ability of the periphery to pursue independent development policies thereby generating dependence upon more prosperous localities for the

provision of funding and services. Additionally, this economic cumulative causation results in inequalities in non-economic aspects, such as political power, cultural dominance and social marginalisation. Friedman (1973), for instance, emphasises that such centre-periphery dynamics are further compounded by political relationships of power and domination, involving different forms from exclusion from decision-making processes and control over agenda-setting leading to disconnection from infrastructure and knowledge networks (Kühn et al., 2017). Further, Leibert & Golinski (2017) highlight sociological exclusion mechanisms of discursive marginalisation or stigmatisation through the creation and perpetuation of negative regional images and perceptions.

Reinforced by policy: policy induced monopoly power and finance. Feldman et al. (2021) argue that the spatial polarization of prosperity through Myrdalian backwash effects has been exacerbated by institutional changes since the 1980s. These changes, favouring finance and network industries, have allowed dominant firms to strengthen their market power. This institutional environment has amplified the benefits of spatial proximity, enhancing the gravitational pull of agglomeration economies. Deregulated finance enables financial actors to shift resources from firms which are less profitable to firms with higher earnings prospects based on expectation of market power and monopoly rents, while extended intellectual property rights protections in industries like big tech and pharma help incumbents internalise economies of scale, reinforcing winner-take-all dynamics. High-growth startups in scalable industries benefit from being close to venture capitalists and large firms, as working towards acquisition by incumbents is often the only viable strategy for SMEs. These monopolistic entry barriers limit entrepreneurial opportunities and often draw successful firms away from their original locations to major economic centres. This dynamic perpetuates localised returns and creates "superstar" cities and clusters, making it increasingly difficult for other areas to compete.

To address the spatially polarising forces of accumulation regimes based on IRS, nurturing and creating an agglomerating force is critical beyond addressing market failures to agglomeration economies. Here, anchor firms can be harnessed as a regional development tool. Feldman (2003) further suggested that so-called "anchor firms," which are locally-embedded lead firms, generate a gravitational pull towards themselves and shape regional productive activities, supporting cumulative causation and IRS from interconnection of technologies and firms within the area. Anchor firms attract new start-ups that often specialize in similar or related fields and cater highly specialised input demand of lead firms. As the region gains a reputation for its expertise, it attracts additional companies focused on related applications or products, thereby generating a gravitational pull towards the region.

2. The neoliberal transition shock: De- and Re-industrialisation of the East German economy since 1990

Regional polarisation stemming from accumulation regimes based on cumulative causation have been relevant for the EU and its peripheries

International political economy and comparative political economy research has shown that accumulation regimes based on cumulative causation have favoured regional polarisation within the EU and its peripheries. Arestis & Paliginis (1995) argue that Southern peripheral economies within the EU have integrated into the productive structures of core economies under uneven terms, where peripheral economies rely on the core for importing high value-added capital and consumer goods, while exporting to the core based on lower labour costs. The growth in industrial production in the EU periphery is largely driven by multinational enterprises seeking to exploit these labour cost advantages. This arrangement resulted in challenges for peripheral economies in controlling product outputs, employment levels, service conditions, and profit movements. Moreover, to maintain their "comparative advantage" (or disadvantage), peripheral countries are in a position of perpetually competing as low-wage economies on a global scale. Those structural economic issues compounded

by EU market integration have deepened peripheral economies' reliance on core countries for imports and exacerbated significant unemployment or underemployment problems (Arestis & Paliginis, 1995).

Research on transition economies suggests similar dynamics of a dependent integration into core EU production structures have taken place in Central and Eastern European (CEE) economies (Michalski 2018; Bohle, 2018; Soygiğit & Michalski 2022; Nölke & Vliegenthart 2009; Plank & Staritz 2013), which rely on technology from and markets in the core. This sustains a significant development gap between EU and CEE economies as well as within CEE economies (Dunford & Smith 2000). Nölke & Vliegenthart (2009) suggest that CEE economies have become Dependent Market Economies (DMEs), producing complex manufactured goods based on skilled yet cheap labour. Similar to Southern European peripheral economies such a growth model is under constant pressure to maintain labour cost advantages and is fundamentally dependent on the investment decisions and technology of transnational corporations (TNCs) headquartered in the core. Michalski (2018) provides empirical evidence for this type of dependent relationship for the Polish economy, which functions largely as an assembly line for more advanced economies, evident from the declining share of domestic value added in exports and the increasing reliance on intermediate products in exports. These intermediate exports show consistent deficits in high-tech sectors like machinery and high-tech equipment and surpluses in mid-tech and low-tech sectors (Michalski, 2018). Soygiğit & Michalski (2022) find that the participation of Visegrád economies in Global Value Chains (GVCs), particularly those oriented towards the German industrial complex, does not lead to the structural upgrading but instead reinforces existing technological gaps. Plank & Staritz (2013) reveal that the potential spread-effects from EU multinational investment in the Hungarian and Romanian electronics sector in the form of local linkages and knowledge spillovers, have remained extremely low.

The transformation of Visegrád economies into export platforms of semi-standardised industrial goods produced by abundant skilled labour, dependent on FDI in their manufacturing sector and on demand conditions in the core was conditioned politically (Bohle, 2018). FDI began entering the Visegrád region early on as Western firms, in particular West German, Dutch and Austrian firms, sought opportunities in new low-wage locations but in skilled sectors like automotive, electronics, and pharmaceutical industries. Initially, most host countries were cautious against FDI from Western firms but their attitude gradually changed, influenced significantly by EU accession processes making openness to FDI a crucial condition for membership (Bohle, 2018).

Regional polarisation in Germany: the neoliberal transition shock in the peripheral integration of the East German manufacturing into German production structures

This section shows that similar patterns of dependent, peripheral production relations have emerged within Germany. This peripheral position emerged following the destruction of anchor firms in the privatisation process. East Germany can be considered an extreme case of the 'least likely' type in case study methodology. On the one hand, the transition shock was particularly severe. Deindustrialisation unfolded at historically unprecedented speed and breadth after reunification. On the other hand, East Germany was absorbed into wealthy West Germany and received equally historically unprecedented subsidies. Yet, despite those fiscal transfers, the lasting consequences of the transition shock are still measurable today. Various dimensions of left-behindness persist in Eastern Germany including demographic shrinkage (Lang, 2012; Velthuis et al., 2023), stigmatisation (Leibert & Golinski, 2017), and a persistent wage gap (Dickey & Widmaier, 2021). Demonstrating the existence of certain phenomena in extreme cases of the 'least likely' type can be deployed to inform research on the most critical causal processes at play (Eckstein 2000; Flyvbjerg 2006). In particular, the destruction of anchor firms in the privatisation process led to a peripheral integration of the remaining East German

manufacturing base into West German production networks, in line with early predictions along these lines by Nolte (1995) and Hall & Ludwig (1993).

The outcomes of the East German privatisation process implemented by the Treuhandanstalt (THA) were by any standard a failure. On the one hand, the decline in productive capacity by far exceeded the worst expectations. 70% of firms placed under THA ownership were classified as independently viable or potentially viable by the THA (Kehrer, 2000). By 1992, total industrial production in East Germany had declined to less than 30% of its 1989 levels. Within two years of reunification, over 3.2 million jobs were lost, and by 1992, 46% of the East German labour force was either unemployed or underemployed in job creation schemes (ABM) (Roesler, 1994b). The deindustrialization process was unprecedented in its depth, affecting the entire manufacturing sector rather than just individual industries, and in its rapid pace, unfolding over just two years. Typically, industrial declines, such as in the Saar region, occurred gradually over a decade or more and impacted thousands rather than millions of workers (Damm, 2017). On the other hand, the proceeds from the sale of East German were minimal. Operated under adverse market conditions without prior restructuring, the sales proceeds from privatisation covered merely 38% of the THA's running costs let alone generating any proceeds from the sale of East German assets (Roesler, 1994a).

These outcomes were conditioned by the neoliberal principles that guided the East German transition under the THA and unfolded against unequal power relations (Priewe 1993, Carlin 1992, Carlin 1994, Roesler 1994a, Hall and Ludwig 1995). For liberal economists in particular, the transition of the East German economy appeared as an opportunity for a greater withdrawal of the state (Damm, 2017), hence the push for 'instant capitalism' (Hall & Ludwig, 1995) operated through market principles. At the same time, the privatisation process happened on terms of unequal power relations. East Germany was highly indebted, with most of its debt held by West Germany. The political weight of East German regional governments and representatives of industry was limited, leaving little scope to push for alternative routes such as industrial restructuring and infant industry-type nurturing of transition enterprises under THA trusteeship (Kehrer, 2000). Several detailed proposals were rejected both the THA and the federal government, who, instead, placed their confidence in market forces (Priewe, 1993). Power-imbalances were evident not least in the governance structure of the THA. The THA was subject to inherent conflicts of interest, as it included West German managers who competed in the same market as the emerging East German firms (Carlin, 1992). The THA management consisting of a supervisory board (*Verwaltungsrat*) and a management board (*Vorstand*) was almost exclusively West German, including representatives of the federal ministries of finance and economics, the Bundesbank, the new Bundeslander, major West German companies, the commercial banks, and the trade unions (Priewe, 1993; Carlin, 1992). Treuhand firms with more than 500 employees had a supervisory board whose shareholder representatives were also West German, drawn primarily from West German companies (60-70%), banks (20-25%), and local government (Carlin, 1992).

This setting of unequal power relations against the background of a neoliberal policy turn guided the nature of the privatisation process and ultimately its outcomes. The nature of the privatisation process is distinct in terms of its method and its speed. The THA has largely ignored the dominant privatization methods used in other Eastern European transition economies, including public listing, voucher schemes, management or workers' buy-outs (Priewe, 1993). Instead, the main method for finding buyers relied on discrete bargaining between the THA and West German firms in the same industry. 90% of East Germany's productive assets were sold or donated to West German corporations or firms (Hall & Ludwig, 1995), based on contacts established by the THA's supervisory board (Roesler, 1994b; Priewe, 1993). The choice of this privatisation method was publicly and academically justified on the

grounds of lack of private capital and entrepreneurial know-how of East German citizens and on the ground of guaranteeing direct managerial control within privatised enterprises (Carlin, 1992). Management buy-outs being considered as a last resort only and voucher scheme favouring dispersed ownership being ruled out altogether, meant that East Germans were by design excluded or at least disfavoured in the ownership transfer (Carlin, 1992; Roesler, 1994b). Many other THA companies, which were independently viable or could have been after restructuring, were sold to market-dominating West German investors. This included, for instance, profitable hotels, regional newspapers, the East German airline 'Interflug,' energy-producing enterprises, and the high-tech firm 'Zeiss Jena' (Priewe, 1993).

This privatisation methods had profound consequences for regional productive capabilities through the destruction of anchor firms. To implement the privatisation method, the dramatic difference in size between East and West Germany enterprises at the time of reunification needed to be overcome. East German firms were significantly larger on average, production being characterised by large, vertically integrated combines (Kehrer, 2000). The average Kombinat employed 20,000 people, while the average number of employees per firm was 893, compared to just 190 in West Germany. In West Germany, over two-thirds of firms are classified as Mittelstand, whereas in East Germany, only 12% fall into this category (Carlin, 1992). A central part of the THA's work was therefore to break up, strip down, and recombining parts of former combines into units sellable to the West German Mittelstand (Carlin, 1992).

The destruction of large industrial firms resulted in a void of regional anchor firms. The THA facilitated the transfer of a significant portion of the capital stock and largely to the ownership of individuals and firms headquartered in West Germany. By 2004, of Germany's 100 largest industrial firms, only 1 Jenoptik was headquartered in East Germany (Hall & Ludwig, 2009). The absence of regional anchor firms hindered the development of the Mittelstand, undermining viable new business registrations (Roesler, 1994b). West German industrialists showed limited interest in purchasing new capacity in East Germany, even during economic booms. Many German firms preferred to meet the demand in East Germany by expanding their production capacities in Bavaria and the Rhineland, where conditions were more familiar and predictable and there was no need to deal with uncertainties surrounding the workforce and infrastructure (Roesler, 1994a). The remaining East German manufacturing base was largely transformed into a dependent province serving as extended workbench or producing intermediate inputs in branch plant facilities owned by large enterprises with higher value-added largely accruing to the Western-based headquarters (Hall & Ludwig, 2009; Hall & Ludwig, 2008).

The privatisation method was one that structurally altered the productive position and capabilities of East German firms. The neoliberal policy background against which privatisation was implemented advocating for a rapid transition without any prior rehabilitation or productivity enhancing investment amplified these effects. Privatisation was carried out at a speed by far exceeding that in CEE economies: by 1993, 95% of publicly owned enterprises privatised (Roesler, 1994a). A strategy of rapid privatisation without prior rehabilitation was adopted. The THA had no political mandate concerning labour market, regional or environmental policy and the rehabilitation of firms was left almost exclusively to western investors. Firms under THA trusteeship were actively prevented from productivity enhancing investment prior to privatisation, being generally only allowed to start unavoidable investment, assessed as being 'neutral' with respect to prospective buyers (Priewe, 1993; Roesler, 1994b). Selling under adverse market conditions, the THA was often forced to sell firms to bidders focused on securing oligopolistic market position and conquer East German regional markets with products from western locations. Many contracts went to fraudulent and speculative investors, a

result of the rapid privatization strategy in poor market conditions (Priewe, 1993; Schulz, 2013; Hall & Ludwig, 1995).

East German firms were often in bad conditions in terms of their capital stock and equipment (Roesler, 1994b), their their debt stock (Priewe, 1993), and they faced structural disadvantages in the form of the near total collapse of domestic and external markets¹ (Hall & Ludwig, 2008; Priewe, 1993; Roesler 1994b) as well as labour cost disadvantages under the unified labour market and currency union (Carlin, 1992; Carlin, 1994). The policy debate on how to deal with these structural disadvantages unfolded against the neoliberal policy moment in the immediate aftermath of reunification, wage cost disadvantages dominated the political and economic debate, especially in the neoclassical mainstream seeing the monetary union as the main market distorting force preventing adjustment of the East German economy (Snower & Merkl, 2006).

The imminent consequences of the transition model in form of mass-unemployment in the East necessitated massive transfers payments in the form of unemployment benefits and subsidies for pensions and health care contributions. This skewing of transfers to social welfare payments supporting consumption rather than productive capacity served to subsidize East German consumption relative to production of output and lead to a short-lived reunification expansion: largely benefiting West German firms shipping to the newly acquired markets in the eastern region in the first half of the 1990s (Hall & Ludwig, 2008). Demand of the East German economy largely served by West German firms meant persisting high levels of unemployment in the East (Hall & Ludwig, 2008).

3. Long-neoliberalism: the lasting consequences of neoliberal shock therapy...

The following section uses geospatial clustering and hotspot analysis to trace any lasting effects of the privatisation programme. The findings reveal a measurable if declining gap in manufacturing density and as well as evidence of a persistent peripheral productive integration into German production structures.

Natural breaks clustering analysis based on the Jenks natural breaks optimisation is used to divide geospatial data into clusters that are as internally homogeneous as possible while maximising the differences between the classes. *Getis-Ord Gi* statistics* are used to identify ‘hotspots’ and ‘coldspots’ in spatial data. The Getis-Ord Gi* statistic evaluates whether high or low values cluster spatially. To evaluate whether high or low values cluster spatially, the Getis-Ord Gi* statistic determines the degree to which a value at a given location is higher or lower than expected based on the values at neighbouring locations. The Gi* statistic for a feature i is defined as:

$$G_i^* = \frac{\sum_{j=1}^n w_{ij}x_j - \bar{X} \sum_{j=1}^n w_{ij}}{\sqrt{\frac{n \sum_{j=1}^n w_{ij}^2 - (\sum_{j=1}^n w_{ij})^2}{n-1}}}$$

¹ The overnight liberalization of markets resulted in the collapse of virtually all markets. External markets collapsed in the East bloc and in the Western market due to the removal of export subsidies. The East German internal market collapsed due to shifting consumer preferences (Hall & Ludwig, 2008; Priewe, 1993; Roesler 1994). The example of Berlin-Kosmetik underscored this, where the THA allowed modernizing investments before privatization, yet major retailers refused to stock Berlin cosmetic products (Roesler, 1994b).

where:

- x_j is the attribute value at location j.
- w_{ij} is the spatial weight between location i and location j. $w_{ij} = 1$ if locations i and j are neighbours, and $w_{ij} = 0$ otherwise.
- \bar{X} is the mean of the attribute values.
- S is the standard deviation of the attribute values.
- n is the total number of locations.

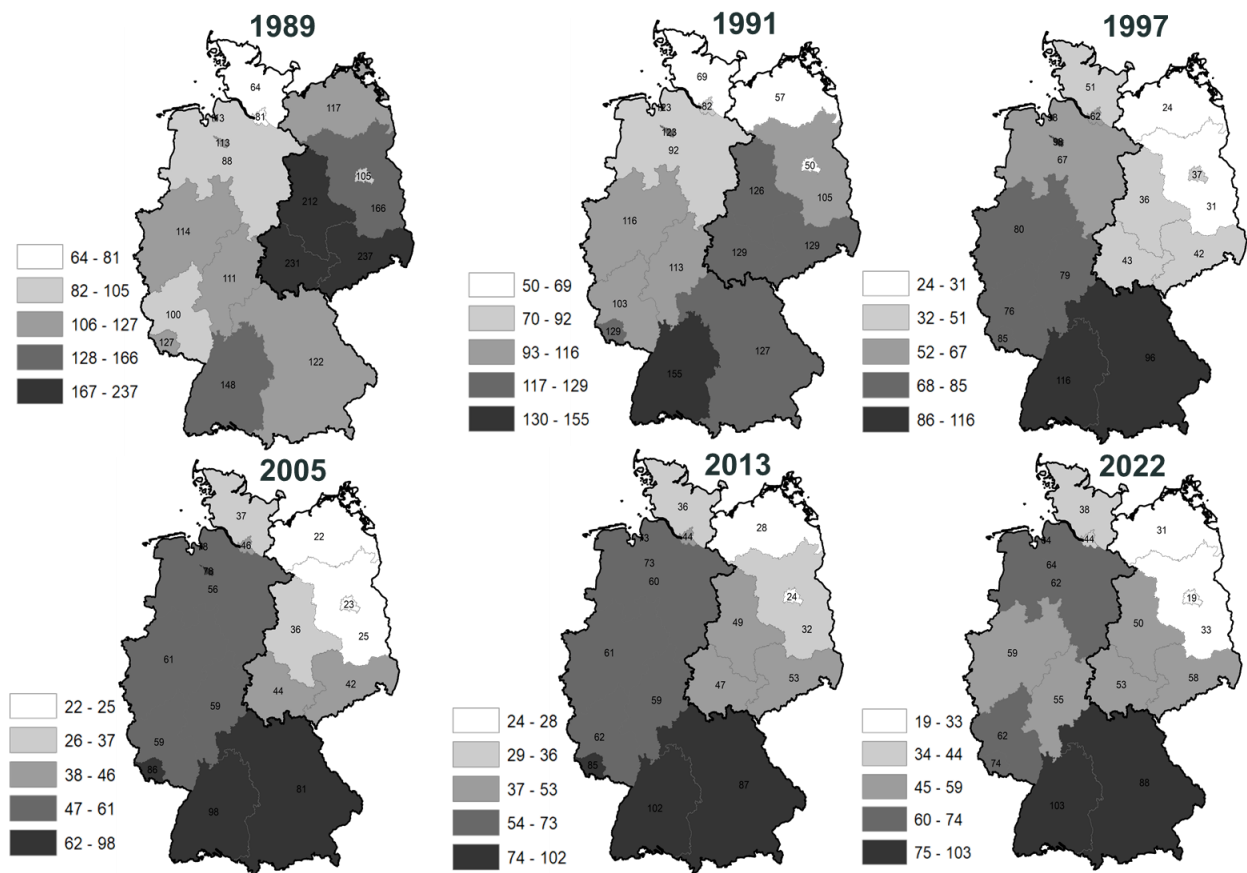
High Gi Values* indicate that a location is part of a cluster of high values (hotspot). Low Gi Values* indicate that a location is part of a cluster of low values (coldspot). Near-zero Gi Values* indicate that the location does not significantly deviate from the average spatial pattern. Statistical significance of the Gi Values* is established against critical values from a standard normal distribution.

Persistent though declining manufacturing gap

Figure 1 and Figure 2 show regional and district level data on manufacturing density. Manufacturing density is measured as manufacturing employment per 1,000 residents. The advantage of measuring manufacturing density in this way is that it becomes possible to construct a data series including the period before reunification. Manufacturing employment per 1,000 residents give a measure of manufacturing density comparable across East and West, which is not distorted by differences in the value accounting systems.

Regional level data reveal a persisting if narrowing manufacturing gap. Figure 1 applies natural breaks clustering on data on manufacturing employment per 1,000 at regional level. The Jenks natural breaks optimisation divides data into clusters that are as internally homogeneous as possible while maximizing the differences between the clusters. What stands out is that before reunification both parts of Germany were highly industrialised and positioned in leading roles in their respective blocs. Manufacturing density in the Southern parts of East Germany (Thuringia, Saxony and Saxony-Anhalt) was substantially higher in 1989 than in any West German region. Manufacturing density declined across both parts of Germany over the period 1989 to 2022 but the process of deindustrialisation substantially faster in East German regions. Manufacturing density in Saxony, the densest region, declined from 237 manufacturing workers per 1,000 residents in 1989 to 42 in 1997, recovering to 58 in 2022. In the least dense region, Mecklenburg-Vorpommern, manufacturing workers per 1,000 residents declined from 117 in 1989 to 24 in 1997, recovering to 31 in 2022. We observe some degree of spatial equalisation but manufacturing density in the strongest performing East German regions (Thuringia and Saxony) only reach the medium cluster by 2022, i.e. more than three decades after reunification. Noticeable as well is that the lowest cluster in 2022 contains only East German regions, namely Brandenburg, Mecklenburg-Vorpommern and Berlin (Figure 1).

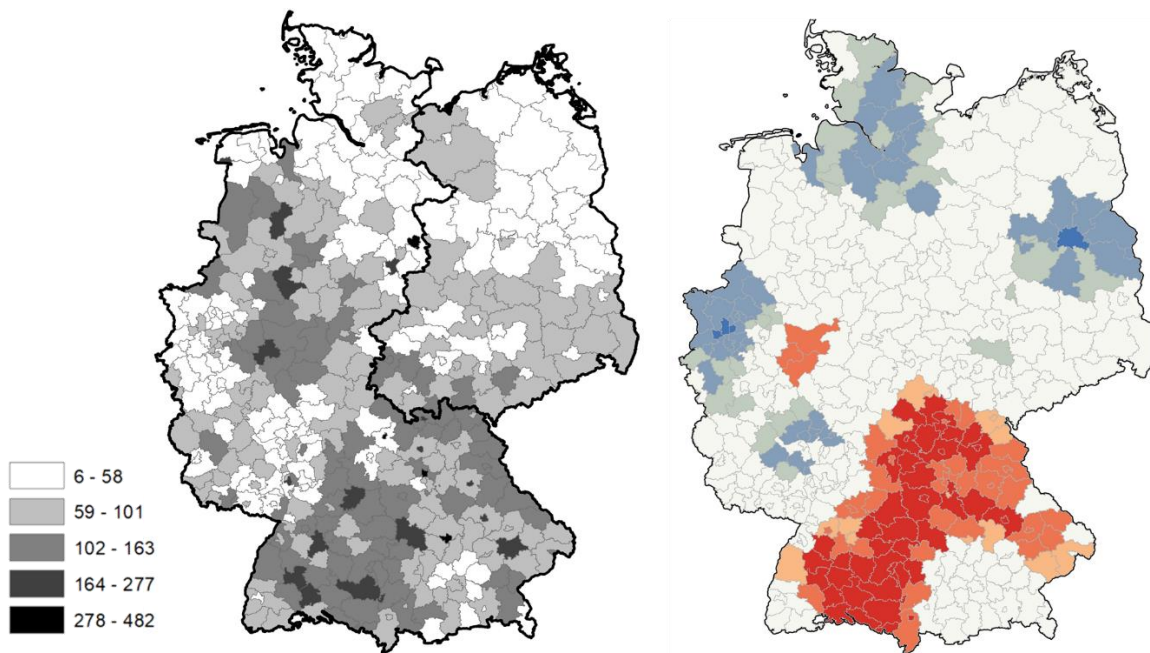
Figure 1. Manufacturing employment per 1,000 residents (natural breaks)



Calculations based on: Statistisches Jahrbuch der DDR 1990; Statistische Jahrbucher der Bundesrepublik 1990, 1992, 1998; Volkswirtschaftliche Gesamtrechnung der Lander 2005-2022

Figure 2 disaggregates manufacturing density by district for the year 2022 applying both natural break analysis and Getis-Ord G_i^* hotspot/ cold spot analysis. The overall pattern is one of a North-South divide and an East-West divide within that. The natural break analysis shows that only five East German districts have reached the middle cluster in terms of manufacturing density. The hotspot analysis shows that although most East German districts do not significantly deviate from the average spatial pattern, we see significant cold-spots in East German districts (Brandenburg around Berlin) and practically no hotspots apart from three Thuringian districts (Sonneberg, Hildburghausen and Schmalkalden-Meiningen) close to the Bavarian border.

Figure 2. Manufacturing employment per 1,000 residents 2022 (natural breaks and hotspots)



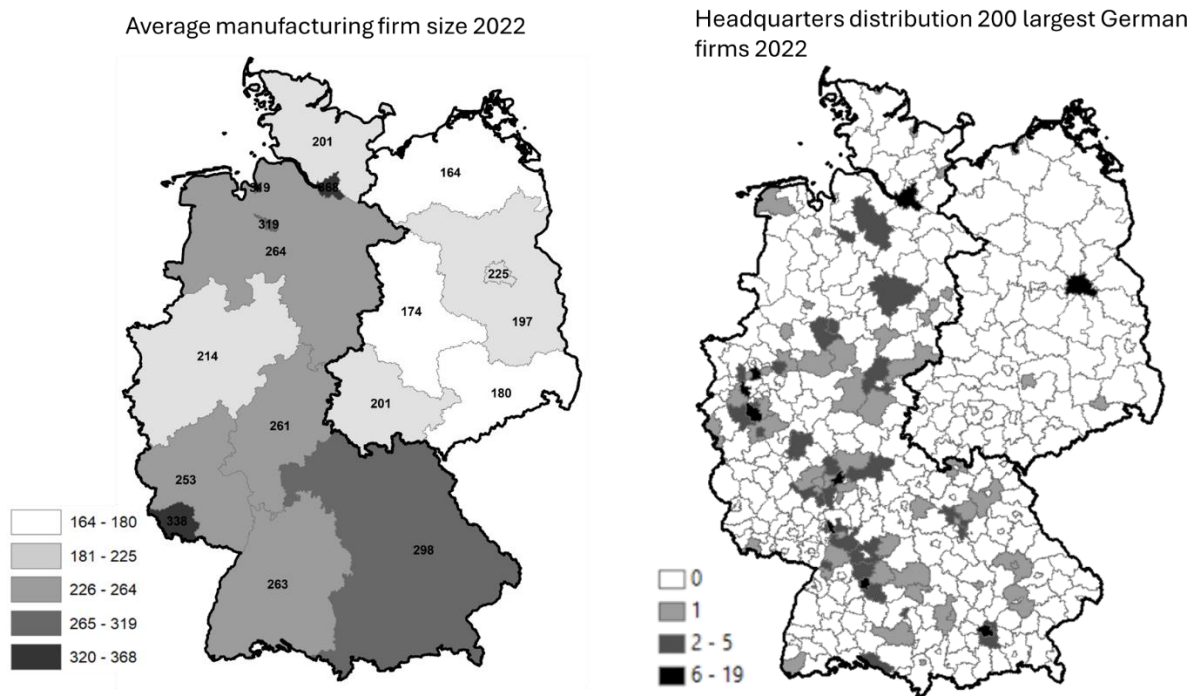
Calculations based on: Volkswirtschaftliche Gesamtrechnung der Länder 2022

Persistent dependent manufacturing: From large industrial conglomerates to peripheral suppliers

A significant caveat to the narrowing of the still-existent manufacturing gap is that reindustrialisation happened within a dependent, peripheral position still measurable today. The peripheral pattern of productive integration is evidenced by a persistent gap in the value added captured by East German manufacturing firms and the lower density of high-tech manufacturing sectors. It is very closely linked to the destruction of regional anchor firms following the break-up of the industrial combines, rendered necessary to create saleable units for West German investors.

One of the direct and most significant consequences of the THA privatisation programme was the uneven distribution of enterprise headquarters between the two German regions. By the mid-1990s, the eastern region of Germany had almost no corporate headquarters of enterprises with substantial annual revenues and by 2022 there was barely any change to the spatially uneven distribution of headquarters, with only three out of the largest 200 German firms in industry, commerce and services being located in East Germany (Figure 3).

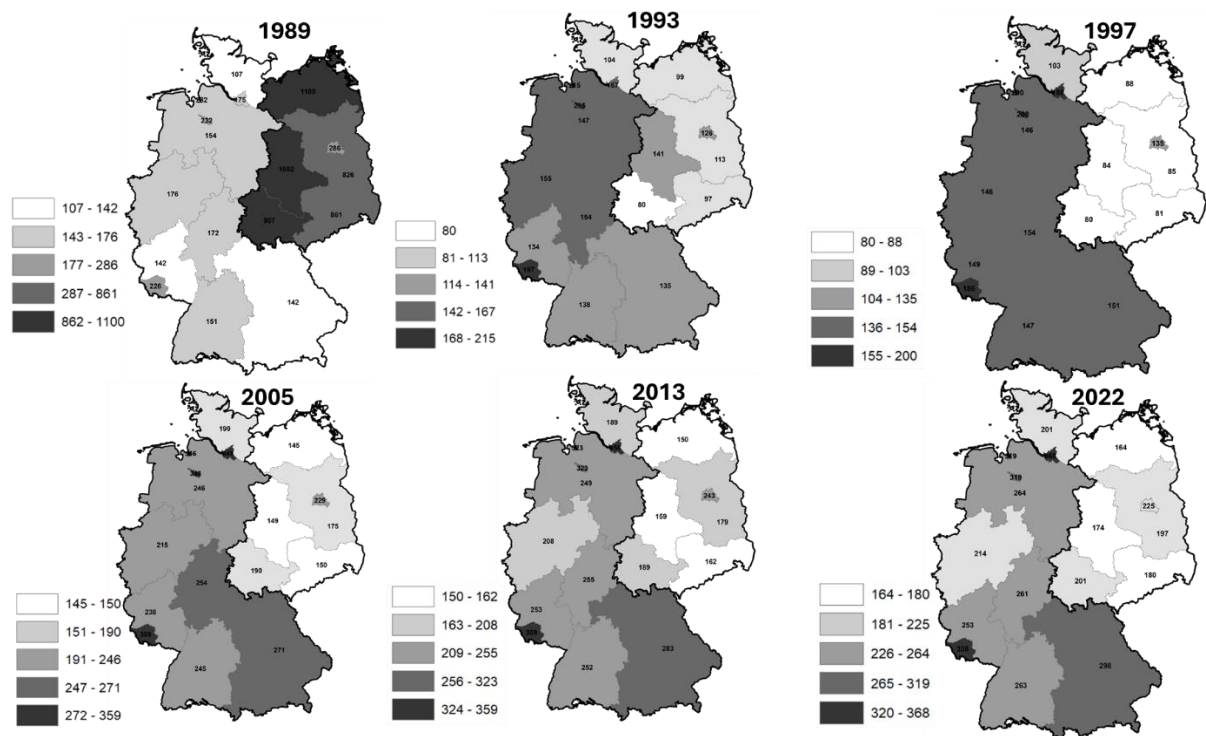
Figure 3. Average manufacturing firm size and distribution of headquarters in 2022



Calculations based on: Volkswirtschaftliche Gesamtrechnung der Länder 2022 and FAZ(2023) Die 100 Größten

The THA privatisation led to a radical reconfiguration from large industrial combines to a disproportionately large number of small to medium-size enterprises. Figure 4 traces the evolution of averages manufacturing firm sizes at regional level from 1989 to 2022 applying Jenks natural breaks clustering. Whilst in 1989, the average firm size in all East German regions clustered in the top two clusters, by 2022 average firm size in all East German regions clustered in the two lowest clusters. No West German region appeared in the lowest cluster in 2022.

Figure 4. Average Manufacturing Firm Size (natural breaks)

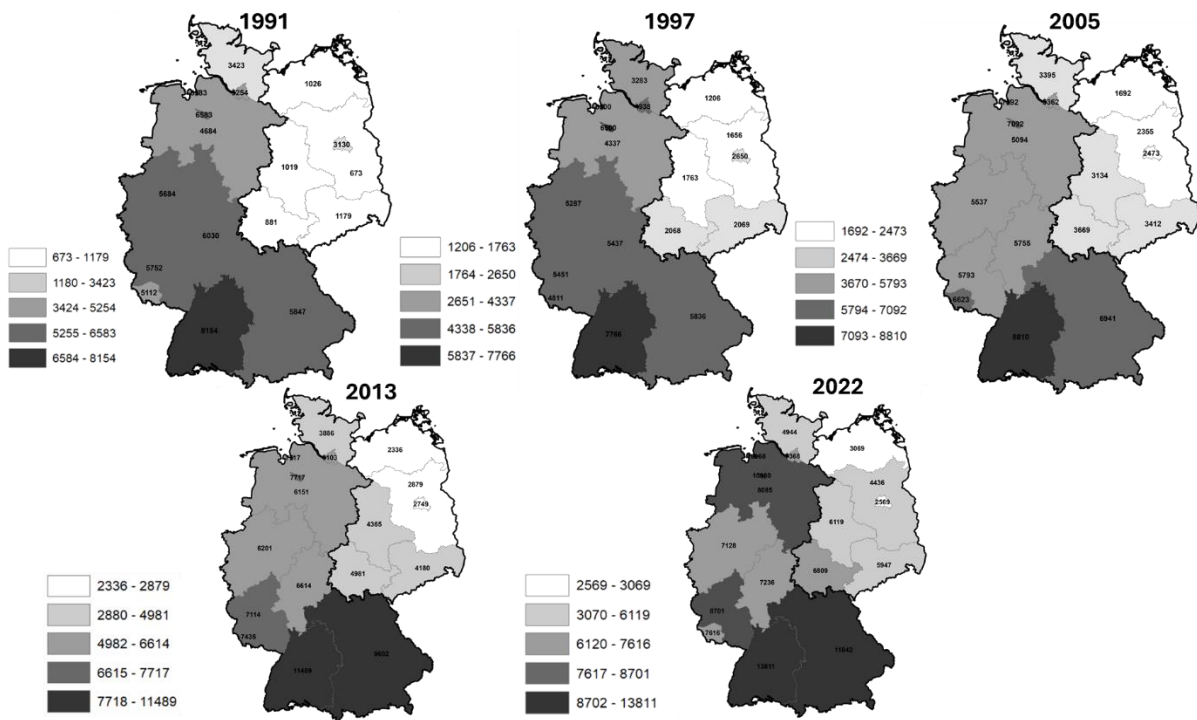


Calculations based on: Statistisches Jahrbuch der DDR 1990; Statistische Jahrbücher der Bundesrepublik 1990, 1992, 1998; Volkswirtschaftliche Gesamtrechnung der Länder 2005-2022

The void of headquartered enterprises has been linked sluggish linkage formation. Demand for demand for producer-related services tended to remain in, or be created in, the western region, close to the corporate headquarters (Heimpold, 2009; Hall & Ludwig, 2008). In the absence of regional anchor firms, fewer SMEs are viable (Roesler, 1994b) What is more, the spatial concentration of headquarters has persistent consequences for the *location of high value-added strategic firm activities*, which tend to be spatially close to headquartered firms. The production pattern that emerged is one in which East German firm occupy positions of extended workbenches and suppliers of intermediate inputs (Hall & Ludwig, 2008). As such, the headquarters gap has consequences for value captured by East German manufacturing firms and by extension wages, their research intensity, and the density of producer related services. In terms of research-intensity and innovation capacity of East German firms substantial gaps remain. Röhl & von Speicher (2009) find that R&D activities of manufacturing firms are still largely concentrated in West Germany, only 10% of private R&D employees in East. Eickelpasch (2013) shows that R&D employment as share of the total workforce is only 86% of the West German level, the distance being even more pronounced when looking at private firms only (48%).

Persistent unequal value capture is illustrated in Figure 5 showing manufacturing value per capita over the period 1991 to 2022. Whilst the gap between East and West German regions narrows, it persists into 2022. By 2022, only one East German region (Thuringia) has reached the medium cluster whilst all other East German regions appear in the lowest two clusters.

Figure 5. Manufacturing Value Added per capita (natural breaks)



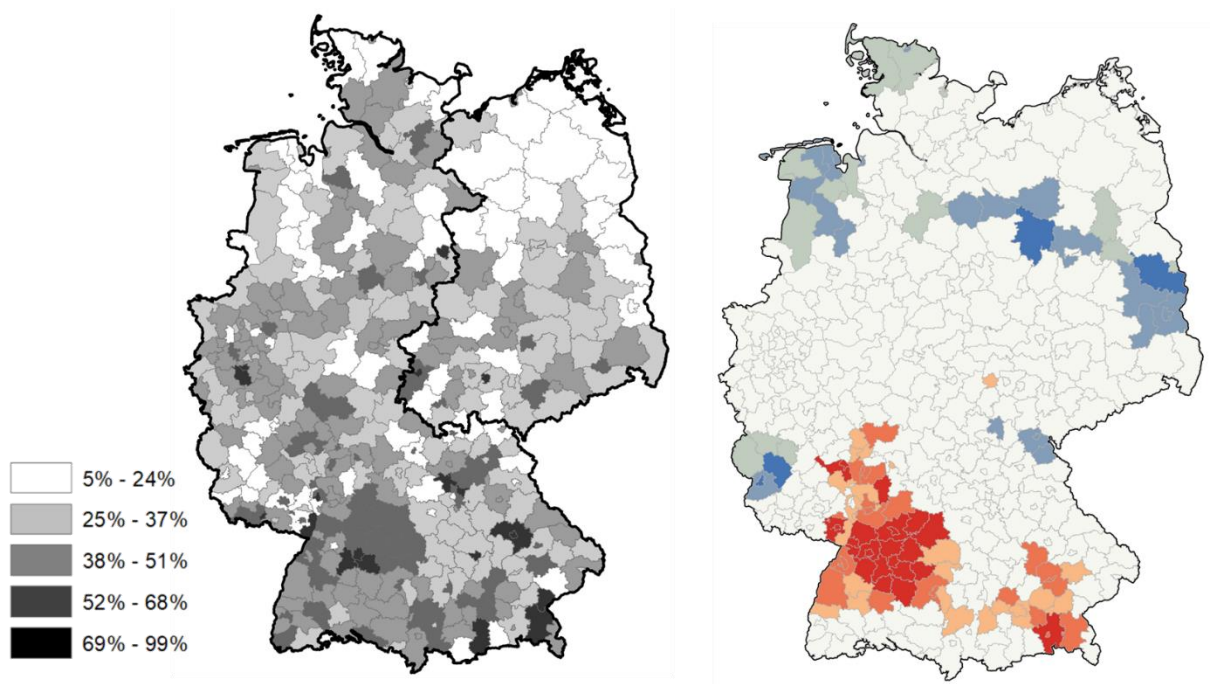
Calculations based on: Statistische Jahrbücher der Bundesrepublik 1990, 1992, 1998; Volkswirtschaftliche Gesamtrechnung der Länder 2005-2022

To trace differences in the technology-intensity of manufacturing, the cluster and hotspot analysis has been disaggregated by sector. Since 2008, sub-sectoral data on manufacturing published by the Statistical Offices of the Federal States (Statistische Ämter der Länder) follow ISIC Rev. 4 in their industry classification (WZ 2008). Of the two-digit codes, the following were classified as 'technology-intensive':

- 1) Manufacture of chemicals and chemical products
- 2) Manufacture of pharmaceuticals, medicinal chemical and botanical products
- 3) Manufacture of computer, electronic and optical products
- 4) Manufacture of electrical equipment
- 5) Manufacture of machinery and equipment
- 6) Manufacture of motor vehicles, trailers and semi-trailers

Figure 6 illustrates a persistent gap in technology-intensive manufacturing employment relative to total manufacturing employment at district level. East German districts show considerably more cold spots and only a single hotspot district around Jena (Thuringia).

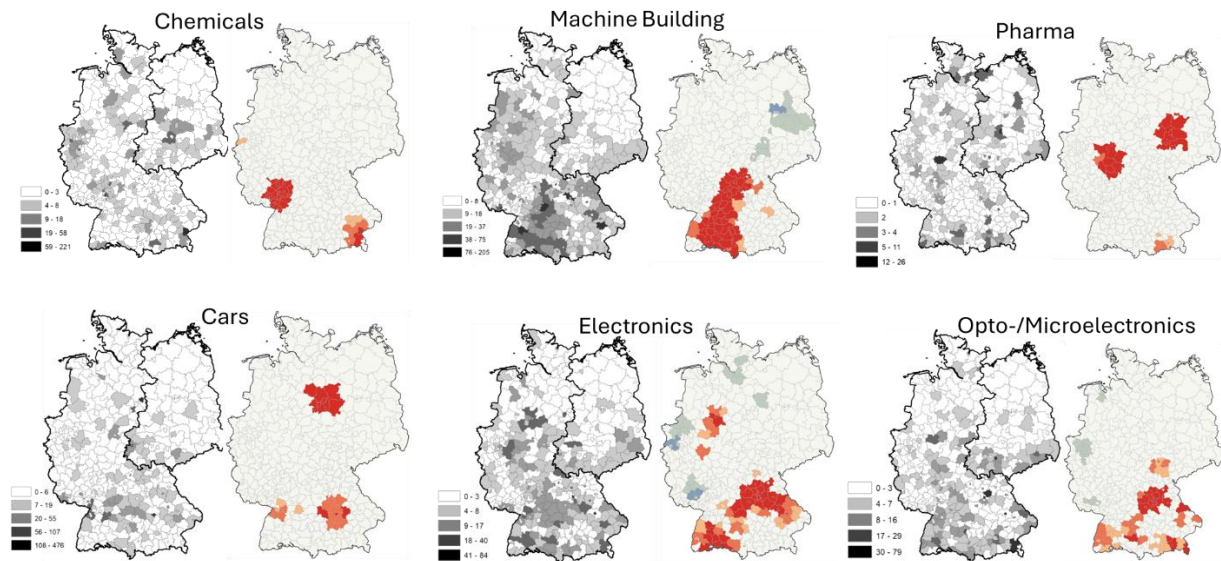
Figure 6. Technology-intensive manufacturing employment as % total manufacturing employment 2022 (natural breaks and hotspots)



Calculations based on: Volkswirtschaftliche Gesamtrechnung der Länder 2022

Figure 7 illustrates the lower density of technology-intensive manufacturing, showing employment per 1,000 residents at district level for the chemicals, machine building, pharmaceuticals, automotive, electronics and opto-/ microelectronics sectors. Apart from pharmaceuticals and opto-/microelectronics there are no discernible hotspots of technology-intensive manufacturing located in East Germany.

Figure 7. Manufacturing employment per 1,000 residents by technology-intensive manufacturing sectors (natural breaks and hotspots)



Calculations based on: Volkswirtschaftliche Gesamtrechnung der Länder 2022

4. Some of its cures: the role of anchor firms in state-ownership supporting reindustrialisation in industrial cores

The rapid collapse of the East German economy very quickly proved to be politically untenable (Roesler, 1994a). Huge fiscal transfer payments followed estimated in the range of €1.5tn to € 3.4tn between 1991 and 2018 (Deutscher Bundestag, 2020). Most of these (60-70%) were transfer payments for unemployment benefit, pensions, health care etc., followed by infrastructure extension. Support for productive capacity played a subordinate role on aggregate in total transfer payments, though since 1993, there was a policy shift towards preserving so-called industrial cores (Karlsch, 2017; Damm, 2017).

From 1991 to 2009, Germany implemented fiscal transfers aimed at directly supporting productive capacity through several key initiatives. One significant programme was the "Investitionszulage" which provided approximately €40 billion, subsidising investment projects of manufacturing firms and producer-related services at a rate of 12.5% (25% for SMEs). Another major initiative was the "Gemeinschaftsaufgabe zur Verbesserung der regionalen Wirtschaftsstruktur (GA)" which received about €35 billion in federal resources over the same time period. Around 90% of these funds were allocated to East Germany, with the chemical industry, metallurgy, and printing sectors being the largest beneficiaries. The Kreditanstalt für Wiederaufbau (KfW) played a significant role by providing subsidized credits totaling approximately €52 billion to newly founded firms during the same period. Additionally, the "Zentrales Innovationsprogramm für den Mittelstand (ZIM)" aimed at fostering innovation and cooperation among SMEs, including collaborations with research institutes received around €1.5 billion in funding. Furthermore, the "EXIST" program incentivising university graduates in high-tech industries to start their own businesses, received approximately €30 million in support (Röhl & von Speicher, 2009: 22). Röhl & von Speicher (2009) provide econometric evidence for a positive effect of GA transfers on value added and on investment activity. In an average firm, support through GA funds leads to about 3 times higher investment per employee than in firms without GA support.

Efforts to support productive capacity in East German had some effect (Röhl & von Speicher, 2009) but efforts to preserve industrial cores as the privatisation process before were marked by conflicting interests between 'established' Western (West-German/ EU) producers and the East German SOEs in conditions of excess supply across most industries (Karlsch, 2017) and was taking place against gravitational forces of spatial unevenness unleashed through the privatisation process (Hall & Ludwig, 2008; Hall & Ludwig, 2009).

The overall pattern traced through geospatial cluster and hotspot analysis in the previous section is one of a North-South divide with a persisting East-West divide within that. Though the manufacturing gap shows signs of narrowing it is still measurable in 2022 and East German manufacturing remains in a peripheral position when considering value added and the sectoral composition of manufacturing firms. However, two technology-intensive manufacturing sectors – 'pharmaceuticals, medicinal chemical and botanical products' and 'computer, electronic and optical products' – do show statistically significant employment hotspots in East German districts, begging the question which types of regional industrial policy measures have facilitated this recovery. In both cases, the recovery builds on capabilities built in the socialist era and an active regional industrial policy nurturing regional anchor firms.

Carl Zeiss and Jenoptik – State-capitalist ownership

Carl Zeiss Jena was founded in 1846 as a in Jena, Thuringia, producing optical precision equipment including microscopes and lenses. From its outset, the company operated at the technological frontier building on a close collaboration with Jena-based physicist Ernst Abbe and glass chemist Otto Schott, leading to significant advancements in optical theory and the quality of microscopes as well as to the development of new types of optical glass essential for high-quality lenses. After Carl Zeiss's death in 1888, the company was transformed into a foundation-owned company (*Stiftungsunternehmen*) by Ernst Abbe to ensure social responsibility and to promote the company's need for a highly qualified workforce.

Allied intelligence recognised Carl Zeiss as a leader in optical and precision engineering, whose technology was of strategic interest to all Allied powers. Upon the liberation of Thuringia in April 1945, American forces therefore relocated Zeiss' most important intellectual property, patents, and physical assets as well around 84 of Zeiss' leading engineers, scientists and managers from Jena to the American-occupied zone, reportedly mostly against their will. A new Carl Zeiss company was established in Oberkochen in the American zone of occupation. The Carl Zeiss company was therefore effectively split into two entities - the original company in Jena (under Soviet control since July 1945) and the new company in Oberkochen, Baden-Württemberg (under American control). Each Zeiss company operated within different political and economic systems, contributing to technological and industrial developments aligned with their respective blocs.

Zeiss West advanced to a typical West German medium size company benefitting from Marshall plan help. Zeiss East transformed into a huge conglomerate of about 60,000 workers at the time of reunification (Steiner, 2020), playing a key role in the East German micro-electronics programme (Stokes, 2000; Augustine, 2007). Under the leadership of its notorious manager Wolfgang Biermann (Augustine, 2020), among the most significant areas of development at Zeiss Jena lithography machinery for the production of semiconductors and integrated circuits and electronic medical precision equipment competitive with Western counterparts (Raab, 2020).

At the time of reunification, the question emerged how and under which terms to reunite the two Zeiss entities. As for other combines, the VEB Carl Zeiss Jena was split up and the core business parts around lithography and medical precision technology were acquired by Zeiss Oberkochen. For this acquisition, Zeiss Oberkochen received more than DM 3bn in financial support for the acquisition from Thuringia and the THA, including debt settlement, equity and a five years coverage of financial losses. Of the 60,000 VEB Zeiss Jena employees, less than 3,000 were retained (Steiner, 2020; Roesler, 1994a).

The viable non-core business parts of Zeiss Jena, including laser, clean room technology and industrial measurement equipment, were retained in the newly formed 'Jenoptik' under Thuringian state-ownership (Steiner, 2020). Not expected to survive reunification for very long, Jenoptik advanced to a multinational photonics company with presence in over 80 countries, core competencies including laser technology, security and defence technology, and traffic safety systems. Today, Jenoptik is one of the few cases in Eastern Germany where a corporate headquarter emerged from a former combine's core operation during privatisation. In the 1990s under the leadership of Lothar Späth, the former First Minister of Baden-Württemberg, Jenoptik advanced to an anchor firm under Thuringian state-ownership, deploying several strategies to attract related firms into the region. Doing so, Jenoptik significantly contributed to the preservation and restructuring of a nucleus of industrial activities, around which additional investors settle or new businesses are founded – as intended by the policy to preserve industrial cores (Heimpold, 2016).

First, Jenoptik sold most of the real estate inherited from the VEB. The proceeds were used to attract investors to Jena. For instance, an Investor Centre was set up to provide support with bureaucratic processes and staff acquisition. By the end of 1996, these efforts attracted 47 investors to Jena, with 139 other employers leasing Jenoptik properties (Heimpold, 2016).

Second, Jenoptik under Späth strategically acquired West German firms and used the acquired firms to sell Jenoptik products through the sales channels of the acquired firms thereby solving Jenoptik's market problem. The acquisition of Meissner und Wurst GmbH & Co. (Stuttgart) in October 1994, Hagenk Impulsphysik (Hamburg) in 1995 and ESW Extel Systems Wedel, specializing in civil and defence technology, in November 1997 were key in this strategy. These strategic acquisitions allowed the company to navigate the difficult initial market conditions—low productivity, revenue declines, and losses after the introduction of the Deutsche Mark, typical for most former state-owned enterprises (Heimpold, 2016).

Equally significant was third the support for local settlements and startups. Throughout the 1990s, Jenoptik GmbH supported the formation of industry networks, such as the Optics and Photonics Network OptoNet e.V. and the Health Technology and Medical Technology Network medways e.V., thereby further contributing to the establishment, settlement, and advancement of numerous technology-oriented companies in the city. Moreover, JENOPTIK AG collaborates with numerous partners from both academic and non-academic research institutions and industry. Of the eleven R&D partners mentioned in the 2015 annual report, five are located in Jena or Thuringia: Friedrich Schiller University Jena, Fraunhofer Institute for Applied Optics and Precision Engineering (IOF), Leibniz Institute of Photonic Technology (IPHT), Ernst Abbe University of Applied Sciences Jena, and Ilmenau University of Technology (Heimpold, 2016).

The opto-electronics hotspot in Jena and surrounding districts was further supported by the growth of Zeiss itself from the early 2000s. Following a difficult start in the mid-1990s, the reunited Zeiss grew into large multinational company through its growth in the semiconductor technology segment, having pioneered UV lithography. As of 2022, Zeiss grew into multinational company employing 38,000 people

worldwide. As per THA agreement, Zeiss committed itself to keep production facilities and its research centre in Jena.

Conclusions

Against the background of rising regional unevenness, there is ongoing debate about how to support resilience to shocks (Boschma, 2015) and 'levelling-up' in 'left-behind places'. *Place-sensitive* approaches to regional development emphasize tailoring policies and interventions to the specific characteristics and needs of different regions (Iammarino et al., 2019; Rodríguez-Pose, Bartalucci, et al., 2024). *Place-based, people centred* approaches propose post-growth, foundational-economy centred regional policy agenda centred around community well-being and sense of belonging (MacKinnon et al., 2022; Kinossian, 2018).

Looking at the trajectory of East German regions following the transition shock, this paper contributes to these debates arguing that place-sensitive and place-based regional development agendas should not be viewed as mutually exclusive but rather complementary options. However, place-sensitive approaches need to be refined with a deeper understanding of the structural economic conditions driving spatial polarisation. Drawing on structuralist theories of cumulative causation, the paper argues in particular that the formation or creation of anchor firms, which create an independent pull into the region and structure its productive activities is critical in supporting regional development economically. What is critical to the poly-centric emergence of agglomeration economies is not just the removal of barriers to agglomeration economies as emphasised by place-sensitive approaches but also the nurturing of an agglomerating force in the form of regional anchor firms in the first place.

After reunification, the East German economy deindustrialised at historically unprecedented speed and sectoral breadth. By 1992, the East German industrial base reduced to under 30% of its 1989 levels, while 46% of the entire East German workforce were either un- or underemployed. In the privatisation process, a pattern of dependent, peripheral production relations, similar to those observed in Southern and CEE peripheries of the EU, emerged within Germany. The outcomes of the transition process were conditioned by the neoliberal principles that guided the East German transition under the THA and unfolded against unequal power relations. Critically, the peripheral position of the remaining East German production base is linked to the destruction of anchor firms in the privatisation process.

In 1992/93, a policy reversal occurred attempting to support the preservation of industrial cores. This article investigates the extent to and the conditions under which the East German manufacturing sector recovered from the neoliberal shock. Using natural breaks and Getis-Ord G_i^* geospatial analysis techniques, the article shows, that despite some degree of reindustrialisation, the East German manufacturing sector suffers from 'long-neoliberalism', including a persistent gap in manufacturing density and persistent peripheral position in German production structures as evidenced by lower shares of value captured by East German firms and persisting gaps in technology-intensive manufacturing. At the same time, there were some pockets of recovery as evidenced empirically by the emergence of individual hotspots in high-tech industries building on capabilities in micro- and opto-electronics formed in socialist era. Where industrial recovery in high-value added sectors was successful, it relied on the recreation of anchor firm functions in state-ownership. Overall, what appeared to be critical is not just the removal of barriers to agglomeration such as connectivity or an adequately trained labour force but the creation and nurturing of an agglomeration force in the first instance.

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