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Industrial and geographical mobility of workers during industry decline: The Swedish and German shipbuilding industries 1970–2000

Rikard H. Eriksson [a], Martin Henning [b,c,*], Anne Otto [d]

[a] Department of Geography and Economic History, Umeå University, Samhällsvetarhuset, 90187 Umeå, Sweden
[b] Centre for Regional Analysis, School of Business, Economics and Law, University of Gothenburg, P.O. Box 610, 40530 Göteborg, Sweden
[c] Department of Human Geography, Lund University, Sweden
[d] Institute of Employment Research (IAB), Eschberger Weg 68, 66121 Saarbrücken, Germany

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ABSTRACT

This article follows the industry employment histories of all individuals who at some point have been affiliated with the declining German or the dismantling Swedish shipbuilding industry during 1970–2000. We analyse the situation of the individual workers leaving shipbuilding, investigating the extent to which they were employed at all, tended to move to related sectors within or outside the region, and whether such moves were beneficial for the individuals. Combining insights from labour geography and redundancy studies with evolutionary economic geography, we find remarkably similar results for the West German and Swedish cases. Our findings indicate a notable impact of the regional industry structure on the labour market outcomes for workers leaving shipbuilding. This suggests that more attention should be devoted to the specific structures of the absorptive capacity of regional labour markets. The findings are discussed within the context of a mature industry.

1. Introduction

This article analyses the labour market outcomes of all workers who at some point have been affiliated with the Swedish or West German shipbuilding industry during the period 1970–2000. In the early 1970s, Sweden and West Germany were among the most important shipbuilding nations in the world. In West Germany, the shipbuilding industry employed about 58,000 persons (1975), and in Sweden about 37,000.[1] After 1970, a cascade of closures in relation to intensified global competition drastically reduced the number of employees. Fragments of these industries do still remain, most importantly so in West Germany with roughly 12,000 employees (2000). The downturn of shipbuilding posed enormous challenges to many industrial cities such as Göteborg and Hamburg, as industrial dismantling sets off processes whereby redundant workers need to be shifted to jobs in other industries in the regional economy.

The encompassing literature on plant close-downs and worker displacement has conventionally focused on identifying the individual characteristics affecting the probability of workers facing unemployment or wage loss (Fallick, 1996). But the impact of the regional economic environment on the re-employment of displaced workers has of course not gone unnoticed (Pinch and Mason, 1991; Bailey et al., 2012). In quantitative studies, unemployment rates in the local economy have repeatedly been found to affect the outcomes of displacement (Fallick, 1996). More generally, Bluestone (1984) argued that the 'absorptive capacity' of the regional labour market was instrumental in creating opportunities for workers who lost their jobs as a consequence of deindustrialization. A similar line of argument was pursued by Shuttleworth et al. (2005), who showed the importance of regional demand side factors affecting the employability of workers exiting the shipbuilding industry in Northern Ireland.

There are important qualitative aspects to the absorptive capacity of regional labour markets. For example, recent arguments within evolutionary economic geography suggest that labour mobility between related industries allows workers to at least partially re-use previously acquired skills (Neffke and Henning, 2013). Thus, the successful re-allocation of workers from displacement

* Corresponding author at: Centre for Regional Analysis, School of Business, Economics and Law, University of Gothenburg, P.O. Box 610, 40530 Göteborg, Sweden.

E-mail addresses: rikard.eriksson@umu.se (R.H. Eriksson), martin.henning@handels.gu.se (M. Henning), anne.otto@iab.de (A. Otto).

[1] To derive comparable data between the two countries, all apprentices (<18 years) are excluded from the West German data. In total (including all apprentices), the West German shipbuilding industry comprised 66,700 in 1975 and 16,980 in 2000.

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may be especially alleviated in regions which host many of such related industries. This article brings together arguments from the labour geography, displacement and evolutionary economic geography bodies of literature to study the propensity of individuals to leave the shipbuilding industry, take up new work, or become non-employed. We are especially interested in how the regional industry structure affected the outcomes for the individuals.

As a complement to the traditional way of relying on occupations and formal skill levels between former shipyard jobs and new workplaces to assess the matching quality, we use information on human capital similarities between industries to empirically verify whether the regional presence of related industries matters for the propensity of an individual to move, and for his or her success when doing so. In comparison to most previous work, this study expands the time frame and sample, and considers all employees affiliated with shipbuilding at some point during a 30-year period. While most previous work in this field has focused on the discrete event of closure (Pike, 2005), the dismantling process of shipbuilding in Sweden and West Germany was a process that ranged over many years. Additionally, few quantitative studies have compared the dismantling of industries and outcomes of redundancy processes in different countries. Comparing the outcomes between Sweden and West Germany allows us to initiate a discussion about the impacts of institutional differences.

2. Previous literature

The analysis of labour market outcomes after plant closures is a longstanding issue in the literature. The variation of theoretical and empirical approaches to examining the topic can be exemplified by a set of more general studies (Davis and Haltiwanger, 1999; Fredriksen and Westergaard-Nielsen, 2007), numerous investigations on plant closures in mature industries (e.g. Pinch and Mason, 1991; Bailey et al., 2012; Oesch and Baumann, 2015), and studies of modern services (Dawley et al., 2014; Pike, 2005). Especially interesting for this investigation are the case studies on the effects of the decline of the shipbuilding industry for Germany (e.g. Eich-Born and Hassink, 2005) and other countries (e.g. van Klink and de Langen, 2001; Karlsen, 2005; Shin and Hassink, 2011). In addition, scholars have conducted more in-depth studies investigating the nature of shipyard closures, or the impact of such closures on workers' labour market transitions, for example Storrie (1993) and Ohlsson and Storrie (2012) in Sweden, Heseler and Osterland (1986) and Hien et al. (2007) in Germany, Tomaney et al. (1999) in Great Britain, Shuttleworth et al. (2005) in Northern Ireland, and Holm et al. (2012) in Denmark.

The objective of many case studies on plant closures has been to investigate the characteristics and success of matching the process of redundant workers' transition to other economic activities using indicators such as re-employment rates or early retirement quotes (for shipbuilding, see for example Storrie, 1993; Tomaney et al., 1999; Ohlsson and Storrie, 2012). In the literature particularly concerned with displaced workers, individual factors such as tenure, age, education and occupation have repeatedly been found to affect the likelihood of being displaced, while non-employment after displacement is primarily experienced by workers with longer tenures and higher wages (Fallick, 1996). Moreover, the displacement process itself is often found to come with earning losses. For mature industries, the interacting specialization and age effects among redundant workers are particularly interesting. Previous studies highlight that an aging workforce is a typical feature of declining industries (e.g. Andersson and Lindmark, 2008). The fact that longer tenured workers are less likely to leave their job may partly be explained by the legal structures of some labour markets, and by the fact that older workers have accumulated sector-specific human capital that becomes a sunk cost if they exit (Eriksson et al., 2008).

Some scholars have emphasized the gender perspective in displacements (Pinch and Mason, 1991), for example noting that women have a greater risk of withdrawing from the labour market in cases of lay-offs and are more inclined to take up just any job due to the gender relations in the household (Hanson and Pratt, 1991). Institutional arrangements underlying industrial downsizing and plant closures, and how mature industries are regarded in policy, will differ between countries and regions. This can also be expected to affect the labour market outcomes of large-scale displacements and the pace of structural change. Indeed, Tomaney et al. (1999), Bailey et al. (2012) and Holm et al. (2012) argue that the organization of the redundancy process itself is highly important for the labour market outcomes of redundant workers.

Tomaney et al. (1999, pp. 406–407) summarize previous surveys on the effects of the close-downs of shipyards in particular. A large part of the workers who become redundant exit unemployment after a short time and are re-employed in other industries, while those who remain unemployed after this initial period run a high risk of long-term unemployment. Low-skilled workers are typically hit hard by redundancies. Furthermore, many redundant workers are likely to accept a lower initial pay in their new employment. Moreover, the majority of ex-shipyard workers do not migrate to other regions after displacement, but rather start commuting longer daily distances to work.

In the displacement literature, conditions in the surrounding regional economic environment, such as employment rates, have long been acknowledged as important factors determining the outcomes of worker displacements (Fallick, 1996). Primarily in the labour geography literature, more detailed accounts of the role of the regional economic environments have been developed, especially in studies dealing with displacements from particular plants (Pinch and Mason, 1991; Pike, 2005; Shuttleworth et al., 2005; Bailey et al., 2012; Holm et al., 2012) and the regional impacts of large-scale closures (Chapain and Murie, 2008).

However, recent developments in the literature within evolutionary economic geography allow us to further qualify the notion of the 'absorptive capacity' of the regional labour market (Bluestone, 1984). The absorptive capacity of the local labour market is highly important to the outcome of redundancy processes, because the geographical movement of individuals on the labour market and during industrial restructuring processes is constrained by place (regional) concerns due to economic, social and institutional reasons. It is well established that searching for and finding a new job in other regions is time-consuming, and carries monetary and social costs (van den Berg, 1992; Sjaastad, 1962). Moreover, Rigby and Essletzbichler (2006) demonstrated that the same industry may have significant and persistent differences in production techniques across regions. When an individual thus moves and becomes detached from the regional knowledge structure and routines, parts of the human capital may be lost, and will have to be built up again in a costly process (Fischer et al., 1998).

Given this constrained mobility of individuals in geographical space, the qualitative dimensions of the regional industry structure can be assumed to have a decisive influence on the processes of labour re-allocation. A highly specialized regional economy runs the risk of limiting the number of potential employers (Krugman, 1993), although within-industry moves are often beneficial to the individual (Fallick, 1996). In fact, Frenken et al. (2007) found that regional industrial diversity is shock-absorbing and protects from unemployment due to portfolio effects. Similarly, thick urban labour markets are generally associated with an increase in the chances for workers to find new employment (Duranton and

Puga, 2004; Puga, 2010). Nevertheless, changing jobs between different industries often involves a certain degree of human capital destruction. This consequence of job switching is less prevalent when the skill distance between the old and new job is lower. Job moves between *skill-related* industries enable individuals to use parts of their acquired human capital in their new job as well (Neffke and Henning, 2013, also Poletaev and Robinson, 2008; Nikulainen and Pajarinen, 2013). Consequently, as demonstrated by Boschma et al. (2014), the possibility to find any job in any industry is greater in thick and diverse labour markets, while the quality of matching is greater in regions hosting industries that are related to each other.

For the region, a job switch between skill-related industries implies a regional re-use of important human capital resources present in the region (Neffke et al., 2016). The opportunity for workers to remain in the same region without being subject to major skill destruction will impact the transformative capability of regional economies (Diodato and Weterings, 2014), and thereby the adaptability and resilience of regional economies (Pike et al., 2010; Boschma, 2014). In all, as indicated by Eriksson and Hane-Weijman (2015) in their study of how regional economies in Sweden responded to recessions, the presence of related industries may be an essential qualitative part of the absorptive capacity of the regional labour market.

3. Shipbuilding in Sweden and West Germany

Table 1 shows the total number of employees in the shipbuilding industries in Germany and Sweden, as well as the most important shipbuilding cities in the two countries with their employment numbers and shipbuilding location coefficients at specific points in time. The location coefficients have been normalized, and range between −1 and 1. In the 1970s in West Germany, Hamburg, Bremen, Bremerhaven and Kiel all featured location quotients far above 0, which indicates strong shipbuilding concentrations. In Sweden, Göteborg, Malmö, Uddevalla and Landskrona were the most important shipyard cities, also featuring high location coefficients.

From these countries having been two of the world's leading shipbuilding nations after World War II, a global over-capacity in shipbuilding production following the oil crisis in the 1970s and increased global competition from East-Asian producers began to pose severe challenges to the West German and Swedish shipyards (e.g., SNA, 1997; Hassink and Shin, 2005). Starting with the closure of the Rolandswerft in Bremen in 1972 and Lindholmen in Göteborg in 1976, even massive public support efforts in both countries during the 1970s and early 1980s could not prevent the list of shipyard closures becoming longer, within our investigated period stretching to the closure of Schichau Seebeckwerft in Bremerhaven in 2009 (Table 2). An example of the dramatic policy measures implemented to alleviate the consequences of this crisis in Sweden is that in the late 1970s, several important Swedish shipyards were taken over by state-owned conglomerate Svenska Varv, with the idea of restructuring the industry. After a short time of stability in the early 1980s, the remaining shipyards in Sweden were indeed technologically up to date and even started diversifying their production (SNA, 1997). But, when the state subsidies ended in 1985, Uddevalla shipyard was closed down almost immediately. Shortly after this, at the end of the 1980s, Götaverken (Göteborg) and Kockums (Malmö) ceased production. In West Germany, the dismantling process began with the crises at five large shipyards specialized in building large tanker ships: Howaldtwerke (Hamburg and Kiel), Blohm + Voss (Hamburg), Bremer Vulkan and Unterweser AG (Bremen). The Krupp group owned the largest shipyard, Unterweser AG, and the owner sought to strengthen its competitiveness with huge investments in the 1970s. Before the final closure of this shipyard in 1983, there was a vain attempt to establish a new business activity with the construction of small, individual ships. As noted by Heseler and Osterland (1986), this reorientation was sustained by subsidies from the Federal State of Bremen and the national government (as was the closure process itself). In times of crisis, each of these shipyards was individually sustained by owners, regional and national institutions. For instance, to secure jobs the North-West German Federal States became owners of parts of local shipyards. In Germany, numerous repair facilities as well as some full-size shipyards (for example

Table 2
Closure of large shipyards in Sweden and West Germany.

Year of closure	Shipyard	Region
Sweden		
1976	Lindholmen	Göteborg
1979	Eriksberg	Göteborg
1981	Öresund	Helsingborg/Landskrona
1985	Uddevalla	Uddevalla
1987	Kockums	Malmö
1989	Arendal	Göteborg
West Germany		
1962	Schlieker Werft	Hamburg
1966	Stülcken Werft	Hamburg
1972	Rolandswerft	Bremen
1983	AG Weser, Großwerft	Bremen
1986	Rickmers Werft	Bremerhaven
1995	Bremer Vulkan	Bremen
2009	Schichau Seebeckwerft	Bremerhaven

Table 1
Development of employment in major shipbuilding cities in Sweden (1970–2000) and in West Germany (1975–2000). Source: Employment History Panel (EHP), Institute of Employment Research (IAB), Statistics Sweden (own elaborations).

	Sweden	Göteborg	Malmö	Uddevalla	Helsingborg/Landskrona	West Germany	Hamburg	Bremen	Bremerhaven	Kiel
Total number of employees										
1970	28,548	13,821	4664	3646	2465	–	–	–	–	–
1975	37,276	15,604	5943	4512	3468	54,558	15,354	11,198	9694	10,632
1980	24,280	7786	4335	3953	2681	44,890	12,550	7476	7401	8622
1985	13,763	5725	2661	2369	224	34,422	8689	3816	7299	6306
1990	7341	4219	1060	427	1536	26,863	6366	3249	5553	5569
1995	6193	3984	1137	478	944	17,518	1794	2700	3647	4463
2000	4534	2589	1266	184	552	11,681	2615	423	2033	4043
Average annual normalized location coefficient										
1970(75)–2000	–	0.36	0.15	0.41	0.19	–	0.70	0.76	0.93	0.89
1975–1980	–	0.61	0.44	0.80	0.54	–	0.71	0.85	0.92	0.87
1975–1990	–	0.55	0.36	0.69	0.36	–	0.71	0.82	0.93	0.88
1990–2000	–	0.04	−0.26	−0.12	−0.01	–	0.67	0.69	0.94	0.91

Meyer-Werft in Papenburg and ThyssenKrupp-Marinesystems in Kiel) are still in operation, in many cases successfully. Shipyards today are even sustained through programmes and subsidies from public institutions. The Swedish shipyard industry today is vastly diminished and transformed, consisting of a few repair facilities and highly specialized shipyards, for example geared towards advanced naval applications (SNA, 1997).

While much of the industry dynamics in shipbuilding as well as the competition pressure in Sweden and West Germany were the same, the institutional differences concerning the management of the transformation process of shipbuilding differed (Heseler, 1990). For example, active policies in combination with a duty to announce the closure process in a timely manner alleviated the transition processes of redundant shipyard workers in Sweden. This was not the case in West Germany. Here, the unemployment of shipyard workers was more likely, and thereby crowding-out effects on local labour markets were more likely to operate, as the local labour market situation was less favourable than in the Swedish shipyard regions. In Sweden, formal seniority rules were stipulated by law, while in West Germany informal seniority rules played an important role. After accounting for our empirical effort, we will return to this important institutional issue.

4. Data and estimation issues

The empirical analysis is based on two matched employer-employee datasets from West Germany (1975–2000) and Sweden (1970–2000). The West German dataset, the Employment History Panel, is derived from the Institute of Employment Research (Bender and Möller, 2010). The Swedish dataset is obtained from Statistics Sweden. Due to limited data availability in Sweden before 1985, we study five-year outcomes of labour market moves. From our datasets, we select the individuals who – for any of our observation years – are affiliated with the shipbuilding industries. We define functional regions (local labour markets) according to the West German Standard Planning Regions (N = 74) and the conventional Swedish A-regions (N = 70). For each country, we construct an employer-employee dataset that includes all cohorts of shipbuilding employees (1970, 1975, 1980, 1985, 1990, 1995) and their subsequent employment histories. For legal reasons, we were not able to merge the Swedish and German datasets into one, or to follow individuals who have moved abroad since they are no longer registered in our datasets. Therefore, we conduct parallel sets of country analyses throughout the article. Apart from general descriptive measures, we make use of multinomial logistic regressions and ordinary least square (OLS) regressions, for which two different dependent variables are created. A full list of variables, descriptives and correlations can be found in Tables A1 and A2.

First, we want to assess the extent to which our independent variables impact workers' propensity to stay in the shipbuilding industry, to leave for another industry, or to be non-employed. We therefore create a dependent categorical variable (Status), which equals 1 if a worker remains in the industry between two measurement periods (t_0 to t_{+5}), 2 if the worker leaves the industry but is employed in another industry at t_{+5}, and 3 if the worker is not working at t_{+5}. For all categories, obvious retirees due to age (65 years or older) at t_{+5} are excluded.

Second, we study how regional and industrial features affect the success of the individual after he or she left the shipbuilding industry. For those who exit the shipbuilding industry to work in another industry, our second dependent variable therefore measures the change in wage that the worker receives at the new job compared to the job in the shipbuilding industry. Following Holm et al. (2012), we use the workers' relative wage to capture potential unobserved factors. We run separate regressions for each year on the entire national workforces in both countries. For each year, wage is regressed on individual characteristics (age, sex, and whether or not one has a university degree), ten 1-digit sectors and regional fixed effects. The observed income is then divided by the fitted values of these regressions to calculate the relative wage for each worker. The dependent variable (HigherInc) is created by comparing relative wage at t_{+5} to that of t_0.

As independent variables, we first introduce conventional individual characteristics. Age dummies are included. For Germany, the dummy *Academics* is assigned to all individuals with a degree from a regular university or a university of applied sciences. Due to Swedish data restrictions, the *Academics* dummy variable equals 1 if the worker either has an occupation requiring a university degree (prior to 1990), or at least has a Bachelor's degree (after 1990). To consider the impact of individuals acquiring a higher education (Holm et al., 2012), the dummy *HigherEd* equals 1 if Swedish individuals have *obtained* a Bachelor's degree (or an equivalent occupation) between two measurement points. Higher education is given for German employees if they have obtained a certificate of vocational training or a university degree. Lastly, we include the dummy variable *Female*.

The second group of independent variables concerns the regional destination of ex-shipyard workers. The first indicates whether they remain in the same region or leave for work in another region (NewReg). We also create regional dummies that decompose regional and skill-relatedness dimensions into four dummy variables capturing whether workers (i) remain within the same region and move to a related industry (SRegRel), (ii) remain within the region but move to an unrelated industry (SRegDiff), (iii) change region and move to a related industry (ORegRel), or (iv) change region but move to an unrelated industry (ORegDiff). Remaining in the region but moving to a different but unrelated industry (SRegDiff) is used as the reference category in the OLS regressions estimating the wage equation.

The third group of independent variables addresses the regional industrial portfolio in terms of specialization, diversity and the presence of related industries. Regional industry specialization is calculated according to the traditional location quotient of shipbuilding in the region (LQshp). We also include an indicator of regional diversity (Diversity) defined as the entropy (Jacquemin and Berry, 1979).[2] Finally, a controller measuring the size of the region (RegSize) was included.

A great challenge involves identifying which industries are related to shipbuilding. As we discussed above, people normally strive to minimize the destruction of human capital when they change jobs, and want to use their previously acquired skills and experience in their new position as well. Neffke and Henning (2013) argued that labour flows between industries, arising from job switches, are a clear indication of the degree to which industries are dependent on the same types of skills. They devised a quantitative strategy to derive the *skill-relatedness* between industries in the economy by observing the flows of (skilled) labour between these industries as people change jobs. Importantly, though, the observed flow needs to be compared to a baseline of expected flows to adjust for other factors besides relatedness that will obviously impact the size of the flows, for example the size of industries. This line of reasoning was further developed by Neffke et al. (2016), who designed a method of calculating expected flows (baseline) from the relative risks of cross-industry flows. In our case, however, using the same labour mobility datasets for both countries to calculate the skill-relatedness to other industries,

[2] This was performed on the finest available division of industry codes in each economy. We used 302 three-digit industries from the 1973 German System of Industrial Classification, and the 183 Swedish four-digit industries from the SNI69 system. The same industries were used for the relatedness calculations.

and subsequently studying the impacts of these labour flows, would run the risk of reflecting circular reasoning.

To remedy this potential problem, we identify those industries that are consistently skill-related to shipbuilding in both West Germany and Sweden during the observation period. We take it to be likely that these are persistently, or 'generically', skill-related to shipbuilding not only over the period we are studying but also across different institutional and national contexts. We first observe the real labour flows between all industry pairs in Germany and Sweden during our investigated period. Second, we establish expected baseline labour flows across all industry pairs by calculating relative risks (of flows) based on the overall shares of flows in the economy, according to the method by Neffke et al. (2016). Third, to obtain the measure of skill-relatedness between industries, we take the ratio between observed and expected baseline flows. Greater labour flows than expected are taken as an indicator that the industries are skill-related. To compare the industries related to shipbuilding in Germany and Sweden, we then identified the counterparts to the German codes in the Swedish dataset.[3] We then selected the industries that were related to shipbuilding for more than ten years during the observation period in both Germany and Sweden. We consider these industries to be *generically skill-related* to shipbuilding (Table 3). The majority of skill-related industries to shipbuilding belong to the manufacturing sector, for example mechanical engineering and metal products, but there are also a few service industries.

The degree of relative presence of related industries in each region is calculated using a location coefficient (LQrel) of skill-related industries *j* of the industry *i* (shipbuilding industry) with *emp_rel* as total employment in related industries *j* in region *r* or in all regions *total*.

$$LQrel_r = \frac{\frac{\sum emp\_rel_r}{\sum emp_r}}{\frac{\sum emp\_rel_{total}}{\sum emp_{total}}} \qquad (1)$$

In the regressions, normalized values of the specialization measures (ranging between −1 and 1) are used to reduce the impact of a skewed distribution.

5. Results

Table 4 depicts the number of employees in shipbuilding at our benchmark point t_0 and their whereabouts five years later, at t_{+5}.[4] In general, 40–60% of the workforce remain in the shipbuilding industry at t_{+5}. These figures are lower for Sweden than for West Germany, because here the contraction was more gradual. At t_{+5}, 20–30% are no longer employed. This category captures all statuses beyond employment such as self-employment, further education and unemployment.[5] The quite small shares of workers moving to the related industries are not surprising, given our strict definition of generically related industries. The most interesting are variations over time. In the most severe crisis period in Sweden, 1985–1990, only 23% of those working in shipbuilding remained in the industry, while about 50% left to work in other industries. Meanwhile, 27% left to non-employment.

Table 3
Industries generically related to shipbuilding.

Manufacture of structural metal products
Manufacture of other equipment related to mechanical engineering
Manufacture of aircraft
Building and repair of boats and yachts
Shipping agents
Sea and coastal water transport
Inland water transport

Tables 5 and 6 depict the results of the multinomial logit estimations on the determinants of staying in the shipbuilding industry, working in another industry (baseline), or not being employed at t_{+5}.[6] For each country, we estimate six models covering different variable sets and time periods: the whole period (1970–2000); the pre-crisis period in Sweden and the early crisis period in Germany (1970–1980); the crisis period (1975–1990); and the post-crisis period in Sweden but continued crisis in Germany (1990–2000).

We first investigate which factors explain the future position of the shipbuilding workers (Tables 5 and 6), with the workers occupied in a new sector at t_{+5} being the reference category. Controlling for individual and regional factors, the wage level of individuals positively affected their propensity to stay in the shipbuilding industry (upper panel). This pattern is highly consistent for Sweden and West Germany, except in the last period, 1990–2000. Younger people were more likely to leave the shipbuilding industry. Similar patterns between both countries are found for the qualification variables as well. Having an academic degree did not affect the propensity to leave the industry, except for a significant positive effect in West Germany from 1975 to 1980. However, those who obtained a higher education between t and t_{+5} have a significantly higher chance of leaving the industry. Moreover, the impact of the female variable differs between the countries. In Sweden, females are less likely to stay in the shipbuilding industry, while the results are more mixed (and usually non-significant) for West Germany. We will return to this issue in the elaborations on our results.

Turning instead to the issue of the impact of the regional economic structure on the mobility propensity, the location coefficient in the shipbuilding industry has a positive significant effect on workers' propensity to remain in the industry (LQshp). This result is not surprising, but nonetheless highly consistent. A high (low) specialization of generically related industries indicates whether the shipbuilding industry is strongly (weakly) embedded in a regional economy (LQrel_n). In general, we find a negative impact on the probability of staying in the shipbuilding industry from such embeddedness. This pattern is very strong for West Germany over time, and quite strong for the model covering the entire period for Sweden. However, in the Swedish case the effect wears off in the later periods, even though the negative signs remain. In the Swedish case regional diversity and size are basically not significant, while in West Germany they are positively significant in most models, except for the negative coefficient for 1990–2000.

The lower panels of Tables 5 and 6 display the influence of individual and regional factors on the risk of being non-employed (at t_{+5}). Older shipyard workers run a much higher risk of becoming

[3] We allowed one-to-many translations, and dropped industries for which we could not find reasonable translations.

[4] The construction of our dataset allows for persons' entering and exiting the shipbuilding industry more than once during the study period. If we were to restrict the sample to allow for one exit only, we would be faced with the difficult choice of defining the 'right' exit. Nevertheless, the empirical consequences of our strategy are very limited. With our sample design, for Germany we find only 1016 among 178,000 persons who re-entered shipbuilding. These returners are slightly younger and earn more than the rest of the sample. They are also slightly more likely to be academics and male. For the Swedish case, we find 28,144 among 117,401 who re-entered shipbuilding. The only striking dissimilarity in this group compared to the rest of the Swedish sample is that they tend to be slightly older. When we exclude the returners from the sample and run all regressions without the workers who re-entered shipbuilding, the results are identical to those accounted for in the article, for both Germany and Sweden.

[5] For Germany, an employee is no longer reported in the database in the case of retirement.

[6] In all models, cluster-robust standard errors at the regional level are reported to allow for intra-regional correlations (Cameron and Trivedi, 2005).

Table 4
Number of employees in shipbuilding industry 1970–1995 and their status at t_{+5}. Source: Employment History Panel (EHP), Institute of Employment Research (IAB), Statistics Sweden (own elaborations).

	Sweden						
	1970–1995	1970	1975	1980	1985	1990	1995
Total number of shipbuilding employees t_0	117,401	28,548	37,276	24,280	13,763	7341	6193
In shipbuilding t_{+5} (%)	47	61	46	40	23	55	52
Not in shipbuilding t_{+5} (%)	30	19	32	30	50	19	29
Related industry (%)	9	9	8	9	11	5	6
Unrelated industry (%)	21	10	24	21	39	14	23
Not employed t_{+5} (%)	16	11	14	22	22	21	12
Retired t_{+5} (%)	7	9	8	8	5	5	7
	West Germany						
	1975–1995	1970	1975	1980	1985	1990	1995
Total number of shipbuilding employees t_0	178,251		54,558	44,890	34,422	26,863	17,518
In shipbuilding t_{+5} (%)	59		65	57	59	52	59
Not in shipbuilding t_{+5} (%)	16		16	12	15	21	18
Related industry (%)	2		2	2	3	2	3
Unrelated industry (%)	14		14	10	12	20	15
Not employed t_{+5} (%)	25		19	31	26	27	23

non-employed, and those with a higher education or who began a higher education run a far lower risk of non-employment in both countries. In West Germany, the females face a higher risk of non-employment after leaving shipbuilding, whereas this result is less consistent for Sweden.

When one is leaving (or being forced to leave) the dismantling shipbuilding industry, there is a much higher risk of becoming non-employed for a longer period in a specialized shipbuilding region, in West Germany as well as in Sweden. However, for the whole period, there is some evidence suggesting that high regional specialization in related industries protects against non-employment in both Sweden and West Germany (model 7000a). When individual control variables are introduced and periods are split, the significance is slightly weakened and becomes period-specific. For West Germany it is weakly significant between 1975 and 1990, and for Sweden it is not significant during this same time, that is the worst period of close-downs.

The diversity of the regional industry structure in most phases has a negative but non-significant association with non-employment probabilities in Sweden, while it is positively significant in most periods in West Germany. There is a notable exception, however. Diversity has a strongly positive effect in Sweden for the period prior to the major close-downs (1970–1980). For Sweden, however, diversity decreases the risk of non-employment during 1975–1990 (weakly significant). Regional size has a positive impact on the non-employment probabilities in these two countries, except in the very last period in West Germany.

The second set of regressions concerns the success of workers leaving the shipbuilding industry in terms of change in (relative) wages between the old job in shipbuilding and the new job. Thus, we only include the reference group from the previous multinomial logistic models (those who left shipbuilding to work in other industries; Tables 7 and 8). The results indicate that those with higher wages will experience a negative effect on their wage change. Young people benefited from a more positive increase in relative wages, while the older part of the workforce saw a negative change. In West Germany, there is a strong and consistent education premium in relative wage change, whereas this is largely absent in Sweden for those already possessing a higher education. In turn, the Swedish data show extra benefits to those who obtain a higher education between t and t_{+5}. Females have a stronger relative wage increase in West Germany, and in the early period (1970–80) in Sweden.

We also consider how wage increases with the regional and industrial mobility of workers. For the entire period in West Germany, moving to other regions (NewReg) is not beneficial for the period as a whole, but there is a positive effect until 1990. In Sweden this overall effect is also moderate, except for the crisis period of 1975–1990. A positive effect of remaining in the same region is mainly attributed to West German workers ending up with new jobs in related industries (SRegRel). In Sweden this positive effect is observed only for the period 1970–1980, then turns non-significant (but still positive) in the following period, and at the very end (1990–2000) this effect is even negative. In West Germany, there are also clear positive effects from moving to (generically) related industries in other regions (ORegRel), whereas moving to unrelated industries in other regions is again positive only up till 1990, and then less so than a move to related industries. The positive impact of moving to a new region in Sweden during 1975–1990 pertains primarily to the move to related industries, even if there is also a positive effect on the wage change from moving to unrelated industries.

6. Reflections and conclusions

We have attempted to bring together insights from labour geography, displacement studies and evolutionary economic geography to analyse the impact of individual and regional factors for the labour market situations of employees in the dismantling West German and Swedish shipbuilding industries during 1970–2000. We have especially ventured to give a more detailed account of the regional absorptive capacity of regional labour markets than has been done in most previous studies.

For individual characteristics, our results recall many findings previously described in the literature. Older workers will be more negatively affected by leaving their industry, and will hesitate to do so. In addition, more skilled workers, regarding relative wage level controlled for a number of features as a broad indication of skill, will tend to cling to their industry even during decline. However, an important point in our study is that the industrial non-mobility of workers is strengthened by the demand side of the local labour market, conceptualized as opportunities in the regional industrial structure. The presence of strong specialization in shipbuilding made people stay in the industry as long as possible rather than going elsewhere, even during industrial decline. But, especially in the West German case, the presence of a related regio-

Table 5
Sweden - Multinomial logit models on the probability of remaining in shipbuilding, leaving for another industry (reference) or not working at t_{+5}. Coefficients and cluster-robust SEs are reported.

Sweden	7000a	7000b	7000c	7080	7590	9000
1: Still employed in shipbuilding industry						
rw_t0log		0.570***	0.474***	0.418***	0.696***	0.094
		(0.084)	(0.104)	(0.080)	(0.117)	(0.242)
Age1834		−0.760***	−0.759***	−0.864***	−0.790***	−0.776***
		(0.091)	(0.094)	(0.121)	(0.111)	(0.110)
Age5065		0.350***	0.355***	0.348***	0.369***	0.255***
		(0.094)	(0.091)	(0.126)	(0.107)	(0.079)
Academics		0.086*	0.025	0.022	−0.008	−0.148
		(0.052)	(0.044)	(0.042)	(0.040)	(0.258)
HigherEd_t5		−0.304***	−0.327***	−0.369***	−0.717***	0.241*
		(0.106)	(0.090)	(0.048)	(0.075)	(0.145)
Female		−0.202***	−0.155**	−0.314***	−0.203**	−0.066
		(0.078)	(0.062)	(0.074)	(0.082)	(0.126)
LQshp_n	0.871***		0.836***	1.038***	0.546***	1.584***
	(0.188)		(0.197)	(0.207)	(0.191)	(0.500)
LQrel_n	−2.685**		−2.754**	−3.198**	−1.700	−4.524***
	(1.210)		(1.282)	(1.460)	(1.654)	(0.818)
Diversity	0.180		0.302	4.943***	−1.105	1.407*
	(1.041)		(1.104)	(1.683)	(1.286)	(0.792)
RegSize	0.211*		0.191	−0.022	0.111	−0.011
	(0.124)		(0.131)	(0.151)	(0.169)	(0.134)
Intercept	−2.469	1.473***	−2.494	−21.350***	2.380	−6.841*
	(5.744)	(0.255)	(6.126)	(8.024)	(6.862)	(3.896)
2: Working in other industry (reference)						
3: Not in work						
rw_t0log		0.888***	0.811***	0.406***	0.685***	2.021***
		(0.137)	(0.121)	(0.112)	(0.132)	(0.342)
Age1834		−0.200***	−0.183***	−0.161*	−0.280**	−0.244
		(0.065)	(0.065)	(0.086)	(0.117)	(0.150)
Age5065		1.454***	1.452***	1.474***	1.694***	0.816***
		(0.084)	(0.081)	(0.108)	(0.108)	(0.128)
Academics		−0.483***	−0.568***	−0.667***	−0.601***	0.227
		(0.125)	(0.112)	(0.113)	(0.115)	(0.223)
HigherEd_t5		−8.271***	−7.544***	−8.529***	−8.405***	−8.036***
		(0.537)	(0.533)	(0.594)	(0.571)	(0.489)
Female		0.176	0.198	0.344**	0.458***	−0.520*
		(0.112)	(0.122)	(0.149)	(0.115)	(0.280)
LQshp_n	0.673***		0.669***	0.736***	0.486***	1.169***
	(0.135)		(0.156)	(0.175)	(0.164)	(0.452)
LQrel_n	−1.503**		−1.611*	−1.978*	−0.825	−1.749*
	(0.756)		(0.870)	(1.027)	(1.087)	(0.901)
Diversity	−0.429		−0.319	2.693**	−1.280*	−0.570
	(0.638)		(0.720)	(1.138)	(0.819)	(0.946)
RegSize	0.320***		0.323***	0.191**	0.268**	0.180*
	(0.073)		(0.087)	(0.092)	(0.122)	(0.099)
Intercept	−2.989	−1.075***	−3.649	−15.943***	−1.545	−2.247
	(3.459)	(0.253)	(3.958)	(5.431)	(4.548)	(4.662)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	117,401	117,401	117,401	65,824	75,319	13,534
LL	−80,146.771	−78,386.669	−76,731.1	−47,209.571	−51,356.513	−69,293.919
Pseudo R^2	0.073	0.094	0.113	0.110	0.103	0.129

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

nal specialization was important in providing opportunities for exiting shipyard workers. The presence of skill-related industries in the region offers options to move to new sectors with high matching quality (also Boschma et al., 2014). Thereby, this kind of labour mobility presents opportunities for an incremental change of the regional industry structure (Diodato and Weterings, 2014). We believe that the productive re-allocation of redundant staff from declining to growing industries, thereby achieving a re-use and re-combination of existing region-specific human capital, could be one of the most important empirical drivers behind regional resilience (Pike et al., 2010; Martin and Sunley, 2014; Boschma, 2014; Eriksson and Hane-Weijman, 2015).

Because we are examining a mature industry, there is an important qualification to make regarding our results in the Swedish case in particular. Moving to related industries is associated with a negative change in relative wage in the later study period (1990–2000). Specialized workers in mature industries are sometimes faced with a major predicament, as related industries themselves may also deteriorate. This is exactly what happened in the major Swedish shipbuilding regions, and it became especially obvious in our last estimation period (Table 9). Hence, opportunities to move to related industries in the same region became limited towards the end of our investigated period, even if we do find some overall evidence that related structures offered some

Table 6
West Germany - Multinomial logit models on the probability of remaining in shipbuilding, leaving for another industry (reference) or not working at t_{+5}. Coefficients and cluster-robust SEs are reported.

West Germany	7000a	7000b	7000c	7080	7590	9000
1: Still employed in shipbuilding industry						
rw_t0log		1.537***	1.369***	2.134***	1.686***	0.404
		(0.281)	(0.291)	(0.127)	(0.165)	(0.634)
Age1834		−0.873***	−0.872***	−1.323***	−1.095***	−0.305*
		(0.081)	(0.073)	(0.073)	(0.069)	(0.173)
Age5065		0.420***	0.415***	1.050***	0.621***	0.316***
		(0.084)	(0.073)	(0.059)	(0.071)	(0.085)
Academics		−0.063	0.024	0.658***	0.279	−0.271
		(0.232)	(0.280)	(0.243)	(0.196)	(0.442)
HigherEd_t5		−1.810***	−1.714***	−1.860***	−1.796***	−1.470***
		(0.146)	(0.130)	(0.212)	(0.168)	(0.332)
Female		−0.118	−0.139	0.141	0.041	−0.505***
		(0.092)	(0.096)	(0.094)	(0.078)	(0.153)
LQshp_n	2.621***		2.527***	2.864***	2.713***	1.984***
	(0.305)		(0.311)	(0.292)	(0.261)	(0.680)
LQrel_n	−2.277***		−2.224***	−2.278***	−2.350***	−2.797**
	(0.652)		(0.629)	(0.430)	(0.526)	(1.166)
Diversity	2.488***		2.410***	2.080***	3.292***	0.752
	(0.761)		(0.746)	(0.481)	(0.636)	(0.988)
RegSize	0.322***		0.241**	0.663***	0.560***	−0.591***
	(0.102)		(0.096)	(0.078)	(0.099)	(0.213)
Intercept	−15.949***	1.787***	−14.101***	−17.743***	−22.359***	4.051
	(4.667)	(0.174)	(4.535)	(3.030)	(4.142)	(7.097)
2: Working in other industry (reference)						
3: Not in work						
rw_t0log		−0.131	−0.332	0.458***	−0.030	−1.165**
		(0.205)	(0.220)	(0.162)	(0.197)	(0.543)
Age1834		−0.529***	−0.493***	−0.733***	−0.652***	−0.133
		(0.053)	(0.060)	(0.071)	(0.075)	(0.144)
Age5065		2.451***	2.462***	2.616***	2.583***	2.592***
		(0.132)	(0.122)	(0.059)	(0.129)	(0.063)
Academics		−0.984***	−0.966***	−0.606***	−0.750***	−1.206***
		(0.271)	(0.307)	(0.213)	(0.205)	(0.387)
HigherEd_t5		−21.443***	−20.108***	−20.454***	−20.412***	−17.884***
		(0.405)	(0.429)	(0.464)	(0.441)	(0.566)
Female		0.450***	0.404***	0.670***	0.549***	0.167
		(0.116)	(0.115)	(0.101)	(0.081)	(0.179)
LQshp_n	2.207***		2.112***	3.074***	2.315***	1.666***
	(0.233)		(0.255)	(0.743)	(0.348)	(0.410)
LQrel_n	−1.163**		−0.946	−2.411*	−1.240*	−0.994
	(0.568)		(0.651)	(1.265)	(0.697)	(0.821)
Diversity	1.260**		1.161*	2.664**	1.966***	−0.135
	(0.560)		(0.665)	(1.304)	(0.624)	(1.053)
RegSize	0.284***		0.205**	0.824***	0.527***	−0.495***
	(0.077)		(0.093)	(0.243)	(0.099)	(0.165)
Intercept	−10.727***	−0.086	−9.491**	−24.496***	−17.359***	5.191
	(3.505)	(0.187)	(4.257)	(9.462)	(4.268)	(6.756)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	178,218	176,723	176,723	53,950	132,644	44,079
LL	−160,642.277	−145,124.472	−139,311.714	−40,045.022	−101,298.438	−35,909.780
Pseudo R^2	0.049	0.133	0.168	0.166	0.176	0.184

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

protection against non-employment itself. In Germany, the story is different. Even though the number of employees in industries generically related to shipbuilding decreased in many of the major shipbuilding cities, employment in these industries on the national level stayed rather constant. In this respect, the overall structural change in the Swedish and German regions had quite different impacts on the labour market outcomes of ex-shipyard workers.

In periods of real crisis, the propensity to move to just any industry in just any region increases. During the most intense crisis period in Sweden, regional industrial diversity decreased the risk of unemployment. Diversity thus seems to protect from unemployment during radical change (Frenken et al., 2007). By contrast, a steady decline of industries is 'normal business' for regions, and gives time for normal adjustment mechanisms to operate, whereby resources are transferred from old to new industries in the region. In general, however, neither regional diversity nor regional size was particularly efficient in promoting the exit from shipbuilding to other industries, or in protecting against non-employment. While this outcome may again underline the argument about the importance of the regional quality of the matching processes, we have to keep in mind that the estimates concern a period when many large shipbuilding city regions were subject to considerable economic stress and, in many cases, a loss of inhabitants. Considering that mature industries are largely dependent on a quite specialized labour force and knowledge circulation within the industry, it is perhaps not too surprising that workers from

Table 7
Sweden - OLS regressions on relative wage increase for workers leaving the shipbuilding industry. Coefficients and cluster-robust SEs at regional level are reported.

Sweden	7000a	7000b	7080a	7080b	7590a	7590b	9000a	9000b
rw_t0log	−0.379***	−0.379***	−0.336***	−0.336***	−0.378***	−0.378***	−0.351***	−0.363***
	(0.015)	(0.015)	(0.016)	(0.016)	(0.018)	(0.018)	(0.012)	(0.012)
Age1834	0.026***	0.025***	0.027***	0.028***	0.023***	0.023***	0.047***	0.044**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.018)	(0.018)
Age5065	−0.009	−0.009	−0.004	−0.004	−0.010	−0.010	0.002	0.008
	(0.006)	(0.006)	(0.008)	(0.008)	(0.007)	(0.007)	(0.023)	(0.025)
Academics	0.006	0.005	0.010	0.009	0.001	0.000	0.034*	0.032
	(0.011)	(0.010)	(0.008)	(0.008)	(0.011)	(0.011)	(0.020)	(0.020)
HigherEd_t5	0.064***	0.064***	0.057***	0.056***	0.065***	0.065***	0.034*	0.033*
	(0.007)	(0.007)	(0.008)	(0.007)	(0.006)	(0.006)	(0.017)	(0.017)
Female	0.016**	0.016**	0.011***	0.012***	0.004	0.005	0.046	0.034
	(0.007)	(0.007)	(0.004)	(0.004)	(0.007)	(0.006)	(0.031)	(0.031)
NewReg_t5	0.022*		0.015		0.026***		−0.005	
	(0.011)		(0.013)		(0.009)		(0.022)	
SRegRel_t5c		−0.002		0.012***		0.007		−0.087**
		(0.006)		(0.002)		(0.004)		(0.032)
ORegRel_t5c		0.020		0.022		0.032***		−0.089*
		(0.012)		(0.016)		(0.007)		(0.032)
ORegDiff_t5		0.025*		0.021		0.028**		−0.005
		(0.013)		(0.014)		(0.011)		(0.027)
RegSize	0.007***	0.007***	0.010***	0.011***	0.008**	0.007**	−0.002	0.003
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.008)	(0.009)
Intercept	−0.111***	−0.111***	−0.151***	−0.159***	−0.127***	−0.127***	−0.019	−0.054
	(0.028)	(0.029)	(0.035)	(0.034)	(0.035)	(0.034)	(0.113)	(0.114)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	33,343	33,343	16,043	16,043	24,943	24,943	3190	3190
R^2	0.184	0.184	0.201	0.202	0.197	0.197	0.116	0.130

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

Table 8
West Germany - OLS regressions on relative wage increase for workers leaving the shipbuilding industry. Coefficients and cluster-robust SEs at regional level are reported.

West Germany	7000a	7000b	7080a	7080b	7590a	7590b	9000a	9000b
rw_t0log	−0.596***	−0.605***	−0.702***	−0.713***	−0.651***	−0.664***	−0.458***	−0.460***
	(0.020)	(0.019)	(0.031)	(0.029)	(0.018)	(0.016)	(0.030)	(0.029)
Age1834	0.122***	0.123***	0.130***	0.130***	0.135***	0.137***	0.088***	0.088***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)
Age5065	−0.045***	−0.041***	−0.114***	−0.111***	−0.077***	−0.074***	−0.032*	−0.030*
	(0.014)	(0.014)	(0.018)	(0.018)	(0.008)	(0.008)	(0.018)	(0.017)
Academics	0.160***	0.155***	0.065***	0.056***	0.081***	0.073***	0.243***	0.240***
	(0.023)	(0.023)	(0.010)	(0.008)	(0.009)	(0.009)	(0.018)	(0.019)
HigherEd_t5	0.009	0.008	0.029***	0.028***	0.006	0.005	0.052**	0.053**
	(0.010)	(0.010)	(0.008)	(0.008)	(0.009)	(0.009)	(0.022)	(0.022)
Female	0.048***	0.052***	0.037**	0.038**	0.042**	0.046**	0.057***	0.060***
	(0.012)	(0.011)	(0.018)	(0.018)	(0.019)	(0.018)	(0.009)	(0.007)
NewReg_t5	0.021		0.039***		0.028**		0.010	
	(0.014)		(0.014)		(0.013)		(0.019)	
SRegRel_t5c		0.092***		0.072***		0.101***		0.091**
		(0.020)		(0.010)		(0.013)		(0.041)
ORegRel_t5c		0.093***		0.093***		0.095***		0.104***
		(0.014)		(0.018)		(0.013)		(0.020)
ORegDiff_t5		0.022		0.039**		0.032**		0.008
		(0.015)		(0.016)		(0.015)		(0.020)
RegSize	0.021***	0.024***	0.021***	0.019***	0.013**	0.014**	0.033**	0.040**
	(0.006)	(0.008)	(0.005)	(0.005)	(0.006)	(0.007)	(0.014)	(0.017)
Intercept	−0.245***	−0.297***	−0.255***	−0.237***	−0.151**	−0.184**	−0.408**	−0.504**
	(0.073)	(0.095)	(0.058)	(0.063)	(0.074)	(0.079)	(0.177)	(0.220)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	27,558	27,558	8705	8705	18,979	18,979	8579	8579
R^2	0.307	0.321	0.331	0.340	0.336	0.353	0.277	0.288

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level.

mature industries do not necessarily fare well in dense urban areas (Neffke et al., 2011a,b).

Overall, despite considerable institutional differences between these two countries in handling large-scale redundancies of shipyards (Heseler, 1990), the final labour market outcomes in the countries were not so different. With respect to re-employment rates and non-employment after leaving the shipbuilding industry, the Swedish shipyard workers performed only slightly better than

Table 9
Related (generic) employment in Sweden (1970–2000) and in West Germany (1975–2000). Source: Employment History Panel (EHP), Institute of Employment Research (IAB), Statistics Sweden (own elaborations).

	Sweden	Göteborg	Malmö	Uddevalla	Helsingborg/Landskrona	West Germany	Hamburg	Bremen	Bremerhaven	Kiel
Total number of employees										
1970	227,699	28,120	13,625	2079	5900	–	–	–	–	–
1975	251,198	26,590	13,761	3053	6379	459,284	52,496	21,073	8090	6123
1980	243,304	26,137	14,757	2588	6553	481,645	53,808	19,977	9222	6612
1985	237,251	27,722	14,644	2164	5688	445,093	40,606	15,853	8855	6346
1990	192,744	19,440	8744	2781	5450	494,984	37,298	14,587	9816	6518
1995	171,218	18,438	8761	1729	4405	450,035	35,621	11,320	8331	5278
2000	170,258	17,110	9905	1822	4986	459,179	33,789	9712	7803	4422
Average annual normalized location coefficient										
1970(75)–2000	–	0.13	0.01	−0.12	0.02	–	0.42	0.45	0.55	0.10
1975–1980	–	0.06	−0.01	−0.15	−0.02	–	0.50	0.54	0.52	0.13
1975–1990	–	0.07	0.01	−0.09	0.02	–	0.45	0.55	0.55	0.14
1990–2000	–	0.21	0.04	−0.10	0.06	–	0.38	0.38	0.55	0.05

the West German ones. However, in our estimations some interesting differences could be observed. One of the most interesting involves the gender structures on the labour market: female Swedish workers might have had access to a larger number of jobs on the labour market, marked by high female participation rates by international standards. A much weaker integration of female employees on the West German labour market and stagnating employment growth in shipyard regions obviously hampered women in leaving shipbuilding, though these effects are insignificant. However, this changed in the most recent period (1990–2000), when female labour market integration and regional labour market conditions improved.

Just as the results of Boschma and Capone (2014) suggest that institutional variations associated with varieties of capitalism may influence countries' diversification paths, more detailed comparative studies on labour mobility patterns in different countries can shed light on the most important mechanisms for regional resilience in various policy contexts. With the increasing availability of individual-level register data, this is a challenging (but not impossible) task. Indeed, many regions throughout the world are facing, and are going to face, similar challenges to those that some German and Swedish shipbuilding cities once did. The specific components of the regional industry structure – the same industries, related industries, and industrial diversification – are important aspects of the absorptive capacity (Bluestone, 1984) and the demand side of the regional labour market (Shuttleworth et al., 2005) in different phases of industry development.

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Appendix A

See Tables A1 and A2.

Table A1
Variable definitions and descriptives. Source: Employment History Panel (EHP), Institute of Employment Research (IAB), Statistics Sweden (own elaborations).

		Sweden			West Germany		
Variable	Definition	Mean	Min	Max	Mean	Min	Max
Dependent variables							
Status	Categorical variable on labour market status at t_{+5}. Equals 1 if working in shipbuilding industry, 2 if working in another industry, and 3 if not employed	1.70	1.00	3.00	1.67	1.00	3.00
HigherInc	log difference between relative wages, rw_t5 minus rw_t0	−0.01	−1.82	2.27	0.05	−2.01	2.08
Independent variables							
LQshp_n	Normalized Location quotient: Regional industry specialization (log)	0.45	−0.99	0.86	0.77	−1.0	0.95
LQrel_n	Normalized Location quotient: Regional related specialization (log)	−0.01	−0.65	0.58	0.29	−0.66	0.59
Diversity	Normalized regional diversity	0.61	0.53	0.63	0.66	0.64	0.68
RegSize	Total number of workers in region (log)	11.85	9.24	13.84	12.2	10.8	13.9
NewReg	Dummy. Equals 1 if leaving shipbuilding and working in other region at t_{+5}	0.17	0.00	1.00	0,24	0.00	1.00
SRegRel	Dummy. Equals 1 if leaving shipbuilding and working in same region in skill-related industry at t_{+5}	0.24	0.00	1.00	0.19	0.00	1.00
SRegDiff	Dummy. Equals 1 if leaving shipbuilding and working in same region in unrelated industry at t_{+5}	0.57	0.00	1.00	0.11	0.00	1.00
ORegRel	Dummy. Equals 1 if leaving shipbuilding and working in other region in skill-related industry at t_{+5}	0.05	0.00	1.00	0.01	0.00	1.00
ORegDiff	Dummy. Equals 1 if leaving shipbuilding and working in other region in unrelated industry at t_{+5}	0.14	0.00	1.00	0.02	0.00	1.00
Control variables							
rw_t_0	Relative wage (observed/predicted income) at t_0	1.01	0.35	10.6	1.04	0.14	6.26
Age1834	Dummy. Equals 1 if age of worker is less than 35 years	0.41	0.00	1.00	0.30	0.00	1.00
Age3549	Dummy. Equals 1 if age of worker is between 35 and 49 (baseline)	0.36	0.00	1.00	0.43	0.00	1.00
Age5065	Dummy. Equals 1 if age of worker is 50 or above	0.23	0.00	1.00	0.27	0.00	1.00
Academics	Dummy. Equals 1 if worker has a Bachelor's degree or an occupation requiring at least 3 years' university schooling	0.17	0.00	1.00	0.05	0.00	1.00
HigherEd	Dummy. Equals 1 if worker had completed a university degree (Swe) and/or vocational training (Ger) at t_{+5}	0.06	0.00	1.00	0.02	0.00	1.00
Female	Dummy. Equals 1 if worker is female	0.06	0.00	1.00	0.06	0.00	1.00

Table A2
Correlation matrix between variables included in regressions.

	Status	HigherInc	rw_t_0	LQshp_n	LQrel_n	Diversity	RegSize	NewReg	SRegRel	SRegDiff	ORegRel	Age1834	Age5065	Academics	HigherEd	Female
Sweden																
Status	1.00															
HigherInc	−0.10	1.00														
rw_t_0	−0.01	−0.20	1.00													
LQshp_n	−0.12	0.01	0.08	1.00												
LQrel_n	0.06	0.02	0.01	0.05	1.00											
Diversity	−0.16	0.03	−0.02	0.01	0.15	1.00										
RegSize	−0.17	0.01	0.01	0.01	0.43	0.07	1.00									
NewReg	0.24	−0.03	0.03	0.01	−0.02	−0.02	−0.07	1.00								
SRegRel	0.36	0.00	−0.02	−0.07	0.08	−0.07	0.01	−0.10	1.00							
ORegRel	0.69	−0.07	−0.02	−0.09	0.06	−0.01	0.01	−0.17	−0.18	1.00						
ORegDiff	0.16	−0.02	0.01	0.01	−0.02	−0.03	−0.04	0.50	−0.05	−0.08	1.00					
Age1834	0.15	−0.01	0.00	−0.05	−0.04	−0.03	−0.05	0.14	0.01	0.11	0.07	1.00				
Age5065	−0.08	−0.06	0.03	0.02	0.03	0.07	0.02	−0.09	−0.01	−0.06	−0.05	−0.38	1.00			
Academics	−0.04	0.01	−0.03	0.04	0.04	0.01	0.07	0.02	0.01	−0.07	0.00	−0.10	0.04	1.00		
HigherEd	0.01	0.02	0.12	0.06	0.00	0.06	0.00	0.03	0.00	0.00	0.01	0.03	−0.01	−0.13	1.00	
Female	0.03	0.00	0.00	0.02	0.05	0.02	0.01	−0.01	−0.02	0.06	−0.02	0.05	−0.07	−0.02	0.01	1.00
West Germany																
Status	1.00															
HigherInc	0.00	1.00														
rw_t_0	0.08	−0.30	1.00													
LQshp_n	0.27	0.00	0.05	1.00												
LQrel_n	0.04	−0.02	0.01	0.39	1.00											
Diversity	0.06	−0.02	−0.02	0.14	0.45	1.00										
RegSize	0.00	0.01	0.00	−0.16	0.30	−0.22	1.00									
NewReg	−0.29	0.00	−0.03	−0.34	−0.09	−0.03	−0.02	1.00								
SRegRel	−0.32	0.01	−0.01	−0.02	0.05	0.04	−0.01	−0.03	1.00							
ORegRel	−0.13	0.00	−0.01	−0.11	−0.02	−0.01	−0.01	0.37	−0.01	1.00						
ORegDiff	−0.30	0.00	−0.03	−0.37	−0.12	−0.05	−0.01	0.83	−0.02	−0.01	1.00					
Age1834	−0.20	−0.01	0.07	−0.07	−0.05	0.02	−0.07	0.07	0.05	0.03	0.08	1.00				
Age5065	0.10	0.03	−0.02	0.03	0.00	−0.02	0.02	−0.05	−0.04	−0.02	−0.04	−0.32	1.00			
Academics	−0.01	0.08	−0.11	−0.02	0.02	−0.04	0.06	0.04	0.01	0.02	0.02	−0.05	0.02	1.00		
HigherEd	−0.16	−0.01	−0.03	−0.07	0.01	0.00	0.00	0.08	0.06	0.04	0.07	0.05	−0.04	0.02	1.00	
Female	−0.05	0.07	−0.09	−0.01	0.00	−0.03	0.01	0.00	−0.01	0.00	0.01	0.08	−0.03	−0.02	0.01	1.00

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