Labour market polarisation as a localised process: evidence from Sweden

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The present article creates a link between contemporary labour market polarisation and regional divergence and analyses the spatial patterns of labour market polarisation in Swedish municipalities during the period 2002–2012. The results show that the national pattern of labour market polarisation is driven by polarisation in clusters of previously manufacturing-dominated municipalities with low- and medium-skill production, as well as increasing labour market polarisation and spatial selection within the fast-growing top-tier metropolitan regions. Outside these polarising spaces, most municipalities still experience job upgrading. The much-discussed abandonment of the traditional Western European job-upgrading model towards a polarising trajectory is thus not unequivocal. Regional labour market change and metropolitan selection cause great variation in labour market trajectories across space.

Keywords: job polarisation, job upgrading, labour market models, regional divergence

JEL Classifications: R11, R23

Introduction

There are widespread concerns that the post-industrial process of economic change comes with increasing labour market polarisation, driven by the changing composition of jobs (Autor et al., 2006; Goos and Manning, 2007; Goos et al., 2009). At the same time, divergence and increasing differences characterise regional development in many developed economies (Iammarino et al., 2019; Storper, 2018; Rosés and Wolf, 2019). These processes strongly influence the possibility to sustain employment and welfare in many regional economies.

While a sizeable body of literature deals with job polarisation in a range of countries on the national level and for the labour market as a whole, few studies have been concerned with this issue from a geographical point of view, despite the findings indicating that the regional division of work also entails a strong spatial sorting of jobs (Wixe and Andersson, 2017). This lack of geographical perspectives...
is unfortunate because the explanations for labour market polarisation remain contested in the literature, ranging from the impact of technological change to institutional liberalisation. Going beyond national aggregates, more detailed geographical analyses could offer more precise explanations for labour market changes that influence growing regional inequalities. Such a perspective needs to go beyond the arguably reductionist (successful) core/(unsuccessful) periphery dichotomy that is often used to describe regional development patterns (Breau and Saillant, 2016). This is important because recent developments have created ‘…a finely grained, multi-scale territorial patchwork of diverging real incomes and rates of labour force participation…’ (Iammarino et al., 2019, 274).

The aim of the present article is to address these potential diversities of labour market change by investigating regional patterns of labour market polarisation under conditions of regional divergence. By analysing detailed job data for Swedish municipalities for the period 2002–2012, the article decomposes the growing polarisation of the labour market geographically. Sweden is a particularly interesting case in this regard. For a long time, the ‘Swedish labour market model’ was (in)famously known for its focus on job upgrading, partly sacrificing labour market flexibility to successfully achieve this end under conditions of stable growth during the post-Fordist era. Yet recent detailed investigations have found labour market polarisation tendencies in Sweden as well (Åberg, 2013; Asplund et al., 2011; Heyman, 2016; LO, 2014).

At the same time, the Swedish economy has been moving from a period of regional convergence, during most of the post-war era, to mounting regional differences and divergence regarding both productivity and job creation (Enflo and Henning, 2016; Eriksson and Hane-Weijman, 2017). As elsewhere in the Western world, these coinciding processes have raised widespread concerns across the political spectrum, calling for more active regional policies to prevent the increasingly unequal economic opportunities encountered and experienced first-hand by different groups in society and in different types of regions (Rodríguez-Pose, 2018).

There is little scientific evidence regarding which regions experience labour market polarisation, and how widespread it is across regional economies. This raises questions concerning whether de-industrialising regions or fast-growing and technologically leading ones are more likely to polarise or whether polarisation is a consequence of institutional change on the national or regional level.

The present article finds that the geographies of labour market polarisation are driven by two main tendencies: first, polarisation in previously relatively manufacturing-intense lower- and medium-skilled production municipalities and second, polarisation through spatial sorting in income within the fast-growing metropolitan regions. There are also spatial neighbourhood effects, as the probability of polarisation is affected by the type of change that surrounding regions experience. Thus, in regional industrial districts, polarisation is a localised phenomenon that neighbouring municipalities share. Outside these spaces, most municipalities, and in fact a majority of the entire population, are still experiencing job upgrading. However, some municipalities are not experiencing upgrading or polarisation. Downgrading municipalities, where low-wage occupations primarily grow, are instead associated in particular with higher shares of foreign-born residents. This points to the fact that the polarisation discussion not only has important economic implication, but also has social and demographic implications.

The article applies a geographical perspective to the discussion on labour market polarisation in developed economies. As we show that there is widespread geographical heterogeneity underlying national patterns of polarisation, the article also adds to recent debates on the reasons for regional divergence, spatial patterns of economic and social inclusion as well as...
Labour market polarisation as a localised process

Regional variations in productivity. Most importantly, the main explanations for polarisation seem to differ geographically. No unified, universal explanation can be articulated for all locations, even if outcomes are seemingly similar. For the geographical literature on processes of regional divergence and regional labour market change, this conclusion is instructive in that it adds to the current discussion on whether rising populism is driven by restructuring or inequality (Rodríguez-Pose, 2018). This is because our results indicate that increasing polarisation seems to be strongly connected with restructuring in previously manufacturing-intense regions. The findings thus have implications for regional policies concerning inclusion and growth, which we discuss in our conclusions.

We start with a review of the literature on labour market polarisation and regional divergence. After this, the data and methods are accounted for, and this is followed by the empirical results. Conclusions and a discussion concerning the theoretical as well as empirical contributions end the article.

Literature overview

Regional divergence

Regional divergence and labour market polarisation seem to be salient features of many, perhaps even most, developed economies in the post-Fordist era. New empirical evidence shows how regional convergence and a geographically widespread distribution of growth dominated average spatial development in many economies during the long-term post-war growth era of the 1950s–1970s (Rosés and Wolf, 2019). Since the 1980s, however, there is mounting evidence for increasing spatial divergence in many developed economies (Rosés and Wolf, 2019; Storper, 2018), as Keynesian regulation systems have increasingly been replaced by more market-oriented versions (Scott, 2019).

In Sweden, for example, regional inequality is now back to the levels of divergence recorded before the economic boom following the Second World War (Enflo and Henning, 2016). In the literature, explanations for this increasing divergence have ranged from long-term cyclical argument, to those focussing on the shift from manufacturing-based to service-based economies, as well as on the increasing role of knowledge in contemporary production processes and the spatial consequences of institutional and political change (Eriksson and Hane-Weijman, 2017; Henning, 2020; Lundquist et al., 2008a; Martynovich and Lundquist, 2016).

Labour market polarisation

In parallel with increasing regional divergence, recent evidence suggests a wave of labour market polarisation. Although labour market polarisation tendencies have been recorded in the USA all the way back to the 1950s–1960s (Bárány and Siegel, 2018), the dominating evidence is more contemporary. Several studies have analysed the polarisation tendencies in the USA since the early 1990s (Autor et al., 2006; Dwyer, 2013), but similar evidence has also mounted for the UK for the period 1979–1999 (Goos and Manning, 2007) and for the EU as a whole, as well as for a range of individual European countries for the period 1993–2006, including Belgium, Germany, Greece, the Netherlands, Norway, Spain, Sweden (Goos et al., 2009, 2014) and Finland (Asplund et al., 2011). However, despite the prevailing polarisation discourse, the identification of polarisation patterns across Europe has not been completely uncontested (Fernández-Macías and Hurley, 2017; Oesch and Piccitto, 2019). Fernández-Macías (2012), for example, identifies three typical patterns among European economies during the period 1995–2007: polarisation, upgrading and middling upgrading, where Sweden positions itself, although weakly, among the upgrading countries. Oesch and Piccitto (2019) obtain similar results on upgrading, though using a somewhat different empirical approach.
Polarisation explanations

Different potential explanations for these polarisation tendencies have been subject to quite considerable academic debate (Goos et al., 2014) and cover supply- and demand-driven factors. Note that it is commonly acknowledged that the different explanations are not necessarily mutually exclusive; they may all be relevant and contribute to varying degrees.

One potential explanation focuses on globalisation of the production chains, offshoring and de-industrialisation (Fernandez-Macías and Hurley, 2017; Goos et al., 2009). According to this argument, the middle segment of the labour market in developed economies, often traditionally consisting of relatively well-paid manufacturing work, is increasingly being offshored to low-cost countries due to the globalisation of production. While offshoring tendencies are themselves indisputable and by no means thus far countered by their opposite, growing back-shoring tendencies (Stentoft et al., 2016), the empirical research has expressed doubt about this explanation as a determinant underlying polarisation (Goos et al., 2009). On the other hand, it is well documented that manufacturing shares of employment are declining in many advanced economies, leaving primarily high-end advanced functions such as R&D, product development, design and after-sales services still located in the traditional manufacturing economies (Dicken, 2015; Svensson Henning, 2009).

In practice, it is difficult to distinguish a globalisation explanation for changing labour market patterns from the factors associated with technological change (Iammarino et al., 2019). However, for some, polarisation explanations take on a more general and primary technological guise, cutting across industries. For some time, the model of skill-biased technological change assumed that highly educated workers were able to make use of technological development in a way that was complementary to their skills, thus explaining their attractiveness on the labour market and their increasing share of the workforce in Western economies (Autor et al., 2003). Together with regulated labour markets in many Western countries and deliberate anti-low-wage policies, this would provide a clear explanation for the upgrading patterns of the post-war era.

Even if this approach has been complemented with the insight that the propensity of experiencing upgrading is not necessarily a matter of education or human capital, but that it is the tasks people perform that determine their complementarity with new technology (task-biased technical change, TBTC), more nuanced understandings combine the explanation of growing attractiveness of high-end workers with related demand effects in the lower segments of the labour market spectrum (for example, effects on low-wage services). In this view, polarisation can be seen as a logical consequence of contemporary patterns of technological change, where demand is created for both the most and the least qualified parts of the workforce, whereas the mid-segment suffers the most from automation and digitalisation (Goos and Manning, 2007). In recent history, this middle group of wage earners has been largely reliant on tasks that are more prone to automation (Autor et al., 2003). In fact, this argument is also largely consistent with the ideas of urban theorists (Florida, 2002, 2005; Sassen, 1991), who point to the complementary growth of a well-paid ‘creative class’ and a service-oriented class in the lower part of the wage distribution that caters to the preferences of the creative class. Adding to the structural complexity of this debate, Bárány and Siegel (2018) argue, based on their finding of labour market polarisation in the USA all the way back to the 1950s–1960s, that the automation of routinised work cannot be the sole explanation for labour market polarisation. Rather, they stress that structural change not only between jobs, but also between sectors (from manufacturing to services) is a decisive explanation.
Thus far, we have focussed mainly on the literature primarily emphasising globalisation, technical change and resulting demand effects for low-wage services as the main explanatory factors for labour market polarisation. Other parts of the literature, however, have stressed that institutions and change in socio-political arrangements may influence the degree of polarisation on the labour market. Fernández-Macías (2012) in fact explains divergent features among European economies—only some of which display polarisation in the measurements covering the period 1995–2007—as an outcome of differences in institutional factors. For Scandinavia, this would be the demise of traditional wage compressing policies, the weakening of the traditionally strong labour unions as well as outsourcing of previous public sector jobs. The results of Fernández-Macías and Hurley’s (2017) study suggest that it is not primarily computerisation of routine content in jobs, but rather institutional factors and trade that explain the variation in upgrading and polarisation in European countries for the period 1995–2007. Moreover, rather than turning to an explanation of labour market polarisation based on technological change, Dwyer (2013) argues that the growth of the ‘care economy’, with an increase in occupations associated with the caring activities (for example, healthcare, teaching, childcare and domestic services), contributed significantly to polarisation on the US labour market during the period 1983–2007. Women’s increasing participation on the labour market, as well as the professionalisation of care work and an overall ageing population, fuelled this development.

In fact, in a recent study, Oesch and Piccitto (2019) cannot identify polarisation patterns in either Germany, Spain, Sweden or the UK for the period 1992–2015. Instead, they argue that previous income-based accounts are biased due to, for example, different returns on education and gendered wage structures, in which relatively high-qualified but low-paid occupations (for example, female-dominated healthcare) have increased while relatively well-paid but low-qualified occupations (for example, male-dominated manufacturing) have decreased. Hence, rather than an erosion of middle-class occupations, they identify the erosion of (male) working-class occupations combined with increasing job opportunities for the higher-salaried upper-middle class.

This discussion also links to explanations for polarisation patterns that focus on an interaction between institutional and demographic factors. Recently, the situation of international migrants on the European labour markets has been subject to extensive academic debate, where it is commonly found that, in Western economies, this group underperforms or rather is trapped in underperforming in relation to both wages and employment conditions compared to native employees (Bevelander, 1999; Turchick Hakak and Al Kriss, 2013). There is also a strong sectoral bias towards recruitment of immigrants into lower-skill service industries (Daunfeldt et al., 2018). This has led to widespread concerns that international migrants increasingly are inhabiting the growing shares of less-qualified, low-paid jobs in the economy (LO, 2003; OECD, 2017; Ottaviano and Peri, 2012), although recent research suggests that, among the OECD countries, immigration cannot really explain the growth of the low-wage sector. This is rather due to low levels of investments and limits to social mobility (Andersson et al., 2019).

As we discussed initially, one may naturally question the degree to which these different explanations are in fact exclusive or just different aspects of the same post-industrial transformation of mutually dependent and inseparable institutions, technologies, policies and intertwined supply and demand effects working towards a polarisation outcome. Still, they do differ in emphasis, and as a result, it is important, for both academic and policy reasons, to investigate which explanation tends to
Henning and Eriksson

predominate in different countries, at different points in time.

Regional considerations

Nonetheless, the literature on labour market polarisation has largely ignored the fact that, owing to the spatial division of labour in modern economies, the geography of labour market polarisation should also be differentiated. In other words, polarisation does not take place just anywhere, and the uneven spatial distribution of social and economic factors could even explain some of the inconsistent results obtained in previous studies. In other words, whereas some institutions (but not all) may be geographically invariant in a country, the regional composition of jobs, activities and industries will lead to very different regional labour market outcomes as a result of the forces affecting polarisation. This also means that the spatial differentiation and sorting of economic activities and skills between regions could tell us more about the reasons for and extent of polarisation than average comparisons across countries. Consequently, we believe that we can gain a great deal from simultaneously considering regional average economic outcomes and individual income equalities, which are different aspects of the same processes (Alonso, 1980; Rey, 2018).

Concerning aspects of this matter, a couple of contributions to the literature have preceded us. Lindley and Machin (2014) investigated different labour market polarisation patterns in the USA and found that polarisation was a persistent feature of the labour market across the states during the period 1980–2010. They related this both to educational spatial sorting (concentration of skilled workers) and to increasing income differences. In states showing a higher increase in demand and wages for the highly educated, a market for less-skilled workers also grew. This is generally in line with the technological ‘hollowing out’ explanation for labour market polarisation, as the adaption of information technologies mainly reduces levels of low-skilled production jobs and increases service and high-skilled production jobs (Autor and Dorn, 2013). Even though the results of Lindley and Machin (2014) underline the spatial differentiation of labour market polarisation within nations, empirical features may be different in Europe owing to institutional differences. Furthermore, US states are often aggregates of many different labour markets—a more precise geographical scale would be desirable in attempts to pinpoint the spatially diverse mechanisms underlying polarisation. For example, in an initial analysis, Åberg (2015) also finds that a differentiated geography underlies national polarisation tendencies in Sweden when comparing patterns across large-, medium-sized and small regions. Using descriptive indications for Dutch cities, PBL (2019) discloses a substantial heterogeneity in labour market patterns.

Swedish experiences

Globalisation pressures and institutional change have also spurred the recent debate on increasing labour market polarisation in Sweden. In the Swedish case, the social-democratic labour market model was long geared towards both upgrading jobs through an increase in higher paid and more qualified jobs and out-phasing low-productive, low-paid and low-skilled jobs (Adermon and Gustavsson, 2015; Asplund et al., 2011). For a long time, this was also the empirical tendency (LO, 2014). To the surprise of many observers, however, polarisation tendencies have also been convincingly documented on the Swedish labour market during recent years (Åberg, 2013, 2015; Adermon and Gustavsson, 2015; Asplund et al., 2011; Henning et al., 2016; Heyman, 2016). Relatively high labour costs promoted early automation in manufacturing, and employment shares in manufacturing have been decreasing since the 1970s, in parallel with shares in manufacturing-related professional services
drastically increasing (Henning, 2020; Svensson-Henning, 2009). This has coincided with an elevated qualification structure in these industries. While the shares of workers holding a university degree have increased, shares with a low or no formal education are now far smaller on the aggregate level. Still, as depicted by Eriksson and Hansen (2013), this varies substantially across regions, because the majority of workers outside the largest urban areas have no tertiary education. This is partly attributed to the spatial division of occupations, and partly due to demography, as small and, in particular, peripheral regions struggle with pressures related to an ageing population. Also, the ‘pecuniarisation’ of much household work that took place in Sweden during the 1960s and 1970s (with an elaborated public childcare and elderly care system) can explain why the differences between men’s and women’s labour participation rates are small, but also why the Swedish labour market is highly gender segmented.

Recent policies have made some household services tax deductible (construction and renovations from 2004 and other household services from 2007). In addition, facilitating growth of simple and lower paid (often service) jobs is seen, ‘even’ in social-democratic rhetoric, as a way to increase participation rates for disadvantaged groups. Finally, increased outsourcing of municipal obligations to the private sector in the form of private contracting may alter wage structures locally.

With the recent wave of immigration from non-European countries and the observed difficulty integrating these immigrants into the established Swedish labour market, demographic issues have become a major political concern. It is by now a well-established fact that labour market integration of foreign-born residents has worsened since the 1970s. The exact causes are debated, but potential important explanations range from business cycle shifts and structural change, labour market policies, and the increased importance of social and cultural affinity, to implicit stereotyping and discrimination (Bevelander, 1999; Daunfeldt et al., 2018; Tibajev, 2016).

Data and measurement issues

Polarisation patterns and municipality groups

To investigate the regional variations in polarisation patterns, we use individual-level data from Statistics Sweden covering the years between 2002 and 2012. These data include the annual wages of individuals active on the Swedish labour market as well as their occupations and industry affiliations. We choose the period 2002–2012 for two main reasons. First, previous accounts have not identified polarisation tendencies in Sweden prior to 2000 (Åberg, 2015), which makes this period particularly suitable for our purpose. Second, we select the final year (2012) due to a revision in occupation codes from 2013 onwards, which makes comparisons prior to and after 2012 virtually impossible.

In a first step, we define, as do Goos and Manning (2007) and Åberg (2013), a job as a combination of industry and occupation. In other words, a job is a particular occupation in a particular industry. To define an occupation, we use the three-digit level of the Swedish SSYK96 occupation nomenclature (broadly consistent with the international ISCO-88); to define an industry, we use the two-digit level of the SNI2007 industry classification system (consistent with NACE Rev. 2.).

In a second step, we exclude individuals who are not registered as ‘employed’, who have changed workplace (and/or occupation) during the previous two years, and all above defined job categories with fewer than 100 employees. Based on the remaining sample, we then calculate wage deciles and remove the first and ninth deciles. All of this is done to reduce the impact of job changers on the income levels (people who change jobs tend to receive higher
incomes) and to exclude potential outliers. We carry out several robustness checks to ensure that our results were not biased by this procedure.1

In our third step, we classify the jobs into job quality groups (tiers), as defined by the median wage of the jobs in 2002. Our empirical strategy is inspired by the strategy used by Goos et al. (2009) and nearly replicates (but on the single-country level) the classification strategies established by Fernández-Macías (2012) and Åberg (2013). However, we use an even finer-grained level of industry classification than Fernández-Macías (2012) and, like Oesch and Piccitto (2019), we include all jobs in the economy that reach the size thresholds mentioned above. For 2002, we thus calculate the median wage of each job. To do this, we use the annual wages of the individuals affiliated with each job.2 Following the convention of the polarisation literature, the jobs are then distributed into five bins separated by the quintiles of the distribution of median wages across jobs. This means that individuals with the lowest wages belong to the first bin, while individuals with the highest paid jobs belong to the fifth bin.

Optimally, the bins should be of equal size (20% each of the Swedish workers). This is not quite the case, however, because jobs are of rather unequal size in the economy. In particular, some public sector jobs distort the bin sizes. This is less of a problem, because we are not interested in the wage groups per se, but in changes in their relative size from 2002. If a bin grows, it means that more individuals become attached to the jobs in that wage bin over time (and vice versa). In total, we end up with 3,358,119 workers whom we classify into the bins (in 2002). In 2012, the part of the Swedish labour market that we are able to measure grew to 3,560,643 workers (about 78% of active workers in Sweden).

Based on these numbers, we can calculate the strength of the labour market polarisation process on the national level. In essence, a typical polarisation pattern looks something like the first graph of Figure 1 (upper left), with a relative growth of the jobs in the extreme bins (lowest and highest paid) of the distribution, and a relative decrease in the group of mid-income earners.3

However, regional profiles still need to be constructed. Therefore, as a fourth step, we measure the changes in the regional bin distributions. We are not particularly interested in what the wage bin distribution looks like in the different municipalities, but rather in the compositional changes over time. As a baseline, we construct four different groups based on the nature of the changes in municipalities: polarising municipalities, upgrading municipalities, downgrading municipalities and middling municipalities. Figure 1 displays the stylised patterns of the different groups. All described changes represent changes in percentage units of bins in municipal labour markets.

The idea of classifying countries/regions according to their patterns of change is analogous to the approach developed by Fernández-Macías (2012). But while Fernández-Macías sorts countries into ‘polarisation’, ‘upgrading’ and ‘mid-upgrading’ categories based on visual inspection of graphs describing country labour market change, we need more objective criteria, partly because we are dealing with far more spatial units, and partly to reduce the risk of arbitrary decisions. Therefore, we categorise the empirical municipal patterns using the following procedures:

Polarising municipalities: parallel growth of high- and low-wage segments. Conditions are as follows: \((\Delta Bin1+\Delta Bin2) > 0\) and \((\Delta Bin3 < 0)\) and \((\Delta Bin4+\Delta Bin5) > 0)\)

Upgrading municipalities (Swedish model municipalities): better jobs grow, and worse jobs disappear. Conditions are as follows: \((\Delta Bin1+\Delta Bin2+\Delta Bin3) < 0)\) and \((\Delta Bin4+\Delta Bin5) > 0)\)
Labour market polarisation as a localised process

Downgrading municipalities: better jobs disappear, and worse jobs grow. Conditions are as follows: \((\Delta \text{Bin } 1 + \Delta \text{Bin } 2 > 0)\) and \((\Delta \text{Bin } 3 + \Delta \text{Bin } 4 + \Delta \text{Bin } 5 < 0)\)

Middling municipalities: growth of jobs in the middle of the distribution. Conditions are as follows: \((\Delta \text{Bin } 1 + \Delta \text{Bin } 2 < 0)\) and \((\Delta \text{Bin } 3 > 0)\) and \((\Delta \text{Bin } 4 + \Delta \text{Bin } 5 < 0)\)

To create the most precise geographical disaggregation of the labour market patterns, we use municipalities as the main geographical unit, and bin shares are calculated using resident population. In Sweden, most of the municipalities (290) consist of a main city with a surrounding hinterland. We use municipalities because of our interest in spatial variations and because Swedish municipalities have a considerable degree of self-governance, especially in issues concerning planning, social policy and infrastructure. Moreover, the local tax base is set at the municipal level (place of residence) not the regional, which means that any changes in the wage distribution have direct implications for the municipalities’ financial situation. The most obvious problems with this analytical level arise in the three metropolitan regions (Stockholm, Gothenburg and Malmö), which consist of a number of highly interlinked municipalities. In the empirical analysis, an additional analysis of the internal division of labour in these regions takes this into consideration.

Variable selection
The literature review above centres on four traditions that have different, though not necessarily mutually exclusive, emphases in their primary explanations of labour market polarisation patterns: globalisation, technological change, institutions and change in socio-political arrangements and demographic factors. Our basic contention is also that the impact of these explanations differs geographically, partly because not all regions experience polarisation...
and partly because regions differ in the composition of their economies owing to the spatial division of labour.

Compared to cross-nation comparisons, it is not straightforward to identify variables that afford a full-fledged range of municipal-level indicators that operationalise the different explanations found in the literature. Drawing on the databases of Statistics Sweden, we calculate a set of variables we believe could provide initial indications of primary relevance of the different explanations (all independent variables for 2002 per municipality, resident population).

As an indicator of economic globalisation, we settle for sector employment in extraction/mining industries and manufacturing. While this is of course imperfect as a measure of the total regional effects of globalisation, one of the most important economic effects of globalisation in Sweden has been long-term de-industrialisation, but also servification of the remaining high-productive manufacturing activities (Henning, 2020).

As indicators of the technological change process, we first specify an indicator of share of occupations in construction, manufacturing and transportation that do not require a university degree. Forward-looking research has found that these occupations have a high probability of experiencing future automation (Henning et al., 2016; Fölster, 2014; Frey and Osborne, 2017). We acknowledge that the latter variable is positioned between the globalisation and technology explanations. However, because Swedish manufacturing has a long history of offshoring due to its high relative wages, we believe it is more reasonable to interpret this as an indicator of technological change than pure offshoring. As indicators representing technical change, we also use pure human capital variables (share of population in a municipality with a bachelor’s degree or above and share of population in occupations requiring a specialised university diploma), as well as share of workers in the municipality employed in knowledge-intensive business services (KIBS), for which we expect the demand to grow with technological change and more advanced applications (Lundquist et al., 2008b). While none of these indicators actually represents the regional impact of technological change per se, we interpret them as indirect measures reflecting the value of having a regional labour force readily equipped to deal with technological change or one that is much more susceptible to the substitution effects of automation and computerisation.

We choose two different indicators to signal institutions and socio-political arrangements. The first concerns the presence and extent of public service activities in the municipalities, as measured by the share of workers employed in public administration and care and social services. Second, we measure the share of public expenses going to the private sector due to contracting, which we take as an indicator of public outsourcing affecting wages in outsourced activities. Demographic effects are operationalised by measurements of the share of foreign-born residents in the municipality population, and the share of the population above retirement age. Lastly, we add a number of geographical controls, among which the most important is perhaps a control for municipal unemployment level. Table 2 summarises all variables.

**Findings**

**Descriptive evidence**

Figure 2 displays the national job development pattern in Sweden between 2002 and 2012. The graphs show a, by now, familiar polarisation pattern in the Swedish labour market as measured by an income-based definition (Åberg, 2013, 2015). While the bins in the middle are decreasing in relative terms (left graph), the tail bins experience a relative increase in their respective shares of the labour market. Although the changes are not particularly dramatic
Labour market polarisation as a localised process

regarding labour market shares, in the extreme bins around 1%, the pattern still marks an overall decisive move from the traditional upgrading model. In real terms, however, most bins experience absolute growth, owing to the overall positive development on the Swedish labour market (right graph). For the tail bins (1, 4 and 5), this amounts to an increase of almost 200,000 employees during the period under study.

In the next step, we decompose the national pattern into the regional patterns of Figure 1, according to the quantitative conditions presented above. Table 1 describes the overall outcome. All four stylised patterns are ‘inhabited’ by a number of municipalities. This demonstrates the wide variety of local patterns that make up both the relative and absolute national polarisation trajectory shown in Figure 2. While a significant number of municipalities belong to the polarising group (Figure 3 shows their average patterns), most of the municipalities still experience more conventional job-upgrading patterns. In fact, almost half the total population in Sweden, over 4 million, live in municipalities that are still experiencing job upgrading, which supports the arguments of Oesch and Piccitto (2019). On the other hand, matters are far worse for the 56 municipalities that are experiencing downgrading. More than 2.4 million Swedes live in municipalities with such a negative labour market trajectory. Twenty-seven municipalities are placed in the middling category, with a clear increase in the mid-segment of the labour market.

The geographical distribution of these groups is shown in Figure 4. The polarisers are mainly located along the traditional ‘industrial belt’ of Sweden, from western Sweden northwards to Mälardalen, west of Stockholm and the old industrial municipalities of Bergslagen in the middle of the country. Upgraders instead dominate, perhaps surprisingly, large parts of the more peripheral regions of Sweden and around Gothenburg and Malmö. The downgraders are located mainly around Stockholm and in very remote locations. The middling municipalities dominate in the very south, and some are scattered around the country. Indeed, although there seem to be some geographical clusters of similar trajectories, heterogeneity rather than homogeneity is what characterises

Table 1. Municipal outcomes after sorting into the labour market patterns.

| Patterns   | Number of municipalities | Total population  |
|------------|--------------------------|-------------------|
| Polarisers | 61                       | 1,942,714         |
| Upgraders  | 146                      | 4,041,761         |
| Downgraders| 56                       | 2,406,721         |
| Middling   | 27                       | 549,592           |

Source: Own elaboration of data from Statistics Sweden.

Figure 2. National job development pattern in Sweden between 2002 and 2012. (Left) Change in bin percentage of the Swedish labour market, 2002–2012. (Right) Change in number of employees in bins, 2002–2012. Source: Own elaboration on data from Statistics Sweden.
Table 2. Mean of the different indicator variables among the municipalities assigned to a specific labour market pattern category, 2002.

| Main explanatory framework                  | Variables                                                                 | Polarisers | Upgraders | Downgraders | Middling | All municipalities (non-weighted) |
|----------------------------------------------|---------------------------------------------------------------------------|------------|-----------|-------------|----------|----------------------------------|
| Globalisation                                | Share of workers, extraction and mining (%)                               | 0.9        | 1.6       | 1.1         | 1.3      | 1.3                              |
| Globalisation                                | Share of workers, manufacturing (%)                                       |            |           |             |          |                                  |
| Technology                                   | Share of occupation groups 7 and 8 as share of the municipal manufacturing employment % | 29.2       | 21.8      | 23.2        | 21.7     | 23.6                             |
| Technology                                   | Share of workers, law management and technical (%)                       | 1.8        | 2.1       | 2.6         | 2.5      | 2.2                              |
| Technology                                   | Share of population with a bachelor’s degree                             | 18.2       | 21        | 21          | 22       | 20.5                             |
| Technology                                   | Share of population in occupations requiring a specialised university diploma | 10.7       | 12.6      | 12.9        | 13.4     | 12.3                             |
| Institutions and socio-economic arrangements | Share of workers, public administration (%)                              | 4.4        | 5.2       | 4.8         | 4.8      | 4.9                              |
| Institutions and socio-economic arrangements | Share of workers, care and social services (%)                           | 14.5       | 15.8      | 14.8        | 15.5     | 15.3                             |
| Institutions and socio-economic arrangements | Share of expenses going to the private sector                            | 13.8       | 14.6      | 16.7        | 17       | 15.1                             |
| Demography                                   | Share of foreign-born residents                                          | 9.5        | 7.4       | 10.7        | 78       | 8.6                              |
| Demography                                   | Share of population above retirement age                                 |            |           |             |          |                                  |
| Control                                      | Municipality population 2002 (thousands)                                 | 31.8       | 27.7      | 43          | 20.4     | 30.9                             |
| Control                                      | Population change 2002–2012 (%)                                          | 0.3        | 2.1       | 1.8         | 1.3      | 1.6                              |
| Control                                      | Unemployment share (%)                                                   | 3          | 2.9       | 2.9         | 2.9      | 2.9                              |

Note: Highest numbers are in bold.
Source: Own elaboration of data from Statistics Sweden.
the geographical distribution of labour market trajectories in Sweden during the period 2002–2012.

To make the investigation somewhat more detailed, Table 2 displays the mean of the different initial indicator variables among the municipalities assigned to a specific labour market change pattern: polarising municipalities, upgrading municipalities, downgrading municipalities and middling municipalities (top averages are indicated by grey cells). The means are already indicative of some broad characteristics of the municipalities faced with different labour market trajectories.

The polarising municipalities are characterised by higher shares of manufacturing, slightly lower education levels and slightly higher shares of elderly inhabitants than the municipalities of the other groups, even compared to the downgrading municipalities. In general, it therefore seems that polarisation is closely related to the structural situation of municipalities. This group is inhabited by the slow-growing, static or even declining municipalities that have a more traditional manufacturing-oriented industrial structure, relying on comparatively low- and mid-level-educated workers.

However, these are by no means the smallest municipalities in the regional hierarchy: Only the downgrading municipalities are larger on average. In addition, polarisation in these municipalities does not necessarily mean that the tail bins are growing in absolute terms. Our indicators are based on relative numbers. Indeed, a municipality could also upgrade during overall decline to produce fewer, but relatively better jobs.
The evidence presented in Table 2 suggests that geographical features distinctly structure which municipalities belong to the other labour market trajectory groups as well. The downgrading municipalities have substantial manufacturing shares, too, but are more strongly characterised by services as well as by the highest shares of foreign-born residents. Perhaps the most striking feature of this group, however, is the rapid change in population size, which is comparable to that of the upgraders. When municipalities grow rapidly, it seems that they do so particularly with growth in the tails, compared to the outset. The upgraders are characterised by high presence of mining and extraction activities (which were booming during the period investigated), but also of public sector jobs. Finally, the middling municipalities, where the mid-segment of the labour market tends to grow, are on average comparatively affluent, with high general education levels.

The means found in Table 2 suggest that while polarisation in municipalities has a predominant structural component and links to technological change in manufacturing, there are equally relevant indications for the other groups that require consideration when decomposing the national polarisation trajectory. National change in occupational structures is, hence, a jigsaw puzzle of regionally distinct polarisation, upgrading, downgrading and middling trajectories. We have already discussed the fact that the different explanations suggested for the different patterns in the data are not mutually exclusive. But how does their explanatory power compare across the different groups?

**Regressions**

In Table 3, we show the outcomes for four separate outcome variables in nine different logit regressions (=1), according to the different labour market trajectories (polarising, upgrading, downgrading, middling). Each outcome is, in other words, compared to all other possible outcomes. To estimate the degree of spatial dependency, especially in commuting regions that may consist of several municipalities, we have tested the residuals of each of our original models for spatial autocorrelation (Moran I). The residuals for the upgrading, downgrading and middling models show no or very weak spatial autocorrelation. For these models, we
Table 3. Logit regressions on the different outcome patterns for the municipalities. Own elaboration on data from Statistics Sweden.

|                      | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      |
|----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                      | POL    | POL    | POL    | UP     | UP     | DOWN   | DOWN   | MID    | MID    |
| Share of workers, extraction and mining | -47165 | -40.191 | -43.436 | 31.657* | 31.654* | -26.537 | -26.553 | -5.743 | -7659  |
|                      | (34.940) | (32.138) | (34.059) | (19.180) | (18.736) | (27.587) | (27.250) | (16.211) | (16.071) |
| Share of workers, manufacturing | 4.831* | 2.764   | 2.326   | -3.166  | -2.080  | -0.297  | -0.122  | -1.235  | -1.955  |
|                      | (2.584) | (2.763) | (2.987) | (2.107) | (2.347) | (2.488) | (2.802) | (3.497) | (3.832) |
| Share of workers, law management and technical | -2.868 | 1.497   | -3.418  | -8.260  | -12.529 | 14.200  | 8.789   | 1.828   | 11.825  |
|                      | (20.467) | (20.365) | (21.824) | (15.580) | (16.655) | (17131) | (17898) | (24.500) | (22725) |
| Share of population with a bachelor’s degree | 10.997 | 12.959  | 12.518  | 2.269   | -0.083  | -17.359 | -16.052 | 0.253   | 7485   |
|                      | (11.276) | (11.519) | (12.298) | (8.656) | (9.105) | (10.853) | (11.333) | (14.499) | (14.754) |
| Share of population in occupations requiring a specialised university diploma | -17.726 | -11.878 | -14.134 | -2.793  | -0.700  | 23.408  | 16.039  | 4.770   | 0.597   |
|                      | (17751) | (18.142) | (19.249) | (13.872) | (14.536) | (17169) | (18.053) | (23.525) | (23.977) |
| Share of workers, public administration | -3.433 | -6.450  | -11.104 | 3.935   | 5.502   | -0.524  | 1.083   | -9.559  | -12.570 |
|                      | (9.299) | (9.410) | (10.186) | (7.030) | (7.215) | (9.769) | (10.150) | (12.390) | (12.607) |
| Share of workers, care and social services | -4.343 | -8.247  | -8.357  | 2.509   | 4.206   | 1.403   | 3.474   | -0.573  | -0.228  |
|                      | (6.652) | (7.004) | (7.325) | (4.966) | (5.155) | (2.435) | (6.611) | (7.753) | (7.995) |
| Share of expenses going to the private sector | -2.211 | -1.809  | -0.590  | -2.820  | -3.148  | 2.779   | 1.873   | 3.875   | 2.583   |
|                      | (3.130) | (3.187) | (3.318) | (2.262) | (2.364) | (2.703) | (2.880) | (3.340) | (3.549) |
| Share of foreign born | 5.042   | 6.358*  | 4.198   | -10.419*** | -10.755*** | 9.324*** | 10.660*** | -8.057  | -4.977  |
|                      | (3.465) | (3.567) | (3.951) | (4.001) | (3.473) | (3.950) | (6.605) | (6.248) | (6.248) |
| Share of population above retirement age | -2.756 | -4.070  | -2.142  | -4.721  | -0.496  | 4.569   | 3.390   | 2.787   | -4.877  |
|                      | (5.736) | (5.945) | (7.318) | (4.137) | (5.505) | (4.875) | (6.680) | (6.224) | (7.967) |
| Share of manual workers as share of the municipal manufacturing employment | 6.468** | 5.798** | -1.386  | -3.757  | 1.325   | (2.716) | (2.840) | (2.139) | (2.639) |
| Municipality population (1000s) | 0.003   | -0.002  | 0.003   | 0.003   | -0.025*  | (0.003) | (0.003) | (0.003) | (0.015) |
| Population change 2002–2012 | 1.551   | 3.610   | -4.735  | -2.196  | (2.783) | (3.177) | (3.932) | (3.455) |
consequently retain our original variable setup. The polarisation models, on the other hand, indicated significant and persistent spatial correlation patterns when the original variable setup is used. We therefore add a spatial dependency variable, which we call *polarisation neighbours*. This variable counts the number of neighbour municipalities within a 50 km radius that experience polarisation. This variable is added to Model 3 in Table 3.

The municipalities with a higher share of manufacturing have a greater chance of experiencing polarisation (Model 1). Adding the share of low-skill occupation in manufacturing to the regression (Model 2), we also see that the structural vulnerability from manufacturing comes mainly from municipalities positioned in the middle of the value chain. The manufacturing share variable retains the sign, but turns insignificant, while the share of lower-skill occupations within manufacturing is both positive and highly significant, also when regional controls are added (Models 2 and 3). Indeed, municipalities that have a high degree of manufacturing—but especially those that have high shares of low- and mid-level qualified workers *within* manufacturing (but still manufacturing specific)—are particularly vulnerable to polarisation. Polarising processes in neighbouring municipalities also matter. Municipalities with a high number of polarising neighbours have a significantly higher probability of experiencing polarisation themselves.

As already suggested in Table 2, there are greater complexities associated with these outcomes, which becomes obvious from Models 3 to 9, which focus on the other patterns. Share of extraction industries affects the chance of upgrading positively, while the share of foreign-born residents has a negative association with upgrading. Turning this around, municipalities with higher shares of foreign-born residents are also significantly more likely to experience downgrading trajectories (Models 6 and 7). For the middling outcome, variables give the expected signs reiterating the results of Table 2,
but none of them is significant (Models 8 and 9). In fact, the only significant variable on middle is population size, suggesting that larger regions are less likely to experience growth in the middle of the income distribution.

To further investigate the robustness of the estimations, we run a number of additional tests. First, an obvious potential issue is how sensitive the results are to changing the exact definitions of the stylised labour market trajectories, for example, if ΔBin3 is moved to the right side of the AND sign in the definition of upgrading municipalities. The results from these experiments are that the main findings all remain and are robust to the details of the classification choices. Second, adding metro dummies does not change interpretation of the results of the regressions. We also include share of women, share of young workers (<25 years) and a range of industrial employment shares (apart from manufacturing share). None of these variables changes the findings presented above, nor are any of them significant. Third, multinomial logit regressions reiterate the main outcomes.

How important, then, are the estimated effects? In Figure 5, we run the same full regressions as in Table 3 (Models 3, 5 and 7), but instead of the continuous explanatory variables, we transform the (significant) variables of interest into high/low binary dummies based on their median value, which sorts the municipalities into two groups of equal size. Other variables are kept in their original scales. This gives us a very straightforward interpretation of the probability impact of the variable on the particular labour market trajectory probabilities. Effects on the outcomes are sizeable and ranges between 10% and 20%. For example, moving from a low to a high share of manufacturing workers in the local economy increases probabilities of the regional economy entering polarisation by between 13% (with controls) and 21% (without controls), while a high share of low-qualified workers within manufacturing adds another 10–17%, depending on whether or not controls are included.

The metropolitan regions

A particular part of the regional system is the metropolitan regions. They consist of several highly interconnected and integrated municipalities, which largely share a common labour market. A strong feature of these regions is socio-economic spatial sorting in housing, owing to variation in house prices and accommodation accessibility. Because of such processes, we expect some municipalities in the metropolitan regions to be more likely to experience labour market upgrading, others downgrading. For the total regional labour market of those metropolitan regions as aggregate, the result may well be labour market polarisation, but with strict underlying internal economic labour market differentiation in the spaces between the municipalities within the metropolitan area. Even if we have seen above that spatial dependency affects polarisation probabilities in the country as a whole, the metropolitan regions are special cases. Here, we can expect different trajectories that complement each other because the regions are integrated and mechanisms of spatial sorting apply (especially in housing, but also for jobs), rather than driving surrounding regions into the same trajectory because of spillovers (as in the industrial district regions).

This is exactly the pattern we find in the Stockholm metropolitan region. Table 4 displays the number of municipalities within the Stockholm, Gothenburg and Malmö regions that fall under the different labour market patterns. While patterns point more towards upgrading in the Gothenburg and Malmö regions that fall under the different labour market patterns. While patterns point more towards upgrading in the Gothenburg and Malmö regions, Stockholm has a polarisation pattern when upgrading and downgrading municipalities are added together. This is in essence a case of spatial selection based on income, as can be seen from Tables 5 and 6. In Stockholm, the upgrading municipalities have significantly higher average incomes (Table 5), and lower shares of foreign-born residents (Table 6), compared with the downgrading municipalities. Evidence for Gothenburg is also striking,
Figure 5. Increase in probabilities moving from ‘low’ group of municipalities (=0) to ‘high’ group of municipalities (=1), as defined by the median, of an independent variable, on labour market polarisation, upgrading and downgrading. Other variables held at their means. Source: Own elaboration on data from Statistics Sweden.

Table 4. Municipal outcomes after sorting of the labour market patterns, displayed by metropolitan region membership.

|                  | Polarisers | Upgraders | Downgraders | Middling |
|------------------|------------|-----------|-------------|----------|
| Greater Stockholm| 12         | 13        | 1           |          |
| Greater Gothenburg| 2         | 9         | 2           |          |
| Greater Malmö    | 9          |           | 3           |          |

Source: Own elaboration of data from Statistics Sweden.

Table 5. Average annual wages among (1000s SEK) the municipalities assigned to a specific labour market change category, displayed by metropolitan region membership.

|                  | Polarisers | Upgraders | Downgraders | Middling |
|------------------|------------|-----------|-------------|----------|
| Greater Stockholm| 281.8      | 273.3     | 452.1       |          |
| Greater Gothenburg| 259.0      | 255.7     | 240.0       |          |
| Greater Malmö    | 245.1      | 263.6     |             |          |

Source: Own elaboration of data from Statistics Sweden.
where the polarising regions have far higher shares of foreign-born residents in the population. Overall, however, both Malmö and Gothenburg are dominated much more by income upgrading than is the more differentiated Stockholm region.

### Conclusions

The present article uses geographical data to add to the literature on the polarising labour market in Western economies (Åberg, 2015; Lindley and Machin, 2014). While there are some geographical studies on the topic, the article shows that there is considerable spatial heterogeneity underlying national polarisation patterns. Based on recent literature, this is of course partly expected. In a long-term analysis of regional and interpersonal income equalities in the USA, Rey (2018) shows how global inequality measures can obscure very different local patterns. Here, we have been particularly concerned with the geographies of polarisation. The method we have designed to investigate this is easy to apply to other countries and is not particularly data demanding.

In all, local polarisation (on the municipal level) seems to be closely linked to developments in the manufacturing sector rather than primarily attributed to growth in KIBS and/or low-skilled personal services in large urban regions. Municipalities with high shares of manufacturing activities—but particularly those with high shares of workers in construction, manufacturing and transportation jobs that do not require a university degree—are especially likely to experience polarisation. This could be a result of globalisation and de-industrialisation, but given our regression results and previous waves of offshoring from Sweden, we are more inclined towards a technological explanation. As new technologies and business models transform manufacturing in high-cost countries, firms have less use for relatively low-skilled but relatively high-salaried mid-segment manufacturing workers. Echoing Oesch and Piccitto’s (2019) recent findings on a national scale, the current labour market realignments seem to negatively affect regions dominated by mid-value chain activities in manufacturing, which leads to erosion of the working class in particular.

Our study develops previous findings by showing that national aggregates are not based on simple upscaling of regionally homogenous developments. Polarisation does not happen everywhere. Quite the contrary, national labour market polarisation is a jigsaw puzzle of regionally distinct polarisation, upgrading, downgrading and middling trajectories. Indeed, polarising as well as upgrading, downgrading and municipalities with a growing middle job segment can all be found in the Swedish regional system. However, the findings on labour market trajectories are also an issue of geographical scale. First, while neither upgrading, downgrading nor middling trajectories seem to be affected by spatial spillovers, there is some degree of spatial clustering of polarising municipalities. If neighbours are polarising, a municipality runs a higher risk of also being a polariser. This interdependency may arise because of commuter effects, or even more likely, because the main affecting variables—manufacturing presence and share of workers in manual occupations—tend to be spatially clustered too. Second, owing to spatial selection patterns, or

| Share (%) of foreign born | Polarisers | Upgraders | Downgraders | Middling |
|--------------------------|-----------|-----------|-------------|----------|
| Greater Stockholm        | 12.6      | 18.7      | 12.8        |          |
| Greater Gothenburg       | 16        | 8.1       | 8.6         |          |
| Greater Malmö            | 10        | 12.9      |             |          |

Source: Own elaboration of data from Statistics Sweden.
even spatial segregation, polarisation in the primary metropolitan region of Stockholm is only visible when the labour market development trajectories of the municipalities in the region are added together.

In fact, many municipalities in Sweden, and a substantial part of the population, are still experiencing the traditional upgrading patterns in their immediate regional context, as anticipated in the traditional Swedish labour market model. In the period we investigate, especially regions that have higher shares of extraction industries show more tendencies towards upgrading. This mirrors a period of relative expansion in extraction-rich regions such as Kiruna and Gällivare in the far north. On the other hand, demographic factors (for example, shares of foreign-born residents) as well as structural factors (for example, manufacturing shares) primarily affect which municipalities experience labour market downgrading. We do not know the exact reasons for this, and lessons from the labour literature are still inconclusive (Tibajev, 2016). Naturally, the group of ‘foreign-born’ residents is as heterogeneous as the world itself, with different skills, education levels and experiences represented. Nevertheless, although the direction of causality cannot be determined in the present analysis, our data show disquieting associations between regional shares of foreign-born residents and labour market downgrading. This might be driven either by supply chocks that put pressure on wages or by spatial sorting of foreign-born residents into less buoyant regions, with low-paid service jobs replacing middle-income manufacturing jobs. Regardless, this calls for efforts to improve the absorptive capacity of the labour market in these municipalities (Hane-Weijman et al., 2018). This is especially relevant, as observers have repeatedly pointed at labour migration into Sweden as a way to overcome projected future skill deficits. As shown on the macro-scale, expanding economies are far more likely to integrate foreign-born individuals without expanding the low-wage sector (Andersson et al., 2019). It is thus reasonable to expect similar processes on a regional scale.

Our analysis of labour market polarisation focuses on a period when many Western economies experienced spectacular trends of regional divergence. While some degree of labour market polarisation may be expected in times of high growth and rapid technological change, the results are nevertheless cause for great concern from a social perspective. Parts of the workforce in municipalities that have experienced rapid manufacturing change—and that have welcomed high shares of immigrants to Sweden—are falling behind on the new job markets, where not everyone can expect job upgrading to predominate. This calls for political attention and adds yet another aspect to the current debate on the link between industrial and economic regional change, on the one hand, and highlights the concern for political polarisation and discontent challenging established post-war political structures around Europe as well as calls for a new ‘place-sensitive distributed development policy’, on the other hand (Iammarino, 2019; Rodríguez-Pose, 2018; Storper, 2018).

Our results are closely tied to this debate, as polarisation and restructuring of manufacturing seems to go hand in hand. Nevertheless, labour market changes look very different in different regions, even as the labour market in the country as a whole tends to experience polarisation, which calls for different types of policy interventions. In job-upgrading municipalities, the labour market policies could, on the one hand, concentrate on optimising already productive processes. To prevent increasing labour market polarisation in some regions and municipalities, however, politicians should take a closer look at, and devote policies to, promoting more productive structural change in de-industrialising municipalities and facilitating integration of parts of the vulnerable segments of the labour force. In these municipalities,
inclusive educational efforts and regional training centres are needed to create upgrading mechanisms. The greatest causes for concerns, however, are probably created by the labour markets of the growing metropolitan regions. The growth of Stockholm in particular has resulted in polarised segregation—but the extent of this polarisation only becomes apparent when the labour market patterns of interconnected municipalities are added together.

We believe that policies aimed at preventing divergence are particularly warranted when spatial segregation and labour market polarisation co-occur. Spatial segregation has long been a fact in most metropolitan areas, and some degree of heterogeneity is probably unavoidable. But with increasing labour market polarisation, urban spaces are likely to diverge even further in a globalising post-industrial economy. From this perspective, the national polarisation trajectories studied previously tend to obscure regional patterns and variations. It is, however, of ever-increasing importance that we understand the regional labour market challenges in a globalised, and seemingly more unequal, economy.

Endnotes

1 Alternative specifications excluding only the top and bottom 5%, or using the entire sample did not change the regional results presented in this article.

2 We use annual wages because numbers of hours worked are not available in the Swedish individual-level datasets. The drawback of this strategy is the downward bias for occupations where considerable parts of the labour force work part-time (especially in parts of the public sector). On the other hand, the average wages represent what people in the different jobs actually earn. Since we exclude the top and bottom percentiles (step two), those who work very few hours in each job also do not impact the average wage calculated.

3 A common critique against this strategy is that it ignores potential relative wage changes between jobs, i.e. that a job can increase (or decrease) its mean wage relative to other jobs, and thus change position in the distribution. However, in previous work on wage changes between 2008 and 2013, we have found that the correlation between median job wages was 0.93 for the Swedish case (Henning et al., 2016). It is uncommon that a job makes a relative ‘career’ over time, at least in the Swedish case. One reason for this stability could be the strongly structured institutional system surrounding the central wage negotiations in Sweden. These are performed in rounds, where the manufacturing industries set a target level. Even if there is scope for individual wage negotiation components, it could well be the case that this system prevents or hinders occupations overtaking others in terms of wage, at least in the medium run. It also results in the fact that wage cuts in nominal wages, are extremely rare.

4 $\Delta$ represents change between 2002 and 2012.

5 We have also calculated population-weighted means, but these do not change the basics of our findings.

6 We select 50 km as a cut-off for the spatial effects of polarisation because according to the Swedish transport authority, the average car commuter in Sweden has a commuting distance of 27 km to work (reported at https://www.svt.se/nyheter/inrikes/sa-langar-resan-till-jobbet). Hence, a 50 km radius should capture the vast majority of the extra-municipality labour market effects, while still introducing a limited degree of artificially created spatial autocorrelation effects.

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