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Towards a regional approach for skills policy

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ABSTRACT

Focusing on the UK as a case study, this paper offers a critical discussion of current approaches for skills policy in the context of the increasing spatial imbalances that characterize advanced economies. We outline an integrated framework for regional skills policy, allowing a shift from ex-post interventions on industry-specific skills deficiencies towards a place-based perspective reflecting the dynamic evolution of skills requirements. Building on a systemic institutional approach, the proposed framework identifies synergies across skills and regional development policies connecting them through the role of shared skills in providing horizontal platforms, enhancing combinatorial opportunities across sectors for resilient structural change.

KEYWORDS

skills; human capital; regional policy; Smart Specialisation; regional development

JEL L52, O2, R11, R58

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INTRODUCTION

Since the seminal insights on human capital by Schultz (1961), skills have been regarded as fundamental drivers of productivity and economic growth. The academic literature offers a multidimensional conceptualization of skills, reflecting the set of capabilities required to address a task, incorporating behavioural attributes and technical ability (Green et al., 1998; Oliver & Turton, 1982; Watson et al., 2006). This approach acknowledges the role of formal education in advancing skills, but equally integrates ideas such as learning by doing, experience-based knowledge development and the transferable nature of acquired skills (Neffke & Henning, 2013). In contrast, policy perspectives have primarily focused on a simplistic dichotomy of skills comprising either educational qualifications or vocational training, missing that 'education is not synonymous with skills' (Bacolod et al., 2010, p. 276). Thus, despite policy efforts supporting ever-higher levels of education, advanced economies remain characterized by significant and persistent skills shortages, gaps and mismatches that hamper productivity and growth (Guvenen et al., 2020; Mavromaras et al., 2012, 2015).

These issues have a marked spatial dimension, with skills and skills deficiencies being defined by a persistent heterogeneity within developed countries (Green, 1999; Green & Owen, 2003; Organisation for Economic Co-operation and Development (OECD), 2019). Indeed, the lack of appropriately skilled workers has been increasingly identified as a prominent barrier faced by regions in industrial transitions, which need to prepare for the jobs of tomorrow (OECD, 2019). The literature has long indicated that larger cities and agglomerations tend to provide higher skill levels and better skills matching across occupations, generating a productivity premium (Bacolod et al., 2009; Glaeser et al., 2014). Conversely, firms located in regions experiencing skills shortages have lower productivity (Morris et al., 2020). This can be particularly problematic in lagging areas, which may also face low-skills traps where low demand for skills leads to limited incentives to upskill and persistent productivity gaps (Finegold & Soskice, 1988; Sissons, 2020). The place-specific impact of skills shortages on regional productivity, unemployment duration and employment mismatch has been further emphasized in recent studies moving away from generic measures of education towards more specific

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metrics of skills deficiencies (Berlingieri, 2019; L'Horty & Sari, 2019; Morris et al., 2020).

Despite the growing evidence base and repeated calls to include a robust spatial consideration of the demands, specialities and initiatives of localities in defining skills strategies (Green, 2012; Payne & Keep, 2011), discussions regarding policy recommendations for skills development have received limited attention in regional studies (Sevinc et al., 2020). Indeed, while the renewed attention towards industrial policy acknowledges the presence of regional divides and skills imbalances (Bailey et al., 2018), skills policy remains focused chiefly on industry-specific and place-neutral support for higher education and vocational training.[1] Thus, notwithstanding recent contributions on policy targeting local low-skills traps that hinder the improvement of the local skills base (Green et al., 2020; Sissons, 2020), there is still no unified framework connecting regional development and place-based skills policies.

This paper contributes to the academic and policy debate by offering a critical discussion of skills policy following a regional perspective. In particular, we bridge different strands of the literature in order to develop a new integrated policy framework embedding skills at the centre of regional industrial and development strategies.

We start by providing a critique of current approaches for skills policy looking at the UK, where the rates of skills mismatch[2] and spatial imbalances[3] that characterize most advanced economies are particularly marked (Gal & Egeland, 2018; McCann, 2020; OECD, 2019; Office for National Statistics (ONS), 2016). The UK also represents an interesting case due to its complex structure of local government (Fai & Tomlinson, 2019; Hazelkorn, 2016).[4] Against this background, we draw from previous contributions on skills in the regional literature to renew the call for a place-based perspective for skills policy where intervention is shifted from a static supply-side approach towards a more dynamic viewpoint targeting both skills demand and utilization (Payne, 2007; Sevinc et al., 2020). We then connect this strand of research to the literature on Smart Specialisation (Foray, 2011; McCann & Ortega-Argilés, 2015; Neffke et al., 2011) to make a comprehensive case for considering skills as an integral part of regional industrial strategies. Accordingly, our contribution is intended to have broad applicability beyond the UK, because it focuses on addressing the disjointed linkages and missed synergies between skills and regional development policies that still occur across most developed countries (OECD, 2019).

We argue that a successful regional skills policy requires a conceptually novel framework integrating three main components: (1) a *horizontal scope* where shared skills may provide a unifying base enabling bridging effects across different local industries; (2) a *dynamic identification of skills needs* enhancing the development of new but related industrial paths; and (3) a *systemic institutional approach* connecting stakeholders involved, respectively, in skills policy and regional industrial strategy at the local level. Merging insights on policy platforms and bridging effects in knowledge recombination (Asheim et al., 2011; Cooke, 2007; Corradini & De Propris, 2017), we introduce the concept of *horizontal skills platforms* to underline how shared skills may be used to enhance connections and synergies across related industries. By integrating ex-ante intervention on skills within regional development policy, such platforms may support the demand and supply of skills in conjunction with the place-specific yet evolving needs of diverse regional economic structures. We discuss how embedding skills policy within Smart Specialisation Strategies (S3) may complement processes of related diversification and entrepreneurial discovery inherent to Smart Specialisation to support regional industrial transitions in both advanced and lagging regions. We conclude by highlighting that the definition and implementation of an integrated framework for regional skills policy rests upon a systemic approach connecting stakeholders involved in skills ecosystems with those engaged in defining regional development strategies.

RECENT DEVELOPMENTS IN UK SKILLS POLICY

A supply-side focus has dominated UK skills policy for over 30 years, with the national education and training (E&T) systems dedicated almost entirely to the objective of increasing skills supply (Payne & Keep, 2011). This trend, culminating in the Leitch (2006) Review, called for ever higher qualification levels, improving the quality and quantity of E&T in the workforce. Such focus did not reflect that the UK's skills problem was not solely dependent on lack of supply, but also on weak employer demand for skills and low utilization of the human capital available (Buchanan et al., 2010; Finegold & Soskice, 1988). It was not until 2007 that the shift towards utilization of skills occurred in policy, with Scotland (Payne, 2009; Scottish Government, 2007) pushing for a more holistic approach and substantial policy changes subsequently being adopted across the UK (OECD, 2012). The UK Commission for Employment and Skills (UKCES) encapsulated this change in perspective in its *Towards Ambition 2020* report, stating that 'too few UK employers are innovating or pursuing high skill, high growth strategies and, consequently, we are failing to effectively utilize the skills we are creating' (UKCES, 2009, p. 10). These issues continue to be raised across the UK, with the recent Hazelkorn (2016) report in Wales highlighting the need to better balance supply and demand, a similar concern to those voiced in Northern Ireland (Gunson et al., 2018).

UK skills policy is currently nested within the nations' industrial strategy. Significant reforms were introduced in 2010, with local enterprise partnerships (LEPs) replacing regional development agencies (RDAs) in England. Alongside combined authorities, LEPs were tasked with taking ownership of defining 'local industrial strategies' tailored to the regions' comparative advantages. 'Growth deals' and 'city region deals' were introduced in the following years in England, Scotland, Wales and Northern

Ireland, creating significant imbalances regarding how different places developed regional skills policy. Despite the above, UK skills and education policy remains highly centralized (Fai & Tomlinson, 2019). In some cases, national policies have simply been adapted to different local contexts without consideration of their nuances.[5] Following the government's industrial strategy, many LEPs have only identified narrow 'high-tech' and 'high-skills' sectors to support (Fothergill et al., 2017), resulting in a homogeneous selection of key strengths and demonstrating all the challenges in identifying place-based capabilities (Fai & Tomlinson, 2019; Peck et al., 2013). A prime example of mirroring national policy in this way is the Sheffield City Deal, which centres on high-tech but low-employment sectors instead of focusing on the region's skills base and manufacturing legacy (Sissons & Jones, 2016). This lack of regional variation has led to more convergence than divergence among regional strategies, strengthened further by the lack of resources and imbalances in expertise at the regional level.

While the creation of LEPs and city region deals was an attempt to increase the 'powers available to local leaders and businesses to drive economics growth' (Clegg & Clark, 2011, p. iii), the consensus is that more is needed to empower local areas. Many of the functions that RDAs traditionally held have been centralized, including apprenticeships and further education (FE) 'area-based reviews' (Hildreth & Bailey, 2010; Keep, 2016), with a reduction in the financial resources and decisional powers allocated to regions (Payne & Keep, 2011; Hayman, 2012). Furthermore, differences in internal capabilities to access funding may lead to a two-tier LEP structure reinforcing existing regional imbalances (Fai & Tomlinson, 2019). Considering LEPs do not have any formal power over providers, with funding tied to learner demands in previous years (HM Government, 2011), and city deals suffering from a limited influence on both the level and areas of skills development in their regions (Waite et al., 2018), it is unclear how they can fulfil their mandate of shaping local skills strategy. Many regional bodies have been part of the plea for more extensive decentralization of skills policy, with the recent 'Skills for the North' highlighting that 'there is considerable ambition for skills devolution' (Round, 2018, p. 3) and continued calls for further reform in the devolved nations. This echoes several reports in the area (Dromey & McNeil, 2017; Keep, 2016; Round, 2018) as well as broader calls for decentralization of the power structures in the UK, with Martin et al. (2016, p. 348) urging decentralization of all 'power structures that drive and manage economic growth and development' to spatially rebalance the economy.

Finally, the skills policy environment in the UK has seen much overhaul in the past decades, causing local initiatives to suffer from a lack of institutional stability. The constantly changing landscape of decentralization, E&T and skills policies add a further layer of complexity for employers, reducing commitment in a system that is dependent upon voluntary business engagement (Stanfield et al., 2009). An extensive range of changing organizations,[6] programmes and initiatives operating within this field has caused further confusion for firms, limiting their scope for action and restricting their attempts to coordinate and move away from the government prescriptions. As Warhurst and Findlay (2012, p. 20) state, it is essential to define 'who does what, when, how and why' when bringing together training providers, central government, employers, trade unions and universities in effective collaboration. These concerns are even more substantial in the devolved nations, where the skills agenda is shared between the UK government and national governments, creating a further fragmented approach at the regional and local levels (Hazelkorn, 2016).

INSIGHTS FROM REGIONAL LITERATURE ON SKILLS POLICY

Local skills base for regional development

It is widely acknowledged in the literature that local human capital plays a prominent role in stimulating economic growth by creating competitive advantage, learning opportunities and flexible specialization across regions (Plummer & Taylor, 2001). This process is self-reinforcing in the longer term, where human capital and a strong base of skilled workers have been recognized as critical sources of long-run urban prosperity (Glaeser, 2005; Treado, 2010). By focusing on the local base of human capital, previous studies discuss several approaches to enhance regional productivity and economic growth (Moretti, 2013; Sevinc et al., 2020). First, following a demand-side approach, incentives for entrepreneurial ventures and foreign direct investment may be conducive to a growing pool of skilled workers attracted by the increasing demand for labour in local economies. However, evidence about the effectiveness of such an approach remains mixed with tax incentives and grants having a small impact on firm location decisions, especially when considering the negative externalities from competing proximate regions (Buss, 2001; Devereux et al., 2007; Gibbons et al., 2017). Second, regions could implement strategies designed to attract skilled workers, a supply-side approach that could encourage more firms to relocate to profit from the available skills in a thick local labour market (Moretti, 2013). However, attempts to attract skills by encouraging labour mobility have had limited success, with migration mainly defined by existing job opportunities, agglomeration and the strength of the local economy (Faggian & McCann, 2009; Niedomysl, 2004). Finally, an alternative supply-side approach could be implemented by focusing on upskilling the existing local workforce, thereby improving the local labour market's skills base. This is the primary approach followed to date in the UK (Sevinc et al., 2020).

In contrast to these traditional demand or supply perspectives, recent academic contributions have highlighted the importance of skills deficiencies and skills imbalances in occupational structures for regional employment and productivity growth (Berlingieri, 2019; L'Horty & Sari, 2019; Morris et al., 2019). Furthermore, scholars have

underlined the role of low-skills traps in defining persistent regional inequalities (Green et al., 2020; Sissons, 2020). By analysing the regional qualification gaps in the West Midlands in the UK, Sevinc et al. (2020) have highlighted how skills gaps can impose significant limitations on a region's growth potential. In this sense, better matching the demand and supply of skills and addressing skills deficiencies in the local labour market can be seen as key drivers of productivity, innovation and competitiveness at the local level (Morris et al., 2019). The importance of specialized skills in enhancing regional competitiveness is particularly relevant when considering the operationalization of innovation, occurring not only at the firm level but through the organization and distribution of work at the regional level (Clark & Bailey, 2018). These contributions highlight that policy intervention cannot be confined to reinforcing skills supply but must be extended towards continuous efforts to match available skills to the evolution of local demand. This is a highly complex process dependent on the place-specific labour market context, which needs to account for the dynamic nature of skills needs, reflecting the continuous Schumpeterian process of creative destruction through technological progress and industrial structural change.

Skills and Smart Specialisation

The literature on S3 helps to address some of the critical limitations in skills policies concerning the dynamic regional nature of the demand and supply of skills. The policy and academic debates on S3 have rapidly evolved in the past decade, with a vision of regional growth possibilities built around existing place-based capabilities (Balland et al., 2019; Barca, 2009; Foray et al., 2009; McCann & Ortega-Argilés, 2015). S3 are based on a prioritization logic to identify venues for regional growth driven by place-specific resources through processes of related diversification and entrepreneurial discovery, facilitating

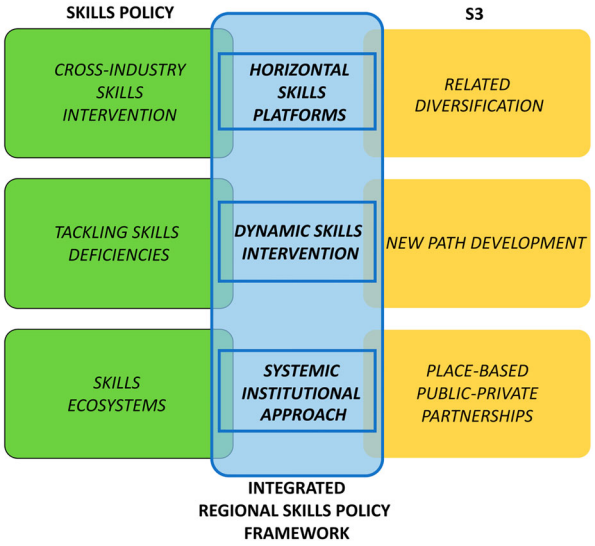

Figure 1. Integrated framework for regional skills policy bridging together skills policies and Smart Specialisation Strategies (S3).

partnerships between businesses, local governments, academia and civil society (Foray, 2011).[7] A significant strand of research exploring this has focused on the recombination of knowledge defined by the existing capabilities in localized incumbent industries (Boschma, 2017; Frenken et al., 2007). The utilization and redistribution of existing capabilities, knowledge and human capital within a region has been proven to provide a viable growth strategy by developing new industrial trajectories. In such a context, related industries can benefit from each other's co-presence by drawing from specialized suppliers, the same pool of related skilled labour and the presence of positive local spillovers (Kogler et al., 2013; Neffke et al., 2011).

According to the S3 logic, focusing on place-specific capabilities may also support structural changes in the regional industrial system and foster new entrepreneurial activities allowing economies to self-transform, gradually diversifying their expertise into new activities related to their past production (Boschma & Frenken, 2011; Corradini & Vanino, 2021). Thus, the rationale underlying Smart Specialisation is neither to narrow down the development path of a region nor to produce technological monoculture, but instead to promote regional diversification in related and more advanced industries. This contrasts with the 'one-size-fits-all' policies developed at the national level and the generalist industrial strategies, which prioritize high-technology sectors over all others (David et al., 2009).

Despite the principles of Smart Specialisation being well mapped out as policy processes (Foray, 2011), the incorporation of skills within this theoretical framework has only recently attracted attention and is still underdeveloped (Hazelkorn & Edwards, 2019; OECD, 2019).[8] Previously, Smart Specialisation has been defined with the assumption that sectoral employment implies the presence of the skills required for the development of new industries, not taking into consideration that skills deficiencies within related sectors could undermine the processes of knowledge recombination theoretically advocated by the S3 literature. The debate regarding the role of skills for regional economic specialization and diversification has instead focused on education, highlighting the role played by universities as crucial drivers of upskilling, innovation and regional development (Edwards et al., 2017; Foray et al., 2014). In this sense, academic and policy contributions have only discussed the importance of skills as one of the elements to consider ex-post once an industrial strategy is formed, rather than considering the skills and human capital in a locality as the basis for the Smart Specialisation process and regional industrial branching (McCann & Ortega-Argilés, 2015). This ex-post approach to skills has significant drawbacks, as in the presence of skills deficiencies and imbalances both S3's processes of related diversification and entrepreneurship discovery are weakened. Regions need to reconfigure their skillset constantly to reflect the dynamic changes in both the demand and supply of skills, which ultimately define their ability to diversify and move in new directions. Similarly, in the presence of skills shortages and skills

mismatch at the local level, regional systems might not be able to identify new directions for growth or to act upon those identified.

TOWARDS AN INTEGRATED FRAMEWORK FOR REGIONAL SKILLS POLICY

Building from the gaps identified in the previous policy and academic contributions, we outline an integrated policy framework bridging together traditional place-neutral skills policy approaches with the place-based and dynamic approach of S3, where interventions on skills supply are integrated within regional development strategies. As highlighted in Figure 1, this new integrated framework for regional skills policy is based on three layers: (1) *horizontal platforms*, where shared skills enable bridging effects across different local related industries; (2) *dynamic skills interventions* proactively identifying current and future needs to support the development of new but related industrial paths; and (3) a *systemic institutional approach* connecting stakeholders involved in skills policy at the local level and regional industrial strategy.

In the following sections we discuss how these three layers build upon the existing conceptual blocks already available across the skills policy and S3 literatures, and how they connect these two strands to form a unified framework. The first two layers reflect the mechanisms through which synergies across skills and regional development policies can be achieved, while the third layer refers to the institutional structure necessary for integrating the various components.

Horizontal skills platforms for industrial diversification

The first layer of our framework advocates creating horizontal skills platforms as a unifying base to enhance processes of related diversification, as the cross-sectoral nature of skills expands opportunities for knowledge recombination and resilient growth.

Previous research has documented that skills crosscut and connect different industries within regions. Porter (1998) identified that the advantages of clusters arise from the mobility of workers not just within the same industry but also through labour pools with shared skills across related sectors. The literature on related diversification similarly underlines how agglomeration externalities do not rest simply on the co-location of industries, but they crucially depend on the degree of relatedness that connects them (Asheim et al., 2011; Boschma & Frenken, 2011). Several empirical studies have evidenced this under the assumption of shared complementarities and skills in nested sectors within hierarchical industry classifications (Content & Frenken, 2016; Frenken et al., 2007). The importance of skills relatedness for regional dynamics and knowledge spillovers has been further supported by works exploring cross-industry labour flows (Boschma et al., 2014; Neffke & Henning, 2013). In particular, most of the workers switching jobs across industries are likely to move to related jobs requiring similar skills, in line with evidence that human capital is occupation rather than industry-specific (Kambourov & Manovskii, 2009; Neffke et al., 2017), demonstrating how skills complementarities drive transitions between occupations (Alabdulkareem et al., 2018; Farinha et al., 2019). These insights underline the localized nature of skills as well as their cross-industry linkages.[9]

Building on this, we argue that skills policy needs to be integrated within regional development policies, creating synergies and advantages through *horizontal skills platforms*. This concept draws on two influential bodies of literature. First, it incorporates insights on the role of policy platforms defined by localized economics actors, including firms, agencies and knowledge or training services, that are connected across sectoral boundaries to support the development of linkages and learning effects through different regional knowledge bases (Asheim et al., 2011; Cooke, 2007). The second element of horizontal skills platforms underlines how shared skills can function as a pivot to connect such stakeholders across sectors. This reflects the idea of pervasiveness, which was introduced to define the characteristic of general-purpose technologies to be applicable across numerous horizontal fields (Bresnahan & Trajtenberg, 1995), yielding bridging effects that provide opportunities for regional change allowing integration across distant knowledge bases (Corradini & De Propris, 2017; Montresor & Quatraro, 2017). Such bridging effects also underpin the conception of cross-specialization policies, where the focus is not based solely on related variety but on a broader underlying set of linkages across industries, connecting diverse knowledge domains to reinforce existing capabilities or enable new growth paths (Janssen & Frenken, 2019).

Establishing this layer of our framework may also enable upskilling and development in lagging regions, especially those suffering from low-skills traps defined by lack of incentives for workers to improve their skills base due to the insufficient and fluctuating demand they face (Finegold & Soskice, 1988). To this end, horizontal skills platforms may allow for economies of scale in training and education provision, where demand is pooled across industries in a way that dispersed industry intervention would not permit. More broadly, they may also enhance incentives and opportunities for the upskilling of local labour through more effective inter-sectoral mobility. The presence of shared skills across localized industries enhances related diversification and resilience to external shocks (Boschma, 2015). Displaced workers find re-employment faster by moving into skill-related industries; furthermore, they are more likely to move to local skill-related sectors rather than finding non-local jobs (Neffke et al., 2018), preventing the erosion of the region's skills base.[10] Thus, when confronting sector-specific shocks, horizontal skills platforms connecting different sectors could sustain occupational tenure and avoid loss of human capital, especially in places characterized by low-skills occupations whose workers are more likely to move to different industries when changing jobs (Kambourov & Manovskii, 2009; Neffke et al., 2017). This mechanism is evidenced by

Chrisinger et al. (2012), who discuss the role of occupational clusters and shared labour pools in fostering poverty reduction and enhancing the mobility of low-wage workers transitioning from declining industries towards those with more robust growth.

Dynamic skills interventions for new path development

The second layer of the framework reinforces the dynamic aspects, linking policies for addressing skills deficiencies to regional strategies for new path development.

The literature on skill-biased technology change (Katz & Murphy, 1992) and job polarization (Goos & Manning, 2007; Goos et al., 2009) has long evidenced how processes of structural change are not industry-specific. They impact workers based on their tasks and skills rather than their sector, leading to within-industry changes in labour market composition and jobs being redefined beyond industrial classification (Autor et al., 2003; Berman et al., 1998). Similar dynamics apply to the evolution of regional economies, which have been described as following a path-dependent trajectory defined by knowledge relatedness between new activities and the existing local capabilities (Boschma, 2017; Corradini & Vanino, 2021). As detailed by Boschma and Frenken (2011), analysing predefined sectoral classifications does not allow us to understand shifts in relatedness over time. Recent papers have instead shown the underlying role of skills relatedness in defining these processes, offering evidence that co-location of related skills promotes novel recombinations and entry of new industries (Alabdulkareem et al., 2018; Farinha et al., 2019; Morrissey, 2020). These elements are embedded within S3 focusing on the dynamic identification of new venues for regional industrial branching based on place-specific capabilities (Balland et al., 2019; Foray, 2011; Neffke et al., 2011). However, S3 overlooks the role of skills – and skills deficiencies – in driving the dynamic processes of industrial diversification, considering them ex-post as something to adjust to the needs of blooming industries (McCann & Ortega-Argilés, 2015). At the same time, skills policies are often defined to address existing skills gaps at the industry level, and their place-neutral perspective does not allow them to consider the changing characteristics of regional economies (Bailey et al., 2018).

This calls for a fundamental change in perspective, where skills policy is integrated within regional development strategies, allowing interventions on both the demand and supply of place-specific skills to be continuously adapted to ensure future growth pathways. Including a dynamic analysis of skills gaps and occupational forecasts as a core element of S3 would address potential mismatches that hamper growth (Sevinc et al., 2020) and enable workers to transfer their skills from declining industries into emerging sectors (Chrisinger et al., 2012). Reflecting the relatedness insights from S3, this focus on local skills could foster labour mobility and further recombination of diverse resources. Putting skills at the centre of the regional S3 would enable new competencies to be built on an existing base of capabilities, facilitating industrial change and adding elements for recombination needed to move in new directions or merely upgrade existing industrial activities.[11] In particular, horizontal platforms of shared skills that connect economic agents across sectors may be used to exploit inter-industry occupational mobility and enhance novel recombinations that underpin the emergence of new specializations (Neffke et al., 2017). Following the logic of Smart Specialisation, such platforms do not require winners to be picked. Instead, they provide support for connecting capabilities and skills that underlie transitions and adaptation in the regional economy (Alabdulkareem et al., 2018). Furthermore, promoting inter-industry skills development may foster new entrepreneurial capabilities and facilitate structural change, adding new elements for recombination needed for moving in new directions or simply upgrading existing industrial activities (Glaeser et al., 2014; Qian, 2017). Such a related variety approach of focusing on a shared skill set defined by relatedness across sectoral employment is likely to create not only firms with higher survival rates (Neffke & Henning, 2013) but also more adaptable and resilient regions (Frenken et al., 2007), and industries that are less likely to depart the locality (Neffke et al., 2011).

Recognizing the place-specific nature of skills deficiencies and the need to upgrade skills is a critical factor in lagging areas (Barzotto et al., 2020; Morris et al., 2019). Following modest results in reducing regional divergence in the last decade, scholars have pointed to Smart Specialisation's disproportionate focus on technology development and limited attention to low institutional and entrepreneurial capabilities and structural weaknesses in lagging regions (Capello & Kroll, 2016; Hassink & Gong, 2019). These issues similarly affect current skills policies, which focus on a narrow set of niche high-tech industries, irrespective of the place-specific limits in regional resources for transformative change. While the presence of novel technologies and innovative high-tech start-ups are essential for the new path creation that defines leading regions, path renewal and path extension can be more effective in lagging regions (Grillitsch et al., 2018; Isaksen et al., 2018). Similarly, entrepreneurial activities driving change are more likely to come from existing rather than new firms (Coenen et al., 2015). Even in the absence of industry-level competitive advantages, lagging regions may effectively engage in processes of knowledge recombination and change based on skills relatedness (Boschma et al., 2014; Neffke & Henning, 2013). In such a context, transitioning from industry-based policy interventions to localized horizontal skills platforms may enable bridging effects that more effectively kick-start processes of regional adaptation along existing skills trajectories. This has been evidenced in regions marked by old declining industries, where overlaps in the skills base of the 'old' and 'new' sectors have been found to underpin the transition towards new industries, primarily when such linkages have been supported through

coordinated retraining initiatives (Fornahl et al., 2012; Jaax, 2016).

A systemic institutional approach for regional skills policy

The third layer of the framework underlines that the integration of skills and regional development policies, as well as the implementation of skills platforms, rests upon the effective coordination of stakeholders and the appropriate designation of decentralized powers.

A systemic perspective is widely identified as an inherent aspect of regional development policies such as S3, which rest on the connection between networks of localized stakeholders from both regional government and private sector across related industries (Bailey et al., 2018; Foray et al., 2009; McCann & Ortega-Argilés, 2015). Following a similar rationale, previous literature has also underlined the advantages of skills ecosystems, where a coordinated system of skills provision can support the supply of entrepreneurial skills and improve regional networks (Buchanan et al., 2010). These relational structures are defined by the links between firms, universities, training providers and local development institutions, which should all be considered partners in skills identification rather than mere suppliers of skills to the market (Hodgson et al., 2018). While a skills ecosystem approach is both ambitious and challenging, it is necessary in order to define an effective matching and transmission of information on skills supply and demand (Hall & Lansbury, 2006; Payne, 2007). However, most of the structures currently in place are usually defined by their specific industries, such as the Skill Sector Councils in the UK, and remain disjointed from the wider regional ecosystem where broader development policies are derived.[12] In contrast, decentralizing skills policies to the local level would allow local decision-makers, who are better placed to assess the local economy needs, to design and implement more effectively policies that fit the local context (Cavaglia et al., 2020). At the same time, as highlighted in the previous section, contributions on regional development highlight the importance of human capital but do not explicitly consider how to address skills deficiencies in the locality. As a result, skills ecosystems and S3 networks are often disconnected.

Integrating skills ecosystems within networks of localized stakeholders leading regional development strategies is, therefore, critical to ensure initiatives addressing skills imbalances are embedded in localized policies for dynamic structural change such as Smart Specialisation. This could be achieved through a multi-scalar and iterative process where integrated network structures may emerge from the location itself by drawing on the concept of 'slack resources' (Stimson et al., 2009). Alternatively, this could be obtained by strengthening the extant multitude of structures already in place. Whilst this requires novel coordination efforts, it would reinforce rather than disrupt existing partnerships at the local level, avoiding further institutional changes that have hindered effective skills policies at the sectoral and local level (Lyons et al., 2020). Accordingly, the level of application of our policy framework across developed countries would vary depending on established structures of regional governance and the geography of local labour markets. In the case of EU countries, this would be regional authorities that are already in charge of S3 and local labour market policies (European Commission, 2019). In places where regional policy is fragmented, such as the UK case, the central government could hand powers and funding to pre-existing regional authorities representing self-defined local labour markets, such as LEPs, combined authorities and city-region deals, to strengthen coordination across regional development strategies and skills intervention (Industrial Strategy Council (ISC), 2021).

The successful combination of these ideas is ultimately dependent upon the implementation of a more holistic systemic approach to skills policy being entrenched at the regional level. This inevitably requires a change in industrial policy with adequate resources for place-specific coordination efforts moved away from over-centralized national governance, in line with recent calls for a more comprehensive decentralization of powers to local governments with dedicated and appropriate levels of local funding (Martin et al., 2016; McCann, 2016).

CONCLUSIONS

Skills intervention in advanced economies has long followed a place-neutral approach dependent on identifying skills deficiencies in the market's supply side. This approach has overlooked the localized nature of labour markets, exacerbating regional inequalities. Even as the renewed attention on industrial strategies has started to recognize the importance of place-based policies, skills policy remains mostly relegated to place-neutral ex-post interventions designed to address gaps rather than utilizing skills as an instrument to leverage underlying capabilities for recombination and drive structural change in the locality. This is notably reflected in the disjointed linkages between skills and regional development policies that still occur in most developed countries.

In this paper, we argue that integrating skills policy within a regional perspective is critical for ensuring the localized nature of skills imbalances is connected to the dynamic landscape of regional industrial development. Our contribution has sought to provide the initial groundwork for connecting the discussion on skills policy with S3 within regional studies. From a policy perspective, we renew the call for skills policy to be designed following a place-based approach, promoting local skills bases that can operate as horizontal platforms across different local economic activities. In particular, we contend that skills interventions need to be embedded in regional development strategies, moving away from ex-post interventions on industry-specific skills deficiencies towards ex-ante strategic approaches that are not confined to addressing future skills requirements, but play an active role in enabling regional adaptation and renewal processes based on the local supply of skills.

To this end, we have proposed a novel conceptual framework where the integration of skills and regional development policies can be defined through three main layers: the consideration of skills as a horizontal platform connecting different local industries, the dynamic identification of the skills needed for the development of new but related industrial paths, and a systemic institutional approach at the local level integrating all relevant stakeholders across these two policy domains.

The first layer introduces the concept of horizontal skills platforms, reflecting the idea that the cross-sectoral nature of skills can be used to increase combinatorial opportunities underlying processes of regional adaptation and resilient structural change. This would further support the dynamic application of S3 strategies also to lagging regions that do not possess industry-specific competitive advantages, building on skills relatedness to enable incremental processes of path renewal and stimulate local economies. This is also strongly connected to the second layer calling for a more active role of skills policy in supporting regional industrial path development. By considering skills as a unifying base for place-specific inter-industry policy development, stakeholders could foster human capital formation for new 'knowledge needs' of regions. More importantly, we contend this could support continuous processes of adaptation and path renewal across local capabilities, leveraging existing strengths in the local economy and generating new opportunities upon which regions can build competitive advantage. The third layer highlights that integrating skills intervention within regional development policy is only achievable through a systemic institutional approach. This would involve connecting different localized stakeholders involved in skills and regional development policies, with policymakers acting as public entrepreneurs to define and support linkages across the regional ecosystem. In line with the calls for spatially rebalancing the economy in most developed countries, we underline that this approach requires a dedicated and appropriate level of local funding and decentralization of powers to local governments. This would further encourage coordination across localized stakeholders and more prominent independent policy action at the regional level.

Whilst the paper offers initial insights for a discussion in this area, several aspects require further attention and define essential areas for future research. Refining how localities address their current and future demand for skills jointly with industrial policy emphasizes the complex step of identifying the dynamic nature of structural change and skills needs. Also, we stress the importance of systemic perspectives and the potential role of entrepreneurial discovery in meeting this goal. Accordingly, additional research is needed to further determine structured approaches by which this could be implemented across various spaces. Finally, while previous policy initiatives have partially included some of the elements discussed in the paper, future work should further explore the practical policy implementation of coherent and integrated regional skills policies, where all the three main elements identified in our framework are combined, as well as the coordination mechanisms for integrating skills ecosystems with S3 networks.

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DISCLOSURE STATEMENT

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NOTES

1. While we discuss below this issue in detail for UK skills policy, evidence of the industry focus towards skills can be seen also in the European Industrial Strategy: Skills for Industry initiatives focus on renewed investment in sector specialized skills; similarly, the European Skills Agenda does not include any regional perspective, concentrating instead on skills partnerships in key industrial ecosystems (European Commission, 2021).
2. Estimates suggest that 40% of UK workers are engaged in occupations for which they are not correctly qualified (OECD, 2017), and by 2030, almost 20% of the labour force could be under-skilled for their job requirements (Industrial Strategy Council (ISC), 2019).
3. These are particularly marked for jobs in declining industries and occupations at risk of automation (ONS, 2019).
4. Given the current structure of local skills policy intervention in the UK, the regional authorities we consider are LEPs, combined authorities and city-region deals.
5. An example is offered by the Apprenticeship Grant for Employers programme (Cavaglia et al., 2020).
6. To highlight this, a far-from-complete list of key players in recent years has included the Department of Education and Skills (DfES), Department of Education and Employment (DfEE); Learning and Skills Council (LSC); Department of Trade and Industry (DTI); Cabinet Office; HM Treasury; Department of Work and Pensions (DWP); LEPs, LEAs, UKCES, National Skills Task Force, RDAs, Business Link, Train to Gain, and Local Growth Fund.
7. Its origins are linked with the European Commission's Europe 2020 Strategy for 'smart, sustainable and inclusive growth', and it is centred around identifying the region's own strengths and comparative advantages, specializing and prioritizing investment in these fields through a strategic and shared policy vision for regional development. For more information, see https://s3platform.jrc.ec.europa.eu/.
8. This is also reflected in the persistent disconnect between skills policy and regional development policies.

9. At the policy level, this is partly reflected in the initiatives on *transversal* or *transferable* skills highlighted by EU recommendations for territorial employment pacts and the European Centre of Excellence for Key Competencies (European Commission, 2011).
10. We thank an anonymous reviewer for this insight.
11. Ex-ante consideration of regional human capital in the policy setting can be seen in specific initiatives such as *Patto per il Lavoro* (Pact for Employment and Growth) in the Emilia-Romagna region of Italy (Bailey & De Propris, 2019; European Commission, 2013). Similarly, the Basque Country has integrated skills and education providers into the S3 process, alongside local government and businesses, for the development of policies looking at future skills needs (Hazelkorn & Edwards, 2019). While these initiatives move towards the element of dynamic skills intervention highlighted in our proposal, they consider future skills still in terms of deficiencies and gaps to address for the growth of existing industries, rather than as sources of recombination to enhance regional adaptation and renewal processes. Indeed, ex-ante consideration of future skills needs is a necessary but not sufficient element to define the comprehensive and systemic interplay between skills and regional development policies outlined in our proposed framework.
12. Examples of this approach include proposals for territorial skills councils for digital transformations in the EU underlining the systemic element in the actors involved (European Commission, 2019) and the UK's skills advisory panels designed to connect local employers and skills providers. While these initiatives offer evidence of possible linkages between skills ecosystems and the territory, they remain confined to the identification of future skills or implementation and monitoring of skills strategies in the locality. However, they do not play an active role in the design of S3 or indeed in integrating skills policy within broader regional development strategies.

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REFERENCES

Alabdulkareem, A., Frank, M. R., Sun, L., AlShebli, B., Hidalgo, C., & Rahwan, I. (2018). Unpacking the polarization of workplace skills. *Science Advances*, *4*(7), eaao6030. https://doi.org/10.1126/sciadv.aao6030

Asheim, B. T., Boschma, R., & Cooke, P. (2011). Constructing regional advantage: Platform policies based on related variety and differentiated knowledge bases. *Regional Studies*, *45*(7), 893–904. https://doi.org/10.1080/00343404.2010.543126

Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly Journal of Economics*, *118*(4), 1279–1333. https://doi.org/10.1162/003355303322552801

Bacolod, M., Blum, B. S., & Strange, W. C. (2009). Skills in the city. *Journal of Urban Economics*, *65*(2), 136–153. https://doi.org/10.1016/j.jue.2008.09.003

Bacolod, M., Blum, B. S., & Strange, W. C. (2010). Elements of skill: Traits, intelligences, education, and agglomeration. *Journal of Regional Science*, *50*(1), 245–280. https://doi.org/10.1111/j.1467-9787.2009.00650.x

Bailey, D., & De Propris, L. (2019). 6. Industry 4.0, regional disparities and transformative industrial policy. *Regional Studies Policy Impact Books*, *1*(2), 67–78. https://doi.org/10.1080/2578711X.2019.1621102

Bailey, D., Pitelis, C., & Tomlinson, P. R. (2018). A place-based developmental regional industrial strategy for sustainable capture of co-created value. *Cambridge Journal of Economics*, *42*(6), 1521–1542. https://doi.org/10.1093/cje/bey019

Balland, P., Boschma, R., Crespo, J., & Rigby, D. L. (2019). Smart specialization policy in the European Union: Relatedness, knowledge complexity and regional diversification. *Regional Studies*, *53*(9), 1252–1268. https://doi.org/10.1080/00343404.2018.1437900

Barca, F. (2009). *An agenda for a reformed Cohesion Policy: A place-based approach to meeting European Union challenges and expectations*. European Commission.

Barzotto, M., Corradini, C., Fai, F., Labory, S., & Tomlinson, P. R. (2020). Smart specialisation, industry 4.0 and lagging regions: Some directions for policy. *Regional Studies, Regional Science*, *7*(1), 318–332. https://doi.org/10.1080/21681376.2020.1803124

Berlingieri, F. (2019). Local labor market size and qualification mismatch. *Journal of Economic Geography*, *19*(6), 1261–1286. https://doi.org/10.1093/jeg/lby045

Berman, E., Bound, J., & Machin, S. (1998). Implications of skill-biased technological change: International evidence. *The Quarterly Journal of Economics*, *113*(4), 1245–1279. https://doi.org/10.1162/003355398555892

Boschma, R. (2015). Towards an evolutionary perspective on regional resilience. *Regional Studies*, *49*(5), 733–751. https://doi.org/10.1080/00343404.2014.959481

Boschma, R. (2017). Relatedness as driver of regional diversification: A research agenda. *Regional Studies*, *51*(3), 351–364. https://doi.org/10.1080/00343404.2016.1254767

Boschma, R. A., & Frenken, K. (2011). Technological relatedness and regional branching. In H. Bathelt, M. P. Feldman, & D. F. Kogler (Eds.), *Dynamic geographies of knowledge creation and innovation* (pp. 64–81) Routledge.

Boschma, R., Eriksson, R. H., & Lindgren, U. (2014). Labour market externalities and regional growth in Sweden: The importance of labour mobility between skill-related industries. *Regional Studies*, *48*(10), 1669–1690. https://doi.org/10.1080/00343404.2013.867429

Bresnahan, T. F., & Trajtenberg, M. (1995). General purpose technologies 'Engines of growth'? *Journal of Econometrics*, *65*(1), 83–108. https://doi.org/10.1016/0304-4076(94)01598-T

Buchanan, J., Scott, L., Yu, S., Schutz, H., & Jakubauskas, M. (2010). Skills demand and utilisation: An international review of approaches to measurement and policy development. OECD Local Economic and Employment Development (LEED) Working Papers, 2010/4, OECD Publ.

Buss, T. F. (2001). The effect of state tax incentives on economic growth and firm location decisions: An overview of the literature. *Economic Development Quarterly*, *15*(1), 90–105. https://doi.org/10.1177/089124240101500108

Capello, R., & Kroll, H. (2016). From theory to practice in smart specialization strategy: Emerging limits and possible future trajectories. *European Planning Studies*, *24*(8), 1393–1406. https://doi.org/10.1080/09654313.2016.1156058

Cavaglia, C., McNally, S., & Overman, H. G. (2020). Devolving skills: The case of the apprenticeship grant for employers.

Fiscal Studies, *41*(4), 829–849. https://doi.org/10.1111/1475-5890.12238

Chrisinger, C. K., Fowler, C. S., & Kleit, R. G. (2012). Shared skills: Occupation clusters for poverty alleviation and economic development in the US. *Urban Studies*, *49*(15), 3403–3425. https://doi.org/10.1177/0042098011433489

Clark, J., & Bailey, D. (2018). Labour, work and regional resilience. *Regional Studies*, *52*(6), 741–744. https://doi.org/10.1080/00343404.2018.1448621

Clegg, N., & Clark, G. (2011). *Unlocking growth cities*. HM Government.

Coenen, L., Moodysson, J., & Martin, H. (2015). Path renewal in old industrial regions: Possibilities and limitations for regional innovation policy. *Regional Studies*, *49*(5), 850–865. https://doi.org/10.1080/00343404.2014.979321

Content, J., & Frenken, K. (2016). Related variety and economic development: A literature review. *European Planning Studies*, *24*(12), 2097–2112. https://doi.org/10.1080/09654313.2016.1246517

Cooke, P. (2007). "To construct regional advantage from innovation systems first build policy platforms". *European Planning Studies*, *15*(2), 179–194. https://doi.org/10.1080/09654310601078671

Corradini, C., & De Propris, L. (2017). Beyond local search: Bridging platforms and inter-sectoral technological integration. *Research Policy*, *46*(1), 196–206. https://doi.org/10.1016/j.respol.2016.09.017

Corradini, C., & Vanino, E. (2021). Path dependency, regional variety and the dynamics of new firm creation in rooted and pioneering industries. *Journal of Economic Geography*. https://doi.org/10.1093/jeg/lbab021.

David, P., Foray, D., & Hall, B. H. (2009). *Measuring Smart Specialisation: The concept and the need for indicators. Knowledge for Growth Expert Group*. http://cemi.epfl.ch/files/content/sites/cemi/files/users/178044/public/Measuring%20smart%20specialisation.doc

Devereux, M. P., Griffith, R., & Simpson, H. (2007). Firm location decisions, regional grants and agglomeration externalities. *Journal of Public Economics*, *91*(3–4), 413–435. https://doi.org/10.1016/j.jpubeco.2006.12.002

Dromey, J., & McNeil, C. (2017). *Skills 2030: Why the adult skills system is failing to build an economy that works for everyone*. Institute for Public Policy Research (IPPR).

Edwards, J., Marinelli, E., Arregui-Pabollet, E., & Kempton, L. (2017). *Higher education for smart specialisation. Towards strategic partnerships for innovation. JRC Technical reports No. 23/2017*. Publications Office of the European Union.

European Commission. (2011). *Transferability of skills across economic sectors: Role and importance for employment at European level*. European Commission.

European Commission. (2013). *Summary assessment of Emilia-Romagna, ESIC European Service Innovation Centre Report*.

European Commission. (2019). *Skills for smart industrial specialisation and digital transformation*. DG for Internal Market, Industry, Entrepreneurship and SMEs. European Commission.

European Commission. (2021). *Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery*. https://ec.europa.eu/info/sites/default/files/communication-industrial-strategy-update-2020_en.pdf

Faggian, A., & McCann, P. (2009). Human capital, graduate migration and innovation in British regions. *Cambridge Journal of Economics*, *33*(2), 317–333. https://doi.org/10.1093/cje/ben042

Fai, F. M., & Tomlinson, P. R. (2019). Developing a place-based industrial strategy. The case of England's LEPs. *L'industria*, *40*(4), 737–760. https://doi.org/10.1430/95939

Farinha, T., Balland, P. A., Morrison, A., & Boschma, R. (2019). What drives the geography of jobs in the US? Unpacking relatedness. *Industry and Innovation*, *26*(9), 988–1022. https://doi.org/10.1080/13662716.2019.1591940

Finegold, D., & Soskice, D. (1988). The failure of training in Britain: Analysis and prescription. *Oxford Review of Economic Policy*, *4*(3), 21–53. https://doi.org/10.1093/oxrep/4.3.21

Foray, D. (2011). Smart specialisation: From academic idea to political instrument, the surprising destiny of a concept and the difficulties involved in its implementation. *Paper presented at the Conference European Integration Process in the New Regional and Global Settings, Warsaw*, October 19–20, 2011.

Foray, D., David, P. A., & Hall, B. (2009). Smart specialisation: The concept. In *Knowledge for growth: Prospects for science, technology and innovation*. EU Report EUR-24047. European Union.

Foray, D., Morgan, K., & Radosevic, S. (2014). *The role of Smart Specialisation in the EU research and innovation policy landscape*.

Fornahl, D., Hassink, R., Klaerding, C., Mossig, I., & Schröder, H. (2012). From the old path of shipbuilding onto the new path of offshore wind energy? The case of northern Germany. *European Planning Studies*, *20*(5), 835–855. https://doi.org/10.1080/09654313.2012.667928

Fothergill, S., Gore, T., & Wells, P. (2017). *Industrial strategy and the regions: The shortcomings of a narrow sectoral focus*. Centre for Regional Economic and Social Research (CRESR), Sheffield Hallam University.

Frenken, K., Van Oort, F. G., & Verburg, T. (2007). Related variety, unrelated variety and regional economic growth. *Regional Studies*, *41*(5), 685–697. https://doi.org/10.1080/00343400601120296

Gal, P., & Egeland, J. (2018). *Reducing regional disparities in productivity in the United Kingdom*. OECD Economics Department Working Papers No. 1456. OECD Publ. https://doi.org/10.1787/54293958-en.

Gibbons, S., Overman, H., & Sarvimaki, M. (2017). *The local economic impacts of regeneration projects: Evidence from UK's Single regeneration budget*. Discussion Papers 12311. Centre for Economic Policy Research (CEPR).

Glaeser, E. L. (2005). Reinventing Boston: 1630–2003. *Journal of Economic Geography*, *5*(2), 119–153. https://doi.org/10.1093/jnlecg/lbh058

Glaeser, E. L., Ponzetto, G. A. M., & Tobio, K. (2014). Cities, skills and regional change. *Regional Studies*, *48*(1), 7–43. https://doi.org/10.1080/00343404.2012.674637

Goos, M., & Manning, A. (2007). Lousy and lovely jobs: The rising polarization of work in Britain. *The Review of Economics and Statistics*, *89*(1), 118–133. https://doi.org/10.1162/rest.89.1.118

Goos, M., Manning, A., & Salomons, A. (2009). Job polarization in Europe. *American Economic Review*, *99*(2), 58–63. https://doi.org/10.1257/aer.99.2.58

Green, A. (2012). *Skills for competitiveness: Country report for United Kingdom*. OECD Local Economic and Employment Development (LEED) Working Papers No. 2012/05, OECD Publ.

Green, A. E. (1999). *Feasibility study of measuring the local distribution of poor skills*. Research Report No. RR173. Department of Education and Employment (DfEE) Publ.

Green, A., & Owen, D. (2003). Skill shortages: Local perspectives from England. *Regional Studies*, *37*(2), 123–134. https://doi.org/10.1080/0034340022000075126

Green, A. E., Sissons, P., Broughton, K., & Qamar, A. (2020). Public policy for addressing the low-skills low-wage trap: Insights from business case studies in the Birmingham city-region, UK. *Regional Studies*, *55*(2), 333–344. https://doi.org/10.1080/00343404.2020.1802005

Green, F., Machin, S., & Wilkinson, D. (1998). The meaning and determinants of skills shortages. *Oxford Bulletin of Economics*

and Statistics, *60*(2), 165–187. https://doi.org/10.1111/1468-0084.00093

Grillitsch, M., Asheim, B., & Trippl, M. (2018). Unrelated knowledge combinations: The unexplored potential for regional industrial path development. *Cambridge Journal of Regions, Economy and Society*, *11*(2), 257–274. https://doi.org/10.1093/cjres/rsy012

Gunson, R., Murray, C., & Williamson, I. (2018). *The skills system in Northern Ireland: Challenges and opportunities*. Institute for Public Policy Research (IPPR).

Guvenen, F., Kuruscu, B., Tanaka, S., & Wiczer, D. (2020). Multidimensional skill mismatch. *American Economic Journal: Macroeconomics*, *12*(1), 210–244. https://doi.org/10.1257/mac.20160241

Hall, R., & Lansbury, R. (2006). Skills in Australia: Towards workforce development and sustainable skill ecosystem. *Journal of Industrial Relations*, *48*(5), 575–592. https://doi.org/10.1177/0022185606070106

Hassink, R., & Gong, H. (2019). Six critical questions about smart specialization. *European Planning Studies*, *27*(10), 2049–2065. https://doi.org/10.1080/09654313.2019.1650898

Hayman, A. (2012). Local government and growth. In M. Ward, & S. Hardy (Eds.), *Changing gear – Is localism the new regionalism?* (pp. 76–85). The Smith Institute and Regional Studies.

Hazelkorn, E. (2016). *Towards 2030: A framework for building A world-class post-compulsory education system for Wales*. HMSO.

Hazelkorn, E., & Edwards, J. (2019). *Skills and Smart Specialisation: The role of vocational education and training in smart specialisation strategies*. Publications Office of the European Union.

Hildreth, P., & Bailey, D. (2010). *The economics behind the move to local enterprise partnerships*. SURGE Working Paper No. 2.

HM Government. (2011). *Unlocking growth in cities*. Cabinet Office.

Hodgson, A., Spours, K., Waring, M., Gallacher, J., Irwin, T., & James, D. (2018). *FE and skills across the four countries of the UK: New opportunities for learning*.

Industrial Strategy Council (ISC) (2019). *UK skills mismatch in 2030*. Research Paper No. 10/2019. ISC.

Industrial Strategy Council (ISC). (2021). *Devolution and governance structures in the UK: Lessons from evidence*. Research Paper No. 05/2021. ISC.

Isaksen, A., Tödtling, F., & Trippl, M. (2018). Innovation policies for regional structural change: Combining actor-based and system-based strategies. In A. Isaksen, R. Martin & M. Trippl (Eds.), *New avenues for regional innovation systems — Theoretical advances, empirical cases and policy lessons* (pp. 221–238). Springer.

Jaax, A. (2016). Skill relatedness and economic restructuring: The case of Bremerhaven. Regional studies. *Regional Science*, *3*(1), 58–66. https://doi.org/10.1080/21681376.2015.1116958

Janssen, M. J., & Frenken, K. (2019). Cross-specialisation policy: Rationales and options for linking unrelated industries. *Cambridge Journal of Regions, Economy and Society*, *12*(2), 195–212. https://doi.org/10.1093/cjres/rsz001

Kambourov, G., & Manovskii, I. (2009). Occupational specificity of human capital. *International Economic Review*, *50*(1), 63–115. https://doi.org/10.1111/j.1468-2354.2008.00524.x

Katz, L. F., & Murphy, K. M. (1992). Changes in relative wages, 1963–1987: Supply and demand factors. *The Quarterly Journal of Economics*, *107*(1), 35–78. https://doi.org/10.2307/2118323

Keep, E. (2016). *Improving skills utilisation in the UK – Some reflections on what, who and how?* Research Paper No. 123. SKOPE.

Keep, E. (2016). *The long-term implications of devolution and localism for FE in England*. Association of Colleges.

Kennett, P., Jones, G., Meegan, R., & Croft, R. (2015). Recession, austerity and the great risk shift: Local government and household impacts and responses in Bristol and Liverpool. *Local Government Studies*, *41*(4), 622–644.

Kogler, D. F., Rigby, D. L., & Tucker, I. (2013). Mapping knowledge space and technological relatedness in US cities. *European Planning Studies*, *21*(9), 1374–1391. https://doi.org/10.1080/09654313.2012.755832

L'Horty, Y., & Sari, F. (2019). The role of spatial and skill mismatches: Explaining long-term unemployment in Paris. *Regional Studies*, *53*(2), 283–296. https://doi.org/10.1080/00343404.2018.1462480

Leitch, S. (2006). *Prosperity for all in the global economy – World class skills*. HM Treasury.

Lyons, H., Taylor, A., & Green, A. (2020). *Rising to the UK's skills challenges*. Research Paper No. 06/2020. Industrial Strategy Council (ISC).

Martin, R., Pike, A., Tyler, P., & Gardiner, B. (2016). Spatially rebalancing the UK economy: Towards a new policy model? *Regional Studies*, *50*(2), 342–357. https://doi.org/10.1080/00343404.2015.1118450

Mavromaras, K., Sloane, P., & Wei, Z. (2012). The role of education pathways in the relationship between job mismatch, wages and job satisfaction: A panel estimation approach. *Education Economics*, *20*(3), 303–321. https://doi.org/10.1080/09645292.2012.672556

Mavromaras, K., Sloane, P., & Wei, Z. (2015). The scarring effects of unemployment, low pay and skills under-utilization in Australia compared. *Applied Economics*, *47*(23), 2413–2429. https://doi.org/10.1080/00036846.2015.1008762

McCann, P. (2016). *The UK regional–national economic problem: Geography, globalisation and governance*. Routledge.

McCann, P. (2020). Perceptions of regional inequality and the geography of discontent: Insights from the UK. *Regional Studies*, *54*(2), 256–267. https://doi.org/10.1080/00343404.2019.1619928

McCann, P., & Ortega-Argilés, R. (2015). Smart specialization, regional growth and applications to European Union Cohesion policy. *Regional Studies*, *49*(8), 1291–1302. https://doi.org/10.1080/00343404.2013.799769

Montresor, S., & Quatraro, F. (2017). Regional branching and key enabling technologies: Evidence from European patent data. *Economic Geography*, *93*(4), 367–396. https://doi.org/10.1080/00130095.2017.1326810

Moretti, E. (2013). *The new geography of jobs*. Mariner.

Morris, D., Vanino, E., & Corradini, C. (2020). Effect of regional skill gaps and skill shortages on firm productivity. *Environment and Planning A: Economy and Space*, *52*(5), 933–952. https://doi.org/10.1177/0308518X19889634

Morrissey, K. (2020). Big Data and its potential role in regional growth: Evidence from Great Britain. *Spatial Economic Analysis*, 1–11. https://doi.org/10.1080/17421772.2020.1825783

Neffke, F., & Henning, M. (2013). Skill relatedness and firm diversification. *Strategic Management Journal*, *34*(3), 297–316. https://doi.org/10.1002/smj.2014

Neffke, F., Henning, M., & Boschma, R. (2011). How do regions diversify over time? Industry relatedness and the development of new growth paths in regions. *Economic Geography*, *87*(3), 237–265. https://doi.org/10.1111/j.1944-8287.2011.01121.x

Neffke, F. M., Otto, A., & Hidalgo, C. (2018). The mobility of displaced workers: How the local industry mix affects job search. *Journal of Urban Economics*, *108*, 124–140. https://doi.org/10.1016/j.jue.2018.09.006

Neffke, F. M., Otto, A., & Weyh, A. (2017). Inter-industry labor flows. *Journal of Economic Behavior & Organization*, *142*, 275–292. https://doi.org/10.1016/j.jebo.2017.07.003

Niedomysl, T. (2004). Evaluating the effects of place-marketing campaigns on interregional migration in Sweden. *Environment*

and Planning A, *36*(11), 1991–2009. https://doi.org/10.1068/a36210

Office for National Statistics (ONS). (2016). *Skills demand, training and skills mismatch: A review of key concepts, theory and evidence*.

Office for National Statistics (ONS). (2019). *The probability of automation in England 2011 and 2017*.

Oliver, J. M., & Turton, J. R. (1982). Is there a shortage of skilled labour? *British Journal of Industrial Relations*, *20*(2), 195–200. https://doi.org/10.1111/j.1467-8543.1982.tb00097.x

Organisation for Economic Co-operation and Development (OECD). (2012). *Draft synthesis report on innovation driven-growth in regions: The role of smart specialisation*. OECD Publ.

Organisation for Economic Co-operation and Development (OECD). (2017). *Getting skills right: United Kingdom*. https://www.oecd.org/unitedkingdom/getting-skills-right-united-kingdom-9789264280489-en.htm

Organisation for Economic Co-operation and Development (OECD). (2019). *Regions in industrial transition: Policies for people and places*. OECD Publ. https://doi.org/10.1787/c76ec2a1-en

Payne, J. (2007). *Skills in context: What can the UK learn from Australia's skill ecosystem projects?* Research Paper No. 70. SKOPE.

Payne, J. (2009). Divergent skills policy trajectories in England and Scotland after Leitch. *Policy Studies*, *30*(5), 473–494. https://doi.org/10.1080/01442870902899996

Payne, J., & Keep, E. (2011). *One step forward, two steps back? Skills policy in England under the coalition government*. SKOPE Research Paper No. 102. University of Oxford.

Peck, F., Connolly, S., Durnin, J., & Jackson, K. (2013). Prospects for 'place-based' industrial policy in England: The role of local enterprise partnerships. *Local Economy*, *28*(7–8), 828–841. https://doi.org/10.1177/0269094213498470

Plummer, P., & Taylor, M. (2001). Theories of local economic growth (part 1): concepts, models, and measurement. *Environment and Planning A: Economy and Space*, *33*(2), 219–236. https://doi.org/10.1068/a339a

Porter, M. E. (1998). Clusters and the new economics of competition. *Harvard Business Review*, *76*(6), 77–90.

Qian, H. (2017). Skills and knowledge-based entrepreneurship: Evidence from US cities. *Regional Studies*, *51*(10), 1469–1482. https://doi.org/10.1080/00343404.2016.1213383

Round, A. (2018). *Skills for the North: Devolving technical education to cities*. IPPR North.

Schultz, T. (1961). Investment in human capital. *The American Economic Review*, *51*(1), 1–17.

Scottish Government. (2007). *Skills for Scotland: A lifelong learning skills strategy*. Scottish Government.

Sevinc, D., Green, A., Bryson, J. R., Collinson, S., Riley, R., & Adderley, S. (2020). Ensuring skills are available in the right locations: Are we there yet? A regional analysis of qualification gaps. *Regional Studies*, 1–11. https://doi.org/10.1080/00343404.2020.1740190

Sissons, P. (2020). The local low skills equilibrium: Moving from concept to policy utility. *Urban Studies*, *58*(8), 1543–1560. https://doi.org/10.1177/0042098020915859

Sissons, P., & Jones, K. (2016). Local industrial strategy and skills policy in England: Assessing the linkages and limitations – A case study of the Sheffield City deal. *Local Economy*, *31*(8), 857–872. https://doi.org/10.1177/0269094216679602

Stimson, R., Stough, R., & Salazar, M. (2009). *Leadership and institutions in regional endogenous development*. Edward Elgar.

Treado, C. D. (2010). Pittsburgh's evolving steel legacy and the steel technology cluster. *Cambridge Journal of Regions, Economy and Society*, *3*(1), 105–120. https://doi.org/10.1093/cjres/rsp027

UK Commission for Employment and Skills (UKCES). (2009). *Towards Ambition 2020: Skills, jobs, growth: Expert advice from the UK Commission for Employment and Skills*. UKCES.

Waite, D., McGregor, A., & McNulty, D. (2018). *Issues paper on city deals and inclusive growth*. Policy Scotland.

Warhurst, C., & Findlay, P. (2012). *More effective skills utilisation: The shifting terrain/shifting the terrain of skills policy in Scotland*. Research Paper No. 107. SKOPE, Universities of Oxford and Cardiff.

Watson, D., Johnson, S., & Webb, R. (2006). Employer perceptions of skills deficiencies in the UK labour market: A subregional analysis. *Environment and Planning A*, *38*(9), 1753–1771. https://doi.org/10.1068/a37319