

## Ensuring skills are available in the right locations

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## **Ensuring skills are available in the right locations: are we there yet? A regional analysis of qualification gaps**

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## ABSTRACT

Matching skills supply and demand is critical for economic growth, competitiveness and inclusiveness. Yet measuring skills is difficult. This article develops an approach for measuring the gap between demand and supply of skills at local level in the UK West Midlands region. It uses qualifications as a proxy for skills. By comparing the projected supply of qualifications with the forecast demand for qualifications from occupational forecasts, the analysis reveals significant skill mismatches with potential to constrain regional growth potential. Policy implications for connecting skills, transport and housing policy as part of local industrial strategies are explored.

## KEYWORDS

skills, qualifications, regional economic development, United Kingdom, labour market

JEL: H75; J23; J24; R12

## INTRODUCTION

Academic accounts of competitiveness have focused on firm-level (Penrose, 1959; Bryson and Ronayne, 2014), regional (Saxenian, 1994; Porter, 2000; Christopherson and Clark, 2007; Clark, 2013; Lowe and Wolf-Powers, 2018) and national competitiveness (Porter, 1990; Vanchan et al., 2018). The academic and policy emphasis placed on competitiveness raises questions regarding the factors that hold back productivity growth. Central to the measurement of productivity is labour productivity, with both labour market participation and the potential to enhance output per worker being important.

In an analysis of the new geography of jobs Moretti (2013) outlined three approaches to enhancing productivity and economic growth focusing on the local human resource base. First, there are demand-side approaches based on attracting foreign direct investment on the understanding that skilled workers will migrate to fill the demand for labour. Second, there are supply-side approaches based on policies designed to attract skilled labour with the expectation that firms will move because of the skills available. Third, supply-side approaches may also upskill existing employees or enhance educational provision, so altering a labour market's skill base. In the UK, the predominant policy focus has been on the third approach. The importance of directing attention to the problem of skills deficiencies and occupational structure has been highlighted in recent publications. Barzotto and De Propris (2018) suggest that a mix of occupations including smart workers employed in advanced manufacturing and knowledge-based production-support activities substantially increases regional gross value added. Similarly, linking the nature of regional skills deficiencies to the goals of local industrial strategies, targeted agglomeration economies or smart specialisation approaches has added value to this debate in terms of both advancing theory and supporting policymakers (Østbye et al., 2018; McCann and Ortega Argilés, 2015).

The UK is facing two challenges. First, negotiations to leave the European Union challenge established patterns of trade and economic relationships. Second, in Spring 2019 the UK unemployment rate was close to full employment at 3.8% (ONS, 2019). These two challenges place skills at the centre of the UK debate on economic growth, with debates about migration and about the development of local industrial strategies being relevant. In May 2019, the West Midlands was the first region to agree a Local Industrial Strategy highlighting the importance of skills and the industries of tomorrow. In this paper, we examine the labour market of the West Midlands conurbation to showcase an approach for measuring intra-urban qualification ‘gaps’ (i.e. mismatches between demand and supply of qualifications) including localised deficiencies and oversupply. The conurbation includes areas that have some of the lowest levels of accredited skills levels in the UK. Unemployment, combined with qualification/skills deficiencies has led to a long history of hard-to-fill vacancies for firms (Bryson et al., 2008).

The historical context is important. Over the past decade, evidence from the UK has highlighted significant and widespread skills deficiencies across regions. Skilled trades comprise nearly half of all occupations reporting skill-shortage vacancies (43%), while the recruitment of machine operators and professionals poses a challenge for employers. In the West Midlands 3.2bn of the 16.9bn output gap is estimated to be due to insufficient skills levels (WMCA, 2018a). In terms of vocational qualifications, there is a large and growing disparity between the UK and other countries (OECD, 2017).

Additionally, Brexit-related uncertainties over migrants’ rights and future flows present additional challenges for matching skills demand and supply at a time when the UK is already experiencing significant shortages of skilled staff (KPMG, 2017). Hence skills deficiencies remain a critical issue: a scarcity of qualified labour leaves firms which are growing or evolving with the problem of matching demand with appropriately-qualified workers. In turn, this significantly affects their productivity and ability to innovate and remain competitive. There

are also important connections with growing income and spatial inequalities across the country (Joyce and Xu, 2019).

It is therefore important to understand the skills that employers have difficulty recruiting and to assess the mismatch between demand and supply. However, a precise measurement of UK skills deficiencies is not straightforward. Comprehensive data are limited and there are inherent measurement difficulties. The possibility to analyse potential imbalances between demand and supply in the labour market is important from a policy perspective. Such information, in conjunction with corresponding demand estimates, sheds light on possible future labour market developments in the West Midlands, highlighting potential mismatches in different LEP areas and thus helping to inform the creation of policy targets and investment decisions made by individuals, firms and policy-makers. As part of a wider aim to develop more robust methodologies to improve understanding of this mismatch. This article presents a technique that relates local demand and supply forecasts of skills. We use qualification levels, measured by National Vocational Qualifications (NVQs)<sup>i</sup>, as a proxy for skills. Model-based estimates of supply of and demand for different qualification levels using population projections are applied using Labour Force Survey (LFS) data on qualifications and forecasts of employment by occupation. It is worth emphasising that this is a new contribution. As far as we are aware there is no current modelling mechanism to deliver this type of assessment available within the local authority policy context.

The analysis covers the period from 2004 to 2020 for three Local Enterprise Partnership (LEP) areas – Greater Birmingham and Solihull (GBS), the Black Country, and Coventry and Warwickshire (i.e. the spatial framework used for strategic economic policy across the conurbation by the West Midlands Combined Authority (WMCA)), to derive a quantitative measure of skill mismatch (hereafter termed ‘gap’). The analysis is designed to provide a

picture of the current situation at the local level to aid future decisions on whether more should be done to address the qualification gaps and how this might be best done in practice.

The remainder of this article is structured as follows. To set the context for the analysis of the qualifications gap, the second section outlines key debates around the role of skills in regional economic development. The third section focuses on developments in skills policy in England and specifically the main features of the skills situation and policy in the West Midlands. Section four presents a methodological discussion. The results of the analysis are presented in section five. Section six explores the approach adopted in the light of the contextual policy discussion outlined earlier and specifically the emerging policy priorities of the WMCA. We then consider the wider applicability of the techniques presented.

## SKILLS AND REGIONAL ECONOMIC DEVELOPMENT

The search for skilled labour is central to firm strategies and positioning in global markets (Christopherson and Clark, 2007). In their review of theories of local economic growth Plummer and Taylor (2001a) note that the local human resource base plays a prominent role in stimulating economic growth in four of six theoretical perspectives developed to understand city-regions: competitive advantage, learning regions, flexible specialization and product life cycle. Their empirical analysis (Plummer and Taylor, 2001b) suggests that the local human resource base plays a critical role in economic growth impacting on competitiveness and productivity. A similar argument is made by Glaeser (2005) in his long-term analysis of Boston's economy, with, human capital, defined by a strong base of skilled workers, was identified as the most reliable source of long-run urban prosperity. Treado (2010) supports this relationship between location, labour and legacy through an analysis of Pittsburgh's steel technology cluster.

Other studies focus on particular sectors, technological change and the importance of specialised skills to regional competitiveness. A strong factor in the ‘operationalization of innovation’ at the firm or sector level occurs through the ‘organization and distribution of work and skill’ at regional level (Clark and Bailey, 2018) but a region’s skill base also contributes to related diversity (Boschma and Capone, 2016). The degree to which demand and supply are aligned across a region to support the specific innovation goals of firms is a key to competitiveness.

To Scott, local labour markets are important sites of “habituation and socialization” and moreover “the congregation of numerous workers in one place facilitates the hiring and screening of job candidates by employers, just as the gathering together of widely assorted firms in one place facilitates job-search on the part of workers” (Scott, 2006: 22). Near full employment in local labour markets poses challenges as firms find it difficult to recruit appropriate candidates. Other scholars have identified a connection between the success of cities and education (Glaeser and Saiz, 2004; Shapiro, 2006) with education having a positive effect on income and population growth (Glaeser et al., 2012). More recently, Nedelkoska and Quintini, (2018), argue that the risks related to the application of artificial intelligence to work decline as educational attainment and skill levels rise (Bryson, 2018).

Technological change more generally is significant in at least two ways. First, automation has displaced some jobs and will displace more in the future. This puts a premium on the need to understand and respond to the specific impacts of new technologies on firms, sectors, socio-economic groups and regions. It also focuses attention on new skills requirements that will either result from, or result in, new technology adoption (Acemoglu and Autor, 2011; Arntz et al., 2016)). Second, globalisation pressures, including import competition and offshoring, combined with technological progress and innovation, have shifted employment towards high-



tech firms (Bloom et al., 2016). This is part of a more general polarisation in the UK job market (OECD, 2019; Blundell et al., 2018; Salvatori, 2018).

It is clear from studies of firms, regions and global processes that the nature of employer demand and the supply of skilled labour is of fundamental importance for economic development and competitiveness. Recent studies have found evidence of the existence of agglomeration economies through better local skills supply-demand matches (Berlingieri, 2018). There is also a long-running debate comparing the detrimental effects of the disconnection between residences and workplaces (i.e. spatial mismatch) (L'Horty and Sari, 2019); suggesting that while these are often analysed separately they should be considered simultaneously. From a local economic development perspective, a limited number of academic studies quantify gaps between the supply and demand for skills at local level (although see the Employer Skills Survey as an exception at LEP area level (Winterbotham et al., 2018) and yet this is a central issue for employers and policy makers concerned with local economic development to address (Florida et al. 2012, Frøyland et al. 2018).

Identifying and measuring skills deficiencies or qualification gaps within local labour markets is challenging. Actual skill needs are sometimes 'hidden' within firms, given the difficulty of measuring and assessing skill levels and people-based competences. Skills may be generic or employer-specific and formal or informal and since they are a derived demand they change over time. Indeed, employers may find it difficult to specify precisely what skills they require in the future. The identification of skills deficiencies (or a qualifications gap) has been a recurrent feature of UK labour markets (Campbell et al., 1999; Leitch Review of Skills, 2006). An under-supply of appropriately skilled individuals constrains business growth, creating skills-shortage vacancies on the external labour market and skills gaps on the internal labour market, impacting on business performance (Bacolod et al. 2009, Rodriguez-Pose and Tselios

2011), while skills surpluses represent deficiencies in skills utilisation and a loss of potential output.

Academic analyses of skills deficiencies too often fail to translate their findings into concrete policy recommendations. For example, L'Horty and Sari (2019) provide strong insights into unemployment duration disparities in the Paris region but conclude with a simple call for 'differentiated public policy recommendations' including 'public transport policies in some territories and training policies' in others. Berlingieri (2018) similarly focuses on the empirical effect of the size of the local labour market on skill mismatch in Germany but provides few specific policy recommendations. The England policy context is explored in the next section, to provide the context for our empirical study.

## DEVELOPMENTS IN SKILLS POLICY IN ENGLAND AND THE WEST MIDLANDS

This section summarises key developments in skills policy across England and the West Midlands to set the context for the empirical analysis. It addresses three interlinked themes: the centralised nature of national policy but with an increasing recognition of the need for more devolved powers at local level; the changing institutional landscape for skills policy; and the overtly supply-side nature of skills policy.

In 1998 a National Skills Taskforce developed a National Skills Agenda to try to ensure that necessary skills were in place to sustain high levels of employment and competitiveness. A coherent spatial component with local action tied to local needs was identified as a critical component of a wider local and regional economic development strategy (Campbell et al., 1999; Green and Owen, 2003). From 2001 the Learning and Skills Council (LSC) had responsibility to plan and fund post-16 education and training (other than higher education) in England. The LSC operated at sub-regional level alongside Regional Development Agencies (RDAs). RDAs' activities in relation to skills strengthened over time and skills became

increasingly central to the policy agenda of organisations at regional and local level, including local authorities and sub-regional bodies working to align skills priorities with economic development.

Regular change has been a key feature of the governance structures in England with remits to support employment, skills and local economic growth. This has been particularly apparent since 2010, when the LSC and the RDAs were abolished. Business-led LEPs acquired some of the powers of the RDAs in terms of setting local economic priorities, but with more limited resources and capacity. Subsequently Combined Authorities were established in some local areas, including the WMCA (Sandford, 2017).

As a result of the above changes, alongside a much longer history of London-centric governance, UK regional and local institutions remain weak, relative to other OECD countries: the UK is one of the most fiscally centralised countries in the developed world (OECD 2016). This has led to a series of arguments for the devolution of fund-raising and spending powers to combined authorities, LEPs and other local authorities (House of Commons Library, 2017). Raising productivity, stimulating investment and growth in regions outside London and the South-East is the central aim of the Industrial Strategy (BEIS, 2017), which has ‘People’ and their skills as one of its central pillars. Arguments for economic rebalancing sit alongside arguments for greater inclusivity and reduced socio-economic and spatial inequalities across the country (Jacobs et al., 2017). As well as more local control over skills policies and investment, the rationale is for infrastructure, R&D spending, land use planning, housing, business taxation, regional economic development and export promotion to be more ‘place-based’.

The focus of skills and local economic growth policy since 2010 has been towards greater devolution of powers to the local level (OECD, 2015), to address challenges and opportunities

identified in Strategic Economic Plans (SEPs). Under agreements associated with Growth Deals, City Deals and Devolution Deals local decision-makers have new powers, freedoms and funding mechanisms in exchange for greater responsibility for stimulating and supporting economic growth in their area, with skills playing a prominent role (Payne, 2018).

In terms of supply- and demand-side emphases, despite the foremost emphasis of skills policy in England on the supply-side there has been increasing recognition of the importance of focusing on stimulating employers' derived demand for skills and on employers playing a greater role in shaping skills policies (OECD, 2015). The underpinning rationale for a supply-side focus is that raising skill levels is a means to achieving higher levels of employment, social mobility, productivity and prosperity, although Payne and Keep (2011) have suggested that this is based on flawed assumptions regarding the efficacy of a 'supply-side' push. The Leitch Review of Skills (2006) set out a vision and ambition for the UK to become a 'world leader in skills' by 2020. This involved setting targets for enhancing skills attainment, with the overall aim of shifting upwards the population's skills profile. In 2010 the Leitch targets were abolished and the emphasis of skills policy became more voluntaristic and market-based.

Skills policy developments in the West Midlands have mirrored national-level changes, with a move towards developing a more locally responsive skills system. A new Skills Advisory Panel programme (Department for Education, 2018) seeks to ensure that local provision of skills meets and responds to changing employer needs. This highlights the importance of a higher standard of evidence and a coherent analytical framework on skills needs to inform local investment decisions. The WMCA Regional Skills Plan (WMCA, 2018b) is focused on equipping local people with the skills they need to support on-going economic activity across the region. At a sub-regional level there is growing recognition of a need to be sensitive to different patterns of employer demand for skills and the characteristics of skills supply. This includes seeking policy solutions for better matching and overall improvement of outcomes for

employers and individuals, while also considering other cognate policy domains, such as local and regional housing and transport.

Prior studies show that policies intended to align regional demand and supply of skills, to improve productivity or increase employment opportunities, need to focus on transport connectivity and housing supply. Connectivity, including intra-regional commuting costs, determines the journey-to-work distances that workers travel influencing local access to jobs for low-income, low-skilled workers. If affordable housing stock is located away from workplaces, this constrains growth and employment in areas experiencing skill shortages (Rae et al., 2016). Policy approaches at the national or local level have tended to avoid the development of a more integrated approach to transport, housing and skills developing disconnected policy interventions which are unlikely to be effective (Rode, et al., 2017).

## METHODS AND EVIDENCE BASE

The article's main contribution is to present a new methodology for estimating the degree to which qualifications are aligned at the regional level to demand and supply, in an attempt to produce a wider framework to explore the dynamic interplay between the availability of workforce certified skills and demand in different parts of the West Midlands region. The level of skills in the workforce is analysed using the latest available local authority level data for the period 2004-2015, which covers the three LEPs that are part of the WMCA: Black Country LEP; GBS LEP; and Coventry and Warwickshire LEP (Figure 1). The model has three stages: (i) forecasting NVQ supply, (ii) forecasting NVQ demand, and (iii) a comparison of NVQ supply and demand across the region.

<Figure 1 here>

Before exploring it in more depth, the benefits and potential pitfalls of such a modelling approach are examined to highlight the key implications such a mechanism has for policy-making and to provide a context for the subsequent analysis. National aggregations using macro-level data sets are relatively common, but are not easily applied at the regional level and often do not produce the localised information required to deliver an effective local policy agenda. There is a trade-off between local specificity and representativeness/generalisability; the analysis here focuses on a defined spatial area reflecting factor conditions in the West Midlands. There are challenges around accuracy, because as Boswell et al (2004:38) have highlighted, ‘complex, often volatile factors are a function of the methodological problems in deriving sufficiently disaggregated projections, especially regarding occupations and skills requirements’. Another limitation is that such projections will inevitably be temporally specific, so models need regular updating.

In the first stage of this approach, we forecast the level of skills in the workforce and how they are projected to change in each local authority and LEP between 2016 and 2020. Annual Population Survey (APS) data are used. An analysis of formal educational and vocational qualifications is the most widely used approach for assessing skills supply (International Labour Organisation, 2014; Wilson et al., 2014). Both vocational qualifications and general education qualifications are included (European Commission, 2016). The main advantage of employing qualifications as proxies for skills lies in the availability of illustrative data that captures significant information about the skills that are present in the labour market (European Commission, 2016). The APS provides the latest and most comprehensive UK official labour market data and includes a highest qualification variable which we code to a qualification level. These highest qualifications are then used to estimate the number of individuals qualified to each of four NVQ levels (NVQ1, NVQ2, NVQ3 and NVQ4) in each local authority area. This

is projected forward by using least squares regression for given historical trends for the period 2004-2015.

Despite some technical shortcomings, as outlined by Melard (2014), such as the generation of random numbers (McCullough, 2008) and accuracy of statistical functions (Yalta, 2008), we have used the Microsoft Excel FORECAST function for ease of replication by policy makers. Notwithstanding these criticisms Excel is a popular and relatively easily applicable tool amongst policy makers for forecasting (Lempert, 2002; Ragland & Ramachandran, 2014).

FORECAST (x, R1, R2) calculates the predicted value y for the given value of x. R1 contains the observed data values and R2 contains the time values. Data on occupational demand is used in the next stage of the analysis as a proxy for skills demand. What is new here is the integration of these forecasts into a technique that identifies localised qualification gaps in relation to projected future demand. Occupational demand data are matched against NVQ levels, and this is then used to measure skills demand at regional and LEP levels (Wilson et al., 2014).

The analysis uses occupational demand forecasts at local authority level drawing upon an established model developed by Oxford Economics (OE) that is widely used by policy-makers around the world (i.e. World Bank, OECD).<sup>ii</sup> The OE approach to forecasting occupational demand starts with the APS providing data on employment by occupation for the West Midlands and its local authority districts (Oxford Economics, 2015). The forecasts are derived using an industry by/occupation matrix. The ratio of occupations within each sector for 2001 and 2011 is calculated from the Census. For other years OE uses regional data from the LFS. The share of each occupation by sector is forecast based upon trend and is applied to the sectoral employment data for each local area, to give an estimate of occupations within each sector. The results are adjusted to reflect the APS data for each local area. The occupations by sector are then aggregated to provide occupational demand by 25 occupations.

Two elements produce total occupation demand for each local area in the region: replacement demand and expansion demand. Expansion demand by occupation refers to the net change in total employment by occupation over the forecast period the results can be positive or negative. Replacement demand represents how many more people will be required at each level due to people leaving the workforce (i.e. due to retirement, unemployment, out migration, leaving for another job in a different occupational group or sector). Whilst replacing the vacant position creates additional labour demand, it has no net effect on total employment. This ‘replacement’ category is much larger than expansion demand and explains why even declining sectors still require new staff. Leaver rates by occupation are calculated from the LFS for the West Midlands (in this instance). These rates are applied across all local authorities. In the final stage, replacement demand and expansion demand are summed to produce total occupation demand. It is worth noting that OE has provided occupation forecasts based upon this approach to a range of governmental bodies and LEPs (e.g. Greater Manchester Combined Authority, 2019; Skills Development Scotland, 2018).

What is new here is the integration of these occupation forecasts into a technique that identifies localised qualification gaps in relation to projected future demand. Table 1 shows the nine major groups of the Standard Occupational Classification (SOC) defined in terms of matched NVQs.

<Table 1 here>

The first set of occupational groups - managers, directors and senior officials, which involve significant managerial control over employees and resources, together with professional occupations - require a substantial knowledge and understanding of production processes and service delivery. Occupations at these levels usually require a degree or an equivalent qualification/equivalent period of relevant work experience (and are coded to NVQ 4) (ONS,



2010). Associate professional and technical occupations and skilled trades occupations require an understanding of the principles that are essential to assume operational accountability and provide practical support to professionals, managers and senior officials (ONS, 2010). These occupation groups are matched against NVQ Level 3, given that most involve a substantial period of full-time training or further study (ONS, 2010).

Personal service occupations, administrative and secretarial occupations, sales and customer service occupations and process, plant and machine operatives are matched against NVQ Level 2. Occupations within this group require a good standard of general education and appropriate qualifications to GCSE level or an equivalent. Entrants to this occupational group typically require either NVQ Level 2 in a relevant subject or an equivalent level of qualification or previous proven experience (ONS, 2010). Finally, occupations in the elementary group are matched against NVQ Level 1. Although there are no minimum academic entry requirements, most occupations in this group will typically have an associated short period of formal experience-related training.

Building on this approach, occupational demand data covering the period 2004-2015 was categorised into the four NVQ levels outlined above and used to project occupational labour demand for local authorities in the West Midlands. The final stage of the analysis subtracts qualification supply projections from qualification demand (with a negative number indicating that demand is greater than supply (i.e. a shortage) and a positive number indicates supply is greater than demand (i.e. a surplus), so providing information and guidance for policy development on possible labour market imbalances and skill mismatches in the West Midlands. (See Appendix for a detailed breakdown of deficits/surpluses by skill level for the 19 local authorities, LEPs and the West Midlands conurbation.) The next section outlines in brief the central results arising from the qualifications gap analysis.

## RESULTS

The qualifications gap results for LEP and local authority areas are presented by qualification level, starting with the least skilled (NVQ1). For a detailed analysis of the West Midlands situation these gaps would need to be interpreted alongside detailed intelligence on firm decision-making, economic, education, training, housing and transport planning and other developments at the local area level, but these are beyond the scope of the paper.

### NVQ 1

NVQ Level 1 is the first rung on the skills ladder. Considering each LEP area it is apparent that there is an oversupply of 9,100 NVQ1 candidates in the Black Country. This oversupply is indicative of a lack of progression up the skills ladder by many people in these sub-regions and reflects a history of a relatively proportion of semi-skilled and unskilled work in the area. Such an oversupply reflects the historical position of the Black Country as an area characterised by a relatively large proportion of semi-skilled and unskilled work in manufacturing, with sectoral decline leading to a rise in unemployment (Green et al., 2017). In contrast, in the Coventry and Warwickshire LEP where there is a history of more highly skilled employment, there is an overall shortage of 11,000 people at this qualification level. For the West Midlands three-LEP region there is an oversupply of NVQ1 candidates, but there are significant intra-regional imbalances, as shown by a more granular picture at the local authority level. In Birmingham there is an oversupply of 5,950, while in North Warwickshire and Coventry, there are shortages of 3,500 and 4,160 respectively. The main policy recommendations here relate to improving the mobility of labour between sub-regions. Although labour mobility is low at NVQ level 1, in line with the lower income levels and reluctance to spend on commuting, subsidised transport and/or upskilling programmes might be part of the policy mix.

## NVQ 2

NVQ Level 2 is considered the threshold level for moving out of skills poverty, as it increases the likelihood of finding unsubsidised employment (Kemp et al. 2004). If we consider the overall pattern across LEP areas, there are significant shortages across all local authorities and LEP areas and nearly all local authorities. This suggests that there is a clear and significant need to support the advancement of large numbers of people across the entire WMCA region to NVQ2 level skills. Starting with the largest levels of mismatch by LEP area, there is a shortage of 63,100 in the GBS LEP followed by Coventry and Warwickshire (41,200) and the Black Country (34,300) and indicating a considerable lack of qualified workers to meet firms' demands. At city level Birmingham has a shortage of 44,200, followed by Coventry with 17,600. These are areas with higher than average unemployment rates also.

## NVQ 3

Analyses of NVQ Level 3 level gaps for the LEP areas show an oversupply of 7,200 NVQ3 candidates in the Black Country LEP (with Dudley and Wolverhampton being the main contributors to this). This contrasts with an undersupply of nearly 17,000 NVQ4 candidates. This highlights that there is scope for upskilling of NVQ3 candidates to fill NVQ4 roles in the Black Country. The pattern of over-supply of NVQ3 and under-supply of NVQ4 is replicated in the GBS LEP. There is scope here for universities to play a key role in raising skills levels. By contrast in Coventry and Warwickshire LEP there are shortages at NVQ3 and NVQ4 levels. At NVQ3 level the under-supply is particularly pronounced in Coventry and Warwick where the automotive sector is one of the key employers. This highlights a likely need for policy interventions to provide technical skills for employers there to access. It may also be the case that there may be NVQ3 qualified individuals employed in lower-income jobs requiring NVQ2 level qualifications, so raising issues of skills utilisation for these individuals.

## NVQ4

The availability of NVQ Level 4 (i.e. degree-level) candidates falls short of demand in all three LEP areas, with an estimated gap of 63,400 in the GBS LEP, 16,970 in Black Country LEP and 11,270 in the Coventry and Warwickshire LEP. Here again there is a case for policy interventions and investment to support upskilling to fill vacancies, especially in areas with an oversupply of NVQ3 level skills. There is a role for all West Midlands universities to play a role here in liaising with employers to understand their priority skills needs and tailor courses with this in mind. This needs to be coupled – especially in the Coventry and Warwickshire LEP area which demonstrates a shortage of skills at various levels – with improved connectivity for residents of other areas to fill skill shortages. At the city level, Birmingham has a substantial 62,970 shortfall at NVQ4 level. There are also shortages in other parts of the GBS LEP area, including East Staffordshire (5,170), Redditch (3,350) and Tamworth (4,160), while Bromsgrove (which has more of a dormitory function i.e. where people live but largely travel to workplaces elsewhere) registers an oversupply of 5,140.

As well as a role for workplace training, to some extent shortfalls in NVQ Level 4 skills may be addressed by retention and attraction of graduates from other areas. Here the housing and transport offer in place is important, especially in a large city such as Birmingham.

## CONCLUSIONS AND POLICY IMPLICATIONS

Skills are a key driver of productivity, innovation and competitiveness at the firm, industry and regional levels. Skills shortages and surpluses are closely related to socio-economic inequalities which, in turn, have a strong spatial component. Based on the conclusions of a wide range of studies of regional economic growth, qualification gaps can place major limitations on regional economic growth, and on inclusiveness and improved income equality.

The UK, alongside most other advanced economies, is experiencing social and political challenges that are partly the result of an extended period in which regional inequalities and economic imbalances have reached unprecedented levels (Cowell et al. 2018). More precise policy interventions are needed both to upskill specific sub-groups of the UK workforce and to reduce supply-demand gaps during a period of near-full employment.

Skill mismatches arise when there is a misallocation in a labour market between the attributes of individuals seeking jobs and the attributes/competencies that employers require. Any detailed assessment of skill attainment or of the specific knowledge and expertise with which employees add value in the context of a firm-level function is a complex, context-specific process. Our study contributes by developing a methodological approach to measuring predicted localised skill shortages and surpluses, by using qualifications as the most appropriate proxy measure. It presents the application of this approach to local areas in the West Midlands and the analysis reveals that there is an overall uneven distribution of qualifications across the region and with significant localised qualification gaps. The approach could be applied in other regions and local areas to set the context for informing skills, housing and transport policy developments at the local scale.

Before reviewing some of the policy implications of the approach used to identify qualification gaps, there are complications in the relationship between qualifications, place and labour markets that should be highlighted. First, the demand for qualifications and skills is dynamic, reflecting alterations in the local stock of businesses but also technological and process innovations. Consequently, policy interventions should focus on horizontal interventions intended to increase local educational/qualification attainment, while encouraging employee flexibility and adaptability. Examples include increased spending on education and training to both the employed and the unemployed to ensure that the labour force attains appropriate range of skills and subsidised childcare provision to free people up to train.

Second, some local labour markets may experience shocks requiring more targeted interventions based on the development of vertical policy. These interventions may attempt to overcome a very specific qualification/skill gap. Ideally, an effective horizontal strategy should reduce the need for responsive vertical policy interventions. Third, due to data availability constraints commuting and travel-to-work patterns were not included in the qualification gap analysis. At a very local level some of the qualification gaps will be addressed by commuting, but a carbon neutral ambition should ideally reduce the need for unnecessary commuting. Nevertheless, it must be emphasised that the application of the analysis to the West Midlands identified an absolute gap across the area in NVQ4 qualifications that cannot be addressed easily by intra-regional movement. As a result of this research, given the region faces an absolute qualification gap at this level, the West Midlands Strategic Economic Plan has included a target around NVQ Level 4 attainment.

The approach developed in this article is intended to contribute to the regional policy development and evaluation policy toolkit. It can be used to identify intra-regional differences in qualifications and changes in qualification gaps over time as the first stage in the development of a localised policy framework. The approach has been developed building on datasets that are available in the UK. This means that it can be applied to all UK regions. Any application to other national contexts would involve aligning local qualifications to international qualification standards combined with the availability of relatively reliable occupational forecasts; (the economic forecasting work of the European Centre for the Development of Vocational Training [CEDEFOP] in this field<sup>iii</sup> suggests an appetite for such analyses). The same challenges exist within other city-regions, such as Paris (L'Horty and Sari, 2019) and between regions, as in Italy (Berlingieri, 2018). The key question is 'what does this technique contribute to policy formulation?' One answer is 'greater localised precision' in

policy development intended to enhance the spatial distribution of demand and supply of skills within and across regions.

In the West Midlands raising skills supply remains an important policy challenge given that the qualifications profile is biased towards lower level qualifications (Green, 2018). Raising demand for skills is important too: if workers cannot find jobs that match their qualification level they tend to ‘bump down’ in the labour market, filling jobs that less qualified workers could occupy. This type of over-education reflects resource underutilisation in which there is a mismatch between skill attainment and that required for a job. An oversupply of graduates might result in employers recruiting graduates for non-graduate positions reducing training costs whilst unemployment increases amongst the less qualified (Verhaest and Omey, 2010). This highlights that utilisation of existing skills is important. The analyses also point to where there are spatial mismatches in skills supply and demand – and this highlights the need to consider housing and transport policy, alongside skills policy, to address them.

In terms of setting targets, this approach highlights the importance of understanding the local labour market vis-a-vis future demand, which leads to a better understanding of appropriate policy and firm responses. The functional role of places may create this mismatch, as in the case of a commuter settlement.

The approach adopted here provides a technique for exploring intra-regional variability in the relationship between local availability of qualifications (as a proxy for skills) and employer demand (with occupation proxying skills). It provides an evidence base that disaggregates the gap at several spatial levels, relevant for different governance structures, from city-region to municipal levels (and it is this more local disaggregation which is new here). This should underpin a coordinated and integrated approach to skills planning, including housing and transportation, across these spatial levels.

This approach provides a snapshot of the current qualification gap and future estimates of this gap. Travel-to-work flows are not included here and would complicate the picture. Nevertheless, the development of an analysis that can provide an indicative analysis of the supply of qualified people by geography against local economic demand provides the starting point to inform a deliberative process of policy development that includes policy-makers, employers, labour market intermediaries, and educational and training providers.

While the analysis provides insights into the skills situation at a local level (as proxied by qualification levels), it could also be extended further to include information on sectoral- and subject-specific skills needs. The technique developed in this article takes a further step towards the development of a transparent and coherent framework for analysing and targeting intra-urban supply and demand qualification gaps, but within the context of a more integrated approach to policy formulation and alignment that includes housing, transport, educational and skills.

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Figure 1: West Midlands Geography

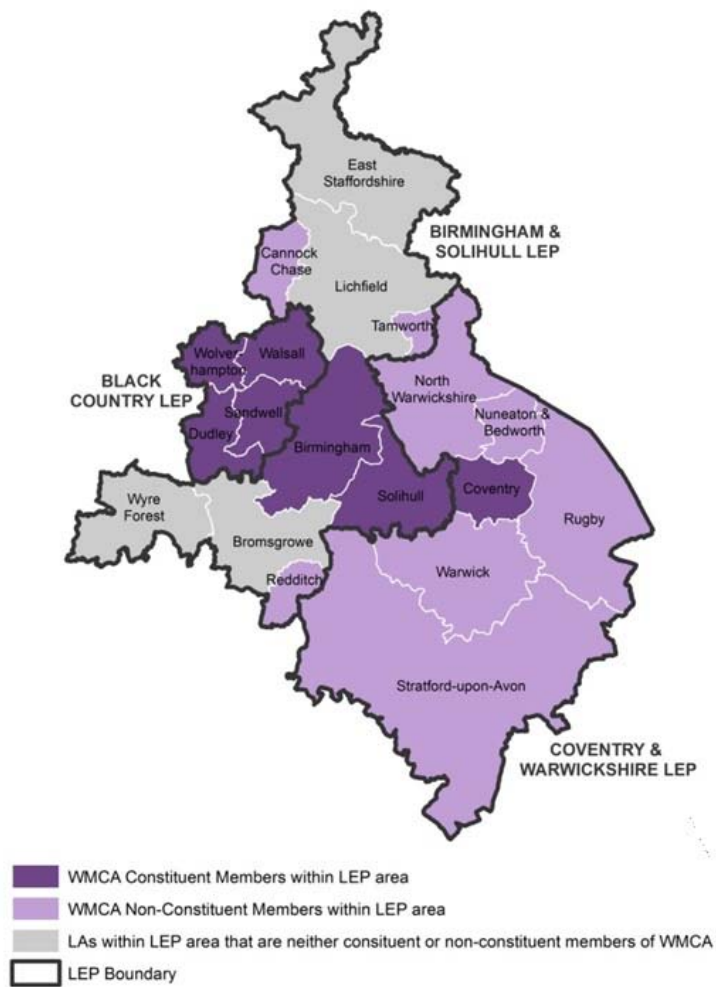


Table 1: Categorization of Standard Occupational Classification into National Vocational Qualifications

SOC 2010 Occupation	NVQ level and example qualifications
Managers and senior officials	4+ : Degree level and higher
Professional occupations	
Associate professional and technical occupations	3 : Two or more A levels, BTEC Ordinary National Diploma (OND)
Skilled trades occupations	
Personal services occupations	2 : Five GCSEs at grades A*-C or equivalent
Administrative and secretarial occupations	
Sales and customer service occupations	
Process, plant and machine operatives	
Elementary occupations	1: Foundation GNVQ, GCSEs at grades D-G, BTEC first certificate

Note: GCSEs (General Certificate of Secondary Education) qualifications are taken at 16 years (the end of compulsory schooling in England)

Appendix: Table A.1. West Midlands, Intra-Regional Geography of NVQ Levels 1, 2, 3 and 4: Qualifications Gap, 2019.

		NVQ4+	NVQ3	NVQ2	NVQ1
LEP AREAS	Black Country (Supply)	143,000	123,810	114,170	79,510
	Black Country (Demand)	159,980	116,620	148,490	70,380
	Black Country (Gap)	- 16,970	7,200	- 34,300	9,100
	GBS (Supply)	309,700	216,150	184,390	117,730
	GBS (Demand)	373,130	206,180	247,560	120,930
	GBS (Gap)	- 63,400	9,980	- 63,100	- 3,190
	C&W (Supply)	171,410	85,530	71,990	51,520
	C&W (Demand)	182,680	101,720	113,170	62,600
	C&W (Gap)	- 11,270	- 16,190	- 41,200	- 11,000
WEST MIDLANDS	West Midlands (Supply)	624,120	425,500	370,560	248,760
	West Midlands (Demand)	715,790	424,530	509,230	253,910
	West Midlands (Gap)	- 91,680	980	- 138,670	- 5,150
BLACK COUNTRY LEP	Dudley (Supply)	43,080	40,770	32,510	24,018
	Dudley (Demand)	43,900	31,490	37,610	15,267
	Dudley (Gap)	- 820	9,300	- 5,090	8,750
	Sandwell (Supply)	36,680	31,590	32,140	20,300
	Sandwell (Demand)	41,830	31,310	43,860	21,000
	Sandwell (Gap)	- 5,150	280	- 11,720	- 700
	Walsall (Supply)	34,590	19,870	29,660	18,060
	Walsall (Demand)	35,580	28,120	35,280	18,120
	Walsall (Gap)	- 990	- 8,300	- 5,620	- 60
	Wolverhampton (Supply)	28,660	31,590	19,860	17,140
	Wolverhampton (Demand)	38,670	25,700	31,740	16,000
	Wolverhampton (Gap)	- 10,010	5,880	- 11,880	1,140
GBS LEP	Birmingham (Supply)	161,260	107,540	87,110	67,500
	Birmingham (Demand)	224,230	110,210	131,390	61,550
	Birmingham (Gap)	- 62,970	- 2,700	- 44,200	5,950
	Bromsgrove (Supply)	22,610	13,190	8,590	5,050
	Bromsgrove (Demand)	17,470	10,160	10,910	5,530
	Bromsgrove (Gap)	5,140	3,040	- 2,300	- 490
	Cannock Chase (Supply)	10,290	14,970	13,530	7,000
	Cannock Chase (Demand)	12,300	11,300	12,600	5,540
	Cannock Chase (Gap)	- 2,010	3,670	930	1,470
	East Staffordshire (Supply)	16,780	17,250	16,080	4,040
	East Staffordshire (Demand)	21,950	14,350	18,220	9,740
	East Staffordshire (Gap)	- 5,170	2,890	- 2,140	- 5,700
	Lichfield (Supply)	18,930	12,440	12,190	6,770
	Lichfield (Demand)	17,930	12,050	12,280	7,880
	Lichfield (Gap)	1,000	390	- 90	- 1,120
	Redditch (Supply)	11,720	8,930	7,390	8,570

i

C&W LEP	Redditch (Demand)	15,070	9,430	11,970	5,700
	Redditch (Gap)	- 3,350	- 500	- 4,600	2,870
	Solihull (Supply)	46,070	18,190	16,780	13,170
	Solihull (Demand)	42,600	22,480	28,980	13,550
	Solihull (Gap)	3,480	- 4,300	- 12,200	- 380
	Tamworth (Supply)	5,360	11,250	11,450	3,230
	Tamworth (Demand)	9,530	7,470	10,330	6,640
	Tamworth (Gap)	- 4,160	3,780	1,100	- 3,400
	Wyre Forest (Supply)	16,700	12,400	11,300	2,400
	Wyre Forest (Demand)	12,070	8,750	10,900	4,810
	Wyre Forest (Gap)	4,630	3,660	390	- 2,400
	Coventry (Supply)	52,260	33,850	26,240	18,670
	Coventry (Demand)	68,360	36,880	43,880	22,850
	Coventry (Gap)	- 16,100	- 3,020	- 17,600	- 4,160
	North Warwickshire (Supply)	8,890	7,760	7,580	3,650
	North Warwickshire (Demand)	11,530	8,880	10,920	7,140
	North Warwickshire (Gap)	- 2,640	- 1,120	- 3,340	- 3,500
	Nuneaton (Supply)	18,450	12,800	11,630	8,240
	Nuneaton (Demand)	15,520	11,250	14,550	8,090
	Nuneaton (Gap)	2,930	1,550	- 2,900	150
	Rugby (Supply)	26,560	9,230	5,350	5,570
	Rugby (Demand)	18,660	10,830	12,120	7,660
	Rugby (Gap)	7,900	- 1,600	- 6,770	- 2,090
	Stratford (Supply)	25,210	12,020	9,770	4,430
	Stratford (Demand)	29,760	16,210	14,490	7,500
	Stratford (Gap)	- 4,550	- 4,200	- 4,730	- 3,070
	Warwick (Supply)	40,030	9,870	11,420	10,950
	Warwick (Demand)	38,830	17,670	17,220	9,360
	Warwick (Gap)	1,190	- 7,800	- 5,800	1,590

The

NVQ is a work-based qualification which recognises the skills and knowledge a person needs to do a job.

ii Thus a is the intercept of the regression line and b is the slope of the regression line.

iii See <http://www.cedefop.europa.eu/en/events-and-projects/projects/forecasting-skill-demand-and-supply>