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Creative Differences?

Measuring creative economy employment in the US and UK

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Abstract

This paper compares the creative economies of US and UK regions and nations, using high-quality administrative microdata spanning 2011-2013. The creative industries are highly urbanized in both countries. However, we find important differences in the size, density and diversity of creative activity between the two, which reflect both differences in urban systems and in industrial organization. By testing the 'Creative Trident' approach in a comparative international context, the analysis adds to the literature on definition and classification of creative economies, as well as to discussions of regional economic development through the creative economy.

Keywords

Creative industries, Creative Trident, cities, labour markets, occupations, cross-country analysis

JEL Classification: P50, R12, R58, L80

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FORTHCOMING IN REGIONAL STUDIES. PREPRINT OF ACCEPTED VERSION.

1) Introduction

In recent years, the creative industries have captured the attention of city- and region-focused policymakers, managers, and academics. Interest can be traced to Allen Scott's (1997) seminal work on the 'cultural economy', and especially Richard Florida's much-debated concept of the 'creative class' (Florida 2002), and extends to recent research examining the destinations of graduates in creative fields (Comunian and Faggian 2014), and creative workers' use of co-working and urban third spaces (Martins 2015).

Much of this interest derives from two linked ideas: that creative activity clusters into urban 'creative' neighbourhoods (Hall 1998; Hutton 2008; Scott 2014); and that urbanized culture and creativity provide local economic prosperity. The mechanisms through which creativity links to prosperity remains the subject of debate. Some highlight consumption benefits for specific knowledge-economy workers (Florida 2002, 2004), while others consider additional gains rooted in production (Scott 1997; Pratt 2008). One clear problem is that, in order to empirically link creative activity and prosperity, researchers require reliable ways of defining and measuring creative industries, both across regions and countries.

This paper presents a new, comparative analysis of regional and national creative industries employment in the United States and the United Kingdom. To do this, we build on the recent Creative Trident method developed by Higgs et al (2008). The Trident improves on prior creative industries definitions by using occupations as the base unit, identifying 'creatively intense' sectors as those with a critical mass of creative occupations in the workforce. This grounding in occupations enables greater flexibility in analyzing the workforce, whether inside or outside a given set of creative industries.

The Trident method is popular among policymakers, but largely untested by academics. It is also hard to apply to cross-country analysis because it requires rich data and common coding of industries / occupations. We first develop a series of original routines to sync national-level industry and occupation typologies at a detailed (4-digit) level, focusing on creative activities. We combine these with high quality administrative microdata from 2011 to 2013. Next, we analyse patterns of creative activity counts, shares and specialization at the regional scale, before turning to the organization of creative work at the national scale. The result is the most careful and detailed multi-level comparison of creative industries to date, with results that are robust to a series of sensitivity checks.

In addition to shining a light on the creative economies of these two countries, this paper also offers insights about the validity of the Creative Trident approach. One conceptual challenge for the Trident is that the set of creatively intensive activities (and thus industries) may vary from country to country, driven by differences in industry structures, urban systems or policy regimes. Our comparative method allows us to explore these issues in detail and reflect on their significance.

We find that the subnational organization of creative activity broadly follows the shape of the two countries' urban structure, with a multipolar US distribution and a unipolar UK distribution *across* the set of regions, from largest to smallest. We also identify notable differences in the degree to which regions specialize within creative work. In the US, larger regions tend to have more diversified creative economies. While London is diversified in an analogous manner, other UK regions have no clear pattern linking size to creative diversification. At a national scale, in absolute terms the US has a much larger creative

workforce than the UK, but the creative workforce comprises a larger share of the UK workforce. Meanwhile, creatively intense industries in the UK (such as design or media) tend to have much lower intensities in their US counterparts. Industries with low creative intensities are dominant in the US, implying US creative workers are more evenly dispersed across all industries. We suggest that these results reflect two organizing logics: an urban logic which shifts creative occupations into a country's largest city-regions (Scott 2014), and an industry logic in which a US model of large-scale, 'industrialised' creative activity contrasts with the UK's smaller, more specialised creative economy (Lash and Urry 1984). Drawing on this and other studies, we then sketch out some policy lessons for US and UK national and regional policymakers.

More broadly, we argue that the Trident's core concept of creative intensity requires further theorisation; currently it raises several questions as to its function and usefulness in comparative work. Decision-makers need to be cautious about transferring the Trident across regional or national settings. In particular, further assumptions are needed to operationalize the intensity concept, especially ones that consider country and context-specific variation in industrial and urban structure.

2) City-regions, creative industries, and the problem of definition

Creative industries have been a longstanding area of research for urban scholars (Scott 2014). Key works in urban scholarship – Zukin's (1989) work on artists in urban areas, Bianchini and Parkinson's (1993) research on the use of culture for urban regeneration, Hall's (1998) exploration of creativity and cities, Scott's (1997) examination of a formalized 'cultural

economy' complementing and replacing industrialised capitalism – have stressed the role of cultural and creative production to the city and the metropolitan region.

Perhaps the most high-profile recent contribution to creative economy research, Florida's (2002) conception of the 'creative class', was as much a theory about the transformation of metro regions through the attraction and retention of particular occupations, as it was a theory about a new class formation of 'creative' workers. Florida's urban focus is also important as his work is also illustrative of broader debates over the contours of the 'creative' – whether the creative class, creative industries, or creative economy. Indeed, critical engagements with Florida (Peck 2005; Markusen 2006; Nathan, 2007) typically critiqued the *practical* impact of his ideas by querying the 'creative class' concept.

This problem of definition has been a core issue for scholars of creative industries, since the initial codification of creative industries by the UK's Department for Culture, Media and Sport (DCMS 1998). This codification, with its focus on intellectual property, was subject to extensive academic scrutiny as a result of perceived practical and theoretical limitations (e.g Hesmondhalgh 2012; O'Brien et al 2016; Banks and O'Connor 2018).

In contrast, researchers have argued occupational and task-oriented lenses are better ways of understanding the economy (Feser, 2003; Barbour and Markusen, 2007; Currid and Stolarick, 2010, Kemeny and Rigby, 2012), along with specific work focused on applying this set of insights to the creative economy. Similarly, many creative industries scholars have shifted definitional work towards the practices and activities within occupations, with specific occupations having high levels of activities and practices defined as 'creative' (Bakhshi, Freeman, and Higgs 2012).

Under occupation-based classifications, creative activities are defined as roles “within the creative process that brings cognitive skills to bear to bring about differentiation to yield either novel, or significantly enhanced products whose final form is not fully specified in advance” (Bakhshi, Freeman, and Higgs 2012:24). Occupations are scaled by their level of creativity, usually implemented by looking at their share of designated creative tasks.

‘Creative industries’ are then defined as those with a share of creative occupations above some threshold. There are also specific sets of business models and practices characterizing these industries, including short production runs, lack of advance knowledge on product success, just-in-time methods and clustering – to broader structural factors including digitisation, increasing consumer spending on taste-based goods, and a growing desire for consuming distinctive and ‘authentic’ products and services (Bakhshi et al 2012; Hesmondhalgh 2012; O’Brien, 2014).

The most advanced iteration of this approach is the ‘Creative Trident’ developed by Higgs et al (2008), which accounts for the fact that workers in creative occupations may work in other, non-creative industries – such as designers for domestic appliances – and those in creative industries may not all do creative tasks. Here, the ‘creative economy’ consists of all workers in a pre-defined set of creative industries, plus those in creative occupations ‘embedded’ in non-creative industries. The creative industries workforce then divides into ‘creative specialists’, in creative occupations, and ‘support workers’ in other jobs. This definition and approach has now been adopted at UK government level (e.g. BEIS 2018, DCMS 2018), replacing the previous, intellectual property based, approach.

To date this approach has not seen much academic scrutiny. Where academic research has engaged, it has been scholars associated with *developing* it (e.g. Cunningham 2011; Bridgstock et al 2015, 2016). Hence the need for a critical examination of the kind seen for IP-based definitions (e.g. Garnham 2005); the idea of a ‘creative class’ suggested by Florida (e.g. Peck 2005; Markusen, 2006); or the relationship between cultural policy and creative industries (Pratt 2005; Hesmondhalgh and Pratt 2005). Understanding what definitions and the representations of the creative economy afford (Campbell et al 2017) has crucial implications for cities and urban policy, as we can expect further ‘exports’ of the Trident, in keeping with British approaches to exporting creative industries policy (Prince 2014; O’Brien, 2015).

3) Methodology and data

National industry and occupation systems have evolved in parallel over time, typically with a focus on manufacturing.¹ Our analysis builds on recent efforts to back-fit these single-country systems into international standardised typologies, specifically ISIC (for industries) and ISCO (for occupations) (International Labour Organisation 2007; UN-DESA 2008). We exploit these typologies to create a bridge from UK creative codes to their US equivalents, and from there to regional and national scales. Specifically, we use concordance tables to create a crosswalk from UK to US occupations; we then repeat the exercise for industries. Tables A1-A4 in Appendix A provide the details on our starting set of creative occupations and industries.

This workflow generates three basic scenarios, requiring different analytical steps. These are set out in Figure 1. In the first (majority) scenario, we have 1:1 matches from UK – international – US codes. Here we can read our result directly off the concordance tables. This is the case for almost all occupations, and some of our industry codes.

Figure 1 about here

In the second scenario, there is a less than perfect match. Sometimes a UK or international code will match onto multiple US codes (as in occupations); in other cases (some industries) we will lose some detail in the crosswalking process. In these cases we use decision rules to create best-fit matches and use sensitivity checks to test contestable assumptions. Figure A1 gives details.ⁱⁱ In a third, rare scenario there is only a marginal match between codes. As we explain below, the structure of US industry codes in our preferred dataset creates a very small number of cases where there is no match between a 4-digit UK industry and any 4-digit US equivalent. In these cases, we construct ‘least-worst’ matches and as before, use sensitivity checks to test these. Details are given in Appendix A. For cleaner comparisons, we then aggregate to nine higher-level creative industry groups, as defined by the UK government (Department of Culture Media and Sport 2014).

For occupations, we crosswalk from UK Standard Occupational Codes (SOCs) to ISCO 2008 codes to US OCCSOC codes. In most cases we achieve a 1:1 match, or match ISCO cells to several US occupation cells (an even better outcome for precision). Our starting 30 4-digit UK creative occupations codes map to 31 ISCO codes and 48 OCCSOC codes, the latter available at 5 or 6-digit precision. Appendix Tables A1 and A2 give more details. For industries, crosswalking is noisier: the 31 DCMS ‘official’ creative industry SICs are

crosswalked to ISIC4 international codes, to US NAICS codes and then to 22 predominantly 4-digit IPUMS NAICS (INDNAICS) codes used in our preferred US dataset. Tables A3 and A4 give details.

3.1) Data and units

We use Annual Population Survey (APS) microdata for the UK analysis. The APS is the largest household survey in the UK (Office of National Statistics 2018): each year merges two waves of the UK Labour Force Survey (LFS) using a boosted local sample. In turn, this makes it more suitable for local and regional analysis than the LFS, which may suffer from measurement error when working with specific industry and occupation cells in small areas, as we are doing here. Specifically, each APS year contains around 320,000 observations on respondents aged 16 or over, and provides rich social and socio-economic information on individuals and their households. The sampling frame includes both self-employed people and those with second jobs. For the US analysis we use the American Community Survey (ACS), specifically extracts from the Minnesota Population Center's Integrated Public Use Microdata Series (IPUMS) (Ruggles et al. 2010).ⁱⁱⁱ The ACS is a mandatory 1% survey of the US population, covering 3.5m households and individuals on a residence basis. Like the APS, the ACS provides detailed individual- and household-level information, with coverage that includes the self-employed, but not workers' second jobs.^{iv} We adjust the APS and ACS sampling frames to make them identical, removing Armed Forces respondents from the US data, and removing second job information from the UK data.^v To maximize geographical comparability in the regional analysis, we use NUTS2 regions for the UK, and Metropolitan Areas defined by the US Office of Management and Budget (OMB). These provide best-fit administrative units that approximate functionally-integrated labour-market areas.

4) Creative city-regions in the US and UK

In Sections 1 and 2, we highlighted the importance of the regional scale – specifically urban regions – to the study of the creative economy. We therefore begin here by showing sub-national results: these cover either large urban areas, or city-regions. For simplicity, we present results for 2013 only, as findings are strongly consistent between 2011 and 2013. We start by looking at the distribution of activity across regional space, then look at employment density and industry mix. In each case we first consider overall creative economy employment, then break it down into the Trident components identified by Bakhshi et al (2012): creative industries jobs, ‘specialist’ creative occupations in creative industries, and ‘embedded’ creative occupations in non-creative industry sectors.

Figure 2 about here

Creative workforce counts are highly uneven both across space and across countries. For a clean comparison, Figure 2 shows the distribution of creative employment and its components across the top 25 US and UK regions, with the largest indexed to 1.^{vi} This allows us to see how creative jobs are arrayed across the urban system. In other words, in these figures Greater London and New York, both Alpha global cities (Beaverstock, Smith, and Taylor 2000), act as reference points for the remainder of their national creative economies.^{vii} Table B1 in Appendix B gives the underlying numbers.

The top left graph looks at the overall creative economy. In both countries, creative employment is dominated by a few large urban cores. But we can also see that creative jobs follow distinct, country-specific regional patterns. Specifically, the UK distribution is more uneven than the US: centred on Greater London, with a couple of second-tier locations and then a close-to-flat distribution across the rest of the top 25 regions. By contrast, the US system, while also uneven, has a flatter distribution at the top, with creative economy activity shared across 4-5 regions, and a steeper distribution in the tail. Other components of the creative economy – creative industries jobs, specialist and embedded occupations – follow a similar pattern in the two urban systems. The pattern is strongest for creative industries, and weakest for specialist creative workers.

Figure 3 describes the density of creative economy activity in the top 25 US and UK city-regions. Controlling for regional labour market size, the distributions of creative economy and industries jobs are flatter than in counts; cities such as London and LA are penalized here for their large and diverse economies (Hall 1998, Storper et al 2015). Nevertheless, distributions are uneven across space, with a steeper distribution in the UK than the US. We can now see that a major US-UK difference is that creative specialists in the UK are far more urbanized than their US counterparts. Table B2 gives the underlying numbers.

Figure 3 about here

We can gain further insight by looking at diversification within creative work. We compare US and UK systems by calculating a Herfindahl-Hirschman index of concentration on the 2013 data. This yields a measure for each regional economy that captures its level of

diversification across creative industries, scaled from zero (an equal spread of work across creative industries) to one (only one creative industry).

Our analysis identifies similarities in regional creative diversification, as well as some notable US-UK differences. At the aggregate scale, the median local labour market in each country is similarly creatively diversified, with a UK median Herfindahl of 0.20 as opposed to 0.18 for the US, indicating slightly greater specialization in the UK. Meanwhile, the spread of values in the US urban system is wider, with a range between 0.13 and 0.54 as compared to a range in the UK between 0.15 and 0.33. This indicates that the US urban system contains both more diversified *and* more specialized city-regions than any found in the UK.

More interestingly, these patterns relate differently to region size in each national economy. In Figure 4, larger US regions host creative economies that are more strongly diversified than smaller urban areas, and this pattern is robust to removing the largest regions. In the UK, London's creative industries are far more diverse than other regions, and when the capital is removed, we observe a roughly flat relationship – size does not predict creative economy diversification. A Spearman's rho, suitable for measuring correlation in the presence of nonlinearity and outliers, confirms this non-relationship in the UK, while for the US it points to a moderately strong, negative relationship between overall employment and creative diversification.

Figure 4 here

Overall, regional results highlight how each nation's creative employment is distributed unevenly, but distinctively, across space. It confirms the existing literature's focus on the

inherently urban character of creative work, and its concentration in the largest agglomerations. Nevertheless, it also makes clear that fundamental differences in urban hierarchy shape the contrasts between these distributions. Just as the overall spatial economy of the UK is highly unipolar, structured around the capital, the US is polycentric, with New York, Los Angeles, Washington and other large city-regions playing functionally different, but nonetheless relatively equivalently important, roles.

Our results suggest that this ordering translates directly into the absolute size of local creative employment. In employment shares, a number of smaller, more specialized localities enter the rankings, most obviously San Jose, containing the traditional, specialized core of Silicon Valley high-technology activities. Nonetheless, the general contrast between mono- and polycentricity holds. The major exception to this pattern is among creative specialist workers, who play larger roles in UK creative employment than in the US – a finding we return to in the next section. Contrasting urban structures also explain, at least in part, local patterns of specialization within creative industries. Inner and Outer London have creative economies that are fairly diversified, with Herfindahl measures that closely resemble those found in the metros of New York City and Los Angeles. But, in other UK regions, specialization rises, albeit weakly, with total employment. In the US, we get a relatively consistent gradient, with diversification rising with the overall size of the economy. Hence, on the one hand, London is of a piece with American alpha cities. On the other, the other UK regions not only display a different pattern to London, their patterns of specialization within creative work also differ from that found in US cities.

5) National analysis

We can interpret many differences in each country's regional structure of creative employment as reflecting both the 'urban logic' of creative economy activity, and national differences in urban systems. However, this does not explain some important differences *within* regions, in particular the substantial differences in creative specialists. To understand these differences, we shift to the (national) industry level.

5.1) Creative occupations

We start by looking at our pre-defined creative occupations. Figure 5 looks at how these creative occupations are distributed across 4-digit industries in the two countries.

Specifically, these break down workforce employment across all industries by creative intensity (the share of creative occupations in each industry).

Figure 5 about here

The UK workforce is largely distributed into distinct blocs, one of which has very low creative intensity (15% or less), with others at rather higher intensity (30-35%, 40-65%, 70-80%, 85-95%). In comparison, the US workforce has a different distribution, with the majority of workers largely in industries with a low share of creative occupations, and only a minority in industries with 30% or more creative occupations.

5.2) Creative industries

Next, we look at workforce size and characteristics in the nine ‘creative industries’ groups defined by the UK Department for Culture, Media and Sport. In the Appendix, the top panel of Table B3 gives results for these industry groups in the US, while the bottom panel repeats the analysis for the UK.

We see striking contrasts in creative intensities. In the US, only two industry groups (Design activities; Music, performing and visual arts) have creative intensities above 0.3, the threshold that officially designates ‘creative industries’ in the UK. On the other hand, the most creatively intense US industry group, design, has a higher creative intensity in the US (0.711) than its UK counterpart (0.613). It is notable that ICT activity is more creatively intense in the UK (0.427) than the US (0.233). We also find one US industry that is not in the DCMS creative industries list, florists (NAICS 4531), where creative intensity is 0.473. The other striking feature of this table is the within-composition. In both countries the ICT, software and computer games groups comprise the biggest slice of the creative industries as a whole. However, the UK creative industries are dominated by this group (over 33% of all jobs) in a way that is not the case in the US (20.1%).

More broadly, the composition of employment in creative industries suggests a particular character to each country’s creative industries. Industries like Architecture, and Advertising and Marketing comprise much smaller proportions of total creative industry employment in the UK than in the US. Conversely, for Film and broadcast activity, the UK takes a considerably larger share of creative industries jobs (13.7%) than in the US (9.4%). The final

column looks at industry group employment shares across the whole workforce, and confirms these patterns of cross-country difference.

5.3) Creative economies

Finally, we compare the two countries' 'creative economies', defined using the standard Creative Trident concept (Higgs, Cunningham, and Bakhshi 2008). The Trident disaggregates overall creative employment into 'creative' and 'non-creative' occupations within the set of creative industries and their non-creative counterparts. Results are shown in Table 1. The top panel gives results for the US, and the bottom panel, results for the UK.

Table 1 about here

Interpreting the table, the UK has a higher share of workers in creative occupations (5.9% of the workforce in 2011-2013) than the US (4.6% of the workforce). The pattern of embedded creative workers in non-creative industries is similar, with the highest shares in the UK (3.3%) and then the US (2.7%). *Within* the creative industries, the UK's share of creative specialists is also higher (52.3% of all creative industries employment, versus 27.4%). Strikingly, in US creative industries, non-specialists outnumber those in creative occupations by about 2.5:1. But in the UK, those in creative jobs (809,000) outnumber non-specialists (737,000) by a ratio of 1:1.9.

Finally, we conduct a series of sensitivity checks to ensure that our results are robust to issues with outliers and concordances (Table B5) and to alternative sampling frames (Table B6).

Reassuringly, results are materially similar to our main analysis.

6) Conclusions and policy implications: The continued problem of defining creative industries

Writing in 2005, Nicholas Garnham argued that the British adoption of ‘creative’, as opposed to ‘cultural’, industries as a core element of cultural and industrial policy ‘assumes that we already know, and thus can take for granted, what the creative industries are, why they are important and thus merit supporting policy initiatives’ (2005: 16). As our opening discussion suggested, in the intervening years the debate has continued. In its current form, the debate has focused less on the broad theoretical underpinnings of the category and more on the technical aspects of demarcation, with the Trident approach the current ‘state of the art’.

Our analysis has attempted to test the usefulness of this approach in a comparative setting, yielding insights for the wider literature on city regions and creative industries, as well as for scholars interested solely in definitional issues. We find striking differences: the US has substantially more creatively occupied jobs than the UK, but these comprise a smaller share of each nation’s workforce (4.44% vs 5.97%); the UK creative industries grew faster than its US counterpart over the 2011-2013 study period; and industries with low creative intensities are dominant in the US, suggesting US creative workers are more evenly dispersed across all industries. Subnational organization of creative activity broadly follows the two countries’ urban systems, with a multipolar US distribution and a unipolar UK distribution *across* the set of cities, from largest to smallest. The exception is the distribution of creative specialists, who are more urbanized *within* cities whatever their size. We also find striking differences in regional specialisation within the creative industries. Notably, US regions have a wider

spread, with large regions being more diverse, as theory would suggest. The UK's London dominance leads to a very different pattern, with London the diverse core and other regions all occupying similar positions.

We suggest this pattern of results reflects two organizing logics. First, an urban logic: different US and UK urban systems allow for different spatial distributions of creative activities and firms. Absent policy or industry shocks, we can expect these factors to be self-reinforcing over time. Second, an industry logic: the sheer size of the US creative economy compared to its UK counterpart suggests that in the former creative activity is industrialised, and the rest of the economy is 'culturalised' (Lash and Urry 1984). Creative labour inputs inside the UK's creative industries are, in comparison to the US, more important to producing goods and services in those industries than roles in for example finance, logistics and management. What is also striking is that UK *non-creative* industries have the biggest share of creative workers. And even conditional on urban location, US creative industries have less creatively intense workforces, employing fewer specialists.

Thus using the Trident approach to 'map' the creative economies in the UK and US gives a sense of the *differences* between seemingly similar economic sectors. Moreover, the mapping itself, and the process of applying it, raises important implications both for policy and for further research.

The structural features likely to explain US-UK differences in creative economies imply that the overall space for policy intervention is limited. Within this, the differences we uncover through the trident also suggest there is no obvious 'one size fits all' form of creative industries policy intervention. For example, automation of routine tasks is likely to lead to

further labour market polarization, as well as reconfiguring both ‘skilled’ and ‘unskilled’ occupations (Autor 2015; Brynjolffson et al 2018). Overall, creative occupations are likely to be more resistant to these shifts (Bakhshi, Frey, and Osborne 2015). Nevertheless, we may see larger changes in the US, with its large-scale industrialised creative industries, than in the more creatively intense business models that typify creative sectors in the UK. Indeed, automation may turn out to be more productivity-enhancing for UK creatives than their US counterparts. Instead, Spence and Hlatshwayo (2012) suggest that US policymakers should seek an overall expansion in tradable employment, both ‘creative’ and otherwise.

At regional level, the policy needs of the UK, with its London-centric creative economy and smaller regional centres, are very different to the needs of the US and specific American cities. Our analysis suggests some important lessons for policymakers in both countries. For one thing, the highly polycentric, and more industrialized and non-embedded nature of creative employment in the US might well mean that policy *levers* are not directly transferable from the UK to the US. That said, the US, with its more powerful metro-regions in comparison to the UK’s highly centralized state and creative economy, could in principle offer a blueprint for UK policymakers. Policies that seek to grow UK city-regions outside London might also shift the location patterns of creative economy activity across the country over the long term. ‘Big push’ interventions such as the British Broadcasting Corporation’s relocation of some functions to Greater Manchester, and Channel 4’s ‘HQ2’ plan for Leeds, could accelerate these processes. However, the actual ability to develop city-regions in the UK, in terms of devolving power and control of finances, has, at best, a checkered history in the UK (Wilks-Heeg 2016).

At the time of writing (January 2019), Britain also faces challenges arising from its intention to leave the European Union. If Brexit goes ahead, it is likely to increase tariffs and non-tariff barriers for the creative sector and other service industries exporting to the EU. This is likely to negatively affect creative employment across the UK in the short to medium term, unless and until an equivalent FTA for services is signed. Mechanically this will hit London harder than other regions, although the thickness of creative activity in the city may provide some sources of resilience. City-regions outside of London will likely need additional steps to strengthen their creative industries.

Our analysis also suggests some critical reflection on the Trident itself. It has been subjected to theoretical critique over the designation threshold, and over the choice of aggregating occupations with very different workforces and forms of industrial organization into a single sector (Campbell 2019; Campbell et al 2018; O'Brien et al 2016). Yet these critiques can be levelled at prior approaches to the measurement of creative employment, and in this sense a basis in creative tasks that can exist inside and outside designated creative industries represents a step forward. Prior approaches were fairly crude, and the Trident is less so, though questions about the potential influence of relatively arbitrary distinctions remain. These concerns will be hard for future approaches to fully overcome, but it is our comparative that offers the largest lessons. The difficulties in applying the Trident we have identified in this paper, along with the substantive differences between the two nations, point to the need for policy to be much more cautious about the overall category of creative industries and the extent to which the underlying idea that creative intensity can be used to identify a single, global set of 'creative industries'. For example, the low level of creative intensities in the US questions the existence of creative industries as a coherent category, if a strict application of the Trident's threshold is used.

Industrial organisation shapes creative intensity, and this is driven by national economic size, industry mix, human capital availability and industry competitive position, among other factors. Urban system characteristics also play a role, and interact with industrial organisation factors. That might suggest the intensity concept is of limited use in itself for international comparisons – but the notion of creative intensity, and the Trident, can productively be used as *inputs*, rather than as totalizing models, in richer comparisons of the creative economy. Moreover, we have assumed that the set of creative occupations in both countries is identical, but industry and urban logics may also influence the task set within those occupations themselves. New sources of task-level information (from administrative sources such as O*NET, as well as online platforms such as LinkedIn) could help in this regard. Both policy and theory will be rewarded by much more detailed work here.

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Endnotes

ⁱ Originally designed for manufacturing sectors, industry codes such as SICs were able to pick out both broad 'industry space' and specific inputs / output industries within these (e.g. optical equipment => cameras => camera lenses). These typologies have, in recent years, been increasingly developed to include service sector activities. It is still rather harder to do this for parts of the economy - such as creative sectors - where activity is much more service orientated.

ⁱⁱ An alternative approach to multiple matches would be to generate weights based on the number of matches, and use these to adjust US employment accordingly. For example, a 1:1 match is weighted 1, a 1:2 match is worth 0.5 on both US cells, a 1:3 match is worth 0.33 and so on. The drawback to this approach is that it takes no account of match quality and could therefore include some bad or irrelevant matches. Decision rules would therefore also be required in this case.

ⁱⁱⁱ We considered a range of other potential data sources. The Decennial Census only allows for analysis every 10 years, and microdata is not publicly available after 2000. Sources of detailed and high-quality industry employment information about the US economy, like the Quarterly Census of Employment and Wages (QCEW) or County Business Patterns, are not suitable since they lack occupational information. The Current Population Survey (CPS) provides smaller samples that do not permit regional analysis.

^{iv} As a robustness check for our US results, we use information from the Bureau of Labor Statistics' Occupational Employment Statistics (OES) program. OES offers highly detailed occupational and industry information, though only at a national scale and excluding self-employed workers. Appendix B provides details and estimates using OES. Results are substantively comparable.

^v The extent of second jobs in the APS is not huge in terms of the wider workforce. In the aggregated 2013 data 1,148,956 people reported a second job: 3.89% of those in work and 1.84% of all respondents. The APS does not include those living in communal establishments (except for student halls or NHS housing). As such, it will include anyone in the Armed Forces except those living in communal establishments. For this analysis, we remove ACS respondents working in the Armed Forces. In the 2013 data this accounts for 0.67% of employees.

^{vi} Tables C1 and C2 in the Appendix lists regions in terms of creative economy employment counts and shares, respectively; these cities contain over 80% of total national creative economy employment. Tables for the full range of NUTS2 regions and metropolitan areas available upon request.

^{vii} Arguably, one might also combine certain contiguous and relatively integrated US regions together, into Combined Statistical Areas (CSAs), as defined by the OMB. This is challenging to do systematically, given our inability to completely identify micropolitan components of CSAs, at least in public-use Census microdata. That said, it would be possible to combine elements found in Tables 5 and 6, for instance San Francisco and San Jose, and Washington DC and Baltimore. However, the payoff for doing so is considerably lower than for unifying London's Inner and Outer regions. Shares in US component metros are relatively similar, hence while the Bay Area and the DC regions' creative economies would grow somewhat larger in absolute terms, shares would remain comparable, as would the overall international distinction between mono- and polycentricity.

Figures and tables

Figure 1. Crosswalk workflow.

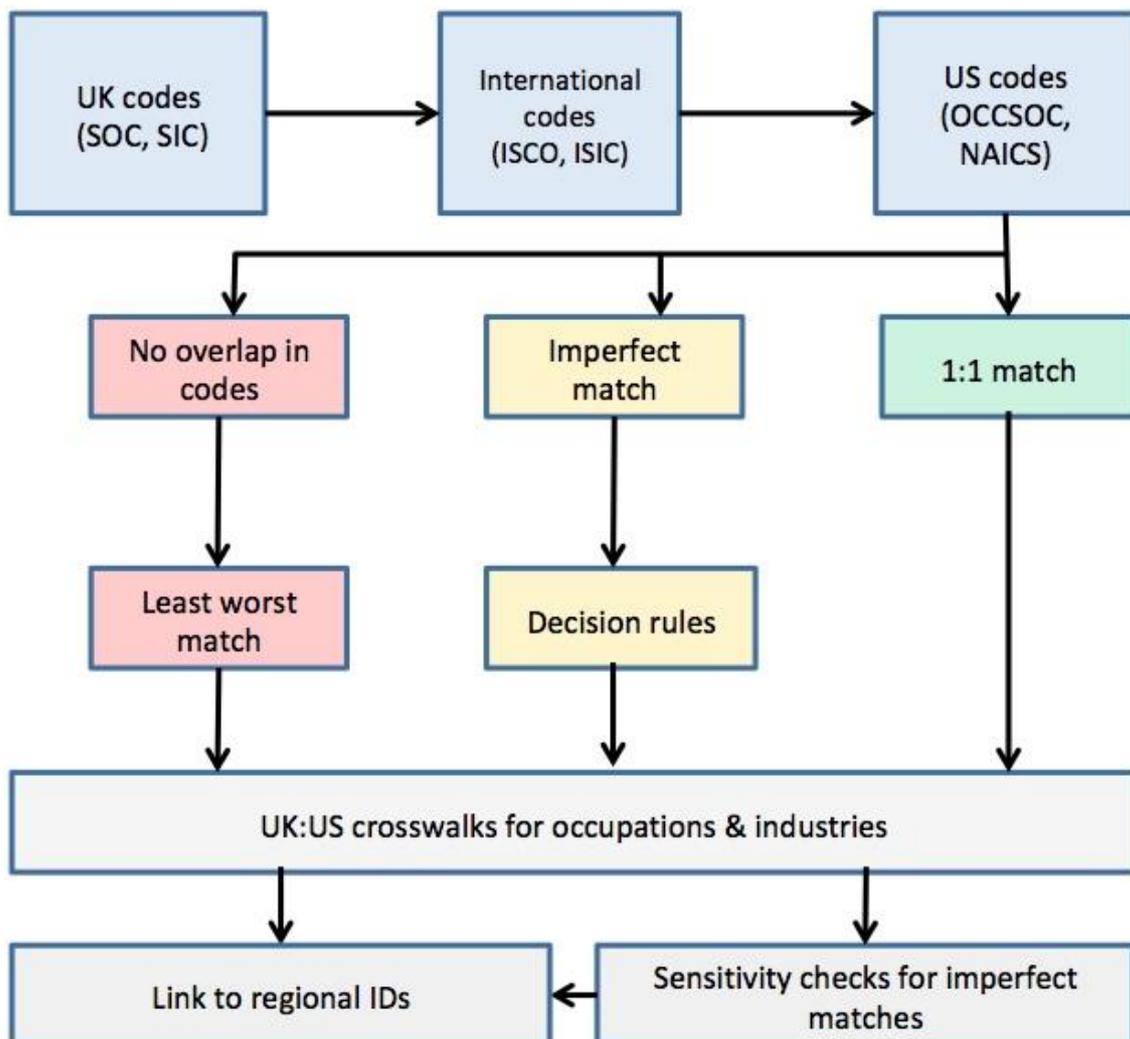


Figure 2. Comparative indexed distribution of creative employment, US and UK, 2013

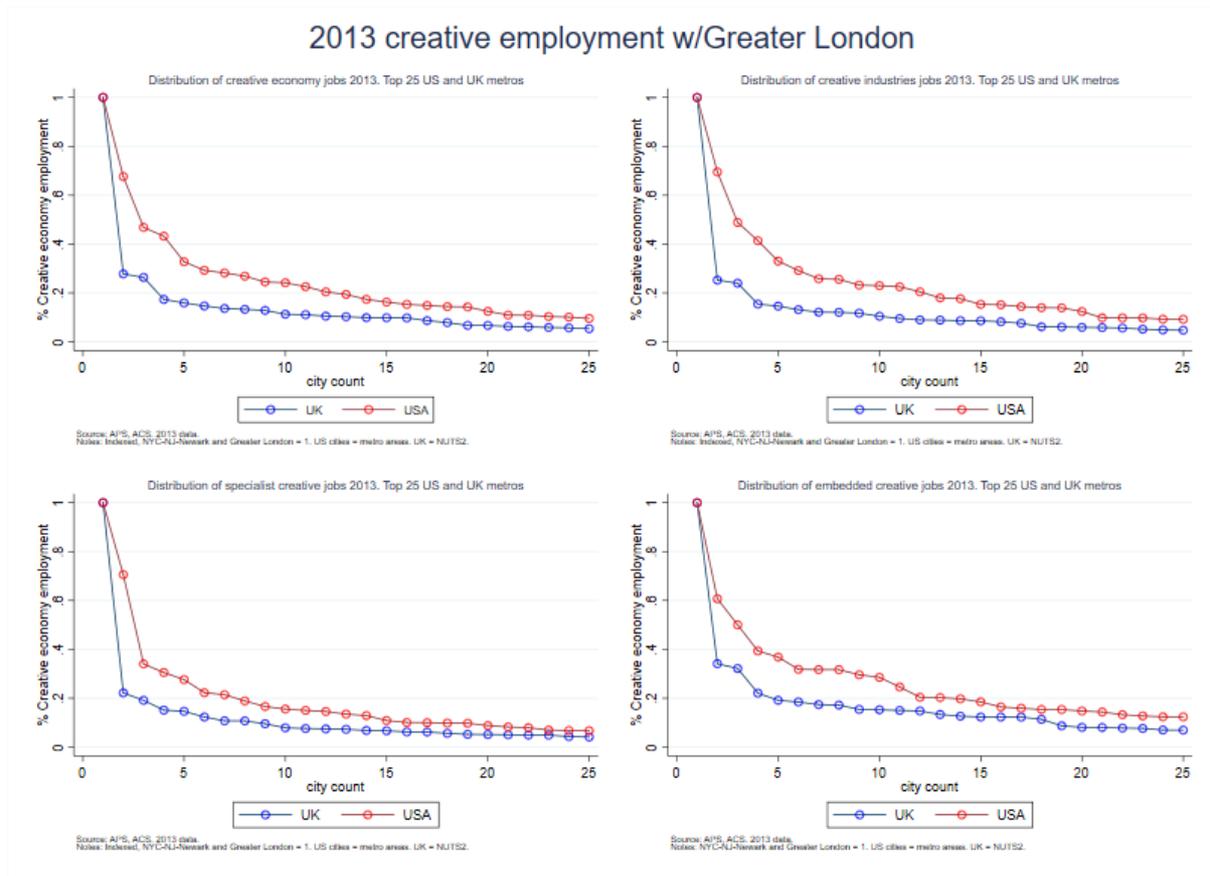


Figure 3. Comparative distribution of shares of creative employment, US and UK, 2013

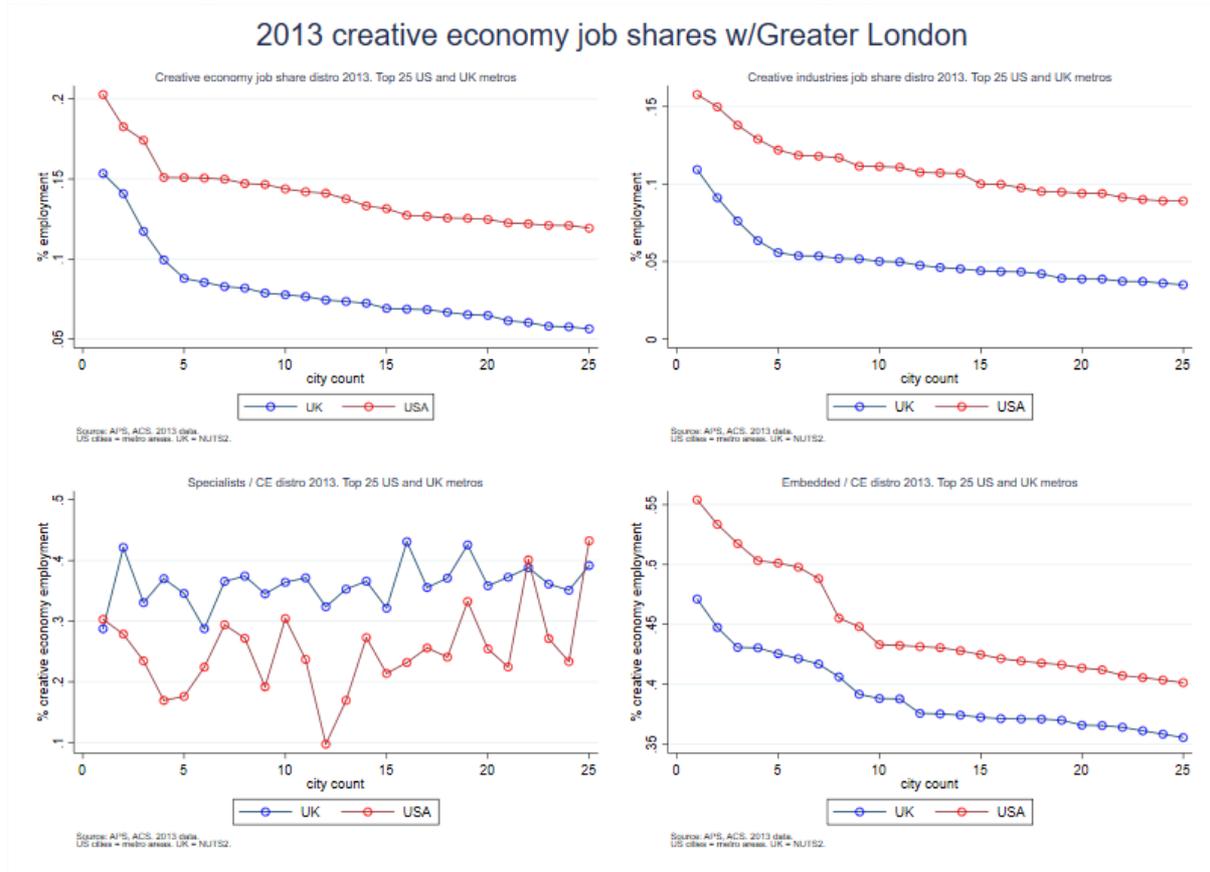
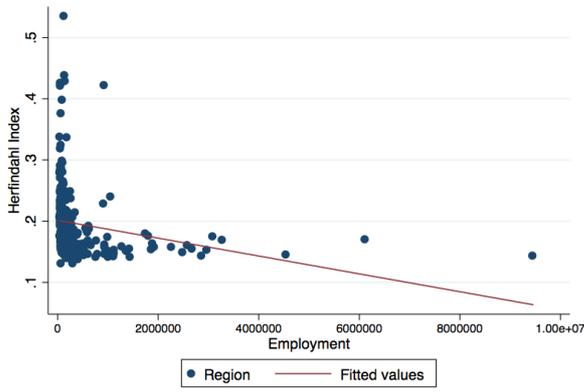
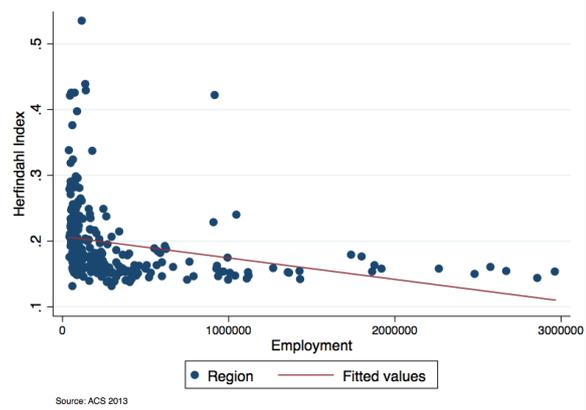


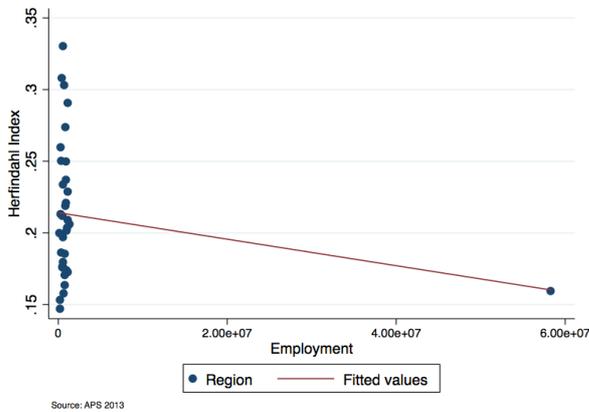
Figure 4. Creative industry diversification and total employment, 2013.



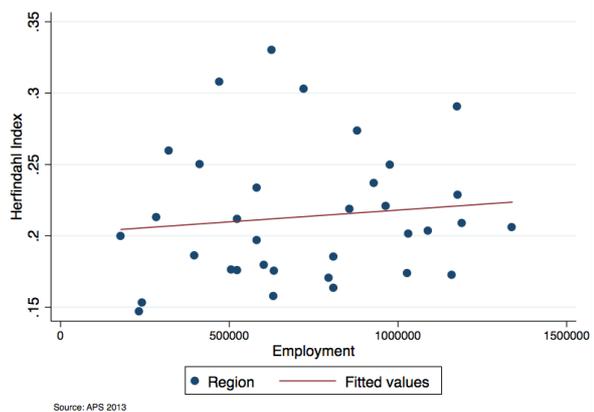
US (all)



US (excluding top 1%)



UK (all)

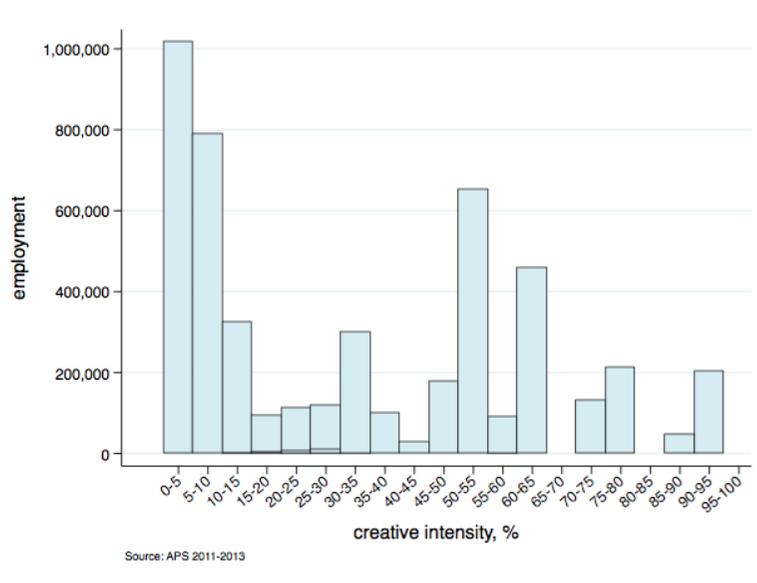


UK (excluding top 1%)

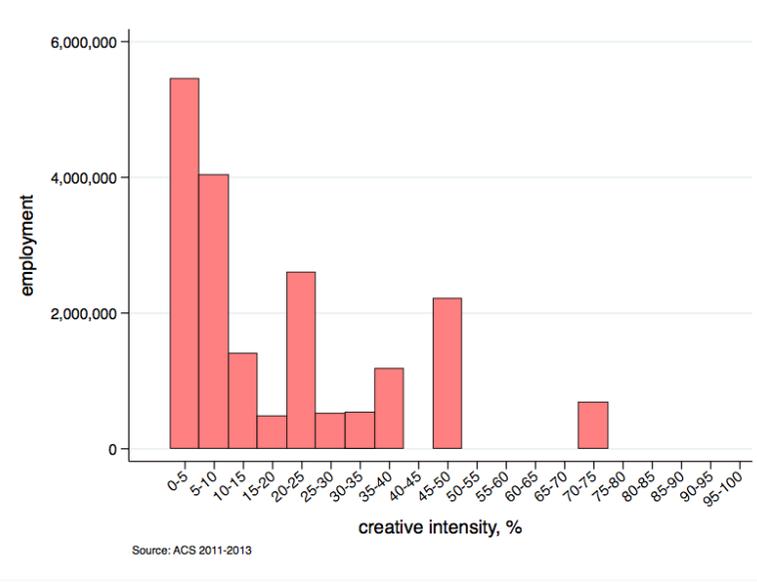
Source: American Community Survey, UK Annual Population Survey.

Notes: 2013 data. Underlying measures are Herfindahl measures of industry diversification, within creative industries only. 1% cap excludes regions with creative workforces over 3,000,000. Spearman's correlation index for all UK regions: $\rho = 0.068$ ($p = 0.699$); for US regions: $\rho = -0.576$ ($p=0.000$).

Figure 5. Industry distribution of jobs by creative intensity, UK, 2011-2013



(a) United Kingdom



(b) United States

Table 1. Creative Tridents for the US and UK.

US, 2011-2013 average			
	Creative industries	Non-creative	All industries
Creative occupations	Specialists: 2,817,000	Embedded: 3,537,000	Creatively occupied jobs: 6,354,000
Non-creative occupations	Non-specialists: 7,462,000	Non-creative: 129,089,000	Non-creatively occupied jobs: 136,551,000
All occupations	Working in creative industries: 10,279,000	Working outside the creative industries: 132,626,000	Workforce: 142,905,000

UK, 2011-2013 average			
	Creative industries	Non-creative	All industries
Creative occupations	Specialists: 809,000	Embedded: 908,000	Creatively occupied jobs: 1,717,000
Non-creative occupations	Non-specialists: 737,000	Non-creative: 26,274,000	Non-creatively occupied jobs: 27,011,000
All occupations	Working in creative industries: 1,546,000	Working outside the creative industries: 27,182,000	Workforce: 28,728,000

Source: American Community Survey, UK Annual Population Survey.

Notes: APS data excludes second jobs. Figures exclude small cells and volatile cells. All samples have armed forces jobs removed to align sampling frames. Totals may not sum due to rounding. All counts rounded to the nearest thousand.

ONLINE APPENDICES

Appendix A / Creative occupations and industries crosswalking.

Table A1. Creative occupations crosswalking: SOC - ISCO crosswalk.

SOC2010	SOC2010 Descriptor	ISCO08	ISCO08 Descriptor
1132	Marketing and sales directors	1221	Sales and marketing managers
1134	Advertising and public relations directors	1222	Advertising and public relations managers
1136	Information technology and telecommunications directors	1330	Information and communications technology services managers
2135	IT business analysts, architects and systems designers	2511	Systems analysts
2136	Programmers and software development professionals	2512	Software developers
2137	Web design and development professionals	2513	Web and multimedia developers
2431	Architects	2161	Building architects
2432	Town planning officers	2164	Town and traffic planners
2451	Librarians	2622	Librarians and related information professionals
2452	Archivists and curators	2621	Archivists and curators
2471	Journalists, newspaper and periodical editors	2642	Journalists
2472	Public relations professionals	2432	Public relations professionals
2473	Advertising accounts managers and creative directors	2431	Advertising and marketing professionals
3121	Architectural and town planning technicians	3112	Civil engineering technicians
3411	Artists	2651	Visual artists
3412	Authors, writers and translators	2641	Authors and related writers
3413	Actors, entertainers and presenters	2655	Actors
3414	Dancers and choreographers	2355	Other arts teachers
3415	Musicians	2652	Musicians, singers and composers
3416	Arts officers, producers and directors	2654	Film, stage and related directors and producers
3417	Photographers, audio-visual and broadcasting equipment operators	3431	Photographers
3421	Graphic designers	3521	Broadcasting and audiovisual technicians
3422	Product, clothing and related designers	2166	Graphic and multimedia designers
		2163	Product and garment designers
		3432	Interior designers and decorators
3543	Marketing associate professionals	2431	Advertising and marketing professionals
5211	Smiths and forge workers	7221	Blacksmiths, hammersmiths and forging press workers
5411	Weavers and knitters	7318	Handicraft workers in textile, leather and related materials
5441	Glass and ceramics makers, decorators and finishers	7314	Potters and related workers
5442	Furniture makers and other craft woodworkers	7522	Cabinet-makers and related workers
5449	Other skilled trades not elsewhere classified	7316	Sign writers, decorative painters, engravers and etchers

Table A2. US creative occupations: ISCO - OCCSOC crosswalk.

ISCO08	ISCO08 Descriptor	OCCSOC	OCCSOC Descriptor
1221	Sales and marketing managers	112020	Marketing and Sales Managers
1222	Advertising and public relations managers	112031	Public Relations and Fundraising Managers
1330	Information and communications technology services managers	113021	Computer and Information Systems Managers
2511	Systems analysts	151121 151111	Computer and Information Research Scientists Computer Systems Analysts
2512	Software developers	151130 151130	Software Developers, Applications Software Developers, Systems Software
2513	Web and multimedia developers	151134	Web Developers
2161	Building architects	171010	Architects, Except Landscape and Naval
2164	Town and traffic planners	193051	Urban and Regional Planners
2622	Librarians and related information professionals	254021 259011	Librarians Audio-Visual and Multimedia Collections Specialists
2621	Archivists and curators	254010	Archivists, Curators
2642	Journalists	273020 273041	Reporters and Correspondents Editors
2432	Public relations professionals	273031	Public Relations Specialists
2431	Advertising and marketing professionals	131161	Market Research Analysts and Marketing Specialists
3112	Civil engineering technicians	173020 173031	Civil Engineering Technicians Surveying and Mapping Technicians
2651	Visual artists	271010	Fine Artists, Including Painters, Sculptors, and Illustrators
2641	Authors and related writers	273042 273043	Technical Writers Writers and Authors
2655	Actors	272011	Actors
2355	Other arts teachers	253000 272040	Self-Enrichment Education Teachers Teachers and Instructors, All Other
2652	Musicians, singers and composers	272040	Music Directors and Composers; Musicians and Singers

Table A2 continued.

ISCO08	ISCO08 Descriptor	OCCSOC	OCCSOC Descriptor
2654	Film, stage and related directors and producers	271010 272012 274030	Art Directors Producers and Directors Film and Video Editors
3431	Photographers	274021	Photographers
3521	Broadcasting and audiovisual technicians	274011 274012 274013 274014 274031 274099	Audio and Video Equipment Technicians Broadcast Technicians Radio Operators Sound Engineering Technicians Camera Operators, Television, Video, and Motion Picture Media and Communication Equipment Workers, All Other
2166	Graphic and multimedia designers	271010 271020	Multimedia Artists and Animators Graphic Designers
2163	Product and garment designers	271020	Commercial and Industrial Designers, fashion designers, all other designers
3432	Interior designers and decorators	271020	Interior Designers, Merchandise Displayers and Window Trimmers, Set and Exhibit Designers
7221	Blacksmiths, hammersmiths and forging press workers	514022 514199	Forging Machine Setters, Operators, and Tenders, Metal and Plastic Metal Workers and Plastic Workers, All Other
7318	Handicraft workers in textile, leather and related materials	516041	Shoe and Leather Workers and Repairers
7314	Potters and related workers	519195 517011	Molders, Shapers, and Casters, Except Metal and Plastic Cabinetmakers and Bench Carpenters
7522	Cabinet-makers and related workers	517021 517130	Furniture Finishers Model Makers, Wood Patternmakers, Wood
7319	Handicraft workers not elsewhere classified	271012	Craft Artists

Notes: Source for concordance tables: ONS (2010), BLS (2012) and IPUMS (2015). Blue highlight = adjusted bad crosswalk.

We first crosswalk from SOC2010 codes to ISCO08, then from ISCO to OCCSOC codes for the US data. In each case we attempt a 1:1 match where the crosswalk allows this. Where it does not we follow the decision rules set out in Section 3 to deal with multiple matches, marginal cases and possible errors in the crosswalk itself.

In the SOC-ISCO crosswalk we find one case of possible error in the crosswalk, where SOC5449 (Other skilled trades not elsewhere classified) is matched to ISCO7316 (Sign writers, decorative painters, engravers and etchers). We amend this to ISCO7319 (Handicraft workers not elsewhere classified) and proceed on this basis.

In the ISCO-OCCSOC crosswalk, we are mapping 4-digit ISCO cells onto much more detailed US occupational categories. We find a series of cases where ISCO cells map on to the same OCCSOC cell on more than one occasion, and use decision rules to assign these to 1:1 matches. We also have one case of possible error in the crosswalk, at least in terms of identifying creative occupations.

Specifically:

1. OCCSOC 273041 (Editors) maps to ISCO categories 2642 (Journalists) and 2641 (Authors and writers). Descriptors from BLS (2012) and ILO (2009) are inconclusive, so we give this to ISCO 2641, journalists.
2. OCCSOC 271012 (Craft artists) maps to ISCO 'Visual artists' (2651), 'Potters and related workers' (7314), and 'Other handicraft workers' (7319). BLS 2012 descriptors say 'Create or reproduce hand-made objects for sale and exhibition using a variety of techniques, such as welding, weaving, pottery, and needlecraft.' We assign the category to ISCO 7319.
3. OCCSOC 273043 (writers and authors) maps to ISCO 'Advertising and marketing professionals' (2431) 'Authors and related writers' (2641). Based on descriptors we assign this to ISCO 2641.

4. ISCO 3112, 'Civil engineering technicians' includes OCCSOC codes 331021 (First-Line Supervisors of Fire Fighting and Prevention Workers) and 332020 (Fire Inspectors and Investigators) and 474011 (Construction and Building Inspectors) as well as 173020 (Civil Engineering Technicians) and 173031 (Surveying and Mapping Technicians). Here, we are concerned that the first two occupational categories are not creative in the sense defined in section 3. Analysis of descriptors from BLS (2012) and ILO (2009) confirm this, so we drop these two cells from the final crosswalk.

Table A3. SIC - ISIC crosswalk

SIC07	SIC07 Descriptor	ISIC4	ISIC4 Descriptor
32.12	Manufacture of jewelry and related articles	3211	Manufacture of jewelry and related articles
32.11	Striking of coins	3211	Manufacture of jewelry and related articles
58.11	Book publishing	5811	Book publishing
58.12	Publishing of directories and mailing lists	5812	Publishing of directories and mailing lists
58.13	Publishing of newspapers	5813	Publishing of newspapers, journals and periodicals
58.14	Publishing of journals and periodicals	5813	Publishing of newspapers, journals and periodicals
58.19	Other publishing activities	5819	Other publishing activities
58.21	Publishing of computer games	5820	Software publishing
58.29	Other software publishing	5820	Software publishing
59.11	Motion picture, video and television programme production activities	5911	Motion picture, video and television programme production activities
59.12	Motion picture, video and television programme post-production	5912	Motion picture, video and television programme post-production activities
59.13	Motion picture, video and television programme distribution	5913	Motion picture, video and television programme distribution activities
59.14	Motion picture projection activities	5914	Motion picture projection activities
59.2	Sound recording and music publishing activities	5920	Sound recording and music publishing activities
60.1	Radio broadcasting	6010	Radio broadcasting
60.2	Television programming and broadcasting activities	6020	Television programming and broadcasting activities
62.01	Computer programming activities	6201	Computer programming activities
62.02	Computer consultancy activities	6202	Computer consultancy and computer facilities management activities
62.03	Computer facilities management activities	6202	Computer consultancy and computer facilities management activities
70.21	Public relations and communication activities	7020	Management consultancy activities
70.22	Business and other management consultancy activities	7020	Management consultancy activities
71.11	Architectural activities	7110	Architectural and engineering activities and related technical consultancy
71.12	Engineering activities and related technical consultancy	7110	Architectural and engineering activities and related technical consultancy

Table A3 continued.

SIC07	SIC07 Descriptor	ISIC4	ISIC4 Descriptor
73.11	Advertising agencies	7310	Advertising
73.12	Media representation	7310	Advertising
74.1	Specialised design activities	7410	Specialized design activities
74.2	Photographic activities	7420	Photographic activities
74.3	Translation and interpretation activities	7490	Other professional, scientific and technical activities n.e.c.
74.9	Other professional, scientific and technical activities n.e.c.		
85.52	Cultural education	8542	Cultural education
90.01	Performing arts	9000	Creative, arts and entertainment activities
90.02	Support activities to performing arts	9000	Creative, arts and entertainment activities
90.03	Artistic creation	9000	Creative, arts and entertainment activities
90.04	Operation of arts facilities	9000	Creative, arts and entertainment activities
91.01	Library and archive activities	9101	Library and archives activities
91.02	Museum activities	9102	Museums activities and operation of historical sites and buildings
91.03	Operation of historical sites and buildings and similar visitor attractions	9102	Museums activities and operation of historical sites and buildings

Notes: Concordance tables used are from UN-DESA (2008), US Census Bureau (2012) and IPUMS (2015). Green highlight = fuzzy crosswalk from SIC-ISIC. Grey highlight = bad match. All groups included but subject to sensitivity tests.

Table A4. US creative industries: ISIC - INDNAICS crosswalk

ISIC4	ISIC4 Descriptor	INDNAICS	INDNAICS Descriptor
3211	Manufacture of jewelry and related articles	3279	Miscellaneous nonmetallic mineral products
3211	Manufacture of jewelry and related articles	3399M ¹	Sporting and athletic goods, and doll, toy, and game manufacturing
5813	Publishing of newspapers, journals and periodicals	51111	Newspaper publishers
5811	Book publishing	5111Z ²	Periodical, Book, and Directory Publishers except newspapers
5812	Publishing of directories and mailing lists	5111Z ²	Periodical, Book, and Directory Publishers except newspapers
5819	Other publishing activities	5111Z ²	Periodical, Book, and Directory Publishers except newspapers
5820	Software publishing	5112	Software publishing
5820	Software publishing	51913	Internet publishing and broadcasting and web search portals
5911	Motion picture, video and television programme production activities	5121	Motion pictures and video industries
5912	Motion picture, video and television programme post-production activities		
5913	Motion picture, video and television programme distribution activities		
5914	Motion picture projection activities		
5920	Sound recording and music publishing activities	5122	Sound recording industries
6010	Radio broadcasting	5122	Sound recording industries
6020	Television programming and broadcasting activities	5122	Sound recording industries
6201	Computer programming activities	5415	Computer systems design and related services
6202	Computer consultancy and computer facilities management activities	5182	Data processing, hosting, and related services
7110	Architectural and engineering activities and related technical consultancy	5413	Architectural, engineering, and related services
7310	Advertising	5418	Advertising and related services
7410	Specialized design activities	5414	Specialized design services
7420	Photographic activities	8129	Other personal services
7490	Other professional, scientific and technical activities n.e.c.	5419Z ³	Other professional, scientific and technical services (excluding vets)
		5416	Management, scientific and technical consulting services

Table A4 continued.

ISIC4	ISIC4 Descriptor	INDNAICS	INDNAICS Descriptor
8542	Cultural education	611M3 ⁴	Other schools, instruction and educational services
9000	Creative, arts and entertainment activities	711	Independent artists, performing arts, spectator sports and related industries
9000	Creative, arts and entertainment activities	5191ZM ⁵	Other information services, except libraries and archives, and except internet publishing and broadcasting and web search portals
9000	Creative, arts and entertainment activities	51912	Libraries and archives
9102	Museums activities and operation of historical sites and buildings	712	Museums, art galleries, historical sites, and similar institutions

Notes: Concordance tables used are from UN-DESA (2008), US Census Bureau {(2012) and IPUMS (2015)}. Green highlight = fuzzy crosswalk from SIC-ISIC. Grey highlight = bad match. All groups included but subject to sensitivity tests. Key for hybrid cells: 1 = NAICS 33992 (sporting goods) and 33993 (toys, dolls and games); 2 = NAICS 5111 except 51111; 3 = NAICS 5419 except 54194 ; 4 = NAICS 6116 and 6117 ; 5 = NAICS 5191 except 51912 and 51913.

We first crosswalk from SIC2007 codes to ISIC Revision 4, then from ISIC to NAICS 2007 codes. In the case of the ACS we use INDNAICS codes, which are NAICS codes crosswalked from the Survey's original Census Industry codes. In most cases INDNAICS are identical to NAICS; levels of detail vary from 3-digit to 5-digit. In the case of the DCMS creative industries, the majority are available at NAICS4 level. In a couple of cases, as shown in Table A6, INDNAICS descriptors vary slightly from standard NAICS descriptors in order to accommodate crosswalking in closely related sectors at different levels of detail and eliminate double counting. For example, we have a detailed NAICS coding on newspaper publishing (51111) but less detailed information for all other publishing. In this case a 4-digit NAICS code (5111Z) is used, but newspaper publishing is excluded and the descriptor is 'Periodical, book, and directory publishing (except newspapers)'.

In each case we attempt a 1:1 match where the crosswalk allows this. Where it does not we follow the decision rules set out in section 4 to deal with multiple matches, marginal cases and possible errors in the crosswalk itself.

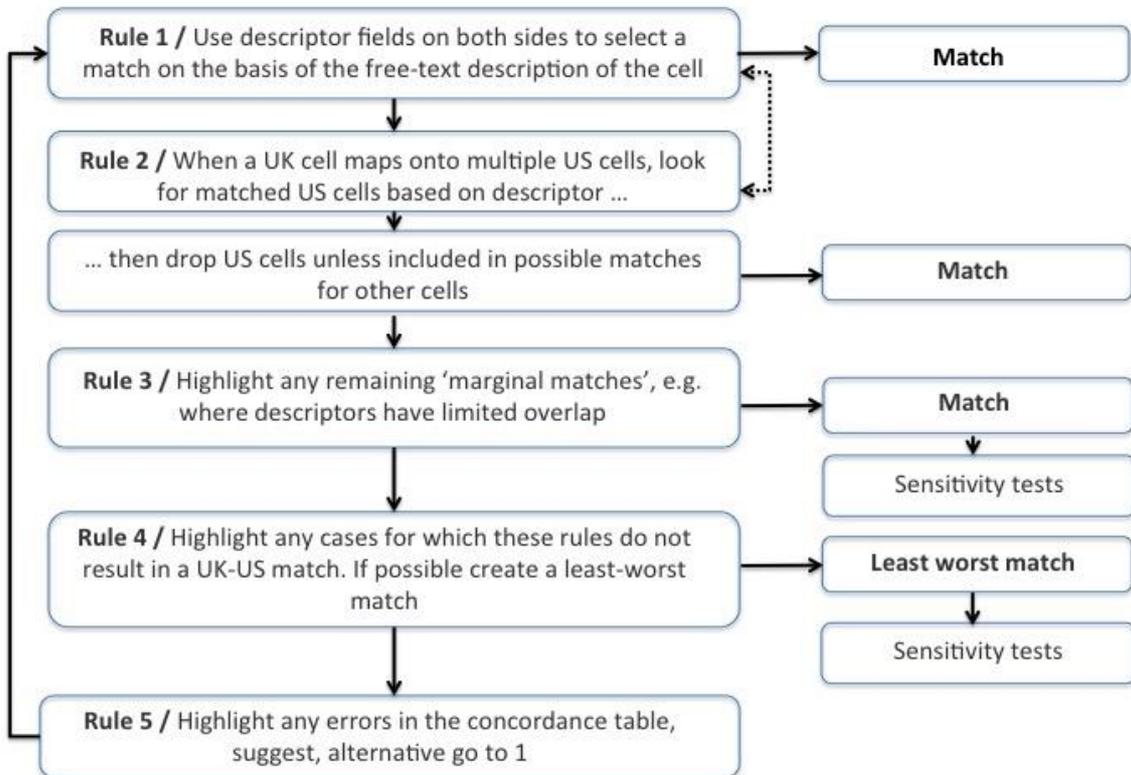
As set out in Section 3, industry crosswalking is less precise than occupational crosswalking at all stages of the crosswalking process. We identify, in green, industries where the initial SIC-ISIC crosswalking is fuzzy: that is, we lose some detail when crosswalking from SIC to ISIC (even if we gain detail in the ISIC – INDNAICS stage). In section 5 we use an APS-based workaround to test the extent to which this induces error in the US estimates. At the INDNAICS stage, we have a number of cases where ISIC codes are collapsed into single INDNAICS codes, as well as multiple matches and two bad matches. Specifically:

1. Large parts of the publishing industry (ISICs 5811 Book publishing, 5812 Publishing of directories and mailing lists, 5819 Other publishing activities) collapse into the INDNAICS codes 5111Z (Periodical, Book, and Directory Publishers except newspapers) and 5191 (Other information services, and internet publishing and broadcasting and web search portals (except libraries and archives)).
2. The INDNAICS cell 5191ZM (Other information services, except libraries and archives, and internet publishing and broadcasting and web search portals) maps to multiple ISIC cells (5813 newspapers, 5819 other publishing, 5920 Sound recording and music publishing activities, 6010 Radio broadcasting, 6020 Television programming and broadcasting activities, 5191 Libraries and archives). The INDNAICS descriptor specifies that 'This industry group comprises establishments, not classified to any other industry, primarily engaged in providing other information services. The main components are news syndicates, libraries and archives, and other information search services on a contract basis.' On this basis we ascribe the INDNAICS cell to ISIC 5191 and drop it from other matches.
3. All film industry ISICs (5911, 5912, 5913, 5914) all collapse to the same INDNAICS code (5121 Motion Picture and Video Industries).
4. Radio and TV broadcasting ISIC codes have the same INDNAICS code (515 Broadcasting, except Internet).
5. INDNAICS cell 5418 (Advertising, Public Relations, and Related Services) maps to two ISIC cells (6202 / Computer consultancy and computer facilities management activities, and 7310 / Advertising). Based on descriptors we assign it to ISIC 7310.
6. SIC code 7021 (Public relations and communication activities) maps to ISIC 7020 (Management consultancy), which makes it one of the many SIC-ISIC fuzzy match cases. The ISIC cell then maps to INDNAICS 5416 (Management, scientific and

technical consultancy services), which is a bad match. Elsewhere in the crosswalk SIC 7310 (Advertising) maps to INDNAICS 5418 (Advertising, Public Relations, and Related Services), which covers the industry activity we need. We therefore drop the first instance of NAICS 5416, although we use it elsewhere (see note 8).

7. ISIC cell 7420 (Photographic activity) maps to a number of apparently unrelated INDNAICS cells (5182 Data processing, hosting, and related services, 5419Z Other professional, scientific and technical services (excluding vets), 711 Independent artists, performing arts, spectator sports and related industries, 8129 Other personal services). More detailed NAICS codes provide a precise match to photography, but these codes are unavailable for ACS or other US labour force data. In this case we keep INDNAICS 8129, other personal services, as the least worst option, but this is arguably a bad match: we drop it completely in a robustness check.
8. The SIC cell for translation / interpretation activities (74.3) maps to a much larger ISIC cell (7490, Other professional, scientific and technical activities not elsewhere classified), and this then maps to the two INDNAICS codes 5419Z (Other professional, scientific and technical services, excluding vets) and 5416 (Management, scientific and technical consulting services). This is arguably a bad match: we drop these cells completely in a robustness check.
9. INDNAICS cell 711 (Independent artists, performing arts, spectator sports and related industries) maps to ISIC cells 7490 (Other professional services) and 9000 (Creative, arts and entertainment). Based on descriptors we assign this to 9000.

Figure A1. Decision rules for imperfect matches and non-matches.



Appendix A references

- Bureau of Labor Statistics (2012). ISCO08-SOC crosswalk. Washington, DC, BLS.
- International Labour Organisation (2009). ISCO08 Descriptors Geneva, ILO.
- IPUMS (2015). IPUMS Occupation Crosswalk -- OCC and OCCSOC ACS and PRCS Samples.
- Office for National Statistics (2010). Mapping Standard Occupational Classification 2010 (SOC2010) unit group with size of organisation to ISCO08 unit group. Newport, ONS.
- UN-DESA (2008). International Standard Industrial Classification of All Economic Activities: Revision 4. Statistical papers Series M No. 4/Rev.4. New York, United Nations.
- US Census Bureau (2012). Concordances: 2007 NAICS to ISIC4. US Census.

Appendix B: Supplemental Results

Table B1. Counts of Creative Employment in US Metropolitan Areas and UK NUTS2 Regions, 2013

Metropolitan area, 2013 OMB delineations	Creative Industries	Embedded	Creative Economy	NUTS2 name	Creative Industries	Embedded	Creative Economy
New York-Newark-Jersey City, NY-NJ-PA	946,192	257,522	1,203,714	Inner London	230,823	103,183	334,006
Los Angeles-Long Beach-Anaheim, CA	657,853	156,348	814,201	Outer London	193,594	83,942	277,536
Washington-Arlington-Alexandria, DC-VA-MD-WV	462,617	101,329	563,946	Berkshire Buckinghamshire & Oxfordshire	107,267	62,755	170,022
Chicago-Naperville-Elgin, IL-IN-WI	391,580	128,857	520,437	Surrey East & West Sussex	101,904	59,280	161,184
San Francisco-Oakland-Hayward, CA	312,656	81,933	394,589	Bristol and Avon	65,657	42,550	108,207
Boston-Cambridge-Newton, MA-NH	276,202	76,244	352,446	East Anglia	62,103	36,774	98,877
Dallas-Fort Worth-Arlington, TX	244,388	94,849	339,237	Bedfordshire & Hertfordshire	55,918	35,569	91,487
Atlanta-Sandy Springs-Roswell, GA	242,233	81,599	323,832	Greater Manchester	51,604	33,812	85,416
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	213,537	81,646	295,183	Hampshire and Isle of Wight	49,889	32,594	82,483
Houston-The Woodlands-Sugar Land, TX	217,664	73,507	291,171	Leeds-Bradford	51,315	28,404	79,719
Seattle-Tacoma-Bellevue, WA	219,860	52,198	272,058	Glasgow-Dumfries-Inverclyde	40,548	29,323	69,871
Miami-Fort Lauderdale-West Palm Beach, FL	193,719	52,516	246,235	Essex	44,563	24,400	68,963
Minneapolis-St. Paul-Bloomington, MN-WI	170,351	63,353	233,704	Leicestershire Rutland & Northamptonshire	36,613	28,520	65,133
Denver-Aurora-Lakewood, CO	167,117	42,316	209,433	Birmingham-Black Country-Wolverhampton-Coventry	34,958	27,070	62,028
Phoenix-Mesa-Scottsdale, AZ	145,230	50,894	196,124	Aberdeen and surrounds	38,142	23,535	61,677
San Jose-Sunnyvale-Santa Clara, CA	143,659	40,975	184,634	Derby-Nottingham	37,771	23,655	61,426
Detroit-Warren-Dearborn, MI	131,808	47,626	179,434	Kent	36,761	24,631	61,392
San Diego-Carlsbad, CA	136,526	36,994	173,520	Herefordshire Worcestershire & Warwickshire	32,356	21,430	53,786
Baltimore-Columbia-Towson, MD	132,528	39,610	172,138	Shropshire and Staffordshire	26,000	22,586	48,586
Austin-Round Rock, TX	117,609	32,845	150,454	Cardiff-Newport	26,267	14,971	41,238

Source: American Community Survey, UK Annual Population Survey.

Notes: APS data excludes second jobs. All samples have armed forces jobs removed to align sampling frames. See Section 3 for column definitions.

Table B2. Shares of Creative Employment in US Metropolitan Areas and UK NUTS2 Regions, 2013

Metropolitan area, 2013 OMB delineations	Creative Industries	Embedded	Creative Economy	NUTS2 name	Creative Industries	Embedded	Creative Economy
San Jose-Sunnyvale-Santa Clara, CA	15.8%	4.5%	20.3%	Inner London	14.9%	6.6%	21.5%
Washington-Arlington-Alexandria, DC-VA-MD-WV	15.0%	3.3%	18.3%	Berkshire Buckinghamshire & Oxfordshire	9.3%	5.4%	14.7%
San Francisco-Oakland-Hayward, CA	13.8%	3.6%	17.4%	Surrey East and West Sussex	7.7%	4.5%	12.1%
Austin-Round Rock, TX	11.8%	3.3%	15.1%	Outer London	8.4%	3.6%	12.0%
Seattle-Tacoma-Bellevue, WA	12.2%	2.9%	15.1%	Bedfordshire and Hertfordshire	6.4%	4.1%	10.4%
Provo-Orem, UT	11.9%	3.2%	15.1%	Bristol and Avon	5.8%	3.7%	9.5%
Huntsville, AL	12.9%	2.1%	15.0%	Hampshire and Isle of Wight	5.5%	3.6%	9.2%
Raleigh, NC	11.1%	3.6%	14.7%	East Anglia	5.4%	3.2%	8.7%
Denver-Aurora-Lakewood, CO	11.7%	3.0%	14.7%	Herefordshire Worcestershire & Warwickshire	5.2%	3.4%	8.6%
Bridgeport-Stamford-Norwalk, CT	11.2%	3.2%	14.4%	Leicestershire Rutland & Northamptonshire	4.5%	3.5%	8.1%
Boston-Cambridge-Newton, MA-NH	11.1%	3.1%	14.2%	Essex	5.2%	2.9%	8.1%
Ann Arbor, MI	9.5%	4.6%	14.1%	Cardiff-Newport	5.0%	2.9%	7.9%
Fort Collins, CO	10.7%	3.1%	13.8%	Kent	4.6%	3.1%	7.8%
Los Angeles-Long Beach-Anaheim, CA	10.8%	2.6%	13.3%	Leeds-Bradford	5.0%	2.8%	7.7%
Trenton, NJ	10.7%	2.4%	13.1%	Cheshire	4.4%	3.0%	7.4%
New York-Newark-Jersey City, NY-NJ-PA	10.0%	2.7%	12.7%	Cornwall and Isles of Scilly	4.8%	2.5%	7.3%
Baltimore-Columbia-Towson, MD	9.8%	2.9%	12.7%	Glasgow-Dumfries-Inverclyde	4.2%	3.1%	7.3%
Atlanta-Sandy Springs-Roswell, GA	9.4%	3.2%	12.6%	North Yorkshire	3.8%	3.5%	7.3%
Minneapolis-St. Paul-Bloomington, MN-WI	9.1%	3.4%	12.5%	Greater Manchester	4.3%	2.8%	7.2%
Colorado Springs, CO	10.0%	2.5%	12.5%	Dorset and Somerset	4.4%	2.7%	7.1%

Source: American Community Survey, UK Annual Population Survey.

Notes: APS data excludes second jobs. All samples have armed forces jobs removed to align sampling frames. See Section 3 for column definitions.

Table B3. US/ UK creative industries groups

US, 2011-2013 average					
Industry group	Creative intensity	Jobs	Creative jobs	% Creative industries jobs	% All jobs
Advertising and marketing	0.171	1,880,000	322,000	18.29%	1.32%
Architecture	0.212	1,418,000	301,000	13.80%	0.99%
Crafts	0.141	190,000	27,000	1.85%	0.13%
Design activities	0.711	320,000	228,000	3.12%	0.22%
Film, TV, video, radio and photography	0.287	963,000	276,000	9.37%	0.67%
IT software and computer services	0.223	2,069,000	459,000	20.10%	1.45%
Publishing	0.272	1,402,000	381,000	13.65%	0.98%
Museums, galleries and libraries	0.217	596,000	129,000	5.80%	0.42%
Music, performing and visual arts	0.486	1,440,000	693,000	14.02%	1.01%
				<i>100%</i>	<i>7.19%</i>

UK, 2011-2013 average					
Industry group	Creative intensity	Jobs	Creative jobs	% Creative industries jobs	% All jobs
Advertising and marketing	0.533	142,000	76,000	9.21%	0.49%
Architecture	0.647	90,000	58,000	5.80%	0.31%
Crafts	0.557	7,000	4,000	0.48%	0.03%
Design activities	0.613	106,000	65,000	6.83%	0.37%
Film, TV, video, radio and photography	0.607	212,000	129,000	13.69%	0.74%
IT software and computer services	0.427	523,000	223,000	33.77%	1.82%
Publishing	0.520	194,000	101,000	12.56%	0.68%
Museums, galleries and libraries	0.235	82,000	19,000	5.33%	0.29%
Music, performing and visual arts	0.703	191,000	134,000	12.33%	0.66%
				<i>100%</i>	<i>5.38%</i>

Source: American Community Survey, UK Annual Population Survey.

Notes: APS data excludes second jobs. Figures exclude small cells and volatile cells. All samples have armed forces jobs removed to align sampling frames. All counts rounded to the nearest thousand.

Table B5. Sensitivity checks of US estimates to various challenges

Dropping poorly UK-US crosswalked cells (1)					
Year	Creative industries	Embedded	Creative economy	Change in % CE	Change in intensity
2011	9,172,000	3,457,000	12,629,000	-0.24%	0.035
2012	9,490,000	3,510,000	13,000,000	-0.36%	0.035
2013	9,768,000	3,643,000	13,411,000	-0.51%	0.031
Adjusting fuzzy SIC-ISIC crosswalk cells (2)					
Year	Creative industries	Embedded	Creative economy	Change in % CE	Change in intensity
2011	9,856,000	3,457,000	13,313,000	-0.05%	0.000
2012	10,211,000	3,510,000	13,721,000	-0.17%	0.000
2013	10,506,000	3,643,000	14,148,000	-0.32%	0.004
Dropping fuzzy SIC-ISIC crosswalk industry cells (3)					
Year	Creative industries	Embedded	Creative economy	Change in % CE	Change in intensity
2011	6,286,000	3,457,000	9,744,000	-2.54%	-0.007
2012	6,358,000	3,510,000	9,869,000	-2.65%	-0.007
2013	6,439,000	3,643,000	10,082,000	-2.80%	-0.003
Dropping Computer systems design and related services(4)					
Year	Creative industries	Embedded	Creative economy	Change in % CE	Change in intensity
2011	8,153,000	3,457,000	11,610,300	-1.21%	0.000
2012	8,307,000	3,510,000	11,818,000	-1.32%	0.000
2013	8,546,000	3,643,000	12,190,000	-1.47%	0.004

Source: American Community Survey.

Notes: 1) Industry cells dropped are INDNAICS 5419Z (Other professional, scientific and technical services (excluding vets)) and 8129 (Other personal services); 2) Industry cells are INDNAICS 3279, 3399M, 5112, 5182, 51913, 5415, 5416, 5419Z, 712; 3) Industry cells dropped are those listed in note 2. 4) Industry cell dropped is INDNAICS 5415, Computer systems design and related services. All counts rounded to the nearest thousand. Creative economy defined as in Bakhshi et al (2012).

Table B6. Crosswalking check on US results using OES data, and comparison to UK results.

US OES, no self-employed						
Year	Creative industries		Embedded		Creative economy	
	Total	% Of all jobs	Total	% of all jobs	Total	% of all jobs
2011	7,990,000	6.29%	7,990,000	1.09%	7,990,000	7.38%
2012	9,973,000	5.68%	9,973,000	1.07%	9,973,000	6.75%
2013	6,807,000	8.06%	6,807,000	1.25%	6,807,000	9.31%

US ACS, no self-employed						
Year	Creative industries		Embedded		Creative economy	
	Total	% Of all jobs	Total	% of all jobs	Total	% of all jobs
2011	7,964,000	6.28%	7,964,000	2.59%	7,964,000	6.28%
2012	8,244,000	6.38%	8,244,000	2.59%	8,244,000	6.38%
2013	8,482,000	6.45%	8,482,000	2.64%	8,482,000	6.45%

Differences OES-ACS						
Year	Creative industries		Embedded		Creative economy	
	Total	% Points	Total	% Points	Total	% Points
2011	-26,000	0.01%	-26,000	-1.51%	-26,000	-1.49%
2012	-1,730,000	-0.70%	-1,730,000	-1.52%	-1,730,000	-2.22%
2013	1,675,000	1.61%	1,675,000	-1.39%	1,675,000	0.22%

UK APS, no self-employed						
Year	Creative industries		Embedded		Creative economy	
	Total	% Of all jobs	Total	% of all jobs	Total	% of all jobs
2011	1,019,000	4.17%	1,019,000	2.86%	1,019,000	7.03%
2012	1,098,000	4.48%	1,098,000	2.96%	1,098,000	7.44%
2013	1,100,000	4.43%	1,100,000	3.10%	1,100,000	7.53%

Source: Occupational Employment Statistics, American Community Survey, UK Annual Population Survey
 Notes: ACS and APS panels exclude the self-employed to ensure consistency with OES. APS data excludes second jobs to ensure consistent sampling frame with US data. Figures exclude small cells and volatile cells. Creative economy defined as in Bakhshi et al (2012).
