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Abstract

In recent years, scholars and consultants have argued that the arts and cultural sector can boost productivity in other sectors of the local economy, but the evidence base underpinning these claims is still sparse, and mostly confined to the US. In this paper, we build an econometric model that explores the impact of cultural clusters on the productivity of English cities using employment, occupational and institutional measures. Our analysis reveals a negative link between cultural clustering and wages, which we interpret as evidence of a compensating differential (skilled workers sacrifice higher salaries to live in places with vibrant cultural scenes). However, when we consider interactions between cultural clustering and salaries in creative industries and occupations, we find some evidence that creative workers in cities with high levels of cultural clustering enjoy a wage premium, which suggests that not-for-profit arts and cultural sectors may be generating knowledge spillovers into the commercial creative economy.

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I. Introduction

The scale of public investment in arts and culture clusters in recent decades suggests that policymakers consider the arts and cultural sectors to be important components of the infrastructure that makes their cities better able to innovate, compete and grow. There is empirical evidence of a strong correlation between arts and cultural clustering on the one hand, and the economic performance of cities on the other.[1]

At first sight, the data for English cities presented in Figure 1 supports this view, showing a positive relationship between clustering of cultural employment (as measured by the location quotient for a city's employment in the cultural industries), and average hourly wages.[2] According to these data, workers in English cities in the 90th percentile of cultural employment clustering earn on average hourly wages of £12.48, £1.11 higher than the average wage for cities in the 10th percentile.

What happens to this relationship when we control for other characteristics of individuals and cities? And what are the connections between arts and cultural clusters, and the performance of their 'cousins' in the commercial and digital creative industries?

Our paper seeks to advance our understanding of these issues in the following ways:

It draws on past research on local wage premiums to build an econometric model that tests the robustness of the relationships between arts and cultural clustering along

[1] Brian Knudsen, Richard Florida, Kevin Stolarick, and Gary Gates, "Density and Creativity in U.S. Regions," Annals of the Association of American Geographers, 98(2) (2008): 461-478. Richard Florida, Charlotte Mellander, and Kevin Stolarick, "Inside the black box of regional development—human capital, the creative class and tolerance," Journal of Economic Geography, 8 (5) (2008): 615-649.

[2] The data sources and definitions underpinning this chart are presented in detail in Section III.

three dimensions (occupational, industrial and institutional), and worker wages in English cities.

Our focus on England aims to redress existing geographical imbalances in the empirical literature in this area, which until now has mostly been concerned with the US. This way, it helps ascertain the generalizability of the US results to other places where the arts and cultural industries may play a different role in urban development.[3]

We also explore the relative significance and magnitude of the relationship between different metrics of cultural clustering and local economic performance, as well as the interactions between cultural and creative industry clusters. By doing this, we aim to shed some light on the mechanisms through which arts and cultural agglomeration may contribute to local economic performance, and on the relationships between different parts of the local creative economy – important questions for urban development policymakers in need of a better understanding of the interactions within their local ecosystem of creativity.[4]

Our structure is as follows. In section II, we review the literature on the relationships between arts and culture, local wages and urban development. In Section III, we describe our research questions, and the methodology and data we use to address them. Section IV presents and discusses the results, and Section V concludes.

[3] Robert C. Kloosterman, "This is Not America: Embedding the Cognitive-Cultural Urban Economy," Geografiska Annaler: Series B, Human Geography, 92(2) (2010): 131-143.

[4] Our focus on the economic impacts of the arts and culture on local development, and, relatedly, on the economic rationales for public investment in arts and culture should not be read as suggesting that these are the only impacts that the arts and culture have, or that they are the only rationales for supporting them. In this sense, we subscribe to Ann Markusen and Greg Schrock's impassionate acknowledgement of those artistic and cultural benefits beyond the 'Artistic Dividend'. Ann Markusen and Greg Schrock, "The Artistic Dividend: Urban Artistic Specialisation and Economic Development Implications," Urban Studies , 43 (10) (2006): 1661-1686.

II. Literature Review

The Arts and Culture have appeared under different guises in the work of Economists and Economic Geographers seeking to explain the spatial division of labour and geographical differences in wages, economic growth and innovative activity.

In this Section we overview two strands of literature that have respectively studied the Arts and Culture as 'Amenities' and as 'Sources of Spillovers'. When doing this, we pay particular attention to what they have to tell us about the relationship between Arts and Cultural clustering and wages, the dependent variable in the econometric model that we specify and estimate in Sections III and IV.

Having done this, we describe some limitations in the current state of knowledge that motivate our paper.

a) The Arts and Culture as local amenities

Economists studying migrations (mostly) within the USA, as well as spatial differences in wages (also referred to as 'urban wage premiums' such as those caused by human capital externalities in dense urban areas), have proposed that individuals balance a menu of factors when sorting themselves between different locations.[5] In addition to purely economic factors (the demand for labour, going wages and housing prices), some other characteristics of localities act as amenities (e.g. good weather) or disamenities (e.g. crime). One could think of them as dimensions of the 'quality of life' in a given place.

[5] For a summary and critique of the general spatial equilibrium underpinning much of this research see Thomas Kemeny and Michael Storper, "The Sources of Urban Development: Wages, Housing and Amenity Gaps Across American Cities," Journal of Regional Science 52 (1) (2012):85–108. For a literature review of urban wage premiums and human capital externalities within this framework, see Benedikt Halfdanarson, Daniel F. Heuermann, and Jens Suedekum, "Human Capital Externalities and the Urban Wage Premium: Two Literatures and Their Interrelations," IZA Working Paper No. 3493 (Bonn: May 2008).

Arts and Culture are introduced in these models as 'amenities' – in other words, individuals will be willing to sacrifice higher wages (or be willing to pay higher housing costs) for the opportunity to live in locations with a rich and varied arts and cultural offer. This means that, holding other variables equal, places with strong arts and cultural clusters should also present lower average wages[6]. Recent studies on the rise of the 'Consumer city' describe Museums, Theatres and other forms of commercial entertainment as important drivers of migration inside US cities over the last two decades – in addition to what could be expected from improvements in productivity (and therefore higher wages) – or decreases in crime (the prototypical urban disamenity).[7]

b) The Arts and Culture as Sources of Spillovers

Other researchers have argued that the Arts and Culture have a positive impact on local productivity (and therefore, increase wages), and specified various mechanisms through which this happens – first, we outline the influential 'Creative Cities' thesis advocated by Richard Florida, and afterwards we summarise other, arguably more 'active', ways in which the Arts and Culture could contribute to local productivity.

Creative Cities and the Creative Class

Perhaps the most influential account of – and programme of research on – the role of the Arts and Culture in urban development is Richard Florida's 'Creative Cities' thesis.[8] While his description of Arts and Culture bears a resemblance to the 'amenities' view we summarised above, Florida emphasises migration by a 'creative class' of high human capital professionals who contribute to urban development

[6] Otherwise they would attract an influx of migrants, pushing wages down (or bidding housing costs up).
[7] Edward L. Glaeser, and Joshua D. Gottlieb, "Urban Resurgence and the Consumer City," Harvard Institute of Economic Research Discussion Paper Number 2109 (Harvard, Mass.: 2006).
[8] Richard Florida, *The Rise of the Creative Class: And how it is transforming work, leisure, community and everyday life* (New York: Basic Books, 2002).

through their entrepreneurialism and by attracting inward investment from innovative businesses. Several studies within this framework show a positive connection between local arts and culture, and wages.[9]

This view of the role of the Arts and Culture in urban development has had a significant impact on local policymakers, and informed investments in 'creative place-making' through the construction of distinctive 'signature buildings', the creation of dedicated cultural quarters and districts, and profile-raising activities, such as urban branding and marketing events.[10]

The Arts and Culture as sources of innovation

Arts and Cultural clusters have been argued to generate other positive spillovers that boost productivity – and therefore wages – in the local economy.[11] These include investments in 'creative' human capital (a labour force with skillsets and attitudes that are conducive to innovation, and can improve the productivity of employers outside of the Arts and Cultural sectors), organisational capital (innovative ways of working that can be adopted by others), and network capital (milieus which are more conducive to knowledge sharing and collaboration).[12]

Perhaps even more significantly, but in a way that is harder to measure, the Arts and Cultural sectors produce 'expressive value' – for example, new artistic

[9] Richard Florida, Charlotte Mellander, and Kevin Stolarick, "Inside the Black Box of Regional Development - Human Capital, the Creative Class and Tolerance," Journal of Economic Geography, 8 (5) (2008): 615-649.
[10] Simon Roodhouse, "Cultural Quarters: Principles and Practice," (Bristol: Intellect, 2006).
[11] Ann Markusen and Greg Schrock, "The Artistic Dividend: Urban Artistic Specialisation and Economic Development Implications," Urban Studies, 43 (10) (2006): 1661-1686.
Caroline Chapain, Phil Cooke, Lisa De Propris, Stewart MacNeill, and Juan Mateos-Garcia, "Creative Clusters and Innovation" (London: NESTA, 2010).
[12] Kate Oakley, Brooke Sperry, and Andy Pratt, "The Art of Innovation," (London: NESTA, 2008). Jason Potts, and Kate Morrison, "Nudging Innovation," (London: NESTA, 2009). Michael Storper, and Anthony Venables, "Buzz: face-to-face contact and the urban economy," Journal of Economic Geography 4 (4) (2004): 351-370.

movements, aesthetic values and symbols that, it is argued, are adopted (and commercialised) by other industries.[13]

The literature suggests that spillovers such as these tend to take 'short leaps' spatially as well as sectorally. This is because innovations and skills are more likely to be transferable between organisations that draw on similar 'knowledge bases'.[14] One important implication of this is that any spillovers originated in Arts and Cultural clusters are likely to be most beneficial for 'cognitively close' commercial creative firms and professionals.[15] This is also consistent with the 'concentric circles' model of the Creative Economy proposed by David Throsby, which places the arts and cultural sectors at the core of the creative value chain, generating 'expressive value' which is commercialised by other creative industries, and eventually transferred into the wider economy through 'creative innovation services' such as advertising and design.[16]

Some examples of the synergies within the 'local ecosystem of creativity' (that is, between generally non-profit Arts and Culture sectors and commercial creative industries) include the crossover of ideas between artists, fashion designers and musicians documented by Elizabeth Currid in her study of New York's 'Warhol Economy', Adam Arvidsson's description of how advertisers 'leverage' Copenhagen's artistic and cultural scene in their marketing campaigns, or the

[13] Adam Arvidsson, "Creative Class or Administrative Class? On Advertising and the 'Underground'," Ephemera 7 (1) (2007): 8-23.
[14] Koen Frenken, Frank Van Oort, and Thijs Verburg, "Related Variety, Unrelated Variety and Regional Economic Growth," Regional Studies, 41(5) (2007): 685-697.
[15] Here, we follow the UK Department for Media, Culture and Sport (DCMS) definition of the Creative Industries as "*those industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property*" (Department of Culture, Media and Sport, "Creative Industries Mapping Document" (London: DCMS, 1998). We list the sectors included in this definition in section III c).
[16] David Throsby, "The concentric circles model of the cultural industries," Cultural Trends, 17(3) (2008): 147-164. Robert Andari, Hasan Bakhshi, Will Hutton and others, "Staying Ahead: The Economic Performance of the UK Creative Industries," (London: The Work Foundation, 2007). Jonathan Haskel, Tony Clayton, Peter Goodridge and others, "Innovation, knowledge spending and productivity growth in the UK . Interim report for NESTA Innovation Index project," (London: NESTA, 2009).

propensity for University of the Arts London's graduates to seek employment in London's creative industries. [17]

c) The State of the Evidence, and its Limitations

The Arts and Culture have received less careful attention than other amenities (and disamenities) in studies of general spatial equilibrium and urban wage premiums such as those that we touched upon in sub-section I(a). There, they have been often operationalized with counts of cultural buildings (e.g. institutions such as museums, theatres, operas) which may only measure imperfectly the real strength of arts and cultural clusters and their contribution to productivity.[18]

Several studies specifically looking a the role of the Arts and Culture as sources of spillovers, primarily within the Creative Cities framework, have identified significant relationships between Arts and Cultural clusters (measured through 'bohemian' indices calculated using occupational data) and urban economic performance, in terms of income, wages and patenting intensity, after controlling for the level of education in the local workforce and other relevant variables.[19]

These studies do however present two important limitations. First, they typically use cross-sectional data and therefore fail to address convincingly the possibility of endogeneity biases (the possibility that arts and cultural practitioners may be attracted

[17] Elizabeth Currid, *The Warhol Economy: How Fashion, Art, and Music Drive New York City*, (Princeton, NJ: Princeton University Press, 2007). Arvidsson, " Creative Class or Administrative Class? On Advertising and the 'Underground". Oakley, Sperry, and Pratt, "The Art of Innovation."

[18] For example, see James Rauch, "Productivity Gains From Geographic Concentration of human Capital: Evidence From the Cities," Journal of Urban Economics, 34 (November 1993): 380-400. Kemeny and Storper, "The Sources of Urban Development: Wages, Housing and Amenity Gaps Across American Cities." Glaeser and Gottlieb, "Urban Resurgence and the Consumer City."

[19] Knudsen, Florida, Stolarick, and Gates, "Density and Creativity in U.S. Regions." Florida, Mellander, and Stolarick, "Inside the Black Box of Regional Development - Human Capital, the Creative Class and Tolerance."

to affluent and innovative places, instead of generating such affluence and innovation themselves).[20]

Second, they do not fully open the 'black box' of (creative) economic development by examining the relative significance and magnitude of the different mechanisms through which Arts and Cultural clusters may contribute to urban growth and innovation, or the extent to which different measures of cultural clustering (such as occupations versus industries) are more strongly related to innovation and economic growth. Yet, recent empirical studies of the geographical distribution of artistic and cultural occupations and industries have shown that Artists and Artistic Sectors do not always cluster in the same places because large numbers of workers in those sectors are not artists themselves – and artists and cultural practitioners frequently work outside the Arts and Cultural sector.[21]

Establishing which – if any – mechanisms (attraction of creative professionals or innovation spillovers) and what types of cluster (occupations versus industries) play a stronger role in urban development would help policymakers prioritise scarce resources between competing arts and culture initiatives (e.g. networking versus urban branding) and guide their choice of policy targets.[22]

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[20] Ann Markusen, "Urban development and the politics of a creative class: evidence from a study of artists," Environment and Planning A, 38(10) (2006): 1921-1940. Michael Storper and Allen C. Scott, "Rethinking human capital, creativity and urban growth," Journal of Economic Geography 9 (2009): 147-167.

[21] Elizabeth Currid, and Kevin Stolarick "The Arts: Not Just Artists (and vice versa): New Methodological Approaches towards Understanding the Economic Composition of Arts" in *Handbook of Creative Cities*, edited by David E. Andersson, Åke E. Andersson, and Charlotta Mellander (Cheltentham: Edward Elgar, 2011.). Peter Higgs, Stuart Cunningham, and Hasan Bakhshi, "Beyond The Creative Industries," (London: NESTA, 2008).

[22] Ann Markusen, "Targeting Occupations in Regional and Community Economic Development," Journal of the American Planning Association, 70(3) (2004): 253-268. Markusen and Schrock, "The Artistic Dividend: Urban Artistic Specialisation and Economic Development Implications," Currid and Stolarick, The Arts: Not Just Artists (and vice versa): New Methodological Approaches towards Understanding the Economic Composition of Arts."

III. Methodology and Data

According to our literature review, the direction of the relationship between Arts and Cultural clustering and worker wages in the cities where they are located tells us something about the economic role of such clusters, as Amenities and/or as sources of spillovers. In this section, we present the model and data that we use to estimate this relationship.

a) The model

We adapt Mincer's classic model of wages to test the impact of different measures of Arts and Cultural clustering (henceforth 'cultural clustering') on worker wages.[23] This simple model estimates individual wages as a function of personal and city characteristics (with the latter including measures of cultural clustering).

The model is estimated as follows, for individual '*i*' in city '*c*':

$$lnWage_{ic} = \propto + \beta_1 Individual_{ic} + \beta_2 City_c + \beta_3 Region_c + \varepsilon_{ic}$$

In this equation, *'Individual'* comprises a vector of individual characteristics including education, ethnicity and migration status, *City* comprises characteristics of the city in England where the individual works (very importantly including measures of Cultural Clustering) and *Region* denotes a set of Government Office Region dummies to control for wider characteristics of the region where the city is located. 'ε' is the residual.

The motivation for this model is straightforward: The sign of the coefficient between our measure of cultural clustering and wages, after controlling for other relevant individual and city characteristics indicates if there is a *compensating differential* for living in cities with stronger Cultural Clustering (if the coefficient is

[23] See, for example, Elsie Echeverri-Carroll and Sofie G. Ayala, "Wage differentials and the spatial concentration of high-technology industries," Papers in Regional Science, 88(3) (2009): 623-641.

negative), or a *cultural city wage premium* (if the coefficient is positive). The first result would be consistent with the idea that arts and cultural clustering is a local consumer good whose presence 'compensates' for lower wages – that is, it acts as a local amenity. The second result would mean that, on average, workers in cities with strong cultural clusters are paid higher wages than we would expect given other individual and city characteristics – such wage premiums are generally interpreted in the literature as indicative of higher productivity, in this case associated with the strength of cultural clustering.

Of course, both effects could be at play in the data – the coefficient only tells us which of the two is stronger.

By constructing our different measures of cultural clustering on a consistent basis, we can also straightforwardly compare the sign, relative significance and strength of their relationship with worker wages.

Before continuing, we should note two important limitations of the model.

First, it does not identify shifts in the labour demand curve from the labour supply curve, which jointly determine wages. That is, while a positive coefficient on cultural clustering is consistent with an increase in labour demand caused by higher productivity in cultural clusters, it could also reflect a lower labour supply (say, if cultural clustering acts for some reason as an urban 'disamenity' in the same way as congestion or crime). Reciprocally, a negative coefficient on cultural clustering could be capturing higher labour supply in cultural clusters (due to the local consumption aspects of Arts and Culture which increases its attractiveness for workers) or a weaker labour demand, as if cultural clustering was detrimental for worker productivity.

To put it in stark terms, each of our two possible results can be interpreted in two alternative ways that have very different economic implications. Bearing this problem

in mind, we focus, for the rest of the paper, on those two interpretations of our coefficients (amenities rather than disamenities, and positive rather than negative spillovers) that are more intuitive, and better evidenced by the literature.

Even after doing this, we face a second limitation in that our model uses cross-sectional data – the significance and magnitude of the coefficients on cultural clustering tell us nothing about the direction of *causality* between wages and cultural clustering. For instance, while one possible interpretation of a positive coefficient is that the presence of a strong cultural cluster generates innovation spillovers making workers in the city more productive, it may also be that highly productive, innovative and affluent places attract, or support more effectively, arts and cultural organisations and/or practitioners.

b) Spatial Unit of Analysis

We conduct our analysis at the UK 'Travel To Work Area' (TTWA) level. TTWAs are defined according to the 2001 Census to be as close as possible to self-contained local labour markets in the UK.[24] They are defined to have a minimum 'self-containment' of 75%, meaning that at least 75% of residents both live and work in the area. TTWAs are now the standard for sub-national analysis in the UK.[25]

There are 168 English TTWAs in our sample. These represent both urban and rural TTWAs. As many of the theoretical predictions are most relevant for urban areas, we focus our testing on individuals working in the 74 English urban TTWAs defined by Gibbons and others[26]: they have an overlap with a population centre of at least 100,000 inhabitants. We henceforth describe these 74 English TTWAs as our 'cities'.

[24] Mike Coombes, and Steve Bond, "Travel to Work Areas: The 2007 Review," (London: Office of National Statistics, 2007).
[25] See, for example, Stephen Gibbons, Henry Overman, and Panu Pelkonen, "Wage disparities in Britain: People or place?," Spatial Economics Research Centre Discussion Paper 0060 (London: SERC, 2010).
[26] Ibid.

c) The Data

Our variables are drawn from three datasets: the Annual Population Survey (APS), the Business Register Employment Survey (BRES), and a unique dataset of cultural institutions that have registered their details on the Culture 24 (C24) platform (see Table 1 for a summary of the variables and their sources).

Our main source of data is the APS, 2010. This is a large-scale sample survey in the UK, covering around 300,000 people. Respondents are asked questions about their wages, labour market participation and personal characteristics, such as their educational qualifications. As we are interested in labour market issues, we restrict our focus on observations of normal working age (16 – 64). We use the APS to construct both individual-level variables and city-level controls.

Responses to the APS are available at the level of local authorities (LA) rather than TTWAs. Following other studies that have used these data, we allocate individuals from LA to TTWA levels using a probabalistic allocation method.[27]

Independent Variable (Wages)

Our measure of wages is the logarithm of the average hourly wage for individuals. This is calculated in the APS from the gross annual wage and the average hours worked per week. This may contain some extreme observations, which previous work has suggested is measurement error.[28] To deal with this, we remove observations with extremely low (less than £1, 135 observations) and high (greater than £100, 70 observations) hourly pay. As our data is for hourly pay, we include data for all workers regardless of total hours worked. There may still be a part-time wage

[27] Max Nathan, "The Long Term Impacts of Migration in British Cities: Diversity, Wages, Employment and Prices," SERC Discussion Papers 0067 (London: SERC, 2011), Neil Lee N., Paul Sissons, and Katy Jones, "Inequality in British cities" (York: Joseph Rowntree Foundation, 2012).

[28] Richard Dickens, Rebecca Riley, and David Wilkinson, "The employment and hours of work effects of the changing national minimum wage. Report for the Low Pay Commission," (London: Low Pay Commission, 2009). Ian Walker, and Yu Zhu, "The college wage premium and the expansion of Higher Education in the UK," Scandinavian Journal of Economics, 110 (4) (2008): 695 – 70

penalty for part-time workers, and so in the wage regressions we use a part time dummy variable to control for this.

Individual-level characteristics

We control for relevant individual characteristics too. These include experience in the labour market, measured as the number of years since an individual left full time education ('Experience'), and its square ('Experience^2'), gender (whether a worker is male or female) and ethnicity (whether or not an individual is of white ethnicity). We also control for skills, an important determinant of labour productivity and therefore, wages.[29] Since we do not have data on individual skills, we use educational qualifications as a proxy. These are measured as "National Vocational Qualification" (NVQ) levels, standardised measures of the respondents' educational qualifications set out by the UK Department for Business, Innovation and Skills. In this framework, NVQ 4 and 5 are roughly equivalent to an undergraduate degree level. The base category (zero) is no qualifications, with each subsequent qualification level, other things equal, expected to have a higher impact on wages.

Finally, we include variables for the nine standard occupational measures in the APS (capturing the occupation reported by an individual). There are collinearity issues in models that include both occupation and the industry where an individual works, so we do not include both variables. Instead, we leave only one. As there is evidence of a public sector wage premium in the UK, we also include a dummy variable for whether an individual works in the public sector.[30]

City-level variables

We control for city-level characteristics that could influence wages. This includes population size (which we include log-transformed in order to account for potential

[29] Allen J. Scott, "Space-Time Variations of Human Capital Assets Across U.S. Metropolitan Areas, 1980 to 2000," Economic Geography, 86 (3) (2009): 233 – 250.
[30] Neil Lee and others, forthcoming.

urban wage premiums in densely populated areas), the share of the population with high qualifications (that is, proportion of APS respondents with NVQ level 4 or more) to control for potential human capital externalities, and the Government Office Region for each respondent.[31]

Indicators of Cultural and Creative clustering

We use three types of data to measure cultural and creative clustering in a city – occupations, employment and institutions. Within each of these measures, we distinguish between 'the Arts and Culture' (which constitute the main focus for this paper) and the commercial 'creative industries' (which the literature suggests could be significant beneficiaries of arts and cultural spillovers).

In all cases, we use these data to construct location quotients (LQs), a standard measure of clustering used in Economic Geography. We calculate location quotients as the ratio between the share of a given variable (e.g. employment in a sector, or number of people in a given occupation) in a city, and the share of that same variable in England overall. Location quotients measure the importance of a sector or occupation in the economy of a given city compared to the national average. LQs above 1 indicate above average levels of specialization (that is, clustering), while LQs below 1 indicate below average levels of specialization. For consistency, we construct the LQ for cultural institutions in a city by dividing its number of cultural institutions per capita by the national average.

Employment Clustering: We build our location quotients of employment clustering in the 'arts and culture' and 'creative' sectors in a city (henceforth referred to as 'Cultural Employment' and 'Creative Employment' respectively) using sectoral employment data from the BRES. BRES is an annual survey of UK businesses

[31] Halfdanarson, Heuermann, and Suedekum, "Human Capital Externalities and the Urban Wage Premium: Two Literatures and Their Interrelations."

carried out by the UK Office for National Statistics (ONS). The BRES Sample (80,000 for the 2010 edition, which we are using) is randomly drawn from the Interdepartmental Business Register (IDBR), which covers all UK businesses registered for Value Added Tax (VAT) and/or Pay As you Earn (PAYE), and captures 99% of UK economic activity.[32]

In order to build our measure of Cultural Employment clustering, we use the 2007 Standard Industrial Classification (SIC) codes for the Performing Arts used by the UK Department for Culture, Media and Sports (DCMS) in its 2011 update of the Creative Industries Statistics, together with the SIC code for Libraries, Archives, Museums and other Cultural Activities (including Botanical and Zoological Gardens and Nature Reserve Activities) (2007 SIC 91). [33] This is different from the definition of the Cultural Industries used elsewhere in that it excludes from our measure of 'Arts and Culture' a number of sub-sectors producing creative content (as well as creative services, such as advertising or design) sold in the market.[34] Instead, we try and focus on those activities lying in the core of the 'concentric circles' model of the Creative Economy, and as captured in the footprint of public arts funding organisations such as Arts Council England.[35]

Our measure of Creative Employment clustering uses the SIC Codes in the 2011 DCMS operational definition of the creative industries excluding the SIC codes for Cultural sectors which we have included in our measure of Cultural Employment described above. Thus, our measure of creative industry clustering captures employment in Advertising, Architecture, Arts Markets and Antiques, Design,

[32] Caroline Chapain, Lisa de Propris, Phil Cooke, Stewart MacNeill, and Juan Mateos-Garcia, "The Geography of Creativity," (London: NESTA, 2009).
[33] That is, 2007 SIC 90010 (Performing Arts), 90020 (Support activities to performing arts), 90030 (Artistic Creation) and 90040 (Operation of Arts Facilities) – See DCMS, 2011.
[34] For example, see Higgs, Cunningham, and Bakhshi, "Beyond The Creative Industries."
[35] Throsby, "The concentric circles model of the cultural industries."

Designer Fashion, Film, Video and Photography, Music, Publishing, Software and Electronic Publishing, Leisure Software, and Radio and TV in English cities.[36]

Occupational Clustering: We build our location quotients of 'arts and cultural' and 'creative' occupational clustering (henceforth referred to as 'Cultural Occupations' and 'Creative Occupations' respectively) in a given city using data from the APS. In order to measure arts and cultural occupations, we adapt a previous definition to ensure comparability with our measure of cultural employment.[37] This consists of the following occupations: Librarians Archivists and Curators, Artists, Authors and Writers, Actors and Entertainers, Dancers and Choreographers, Musicians, Arts officers, Producers and Directors, Conservation and environmental protection officers, and Library Assistants / Clerks.[38]

For our location quotients of creative occupations, we use the Standard Occupational Classification codes set out in the 2011 update of the DCMS operational definition of the creative industries.

Note that there are relatively small sample sizes for most cities using these occupational measures – we are therefore careful to validate them by correlating them with other measures (see below).

Institutional clustering: We build our location quotients for cultural institution clustering in English cities using a unique dataset provided by Culture 24, a non-profit organisation based in Brighton on the South Coast of England that collects, curates and shares cultural information online from arts and cultural venues throughout the

[36] It's worth noting that the 'Arts Markets and Antiques' category primarily captures 'specialised' and second hand retailers. Past research shows that it rarely co-locates with other sectors in the cultural and creative industries. Chapain de Propris, Cooke, MacNeill, and Mateos-Garcia, "The Geography of Creativity."

[37] Higgs, Cunningham, and Bakhshi, "Beyond The Creative Industries."

[38] Librarians (SOC Code 2451), Archivists and Curators (2452), Artists (3411), Authors, writers (3412), Actors, entertainers (3413), Dancers and choreographers (3414), Musicians (3415), Arts officers, producers and directors (3416), Conservation and environmental protection officers (3551), and Library Assistants / Clerks (4135).

UK. The data we use is a self-selected list of cultural institutions, including museums, public galleries, libraries, archives, heritage sites and science centres in the UK.

We extract the details of 4,971 English institutions from the Culture 24 database of venues as it stood in February 2012. Each has a postcode, through which we allocate them to a city (with the exception of 60 observations for which this information is not available, and are therefore dropped). This gives a final sample of 4,911. We use the latest government population estimates to create an indicator of 'cultural institutions per capita' in each of our cities. We divide these by the number of cultural institutions per capita for England to produce location quotients of cultural institution agglomeration at the city level.

Robustness: In order to test the reliability of the (self-selecting) Culture 24 data, and the small-sample Cultural and Creative Occupations data, we explore the correlations between the location quotients we have derived from them, and those for Cultural and Creative Employment clustering.

Table 2 reports these pairwise correlations, and also with city size and the average qualifications of the population (see Table 2).

As Table 2 shows, the Culture 24 data are positively and significantly correlated with three other measures of cultural and creative clustering: Cultural Occupations, Cultural Employment and Creative Employment. The size of the coefficients is as expected (that is, larger for cultural measures than for creative ones), which gives us some confidence in the Culture 24 indicator as a meaningful measure of cultural clustering in English cities.[39] Similarly, our Cultural Occupations LQs correlates closely at the city level with the other measures of creative employment.

[39] In addition, it is significantly correlated with the proportion of the workforce qualified to NVQ4 and above (a standardized measure of qualifications, equivalent to degree level or above).

IV. Results and Discussion

In this section we do the following:

First, we estimate our model of wages using different measures of cultural clustering and our individual and city level controls.

We then look at the impacts of *creative clustering* (in terms of industries as well as employment) on urban wages.

Third, we look at the interactions between cultural clustering and creative industries wages, in order to explore the possibility that spillovers which are not visible for the local economy overall may in fact be present between the Arts and Culture and related commercial creative sectors, as discussed in our literature review.

We conclude by discussing the robustness of our results to different specifications and controls, including housing prices at the city level.

a) Results from Estimating the Model

We estimate each model in Table 3 using Ordinary Least Squares, with wages as the dependent variable (excluding cultural practitioners and workers), and independent variables for individual characteristics, city characteristics, and measures of cultural clustering.[40]

Columns 1 - 3 consider the basic results including the variables for cultural clustering, without controls. These confirm the results we presented in figure 1 at the beginning of the paper: cities with stronger cultural clusters tend to have higher average wages.

In columns 4 - 6 we include a set of individual controls. The effect of the

[40] The full models pass the usual diagnostic tests for collinearity and variables are logged to address potential heteroskedasticity, There was evidence of collinearity when models are estimated using full industry and occupation dummies, and so we limit regressions to the 9 occupation dummies. However, there is little change in the results.

cultural cluster measures changes dramatically. Cultural occupation clustering remains positive and significantly related to wages (though considerably smaller in magnitude), after we control for personal characteristics such as experience, skills and occupation. However, for both the Cultural Employment and Culture Institution measures, the signs switch to negative and the results are statistically significant.

In columns 7 – 9 we include other city-level variables that could influence individual wages. As expected, both the proportion of the population with high qualifications (NVQ 4 and above) and population size have positive coefficients and are significantly associated with wages. They also have consequences for the estimated effects of the cultural clustering variables: Cultural Occupations still have a positive sign, but they are no longer significant, whereas Cultural Employment and Cultural Institutions as measured by the Culture 24 data remain negative and significant.

This set of results supports the idea of a *'compensating differential'* in English 'Artistic and Cultural' cities – this would mean that for a given set of individual characteristics, critically including skills, English workers appear to be willing to sacrifice higher wages in exchange for living in cities with a strong Artistic and Cultural offer, which acts as an amenity. Since Cultural Institutions, and Cultural Employment (that is, people working in Arts and Cultural Organisations) measures appear to be better proxies for that offer than Cultural Occupation clustering (which also captures cultural practitioners working outside of the Arts and Cultural sector), we would have expected any compensating differentials to be more visible in the case of the former two variables, and this is indeed what we find.

As discussed, our findings do not rule out the existence of positive spillovers – a labour demand phenomenon – but if there are such spillovers it does mean that there is a labour supply effect (which we interpret as a compensating differential) more than offsets the effect of the spillovers on wages.

b) Creative Industries and Wages

In Table 4 we include measures of clustering in the commercial creative industries (both in terms of occupations and employment) to our baseline model, retaining all the individual and city controls we used in the baseline.

Columns 1 - 3 respectively pair the results for creative and cultural occupations, creative employment and cultural employment, and creative employment and Cultural institution measures.

The main results for the cultural cluster variables change little: the measure based on Cultural Occupations remains insignificant, while the measures based on Cultural Employment and the Culture 24 data stay negative and significant. It should however be noted that the coefficients on the creative clustering measures, unlike cultural clusters, are positive and significant which is consistent with the idea of positive spillovers from the commercial creative industries into the wider urban economy.

c) Cultural Economy

As we highlighted in the literature review, it could be that the spillover benefits – in terms of higher productivity and wages – from strong Arts and Cultural clustering are primarily captured by people in cultural and creative occupations and industries. Therefore, we would expect to see the impacts of cultural clusters on cultural and creative wages to be higher than the city average.

We test this possibility with a regression model with all the control variables used in Table 4, as well as a variable for whether an individual works in a creative or cultural occupation (those in creative or cultural occupations are, in this case, excluded from the standard occupational dummies we use as controls throughout), and interaction terms between the occupation and the strength of Arts and Culture in the city. A positive result for these interactions would indicate that those in cultural or creative occupations earn higher relative wages in cities with strong cultural clustering.

We estimate the models for all workers, and present the results in Table 5. Columns 1 - 3 consider how wages for those in cultural occupations vary, while those in 4 - 6 wages look at workers in creative occupations.

Table 5 shows that controlling for education and other personal characteristics, those in cultural occupations earn significantly less than those in other occupations. Further, the result are suggestive of a positive wage effect from urban clustering on wages in cultural occupations. Each of the three interaction terms with the city level culture variables are positive, although only one – the interaction between 'being in a cultural occupations' and 'living in a city with a strong cluster of arts and cultural institutions' – is significant.

When looking at the results for people in (commercial) creative occupations, we find that, after controlling for their skills and other individual characteristics, they earn more than people in other occupations. We also find some evidence of spillovers from Arts and Cultural clustering into the wider Creative Economy – the coefficient in the interaction terms are positive for all measures of cultural clustering, though again only the measure for cultural institutions is significant. The interpretation is that those working in creative occupations in cities with high

concentrations of cultural institutions tend to earn higher wages.

In short, these results are consistent with the idea of a positive effect of Arts and Cultural clustering on the productivity of cultural and creative workers. In this respect, although any innovation spillovers originated by Arts and Cultural clusters would be bounded within the 'Creative Economy' of arts, cultural and creative industries and workers, they could still conceivably flow indirectly into the wider local economy through the activities of more commercially oriented creative industries. This is because we have estimated a positive relationship between creative clustering and city wages, supporting the existence of innovation spillovers from creative workers into other sectors. Think, for example, of a web designer who uses the visual language of a painter exhibiting at a local arts gallery in her redesign of the website for a local client, an ad agency that uses the 'cultural capital' generated by local artists to produce a campaign for a client in the automobile industry (as related by Adam Arvidsson), or cultural districts which attract innovative media arts entrepreneurs.

Testing the robustness of these findings, and differentiating them from other explanations, is a priority for further research. We need to be particularly aware of the possibility that Arts and Cultural clustering may be driven by market demand from well-paid creative professionals with high disposable incomes.

d) Other robustness checks

We have subjected our model to further robustness checks – including variables such as diversity, as well as the presence of cultural industries in the same locations as sectors with lower or higher wages than average – namely, manufacturing and the public sectors – something that could have biased our results. Overall, our main results appear to be robust to these alternative

explanations.[41]

We have also checked the effect of including housing prices in our model (as a proxy for housing costs). This is an important variable, which is often considered together with wages in the literature.[42] If higher housing prices go hand in hand with strong arts and cultural clustering (perhaps as a consequence of gentrification), then our negative estimates of the coefficient on arts and cultural clustering would be biased – we would in fact be *underestimating* the magnitude of any arts and cultural compensating differentials, as the magnitude of the 'wage penalty' that individuals would be willing to incur to live in cities with a strong arts and cultural offer (which also happen to have high housing prices) would be even higher than estimated. As it is, collinearity problems between city skills levels and city housing prices make it difficult for us to interpret changes in the coefficients on cultural clustering once we include housing prices in our model – we note that these coefficients do however remain in line with the results we already reported, both in terms of their sign and their magnitude. [43]

[41] The results are available on request from the authors.

[42] James Rauch uses housing expenditure at the individual level as the dependent variable in a model estimated in parallel to wages so as to identify the consumption (that is, amenity) effects of human capital externalities compared to its production (that is, spillovers) effects. Doing this would have helped us address the identification issues described in III(a). Regretfully, the APS data does not include questions on housing costs, so we have had to include the housing price variable at the city – rather than the individual – level. Rauch, "Productivity Gains From Geographic Concentration of human Capital: Evidence From the Cities."

[43] Results available on request from the authors.

V. Conclusions

In this paper we have explored the relationships between arts and cultural clustering and wages of workers in English cities. We have used three measures of cultural clustering – cultural occupations, cultural sector employment, and cultural institutions – respectively constructed from official labour force and business registry survey data, and a new dataset of almost 5,000 UK cultural institutions from the Culture 24 database.

First, we sought to understand better the role of Arts and Culture in the economy of English cities – particularly, to evaluate their differential importance as a dimension of quality of life (that is, an urban amenity) and as a driver of productivity through innovation spillovers.

When considering all workers and individual and city controls, our findings suggest that the 'urban amenity' effects of Arts and Cultural clustering outweigh any 'innovation spillovers' effect. This finding is consistent with the idea of the 'consumer city' where highly skilled individuals are willing to renounce higher wages in exchange for access to a rich offer of Arts and Culture. The fact that the sign and size of the coefficient in our measures of cultural clustering mirror their intuitive validity as measures of the supply of Arts and Cultural goods, services and experiences makes this interpretation appealing.

It is worth noting that this interpretation resembles Richard Florida's 'Creative Cities' thesis, in that those high skilled workers he puts within the 'creative class' appear to be attracted to cities with Arts and Cultural clusters. One could speculate that, over time, they will contribute with their skills to urban innovation and growth – in line with the findings of the Human Capital Externalities literature, and Florida's own claims – but that goes beyond the scope of our analysis here.

We also wanted to explore the interactions between non-profit Arts and Cultural clusters, and the commercial creative industries surrounding them. A number of qualitative studies which we highlighted in the literature review suggest that there is a strong degree of crossover and spillover between different parts of the local ecosystem of creativity, but quantitative evidence is thin on the ground. We have attempted to address this important (and policy-relevant) gap in our paper too.

Here, we find some evidence that creative workers in cities with high levels of artistic and cultural clustering do enjoy a wage premium, which is consistent with the idea that not-for-profit Arts and Cultural sectors may generate innovation spillovers into the commercial creative economy. Together with our estimation of a positive relationship between commercial creative clustering and wages in the urban economy overall, our results identify a potential 'spillover route' from the non-profit Arts and Cultural sector into the commercial creative industries, and from there into the wider economy which warrants further investigation..

Our findings should be interpreted with caution, however, given the cross-sectional nature of our data, with the ensuing risk of reverse causality between our relevant variables (in particular creative worker wages and Arts and Cultural clustering). We also need to bear in mind those unobservable individual characteristics such as 'creativity' or 'entrepreneurialism' which may lead workers to select between different types of cities, and bias our results. Addressing these weaknesses with longitudinal data is a high priority for further research.

We have also mentioned the difficulties identifying the 'consumption' and 'production' effects of Arts and Cultural clustering on wages, which led us to exclude some potential interpretations of our coefficients on a primarily theoretical rather than empirical basis. This is certainly undesirable, and could be addressed by using other

data-sets where housing costs are available at the individual level, another potentially fruitful avenue for further research.

With all of these limitations in mind, our results are broadly supportive of the view that there is a relationship between cultural clustering and urban development. This relationship does however appear to be subtler than is usually acknowledged. In particular, the economic impact of public investments in urban arts and cultural infrastructure may be manifest in improvements in the productivity (and wages) of creative professionals, and may not be associated with higher wages in the wider economy if cultural activities serve as a compensating differential for skilled workers. This apparent complementarity between non-profit arts and cultural clusters, and the creative (and digital) industries in English cities should caution urban development policymakers against adopting a dichotomous view of their Creative Economy, where non-profit activities are seen as, at best, drivers of tourism and urban branding, while creative firms are the ones that drive productivity and innovation.

Our results support the idea that Arts and Cultural clusters could have deeper impacts on the economy of English cities than this. Firstly, by attracting skilled individuals for lower wages, as the 'compensating differentials' that we have identified suggest. Secondly, by forming active part of local ecosystem of creativity where their intangible investments in skills, organisational and social capital and new ideas, make an economic contribution in the shape of innovation spillovers to for-profit creative firms. Further evidencing the robustness and magnitude of these spillovers, and understanding why Arts and Culture clusters do not manage to capture all the external benefits they generate – that is, why there are market failures in local ecosystems of creativity – will be important topics for the research agenda going forward.

Figure 1. Average wage and cultural employment

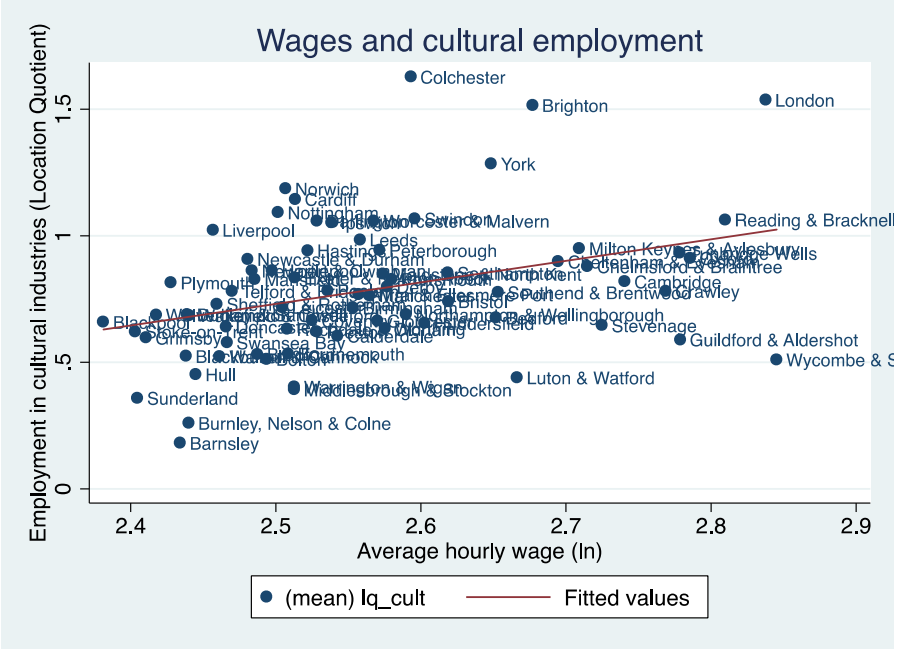

Table 1. Variable list

Domain	Variable	Description	Source
Wages	Hourly Pay (ln)	Log of hourly pay	APS
Cultural and creative clustering	Cultural employment	Share .of employment in cultural sectors (Location quotient)	BRES
	Creative employment	Share of employment in the creative industries (excluding cultural) (Location quotient)	BRES
	Cultural institutions	Culture 24 venues per capita (Location quotient)	C24
	Creative occupations	Share of the workforce in creative industries occupations (Location quotient)	APS
	Cultural occupations	Share of workers in cultural occupations (Location quotient)	APS
Individual controls	Male	Whether individual is male (1) or female (0)	APS
	Experience	Years since leaving education	APS
	Experience^2	Years since leaving education, squared	APS
	Non-White	If individual is not of white ethnicity (1)	APS
	Not UK Born	If individual was not born in the United Kingdom (1)	APS
	Part-time	If individual works part time (1)	APS
	Public	If self-reports as public sector worker (1)	APS
	Occupation	Nine standard occupation dummies	APS
	NVQ 0 – 5	One of five NVQ qualification dummies	APS
City controls (using other sources)	Population	Log of total population, 2010. Calculated from Local Authority figures using Geoconvert.	Mid-year population estimates
	NVQ45	Share of workforce in TTWA with NVQ4 and above	APS
	Region	One of four regional / London dummies (South, London, North, Midlands)	-

Table 2. Correlation matrix for city characteristics

	Cultural Occupations	Cultural employment	Cultural Institutions	Creative Employment	Creative Occupations	City skills	Population
Cultural Occupations	1.0000						
Cultural Employment	0.3258*** (0.0046)	1.0000					
Cultural Institutions (C24)	0.2724** (0.0189)	0.4728*** (0.0000)	1.0000				
Creative Employment	0.4693*** (0.0000)	0.3843*** (0.0007)	0.2324** (0.046)	1.0000			
Creative Occupations	0.4580*** (0.000)	0.2382 (0.0410)	0.2461 (0.0346)	0.6402*** (0.000)	1.0000		
City Skills	0.5206*** (0.0000)	0.4494*** (0.0001)	0.4473*** (0.0001)	0.6626*** (0.000)	0.6394*** (0.000)	1.0000	
Population (ln)	0.2073* (0.0763)	0.1923 (0.1007)	-0.0349 (0.7679)	0.4721*** (0.000)	0.2951 (0.107)	0.2763* (0.0172)	1.0000

Significance in parentheses. Obs: 74 Cities..
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Cultural economy and wages, individual level regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable: Hourly wage (ln), excluding workers in cultural industries and occupations								
City									
Cultural Occupations	0.181***			0.0288***			0.00548		
	(0.00526)			(0.00800)			(0.00923)		
Cultural Employment		0.255***			-0.0241**			-0.0498***	
		(0.00851)			(0.00975)			(0.0106)	
Cultural Institutions			0.172***			-0.0263***			-0.0500***
			(0.00835)			(0.00709)			(0.00750)
City Skills							0.250***	0.329***	0.392***
							(0.0577)	(0.0548)	(0.0543)
Population (ln)							0.0215***	0.0221***	0.0197***
							(0.00397)	(0.00395)	(0.00395)
Individual Skills									
Level 2				-0.000741	-0.00110	-0.00107	-0.000702	-0.00105	-0.000956
				(0.00711)	(0.00710)	(0.00710)	(0.00710)	(0.00710)	(0.00710)
Level 3				0.0877***	0.0874***	0.0875***	0.0874***	0.0872***	0.0873***
				(0.00649)	(0.00650)	(0.00650)	(0.00649)	(0.00649)	(0.00649)
Level 4				0.258***	0.258***	0.259***	0.257***	0.257***	0.257***
				(0.00677)	(0.00677)	(0.00677)	(0.00677)	(0.00677)	(0.00677)
Level 5				0.385***	0.387***	0.387***	0.384***	0.384***	0.384***
				(0.00973)	(0.00973)	(0.00973)	(0.00974)	(0.00973)	(0.00973)
				(0.00860)	(0.00860)	(0.00860)	(0.00860)	(0.00860)	(0.00860)
Constant	2.249***	2.222***	2.304***	1.992***	2.043***	2.032***	1.639***	1.652***	1.637***
	(0.00608)	(0.00788)	(0.00744)	(0.0186)	(0.0189)	(0.0170)	(0.0517)	(0.0511)	(0.0512)
Other individual controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Region Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Dummies	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	52,250	52,250	52,250	52,250	52,250	52,250	52,250	52,250	52,250
R-squared	0.037	0.026	0.010	0.469	0.469	0.469	0.470	0.470	0.471

Estimated with OLS. Controls are 4 region and 9 Occupation Dummies. Weights applied. Robust Standard Errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Creative Economy and wages

	(1)	(2)	(3)
	Dependent variable: Hourly pay (ln) excluding workers in creative / cultural occupations and industries		
Cultural occupations	-0.0134		
	(0.00971)		
Creative occupations	0.0809***		
	(0.0106)		
Cultural employment		-0.0489***	
		(0.0108)	
Creative Employment		0.0292**	0.0213*
		(0.0119)	(0.0118)
Cultural Institutions			-0.0472***
			(0.00753)
Constant	1.370***	1.369***	1.350***
	(0.0603)	(0.0607)	(0.0610)
Controls	Yes	Yes	Yes
Observations	48,634	48,634	48,634
R-squared	0.473	0.472	0.472

Estimated using OLS. Controls are 4 region dummies (including London), 9 Occupation Dummies, NVQ 1 – 5, Experience, Experience^2, Ethnicity, Migration Status, Part-Time Working, Public sector, city population and city qualifications. Weights applied. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 5. Cultural economy and wages for cultural and creative occupations

		(1)	(2)	(3)	(4)	(5)	(6)
		Dependent variable: Hourly pay (ln), all workers					
Individual occupation	Cultural Occupation	-0.312***	-0.264***	-0.274***			
		(0.0533)	(0.0397)	(0.0619)			
	Creative Occupation				0.316***	0.348***	0.359***
					(0.0338)	(0.0250)	(0.0313)
City economy measures	Cultural Institutions	-0.0286***			-0.0309***		
		(0.00709)			(0.00710)		
	Cultural Occupations		0.0209**			0.0178**	
			(0.00815)			(0.00822)	
	Cultural Employment			-0.0312***			-0.0320***
				(0.00987)			(0.00993)
Interaction terms	Cultural Occupation * Cultural Institutions	0.0986*					
		(0.0546)					
	Cultural Occupation * Cultural Occupations		0.0304				
			(0.0275)				
	Cultural Occupation * Cultural Employment			0.0530			
				(0.0563)			
	Cultural Institutions*Creative Occupation				0.0710**		
					(0.0344)		
	Creative Occupation * Cultural Occupations					0.0252	
						(0.0168)	
	Creative Occupation * Cultural Employment						0.0236
							(0.0286)
	Constant	1.837***	1.659***	1.664***	1.419***	1.240***	1.244***
		(0.0604)	(0.0513)	(0.0507)	(0.0600)	(0.0507)	(0.0501)
	Controls	Yes	Yes	Yes	Yes	Yes	Yes
	Observations	52,950	52,950	52,950	52,950	52,950	52,950
	R-squared	0.467	0.467	0.467	0.465	0.465	0.465

Estimated using OLS. Controls are 4 region dummies (including London), 9 Occupation Dummies, NVQ 1 – 5, Experience, Experience^2, Ethnicity, Migration Status, Part-Time Working and Public sector and City Size. Weights applied. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1