

Working Paper 63

Gross Value Added per Workforce Job in London and the UK

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February 2015



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Greater London Authority
February 2015

Published by

Greater London Authority
City Hall
The Queens Walk
London SE1 2AA

www.london.gov.uk

Tel 020 7983 4922

Minicom 020 7983 4000

ISBN 978-1-84781-593-4

Cover photograph

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Executive summary

This paper undertakes an analysis of headline and component Gross Value Added (GVA) data to produce estimates of GVA per workforce job for London, the regions and the UK, by industry sector and division. Such estimates can be useful in trying to understand the relative contribution from different parts of the economy. Such estimates can also be useful when undertaking project appraisal and evaluation to enable an estimation of the total economic impact of projects and programmes when job creation has been used as an outcome measure. This paper has used a combination of publicly available information as well as data specifically requested from the Office for National Statistics to develop these estimates. Headline analysis of the data finds that the all sector average of GVA per workforce job in London was £56,687 in 2012, compared to £41,088 for the UK as a whole and £37,281 for the rest of the UK (excluding London). These estimates are consistent with the European System of Accounts 2010 (ESA10) and the Blue Book 2014.

1. Introduction

This paper undertakes analysis of a mixture of publicly available and specifically requested data from the Office for National Statistics (ONS) to produce estimates of Gross Value Added (GVA) per workforce job, at Standard Industrial Classification 2007 (SIC07) section and division level, for London and the UK as a whole.¹

This analysis feeds in to the wider economic debate relating to labour productivity, where data on total output can be compared to employment, to give an indication of the relative productivity of sectors and also the changing productivity of sectors over time². This paper can also enable estimation of the total output of divisions at the regional level, at levels lower than currently published. Such analysis can also be useful as regards the appraisal or evaluation of public sector interventions, where outcome metrics such as jobs created have been used.

Chapter 2 provides an overview on GVA and the reasons why previous methods used towards estimation of GVA per job have not been used in this study. This leads to the presentation of the methodology in Chapter 3, including the data sources and methodological challenges (which are also provided in more detail within Appendices A-C). Chapters 4 and 5 then present the estimates of the GVA per workforce job by sector and then division, for both London and the UK. Finally Chapter 6 provides the headline conclusions drawn from the data and provides details of how these estimates may be revised over time.

The appendices of this report provide fuller detail of the methodology; the data sources used towards development of these estimates, and provide a time series of estimates of GVA per workforce job over time, from 2007 – 2012.

¹ Section refers to 1 digit SIC codes; division refers to 2 digit SIC codes. <http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html>

² The focus of this paper relates to labour productivity, rather than total factor productivity.

2. Background

Gross Value Added defined

Gross Value Added measures the contribution to the economy of each individual producer, industry or sector.³ More simply put, it is the value added generated from activity in the economy. It is closely related to the concept of Gross Domestic Product (which is used most notably in reporting of national output), through the following definition:

Gross Value Added + (Taxes on Products) – (Subsidies on Products) = Gross Domestic Product

Regional Gross Value Added (GVA) is currently estimated using two approaches, either through an income or production approach. Traditionally regional accounts have been presented using the income approach; however experimental estimates of regional GVA using the production approach were published for the first time in December 2013, as referenced in GLA Economics' Current Issues Note 41.⁴

This paper focuses on the headline figures of GVA using the income approach; the methodology to generate these estimates requires the component elements of GVA, which are as follows:

- Compensation of Employees (CoE)
- Gross operating surplus/mixed income (GOS/MI), which includes profits, non-market capital consumption and holding gains, self-employment and rental income.
- Taxes less subsidies on production

After rounding, data for the UK in 2013 finds that CoE accounted for 58% of total GVA; GOS/MI accounted for 42%, and taxes less subsidies accounted for less than one per cent. This however varies across sectors, and data has been obtained from regional accounts releases, as well as data specifically requested from the ONS, in order to estimate the proportion of GVA attributable to the economic activity of those in the workforce (employees and the self-employed); proportions which themselves vary across industry sectors.

Previous approaches to the measurement of GVA per workforce job

Measurement of economic impacts of public sector interventions through the use of GVA per job have been used previously, and was part of best practice for the evaluation of projects funded by Regional Development Agencies (RDAs) until these were closed in 2012. This was contained within the Impact Evaluation Framework (IEF) guidance, designed to be used alongside associated guidance (such as the HM Treasury Green Book) to enable the additionality and value for money of RDA funded projects to be calculated.⁵

The method proposed within the IEF guidance was based on the use of the Annual Business Survey (ABS).⁶ This is a survey of private sector businesses across all sectors (with the exception of the financial sector), collecting data such as the levels of employment, employment costs,

³ "The Relationship between Gross Value Added (GVA) and Gross Domestic Product (GDP)", available at: <http://www.ons.gov.uk/ons/guide-method/method-quality/specific/economy/national-accounts/gva/relationship-gva-and-gdp/gross-value-added-and-gross-domestic-product.html>

⁴ "Regional, sub-regional and local gross value added estimates for London, 1997 – 2012", GLA Economics Current Issues Note 41, March 2014.

⁵ "RDA Evaluation: Practical Guidance on Implementing the Impact Evaluation Framework, Appendix 1 – Beneficiary survey methodology and questionnaires", Figure 4.3, page 132.

⁶ As well as using predecessors to the Annual Business Survey, such as the Annual Business Inquiry (ABI).

business turnover; and approximate GVA (aGVA). At the national level, survey sample sizes enable estimates of aGVA of those in employment within industry sections and divisions to be made. At the regional level, data on aGVA by division is provided, however to calculate an estimate of the GVA per workforce job, these estimates of aGVA can be divided by supplementary data on employment from other sources as total employment averages (or employment at a point in time) are not included within the regional results of the ABS; typically this would be done through the use of the Business Register and Employment Survey (BRES) (or its predecessors), as these are surveys which cover private sector employment.

This paper proposes the use of regional accounts for the analysis of GVA per workforce job for the following reasons:

- Regional Accounts are constrained using a top-down approach from National Accounts and are therefore a complete measure of the total value-added of the economy across all sectors. By using an effective methodology to determine the extent of GVA attributable to the activity of the workforce, the estimates at the industry section and division level can be based and constrained to the whole economy.
- The ABS is one of private sector businesses, and therefore will not account for the whole of the economy. Analysis from the ONS estimates that “when all covered sections (*of the economy*) are considered, aGVA is between 66% and 69% of GVA....however, when only those sections covered by the ABS are considered, the estimates of aGVA and GVA are much closer, with aGVA being between 90% and 94% of the GVA in each of the years” (referring to the 2008 – 2011 period).⁷
- The ABS covers the UK Non-Financial Business Economy, with data on Section K, Financial and Insurance Activities, not included within this.⁸ The use of Regional Accounts and National Accounts will enable the financial sectors to be included – which are key sectors for London.
- At the regional level, it has been observed that there are significant year-on-year fluctuations in the estimates of aGVA per workforce job, which may be due to sample variability.

It should be mentioned that the ONS produces regional data on nominal GVA per filled job within the labour productivity release (these data however do not provide sectoral breakdowns).⁹ Data produced in this report is based upon a specific methodology for attributing published GVA to the workforce, by SIC07 section.

⁷ Ayoubkhani, D., “A comparison between Annual Business Survey and National Accounts Measures of Value Added”, (2014), Office for National Statistics, page 3.

⁸ <http://www.ons.gov.uk/ons/rel/abs/annual-business-survey/2012-regional-results/stb-abs-regional-2012.html>

⁹ Estimates on GVA per filled job most recently published as part of Regional Economic Analysis, Subregional Productivity, February 2015; available at: <http://www.ons.gov.uk/ons/rel/regional-trends/regional-economic-analysis/sub-regional-productivity--february-2015/index.html>

3. Methodology

This chapter provides an overview of the methodology that has been used in our estimation of GVA per workforce job; at the section and division level, for London and the UK. Fuller details of the methodology and the calculation steps where necessary are included within Appendices A-C. Chapter 4 then goes on to provide the estimates of GVA per workforce job at the section level; Chapter 5 provides the estimates at the division level.

The expressed aim of the methodology is to undertake a top-down approach, ensuring that all outputs constrain to published estimates of GVA. While the published figures for regional (based on NUTS1 geography) section GVA is by definition constrained to the estimate of overall GVA for London; at the divisional level, due to the scarcity of data, the method is more complicated and requires using supplementary data sources, as well as a method to ensure that the sum of all divisions adds to the total for the corresponding section, and therefore constrained to published GVA.

As mentioned in Chapter 2, the ONS produces regional data on nominal GVA per filled job within the labour productivity release however these data do not provide sectoral breakdowns.¹⁰ Data produced in this report is based upon a specific methodology for attributing published GVA to the workforce, by SIC07 section.

Data sources used in calculation of GVA per workforce job

The predominant source used to develop these estimates is the Regional GVA (Income Approach) publication of the ONS¹¹, which presents GVA data for London and other parts of the United Kingdom. This source is the starting point for the calculation. However, it is data on components of GVA that is used for the modelling of the proportion of published GVA that is attributable to the activity of the workforce.

At the regional level, some component level data of GVA are available (such as CoE and GOS/MI). However further data on self-employment income, rental incomes and taxes less subsidies are not available. Therefore a method is used that incorporates UK data into the model where necessary.

In deriving the estimate of the proportion of GVA attributable to the workforce, the following component data is drawn directly from the Input-Output Supply and Use Tables (Industries' intermediate consumption)¹², published by the ONS on 31 October 2014 as part of the Blue Book 2014.

- Compensation of employees
- Gross Operating Surplus/Mixed Income
- Taxes less subsidies

As part of this study, data was specifically requested from the ONS on the breakdown of GOS/MI into self-employment income and rental income (market rents and imputed rents of

¹⁰ Regional Economic Analysis, Subregional Productivity, February 2015; Office for National Statistics.

¹¹ The latest ONS Regional GVA (Income Approach) release is available at: <http://www.ons.gov.uk/ons/rel/regional-accounts/regional-gross-value-added--income-approach-/december-2014/index.html>

¹² The latest ONS Input-Output Supply and Use tables are available at <http://www.ons.gov.uk/ons/rel/input-output/input-output-supply-and-use-tables/2014-edition/index.html>

owner-occupiers) separately. With this data, it is possible to derive estimates of the GVA attributable to workforce jobs and to employees only (although this paper focuses specifically on the estimate of GVA per workforce job).

Finally to calculate the estimates, the denominator used at the industry section level is based on published workforce jobs data (employee jobs and self-employed jobs components). At the division level however, as workforce jobs is not broken down at this level of disaggregation, data from BRES on employees; and the Annual Population Survey (APS) on self-employment is used. With these estimates of employees and self-employment by division, each division is allocated a proportion of the published section level workforce jobs, ensuring that the sum of workforce jobs of each individual division within a section constrains to the published estimate for each section. This therefore makes an implicit assumption that the sum of employees and self-employed sums to total workforce jobs; which is a fair assumption, since the sum of employees and self-employed accounts for over 99 per cent of the published workforce job figure.

Section level methodology (1 digit SIC level)

As mentioned above, the aim of this study is to use as much publicly available information and specifically requested data in order to generate estimates at both the UK and regional level. The first section here outlines the methodology used for the UK estimates, using data drawn from the UK National Accounts; the second section outlines the methodology used for London, where some regional level data from the Regional GVA release has been combined with National Accounts data to derive specific regional allocations of published GVA to the workforce. A fuller overview of the methodology is provided in Appendices A-C, as well as an alternative method to derive regional level estimates through apportioning UK data on market rents and imputed rental incomes to regions (with specific focus on the real estate sector).

Methodology used for the UK

At the industry section level, data on GVA is drawn from the Regional GVA (Income Approach) publication, released by the ONS each December, available for each region and the UK as a whole. However, the key aim of this study is to isolate the proportion of GVA that would be attributable to the activities of the workforce (ie. those employed and self-employed). This can be achieved through separating out the components of GVA deemed relevant to the workforce, from those components which are not (most specifically rental income and related to this, imputed rental income of owner-occupiers).

For each section, the same methodology was consistently used, with data drawn from the Regional GVA publication using component data consistent with Blue Book 2014.

Step 1: Derive an estimate of the proportion of published GVA attributable to the workforce

Within each of the components of published GVA, some will be relevant to the activities of the workforce and, arguably, some will not. The latter primarily relates to rental income. This method looks to isolate rental income from two elements. First, from GOS/MI, which was achieved by asking ONS for a breakdown of UK GOS/MI by industry section where rental income was presented separately. Second, by isolating the proportion of the taxes less subsidies associated with rental income in each section. A simplifying assumption was made here that rental income is taxed (or subsidised) at the same rate as income from other economic activities in the section.

Therefore the numerator of the GVA per workforce job equation would be calculated by:

$$\text{CoE} + (\text{GOS/MI} - \text{rental income}) + (\text{Proportion of rental income to GVA} * \text{taxes less subsidies})$$

This equation is an estimate of published GVA minus rentals, which is hereon known as “Attributable GVA”, which when divided by the published GVA for an industry section, leads to the estimate of the proportion of published GVA attributable to the workforce in that section. Typically for all sections, this proportion is around 99 per cent; with exceptions being real estate, construction, and financial and insurance; where for 2012, these proportions are estimated at 13 per cent, 95 per cent and 93 per cent respectively.

Step 2: Calculation of workforce jobs for each section

The denominator of the GVA per workforce job equation requires the use of the ONS Workforce Jobs series (employee jobs and self-employed jobs components). As the base year for the estimates provided in this paper is 2012, a four quarter average of published workforce jobs by section is calculated.

Step 3: Final calculation

The GVA per workforce job for each section is calculated by:

$$\frac{(\text{Published Regional GVA} * \text{Proportion of GVA attributable to workforce})}{\text{Four Quarter workforce job average}}$$

Full details of the calculation steps are provided in Appendix A, however for clarity in this chapter, the following table provides detail of the calculation step for Section M: Professional, Scientific and Technical Activities:

A	Published GVA, Section M	£106,093 million
B	Proportion attributable to the workforce, Section M	99.5%
C	Attributable GVA	= A * B = £105,560 million
D	Four quarter average workforce jobs, 2012	2,504,000
	GVA per workforce job, Section M; 2012	= C / D = £42,157

Source: Office for National Statistics, GLA Economics calculations

Methodology used at the regional level

At the regional level, publicly available component data from the Regional GVA publication has been used (total GVA and CoE). In addition, breakdowns of GOS/MI and taxes less subsidies at UK level have been used to derive an estimate of “attributable GVA” for each region, assuming that the proportions do not vary between regions. An extension of this model using Census and house price data to apportion rental incomes to each region is outlined in Appendix B.

Step 1: Estimating GOS/MI and taxes less subsidies, all values in £ million

First, published data on GVA and CoE for London was obtained for each sector; working on the assumption that GVA is equal to CoE, GOS/MI and taxes less subsidies, a residual assumed to equal to GOS/MI plus taxes less subsidies was estimated for all sectors by subtracting CoE from GVA. Here an example is based upon the real estate sector (Section L) for 2012:

Section	Published GVA	Published CoE	Residual = assumed equal to GOS/MI + taxes less subsidies
Real estate activities	36,701	3,772	32,929

Source: UK Regional Accounts, Office for National Statistics, GLA Economics calculations

Step 2: Estimation of taxes less subsidies and GOS/MI in London

An assumption is made that the relationship between taxes less subsidies and GOS/MI is the same in London as in the UK as a whole. Therefore the calculation that is made to estimate taxes less subsidies in London and henceforth the estimate of GOS/MI for each industry section is as follows (using the example of the real estate sector – Section L – in this calculation):

A	UK GOS/MI; real estate sector	£156,604 million
B	UK taxes less subsidies, real estate sector	-£401 million
C	Taxes less subsidies as a proportion of GOS/MI at UK level	$= [B/(A+B)]$ $= -0.257\%$
D	Estimated taxes less subsidies in London based on the residual	$= C * £32,929 \text{ million}$ $= -£85 \text{ million}$
	Estimated GOS/MI for the real estate sector in London	$= \text{Residual} - D$ $= £33,014 \text{ million}$

Source: UK Regional and National Accounts, Office for National Statistics, GLA Economics calculations

Step 3: Application of UK proportion of rental income to the residual (estimated GOS/MI)

The assumption is made that the relationship between rental income (market rents and imputed rents of owner occupiers) and GOS/MI is the same in London as in the UK as a whole. Therefore in the context of the real estate sector:

A	Imputed rental income, real estate sector, UK	£117,901 million
B	Rental income (market rents), real estate sector, UK	£28,325 million
C	GOS/MI; real estate sector, UK	£156,604 million
D	Proportion of total rental income to GOS/MI; UK	$= (A + B) / C$ $= 93.4\%$
E	Estimated GOS/MI; real estate sector, London	£33,014 million
F	Estimated total rental income, London	$= D * E$ $= £30,826 \text{ million}$

Source: UK Regional and National Accounts, Office for National Statistics, GLA Economics calculations

Step 4: Estimation of attributable GVA for the real estate sector

The estimate of attributable GVA to the workforce using this method is therefore calculated as follows (using the example of the real estate sector):

A	Published CoE, real estate sector, London	£3,772 million
B	Estimated GOS/MI, real estate sector, London	£33,014 million
C	Estimated imputed rental income and market rents, London	£30,826 million
D	Estimated taxes less subsidies, real estate sector, London	-£85 million
E	Attributable GVA, real estate sector, London	= A + (B - C) + D = £5,875 million

	Published GVA, real estate sector, London	£36,701 million
	Proportion of GVA attributable to the workforce	16.0%

Source: UK Regional and National Accounts, Office for National Statistics, GLA Economics calculations

Step 5: Calculation of workforce jobs for each section

The denominator of the GVA per workforce job equation requires the use of the ONS Workforce Jobs series (employee jobs and self-employed jobs components). As the base year for the estimates provided in this paper is 2012, a four quarter average of published workforce jobs by section is calculated.

Step 6: Final calculation

The GVA per workforce job for each section is calculated by:

$$\frac{(\text{Published Regional GVA} * \text{Proportion of GVA attributable to workforce})}{\text{Four Quarter workforce job average}}$$

Full details of the calculation steps are provided in Appendix A, however for clarity in this chapter, the following table provides detail of the calculation step for Section L: Real Estate Activities

A	Published GVA, Section L, London	£36,701 million
B	Proportion attributable to the workforce, Section L, London	16.0%
C	Attributable GVA	= A * B = £5,875 million
D	Four quarter average workforce jobs, Section L, 2012, London	120,750
	GVA per workforce job, Section M, London	= C / D = £48,656

Source: Office for National Statistics, GLA Economics calculations

Using this methodology for each industry section in turn (and aggregated up to derive an estimate of an all section average), it is estimated that the average GVA per workforce job in London across all sectors was £56,687 in 2012. For the UK as a whole, it is estimated that the GVA per workforce job was £41,088 in 2012.

To put these estimates in context, the following table provides detail of estimates that can be used to derive GVA per job using other methodologies as follows:

- 1: A methodology that does not apportion GVA to activity of the workforce, simply published GVA divided by published workforce jobs
- 2: Using aGVA for London from the Annual Business Survey, and dividing by BRES data on total employment

Table 3.1: GVA per job estimates, 2012

Method	GVA per workforce job (£)		Percentage Difference (London compared to UK)
	London	UK	
ONS's published GVA divided by four quarter average of published workforce jobs (employee and self-employed job components, SIC07 Sections A – S)	63,971	46,290	+38.2%
aGVA from the ABS divided by BRES total employment (value for employees only; data refers to Great Britain, not UK)	47,643	34,315	+38.8%
GLA Economics result for GVA per workforce job	56,687	41,088	+38.0%

Source: Regional Gross Value Added (Income Approach), Workforce Jobs, Annual Business Survey, Business Register and Employment Survey; all Office for National Statistics; and GLA Economics calculations.

Division level methodology (2 digit SIC level)

Industry division level estimates of GVA are not available for London. Therefore a methodology has to be put in place to derive these estimates, but at the same time ensuring that the sum of the GVA within divisions in a section constrains to that of the section estimate. For the UK, where estimates of GVA are available at the division level, the methodology used is simpler to that used for London.

As division level estimates are not available for London, the methodology used takes on board other ONS survey data to calculate estimates of the total division level GVA (the numerator of the GVA per workforce job calculation); and uses ONS survey data and assumptions to constrain to published workforce job data to create the denominator.

The methodology used here makes one assumption: that within sections, divisions have different levels of labour productivity and these will be reflected in wage differentials between divisions. In a more productive division, it is assumed that higher wages are paid to those employed within it.

Data on wages is available from the Annual Survey of Hours and Earnings (ASHE), available up to 4 digit sub-group level by region (however the amount of disclosive or unreliable data increases the lower the level of industry classification used).¹³ For this research, data on mean earnings for all employee jobs has been obtained where available for London at the division level. Some data is either disclosive or not reliable (where the coefficient of variation is too great), in those cases it has been assumed that the wage level for the division is identical to that of the section as a whole. For simplicity, the coefficient of variation of the estimates has not

¹³ Annual Survey of Hours and Earnings, Office for National Statistics, available at <http://www.ons.gov.uk/ons/rel/ashe/annual-survey-of-hours-and-earnings/index.html>

been taken into account (this being a measure of the potential volatility of the estimate); it has been assumed in the model that the wage level stated in the ASHE release is the true value.

The following steps outline the methodology that has been used to generate the estimates for GVA per workforce job at the division level for London:

Step 1: Setting a constraint to section level GVA

Using the methodology for the analysis at the section level, the same proportion of GVA attributable to the workforce has been used in the division level analysis. Here it is assumed that the proportions of GVA attributable to the workforce are identical for all divisions within sectors, as there is insufficient data to assert otherwise. Therefore a constraint of attributable GVA is set for all sections.

Step 2: Creation of attributable GVA estimates at the division level

This step assigns proportions of section level GVA to divisions within them based solely on the employment make-up of the divisions within the section. As workforce jobs are not available at the division level, other survey data has to be used to allocate employment, and therefore GVA, to each of the divisions. At this stage, no assumption regarding relative productivity of divisions within sections is made.

Data has been obtained on employees for each division from BRES; the advantage of using this source is that it is a survey of businesses with detailed data on enterprises and employees, available up to the 5 digit SIC level. This is the best source for this analysis at the regional level. However the details of the data used to generate these estimates are potentially disclosive for some divisions and are therefore not presented within Appendix D. Combined with BRES data for employees are figures from the APS on self-employment at the divisional level, which was obtained through a data request to the ONS. For simplicity, it has been assumed that the estimate of workforce jobs in each division are employees plus the self-employed; whereas the published measure of workforce jobs includes other elements within it (such as HM Forces and government supported trainees).¹⁴

Using an indicative example for Section M (Professional, Scientific and Technical Activities), the calculation used to determine the share of section GVA apportioned to one division within it (Division 69; Legal and Accounting Activities) is therefore:

$$\frac{(\text{Employees} + \text{self-employed for division 69})}{(\text{Sum of employees and self-employed for section M})} * \text{Attributable GVA for section M}$$

Step 3: Using ASHE data to account for relative productivity within sections

Data on mean earnings for all jobs within each division has been collected using ASHE. With these data, this stage of the methodology looks to adjust the estimated attributable GVA for each of the divisions based on the relative wage level of the division compared to the section as a whole. Therefore a division where employees are earning higher wages will have a greater proportion of the section's GVA assigned to it; which given that CoE accounts for over half of published GVA, is a sensible assumption.

This stage of the methodology looks to ensure that these adjusted division level estimates constrain to the whole section level estimate. Using an example for the construction sector

¹⁴ Modelling suggests that employed plus self-employed typically accounts for over 99 per cent of total workforce jobs.

(which contains three divisions: 41, 42 and 43), the productivity adjusted proportion of GVA for a specific division within the section is calculated as follows:

For Division 41: Construction of Buildings:

$$\frac{(\text{Unadjusted GVA for Div.41} * \text{Wage Div.41})}{(\text{Unadjusted GVA Div.41} * \text{Wage Div.41}) + (\text{Unadjusted GVA Div.42} * \text{Wage Div.42}) + (\text{Unadjusted GVA Div.43} * \text{Wage Div.43})}$$

To derive the productivity adjusted GVA for the division, the result of the calculation above is multiplied by the attributable GVA for the section as a whole. Following this method for the other divisions within the section ensures that these productivity adjusted GVA estimates constrain to the attributable GVA for the section as a whole.

Step 4: Calculation of estimated workforce jobs for each division

Using the data from BRES and APS for employees and self-employed within each division, the proportion of the published workforce jobs (WFJ) allocated to each division is estimated. Using the previous example of Division 69 within Section M:

$$\left(\frac{(\text{Employees} + \text{self-employed for division 69})}{(\text{Sum of employees and self-employed for section M})} \right) * (\text{Four quarter average of WFJ for section M})$$

Step 5: Calculation of estimated division level GVA per workforce job

With these data, the productivity adjusted GVA for a division (in Step 3) is divided by the estimated workforce jobs for each division (Step 4), leading to the estimate of GVA per workforce job for each division. The full data for those divisions where estimates have been made are included in Chapter 5, and fuller details of the calculations made are included within Appendix D.

A worked example of the use of this methodology is provided in Appendix A.

Division level methodology for the UK

For the UK as a whole, the methodology is not as complex since the Supply and Use Tables published alongside the Blue Book provide data on GVA at division level, therefore there is no need to undertake similar analysis as has been made for the London estimates. However, an assumption needs to be made as regards the denominator of the GVA per workforce job equation, since published workforce jobs data is only available at the section level. In this case, data has been obtained from the ONS on numbers of employed and self-employed (based on employer surveys for employee jobs and APS for self-employment jobs)¹⁵. This accounts for over 99% of total workforce jobs, therefore the assumption of workforce jobs at the division level for the UK as a whole has been based on simply adding the numbers of employed and self-employed.

The equation uses the attributable GVA based on the proportions for each section (see above) divided by the estimated workforce jobs. As component data of GVA is not available at the division level, the assertion is made that GVA attributable to the workforce is identical for each

¹⁵ Datasets JOBS03 and JOBS04 have been used as the sources to estimate the assumed workforce jobs by division for the UK. JOBS03 refers to employee jobs by division and is largely drawn from employer surveys, with the exception of Labour Force Survey (LFS) for sections A and T.

of the divisions within the section. The data for those divisions where estimates have been made are included within Chapter 5 and in Appendix E.

Worked example of calculation for Division 64: Finance service activities except insurance and pension funding:

Published GVA, Division 64, UK	£74,929 million
Proportion of GVA attributable to the workforce, Section K	92.8%
Attributable GVA	£67,338 million
Four quarter workforce job estimate (employed + self-employed)	547,250
GVA per workforce job estimate	£123,049

Source: Office for National Statistics, GLA Economics calculations

4. Section level estimates of GVA per workforce job

This chapter provides detail of the headline estimates of GVA per workforce job by industry section for London and the UK. This chapter also goes on to provide estimates for other regions and countries within the UK. A time series of GVA per workforce job estimates has been created for 2007 – 2012; data in this chapter are the estimates for 2012. The full time series is provided in Appendix E.

Headline calculation

The following tables provide data on published GVA for London and the UK, the modelled proportion of GVA attributable to the workforce, the attributable GVA, four quarter average of workforce jobs for 2012, and finally estimated GVA per workforce job.

Data providing detail on the modelled proportion of GVA attributable to the workforce for London and the UK are available in Appendix C.

London Analysis

Table 4.1: Modelled section level GVA attributable to the workforce, London, 2012

	Sector Description	Published GVA, (£ million)	Proportion of GVA attributable to the workforce (%)	Attributable GVA (£ million)
A	Agriculture, Forestry and Fishing	81	90.0	73
B	Mining and Quarrying	1,087	99.3	1,085
C	Manufacturing	7,996	99.5	7,960
D	Electricity, Gas, Steam and Air Conditioning Supply	2,843	99.1	2,818
E	Water Supply, Sewerage, Waste Management	1,613	99.6	1,606
F	Construction	15,170	94.9	14,392
G	Wholesale and Retail Trade, Repair of Motor Vehicles	26,215	99.2	26,009
H	Transportation and Storage	13,938	99.4	13,848
I	Accommodation and Food Service	9,943	99.2	9,866
J	Information and Communication	33,508	99.0	33,188
K	Financial and Insurance Activities	60,473	93.3	56,429
L	Real Estate	36,701	16.0	5,875
M	Professional, Scientific and Technical Activities	36,496	99.5	36,326
N	Administrative and Support Services	18,740	98.8	18,522
O	Public Administration and Defence	12,664	100.0	12,664
P	Education	17,195	99.9	17,173
Q	Human Health and Social Work	16,551	99.7	16,500
R	Arts, Entertainment and Recreation	5,817	99.4	5,781
S	Other Service Activities	7,287	99.8	7,272
A-S	Overall	324,318		287,388

Source: Regional Gross Value Added (Income Approach), ONS; GLA Economics calculations.

Table 4.2: Estimation of GVA per workforce job by sector, London, 2012

	Sector Description	Attributable GVA (£ million)	Four quarter Workforce Job Average	GVA per workforce job (£)
A	Agriculture, Forestry and Fishing	73	750	97,205
B	Mining and Quarrying	1,085	6,250	173,669
C	Manufacturing	7,960	122,750	64,846
D	Electricity, Gas, Steam and Air Conditioning Supply	2,818	6,000	469,683
E	Water Supply, Sewerage, Waste Management	1,606	18,250	88,019
F	Construction	14,392	270,500	53,204
G	Wholesale and Retail Trade, Repair of Motor Vehicles	26,009	627,750	41,432
H	Transportation and Storage	13,848	260,000	53,264
I	Accommodation and Food Service	9,866	339,250	29,082
J	Information and Communication	33,188	364,750	90,988
K	Financial and Insurance Activities	56,429	383,250	147,239
L	Real Estate	5,875	120,750	48,656
M	Professional, Scientific and Technical Activities	36,326	627,500	57,890
N	Administrative and Support Services	18,522	506,000	36,604
O	Public Administration and Defence	12,664	225,000	56,284
P	Education	17,173	374,750	45,825
Q	Human Health and Social Work	16,500	518,250	31,839
R	Arts, Entertainment and Recreation	5,781	168,000	34,411
S	Other Service Activities	7,272	130,000	55,941
A-S	Overall	287,388	5,069,750	56,687

Source: GLA Economics calculations

UK Analysis

Table 4.3: Modelled section level GVA attributable to the workforce, UK, 2012

	Sector Description	Published GVA, (£ million)	Proportion of GVA attributable to the workforce (%)	Attributable GVA (£ million)
A	Agriculture, Forestry and Fishing	9,997	94.3	9,428
B	Mining and Quarrying	29,315	99.9	29,274
C	Manufacturing	146,861	99.6	146,302
D	Electricity, Gas, Steam and Air Conditioning Supply	20,726	99.2	20,567
E	Water Supply, Sewerage, Waste Management	16,304	99.6	16,232
F	Construction	88,716	95.3	84,504
G	Wholesale and Retail Trade, Repair of Motor Vehicles	161,985	99.2	160,629
H	Transportation and Storage	62,145	99.4	61,743
I	Accommodation and Food Service	43,332	99.1	42,956
J	Information and Communication	92,214	99.1	91,351
K	Financial and Insurance Activities	119,761	92.8	111,121
L	Real Estate	167,285	12.7	21,287
M	Professional, Scientific and Technical Activities	106,093	99.5	105,560
N	Administrative and Support Services	69,684	98.9	68,923
O	Public Administration and Defence	79,505	100.0	79,505
P	Education	98,738	99.9	98,622
Q	Human Health and Social Work	103,634	99.7	103,315
R	Arts, Entertainment and Recreation	22,151	99.4	22,020
S	Other Service Activities	31,452	99.7	31,357
A-S	Overall	1,469,898		1,304,695

Source: Regional Gross Value Added (Income Approach), ONS; GLA Economics calculations.

Table 4.4: Estimation of GVA per workforce job by sector, UK, 2012

	Sector Description	Attributable GVA (£ million)	Four quarter Workforce Job Average	GVA per workforce job (£)
A	Agriculture, Forestry and Fishing	9,428	404,250	23,322
B	Mining and Quarrying	29,274	75,750	386,453
C	Manufacturing	146,302	2,567,000	56,993
D	Electricity, Gas, Steam and Air Conditioning Supply	20,567	114,750	179,237
E	Water Supply, Sewerage, Waste Management	16,232	192,750	84,213
F	Construction	84,504	2,043,000	41,363
G	Wholesale and Retail Trade, Repair of Motor Vehicles	160,629	4,844,500	33,157
H	Transportation and Storage	61,743	1,510,250	40,883
I	Accommodation and Food Service	42,956	1,999,750	21,481
J	Information and Communication	91,351	1,231,500	74,178
K	Financial and Insurance Activities	111,121	1,144,250	97,113
L	Real Estate	21,287	497,500	42,788
M	Professional, Scientific and Technical Activities	105,560	2,504,000	42,157
N	Administrative and Support Services	68,923	2,543,000	27,103
O	Public Administration and Defence	79,505	1,578,250	50,375
P	Education	98,622	2,769,000	35,616
Q	Human Health and Social Work	103,315	4,055,750	25,474
R	Arts, Entertainment and Recreation	22,020	891,750	24,693
S	Other Service Activities	31,357	787,000	39,843
A-S	Overall	1,304,695	31,754,000	41,088

Source: GLA Economics calculations

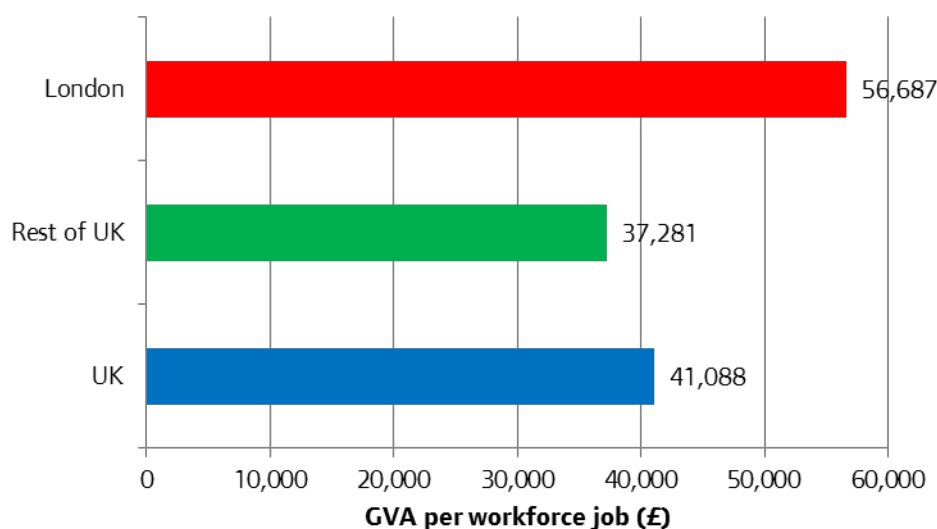
Comparisons between London and the rest of the UK

The estimates produced allow for comparative analysis of the GVA per workforce job by sector for London and the rest of the UK¹⁶.

Figure 4.1 provides the headline comparison of GVA per workforce job for London, the rest of the UK, and the UK as a whole; with the London estimate being 38.0 per cent higher than for the UK as a whole.

¹⁶ "Rest of UK" refers to the UK (excluding extra-region) less London and equates to the sum of all other regions and countries in the UK (allowing for rounding).

Figure 4.1: GVA per workforce job, London and the UK, all sector average, 2012



Source: GLA Economics calculations

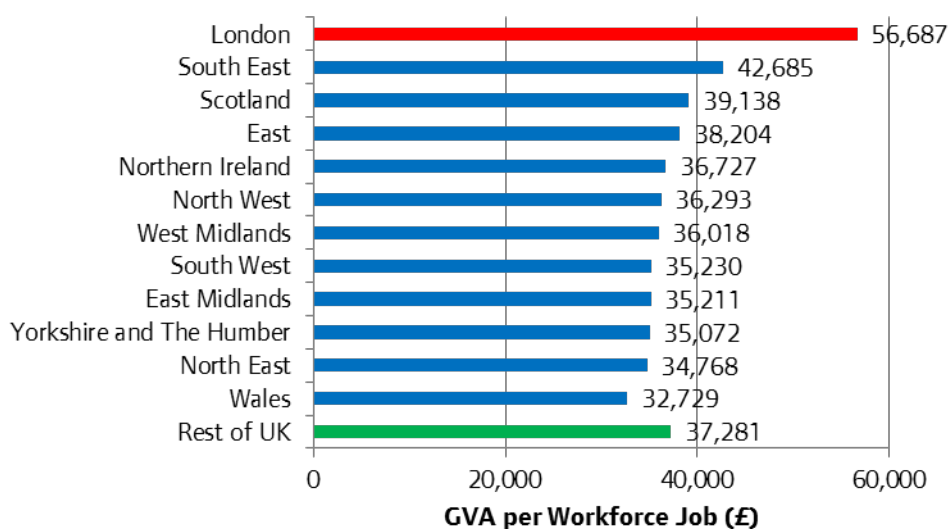
The following table and chart provide estimates for average GVA per workforce job for each region and country within the UK, with the model that attributes published GVA to the workforce calculated for each area individually. However, it should be made clear that these estimates for individual regions and countries within the UK, when aggregated together, do not sum to the total published GVA for the UK, since “extra-regio” output (that which cannot be assigned to individual regions/countries) has not been included or apportioned to individual regions/countries. The calculation for “Rest of UK” used here is United Kingdom excluding extra-regio minus London.

Table 4.5: GVA per workforce job estimates by region/country within the UK, 2012

Region	Published GVA	Attributable GVA	Four Quarter Average Workforce Jobs	GVA per workforce job (£)
North East	43,916	39,444	1,134,500	34,768
North West	136,215	122,009	3,361,750	36,293
Yorkshire and the Humber	98,648	88,241	2,516,000	35,072
East Midlands	86,169	77,164	2,191,500	35,211
West Midlands	106,287	94,997	2,637,500	36,018
East	125,563	109,053	2,854,500	38,204
London	324,318	287,388	5,069,750	56,687
South East	219,732	191,721	4,491,500	42,685
South West	109,314	94,866	2,692,750	35,230
Wales	50,064	44,495	1,359,500	32,729
Scotland	113,576	102,082	2,608,250	39,138
Northern Ireland	32,411	29,630	806,750	36,727
Rest of UK	1,121,896	993,703	26,654,500	37,281

Source: Regional Gross Value Added (Income Approach), published data refers to sections A-S.

Figure 4.2: GVA per workforce job estimates by region/country within the UK, 2012

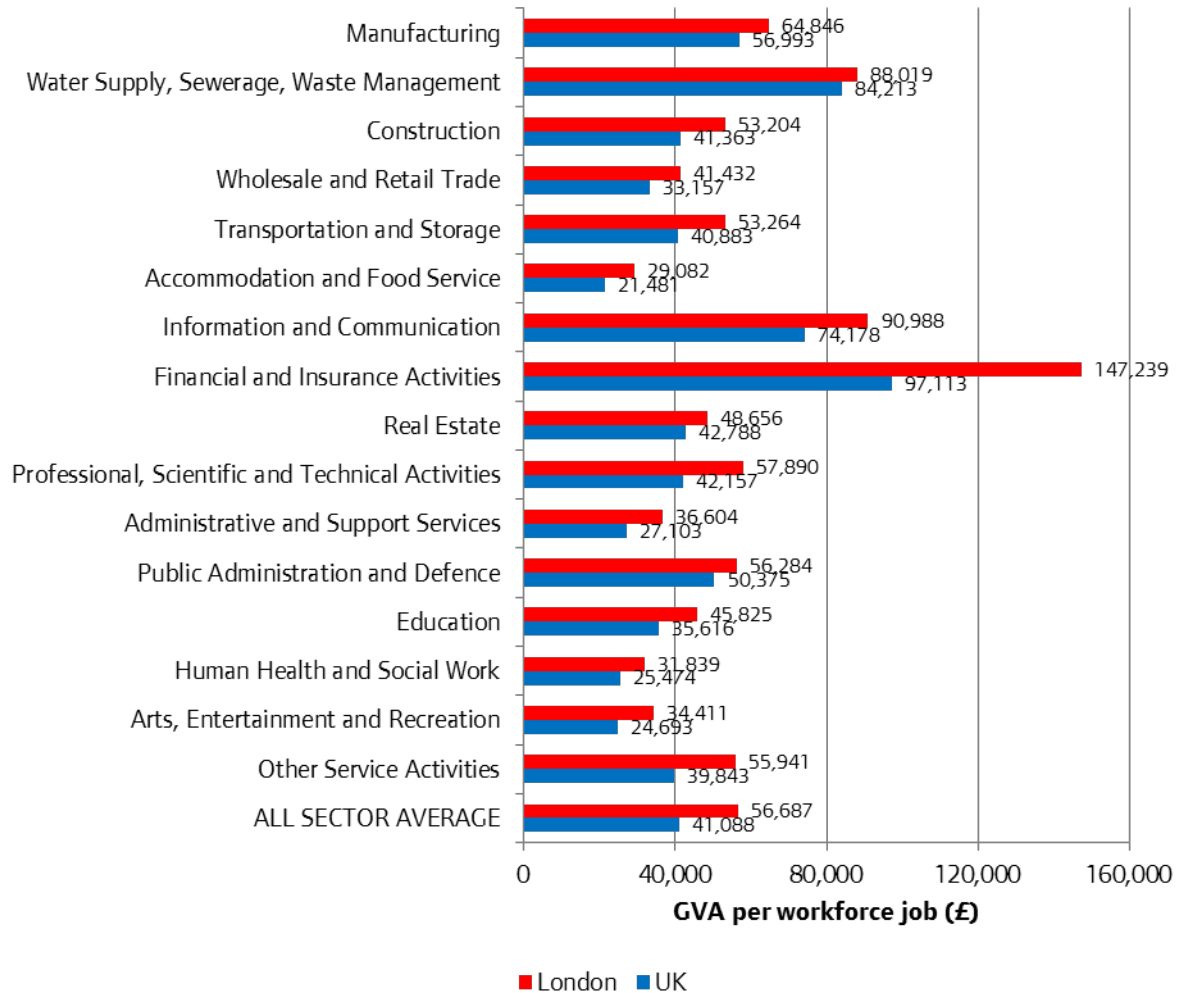


Source: GLA Economics calculations. Rest of UK equals UK excluding extra-region minus London.

Figure 4.2 shows that GVA per workforce job estimates for London are significantly higher than for any other region; compared to the South East, GVA per workforce job is 32.8 per cent higher; and compared to Wales, London's estimate is 73.2 per cent higher. When looking at the UK excluding London, GVA per workforce job is estimated to be £37,281; with London's GVA per workforce job 52.1 per cent higher.

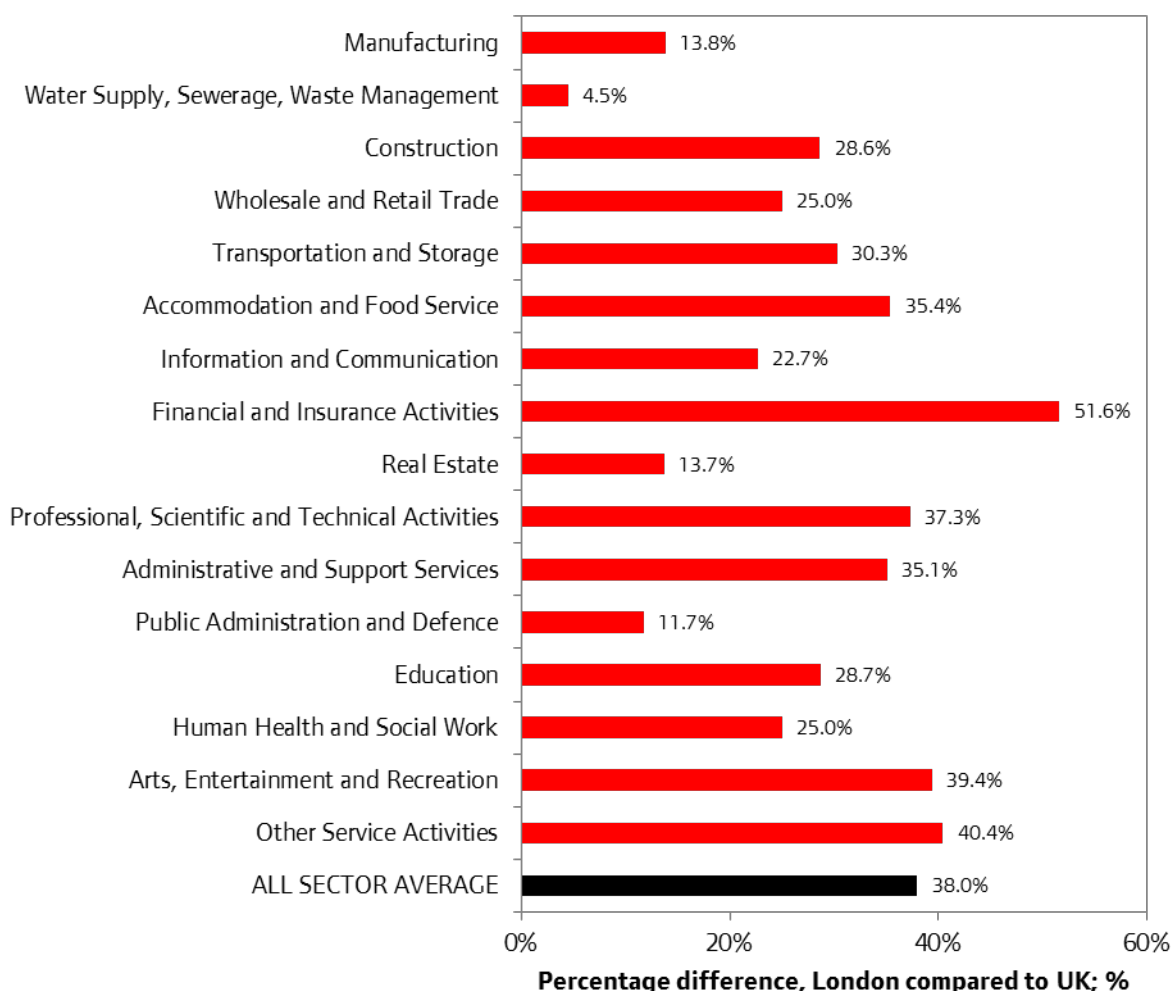
The following chart details comparisons in the estimates between industry sectors for London and the UK as a whole:

Figure 4.3: GVA per workforce job, by industry sector, London and the UK, 2012



Source: GLA Economics calculations

Figure 4.4: Percentage difference in GVA per workforce job estimates by industry sector, London compared to UK, 2012



Source: GLA Economics calculations

Figures 4.3 and 4.4 present the estimates and comparisons of GVA per workforce job for London and the UK. Sections A, B and D have been excluded in the analysis since they represent either only a very small proportion of the London economy (ie. agriculture), or where such activities does not physically occur in London, however the output may be recorded in London (ie. mining and quarrying; electricity, gas, steam and air conditioning supply).

For all sections of the economy, the GVA per workforce job in London is higher than for the UK as a whole. As a general conclusion this is perhaps not surprising, since other measures of output or earnings would suggest this is the case.

Sectors where there are particular comparative advantages for London (and greater disparity between earnings of London compared to the UK as a whole) show the greatest differences. For instance, as shown in Figure 4.4, the largest difference between London and the UK was in the Financial and Insurance Activities section (51.6 per cent higher in London than in the UK as a whole). Large differences were also observed in the Professional, Scientific and Technical section (37.3 per cent), Arts, Entertainment and Recreation (39.4 per cent), and Other service

activities (40.4 per cent). Within Manufacturing, Construction, Wholesale and Retail trades; and Transportation and Storage, Figure 4.4 shows that the differences are lower in magnitude, ranging between 14 and 30 per cent higher in London than in the UK as a whole.

5. Division level estimates of GVA per workforce job

This chapter provides detail of the estimates for GVA per workforce job for all divisions within sections for 2012; however fuller details of the calculation steps within this methodology are not provided for some divisions due to suppression of data obtained from BRES. Full details, where available, are included in Appendix D.

Data for Real Estate activities, Public Administration and Defence, and Education have not been presented within this chapter since there is only one division within the section, therefore the estimates have already been provided within Chapter 4.

Primary and Utilities

Due to the small size of these sectors in London and the limitations of the data, care must be used in the interpretation of these statistics, especially with respect to London. For example, very limited agricultural activity is physically able to take place in London compared to the UK as a whole, therefore the London estimate cannot be considered reliable data; therefore for sections A and B, data has not been included. Estimates for utilities in London, Section D (which contains only one division) and Section E are shown in the table below.

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
D	35: Electricity, gas, steam and air conditioning supply	469,683	179,237	+162%
E	36: Water collection, treatment and supply	87,456	140,226	-38%
E	37: Sewerage	78,181	244,132	-68%
E	38: Waste collection, treatment and disposal activities	89,611	48,449	+85%
E	39: Remediation activities and other waste management services	87,456	48,449	+81%

Sources: GLA Economics calculations using BRES, APS, ASHE and Regional GVA releases. Note for Divisions 38 and 39 for the UK, due to lack of available employment data for these divisions individually, these two codes have been combined and given the same GVA per workforce job estimate.

Manufacturing

The manufacturing sector comprises a significant number of small divisions. However sufficient data is available to produce estimates of GVA per workforce job for all divisions with the exception of Divisions 12 and 19. Due to suppression of employment data within these divisions, the full calculations for each division within this section have not been included within Appendix D.

Division 21 on the Manufacture of basic pharmaceutical products and preparations has seen the total GVA for the division in the UK increase by almost 45% since 2007, whilst employment in this division has fallen; this could partially explain the significant disparity between GVA per workforce job in London and the UK; however it could potentially be explained by significant activity in this sector taking place within major university centres of Oxford and Cambridge.

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
C	10: Manufacture of food products	62,674	49,117	+28%
C	11: Manufacture of beverages	78,820	130,778	-40%
C	13: Manufacture of textiles	70,389	38,619	+82%
C	14: Manufacture of wearing apparel	49,790	49,837	0%
C	15: Manufacture of leather and related products	70,389	55,687	+26%
C	16: Manufacture of wood and products of wood and cork	52,891	30,794	+72%
C	17: Manufacture of paper and paper products	73,253	64,347	+14%
C	18: Printing and reproduction of recorded media	68,759	41,346	+66%
C	20: Manufacture of chemicals and chemical products	88,007	61,530	+43%
C	21: Manufacture of basic pharmaceutical products and preparations	96,477	284,025	-66%
C	22: Manufacture of rubber and plastic products	60,089	52,757	+14%
C	23: Manufacture of other non-metallic mineral products	49,511	44,576	+11%
C	24: Manufacture of basic metals	70,389	40,503	+74%
C	25: Manufacture of fabricated metal products, except machinery	53,488	45,376	+18%
C	26: Manufacture of computer, electronic and optical products	70,389	75,314	-7%
C	27: Manufacture of electrical equipment	51,539	49,046	+5%
C	28: Manufacture of machinery and equipment (other)	66,492	60,011	+11%
C	29: Manufacture of motor vehicles, trailers and semi-trailers	84,507	74,988	+13%
C	30: Manufacture of other transport equipment	72,258	54,513	+33%
C	31: Manufacture of furniture	49,392	34,732	+42%
C	32: Other manufacturing	61,799	41,133	+50%
C	33: Repair and installation of machinery and equipment	80,530	46,860	+72%
	Manufacturing	64,846	56,993	+14%

Construction

Data at the division level for London and the UK as a whole finds that in Division 42, Civil Engineering, the estimate of GVA per workforce job is significantly greater than in London. However due to the size of the division in comparison with the other divisions within the section, the overall average for the section in London is 29 per cent greater than for the UK as a whole; with the majority of employment located within both Divisions 41 and 43 (modelling suggests that around 91 per cent of the total section workforce in London is located within these two divisions).

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
F	41: Construction of buildings	57,433	55,269	+4%
F	42: Civil engineering	48,807	71,560	-32%
F	43: Specialised construction activities	50,881	27,832	+83%
	Construction	53,204	41,363	+29%

Wholesale and Retail Trade

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
G	45: Wholesale and retail trade and repair of motor vehicles/cycles	32,963	44,816	-26%
G	46: Wholesale trade, except of motor vehicles/cycles	52,769	43,711	+21%
G	47: Retail trade, except of motor vehicles/cycles	37,866	27,040	+40%
	Wholesale and Retail Trade	41,432	33,157	+25%

Transportation and Storage

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
H	49: Land transport and transport via pipelines	51,113	34,726	+47%
H	50: Water transport	68,603	295,427	-77%
H	51: Air transport	71,316	77,193	-8%
H	52: Warehousing and support activities for transportation	53,885	36,781	+47%
H	53: Postal and courier activities	38,578	36,238	+6%
	Transportation and Storage	53,264	40,883	+30%

Accommodation and Food

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
I	55: Accommodation	32,491	28,144	+15%
I	56: Food and beverage service activities	28,354	19,620	+45%
	Accommodation and food service activities	29,082	21,481	+35%

Information and Communication

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
J	58: Publishing activities	90,728	58,771	+54%
J	59: Motion picture, video and television programme production, sound and music publishing activities	85,664	64,951	+32%
J	60: Programming and broadcasting activities	92,377	98,125	-6%
J	61: Telecommunications	85,664	120,667	-29%
J	62: Computer programming, consulting and related activities	94,027	62,147	+51%
J	63: Information service activities	96,137	92,668	+4%
	Information and communication	90,988	74,178	+23%

Financial and Insurance Activities

Data for this section shows significant disparities between London and the UK across all three divisions. A review of the data across the time series shows similar results for each of the three divisions.

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
K	64: Financial service activities, except insurance and pension funding	154,347	123,049	+25%
K	65: Insurance, reinsurance and pension funding, except compulsory social security	134,682	238,029	-43%
K	66: Activities auxiliary to financial services and insurance	141,292	33,727	+319%
	Financial and Insurance Activities	147,329	97,113	+52%

Professional, Scientific and Technical Activities

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
M	69: Legal and accounting activities	64,686	52,198	+24%
M	70: Activities of head offices; management consultancy activities	61,675	25,698	+140%
M	71: Architectural and engineering activities; technical testing	49,924	46,710	+7%
M	72: Scientific research and development	61,743	74,439	-17%
M	73: Advertising and market research	53,587	45,281	+18%
M	74: Other professional, scientific and technical activities	42,375	29,757	+42%
M	75: Veterinary activities	41,634	42,008	-1%
	Professional, Scientific and Technical Activities	57,890	42,157	+37%

Administrative and support service activities

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
N	77: Rental and leasing activities	36,855	88,426	-58%
N	78: Employment activities	39,699	18,522	+114%
N	79: Travel agency, tour operator and other reservation services	47,579	83,056	-43%
N	80: Security and investigation activities	28,082	14,918	+88%
N	81: Services to buildings and landscape activities	28,217	8,982	+214%
N	82: Office administrative, office support and other business support	53,320	52,241	+2%
	Administrative and support service activities	36,604	27,103	+35%

Human health and social work activities

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
Q	86: Human health activities	36,434	34,405	+6%
Q	87: Residential care activities	24,629	15,195	+62%
Q	88: Social work activities without accommodation	25,284	12,984	+95%
	Human health and social work activities	31,839	25,474	+25%

Arts, entertainment and recreation

Analysis of this sector shows significant disparity for Division 92, Gambling and betting activities. This may be the result of some enterprises being registered in areas outside London or mainland UK, for example within the Channel Islands or the Isle of Man. Another feature of this sector is that the estimates of GVA per workforce job are much lower than the averages for London and the UK across all sectors; this may be attributed to the potential under-reporting of GVA within cultural activities where no physical good is actually produced; for example, a visit to a museum where no entry fee is charged, or which are staffed by unpaid volunteers is likely to report a much lower output than for a sector where there is a physical chargeable product in an enterprise which only employs paid staff.

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
R	90: Creative, arts and entertainment activities	38,091	16,725	+128%
R	91: Libraries, archives, museums and other cultural activities	36,754	30,148	+22%
R	92: Gambling and betting activities	28,914	102,391	-72%
R	93: Sports activities and amusement and recreation activities	31,610	10,146	+212%
	Arts, entertainment and recreation	34,411	24,693	+39%

Other service activities

	Division	GVA per workforce job estimate (£)		Percentage Difference: London compared to UK
		London	UK	
S	94: Activities of membership organisations	65,485	53,866	+22%
S	95: Repair of computers and personal and household goods	51,005	28,417	+79%
S	96: Other personal service activities	46,706	33,677	+39%
	Other service activities	55,941	39,843	+40%

6. Conclusions

This paper has put forward a top-down approach for the calculation of GVA per workforce job. Whilst other methods of calculating GVA per workforce job have previously been used towards the evaluation of RDA projects and programmes, this paper proposes a new approach using National and Regional Accounts data. It uses a methodology designed to isolate output directly attributable to the workforce, to calculate a measure of GVA per workforce job; which can be used towards appraisal and evaluation of projects and programmes.

The findings of the analysis fit broadly in line with a priori expectations of the relative labour productivity of sectors of the economy. London has specific comparative advantages in sectors such as finance, business support and professional services; and these are amongst the sectors with the largest estimates of GVA per workforce job. When compared to the UK as a whole, across the main sectors of London's economy, the estimate of GVA per workforce job is higher in London than in the UK as a whole for all sectors.

The methodology used to attribute a proportion of published GVA to economic activity associated with the workforce would not have been possible without data requests to the ONS. It is hoped that in the future, the ONS may be able to provide regional figures for more components of GVA to enable further refinement of these estimates.

Appendix A: Worked examples of the methodology used to derive section and division level GVA per workforce job

This appendix provides a more detailed run through of the calculation steps used in the estimation of GVA per workforce job at the section and division level for London and the UK.

Section level estimate, UK – calculation steps

Step 1: Derive an estimate of the proportion of published GVA attributable to the workforce

As referenced in Chapter 3, the methodology looks to isolate the activities (and hence output) which would be as a result of direct activity of the workforce; therefore removing the effect of rentals from the measure of GVA. As presented in Chapter 3, the numerator for the GVA per workforce job equation was given as follows:

$$\text{CoE} + (\text{GOS/MI} - \text{rental income}) + (\text{Proportion of rental income to GVA} * \text{taxes less subsidies})$$

This equation is the estimate of “attributable GVA”, which when divided by the published GVA for a section, leads to the estimate of the proportion of published GVA attributable to the workforce.

The following is a worked example for Section M: Professional, Scientific and Technical Activities; all values in £ million:

A	Compensation of Employees	62,245
B	Self-employment income	22,770
C	Rental income	530
D	GOS/MI	43,277
E	Taxes less subsidies	571
F	Published GVA	106,093

G	GOS/MI minus rental income	= D - C 42,747
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H	Proportion of GVA attributed to rental income	= C / F = 1.2%
I	Taxes less subsidies, excluding rentals	= E - (C * H) = 568

Published GVA minus rental income effects: “Attributable GVA”	= A + G + I = 105,560
Proportion of section GVA attributable to workforce	99.5%

Source: Regional Gross Value Added (Income Approach), Office for National Statistics, GLA Economics calculations

Step 2: Calculation of workforce jobs for each section

The denominator of the GVA per workforce job equation requires the use of the ONS Workforce Jobs series. As the base year for the estimates provided in this paper is 2012, a four quarter average of published workforce jobs by section is calculated.

For Section M, the estimate is calculated as follows:

Date	Number of workforce jobs; Section M, London
March 2012	2,464,000
June 2012	2,516,000
September 2012	2,485,000
December 2012	2,551,000
Four Quarter Average, 2012	2,504,000

Source: Workforce Jobs, ONS

Step 3: Final calculation

The GVA per workforce job for each is calculated by:

$$\frac{(\text{Published Regional GVA} * \text{Proportion of GVA attributable to workforce})}{\text{Four Quarter workforce job average}}$$

The following table provides detail of the calculation step for Section M: Professional, Scientific and Technical Activities:

A	Published GVA, Section M, UK	£106,093 million
B	Proportion attributable to the workforce, Section M	99.5%
C	Attributable GVA	= A * B = £105,560 million
D	Four quarter average workforce jobs, 2012, UK	2,504,000
	GVA per workforce job, Section M, UK	= C / D = £41,088

Source: Office for National Statistics, GLA Economics calculations

Appendix C provides the background data to derive the attribution model, used to calculate these estimates.

Division level estimate, London – calculation steps

The following tables outline how the estimates of GVA per workforce job in London for each division within a sector have been estimated; and is based on Section M: Professional, Scientific and Technical Activities. The first step is to transform the published figure for GVA in this sector and generating the attributable GVA to the activity of the workforce, therefore setting the constraint for the section level GVA.

Published GVA	£36,496 million
Proportion of GVA attributable to the workforce	99.5%
Total sector “attributable GVA”	£36,326 million

Source: Office for National Statistics, GLA Economics calculations

Data is then obtained on employees and self-employed (for the purposes of the model, the summation of the employees and self-employed is assumed to be the measure of workforce

jobs). These data for this section is included below, with data on employees drawn from BRES and self-employed from APS. Using the equation as outlined in Step 2 within the relevant section of Chapter 3, the attributable GVA estimates for each division are estimated, ensuring that the summation of the division constrains to the whole sector GVA.

Example for Division 69: Legal and accounting activities:¹⁷

$$\left(\frac{164,300 + 41,000}{539,300 + 133,000} \right) * £36,326 \text{ million} = £11,093 \text{ million}$$

Division/Section	Employees	Self-employed	Attributable GVA (£ million)
69: Legal and accounting activities	164,300	41,000	11,093
70: Activities of head offices; management consultancy activities	170,700	28,000	10,736
71: Architectural and engineering activities; technical testing	75,800	17,000	5,014
72: Scientific research and development	15,900	2,000	967
73: Advertising and market research	73,400	13,000	4,668
74: Other professional, scientific and technical activities	38,000	32,000	3,782
75: Veterinary activities	1,200	0	65
M: Professional, scientific and technical activities	539,300	133,000	36,326

Source: Business Register and Employment Survey (employees), Annual Population Survey (self-employed); Office for National Statistics; GLA Economics calculations.

Data from ASHE is then obtained for each division and for the section as a whole; with these data and the attributable GVA, a proportion of adjusted section GVA is generated for each of the divisions; this method ensures that the summation of the adjusted GVA for each division constrains to the attributable GVA for the section, at the same time as enabling an adjustment for the relative wages in each of the divisions.

Example for Division 69: Legal and accounting activities

$$\frac{11,093 * 28.79}{(11,093 * 28.79) + (10,736 * 27.45) + \dots + (65 * 18.53)} = 34.1\%$$

$$34.1\% * £36,326 \text{ million} = £12,395 \text{ million}$$

¹⁷ Note for the purposes of this example, suppression and rounding of BRES and APS figures have been applied before calculations are made.

Division/Section	Attributable GVA (£ million)	Gross mean hourly wage, all employee jobs (£, London)	Proportion of section level GVA adjusted for relative wage	Productivity adjusted GVA (£ million)
69: Legal and accounting activities	11,093	28.79	34.1%	12,395
70: Activities of head offices; management consultancy activities	10,736	27.45	31.5%	11,438
71: Architectural and engineering activities; technical testing	5,014	22.22	11.9%	4,324
72: Scientific research and development	967	27.48	2.8%	1032
73: Advertising and market research	4,668	23.85	11.9%	4321
74: Other professional, scientific and technical activities	3,782	18.86	7.6%	2769
75: Veterinary activities	65	18.53	0.1%	47
M: Professional, scientific and technical activities	36,326	26.05	100.0%	36,326

Source: Annual Survey of Hours and Earnings, Office for National Statistics; GLA Economics calculations

Data from BRES and APS on employee jobs and self-employed is then used to model the proportion of total sector workforce jobs that will be assigned to each of the divisions within the section, ensuring that the sum of the divisions is constrained to the published workforce jobs for the section. The reason for this step is that BRES is a business survey therefore not accounting for the totality of the workforce, and APS is a household survey which has been used to estimate the number of self-employed in the division, therefore the summation of the employee and self-employed estimate will not equate to the published workforce job figure – this step models the published section workforce jobs into each of the division components.

Example for Division 69: Legal and accounting activities

$$\left(\frac{164,300 + 41,000}{539,300 + 133,000} \right) * 627,500 = 191,619$$

Division/Section	Employees	Self-employed	Modelled Workforce Jobs (based on four quarter average, 2012)
69: Legal and accounting activities	164,300	41,000	191,619
70: Activities of head offices; management consultancy activities	170,700	28,000	185,459
71: Architectural and engineering activities; technical testing	75,800	17,000	86,616
72: Scientific research and development	15,900	2,000	16,707
73: Advertising and market research	73,400	13,000	80,643
74: Other professional, scientific and technical activities	38,000	32,000	65,335
75: Veterinary activities	1,200	0	1,120
M: Professional, scientific and technical activities	539,300	133,000	627,500

Source: Office for National Statistics, GLA Economics calculations

With these data on “productivity adjusted GVA” and modelled workforce jobs by division, the final calculation of GVA per workforce job can be made, and the results for the Professional,

scientific and technical activities section is provided below. Full details of the calculations made, where available, are included within Appendix D.

Division/Section	Productivity adjusted GVA (£ million)	Modelled workforce jobs	GVA per workforce job estimate (£)
69: Legal and accounting activities	12,395	191,619	64,686
70: Activities of head offices; management consultancy activities	11,438	185,459	61,675
71: Architectural and engineering activities; technical testing	4,324	86,616	49,924
72: Scientific research and development	1032	16,707	61,743
73: Advertising and market research	4321	80,643	53,587
74: Other professional, scientific and technical activities	2769	65,335	42,375
75: Veterinary activities	47	1,120	41,634
M: Professional, scientific and technical activities	36,326	627,500	57,890

Source: Office for National Statistics, GLA Economics calculations

Appendix B: Alternative methodology to apportion published GVA to activity of the workforce for regions

The data used within the model for working out which part of published GVA can be attributed to the economic activity of the workforce at the regional level is based upon available component data. One particular sector of interest is the real estate sector (SIC07 section L), where market rents and imputed rental income of owner occupiers were estimated at £146,226 million in 2012 and comprised almost 90 per cent of the total published GVA for the sector (at UK level). Given the strength of the London housing market in comparison to other regions, a method for removing market rents and imputed rental incomes at regional level was explored. This uses data from the 2011 Census and ONS House Price Index to create a means of apportioning published UK imputed rental income to individual regions.

The method outlined within the regional model in Chapter 3 uses the UK proportion of market rents and imputed rental income within GOS/MI and assumes that this share is identical for all regions; this alternative method looks to allocate total market rents and imputed rental incomes to each region, and has been based upon the relative value of owner-occupier housing within each region. This method has used data on home ownership from the 2011 Census and data from the ONS on average house prices (in April 2011). With these data, an estimate of the total value of residential owner-occupier housing has been calculated, and the total rentals (sum of market rent and imputed rental income) have been allocated based on the share of the total UK value each region/country represents. This figure is then subtracted from GOS/MI, and added to CoE and (T-S) to calculate the attributable GVA for each region/country, by section.

Region	Number of properties owned according to 2011 Census	Average house price (April 2011)	Total value of owned properties (£ million)	Proportion of UK value	Apportioned imputed rental income and market rents (£ million), 2012
North East	698,595	138,962	97,078	2.8%	4,100
North West	1,941,564	152,556	296,197	8.6%	12,511
Yorkshire and the Humber	1,425,563	155,072	221,065	6.4%	9,337
East Midlands	1,274,665	160,552	204,650	5.9%	8,644
West Midlands	1,489,094	169,194	251,946	7.3%	10,642
East	1,637,861	234,037	383,320	11.1%	16,191
London	1,576,207	352,061	554,921	16.0%	23,439
South East	2,404,517	270,701	650,905	18.8%	27,493
South West	1,526,958	211,114	322,362	9.3%	13,616
Wales	878,654	148,504	130,484	3.8%	5,511
Scotland	1,470,986	169,898	249,918	7.2%	10,556
Northern Ireland	703,275	140,858	99,062	2.9%	4,184
Total UK			3,461,908	100.0%	146,226

Source: Census 2011, Census 2011 Scotland, Census Ireland & Northern Ireland, 2011. House Price Index (mix-adjusted average house prices by region; DCLG table A2), Office for National Statistics.

It is estimated that 16.0 per cent of the total rental incomes for the UK would therefore be apportioned to London; the proportion of published GVA attributable is estimated as follows:

A	Published CoE, Real estate section, London, 2012	£3,772 million
B	Estimated GOS/MI, Real estate section, London, 2012	£33,014 million
C	Estimated total rentals, Real estate section, London, 2012	£23,439 million

D	Estimated taxes less subsidies, Real estate section, London	-£85 million
E	"Attributable GVA", Real estate section, London, 2012	= A + (B – C) + D = £13,262 million

	Published GVA, Real estate section, London	£36,701 million
	Proportion of GVA attributable to the workforce	36.1%

Source: Regional Gross Value Added, Office for National Statistics; GLA Economics calculations

This alternative method has estimated that a significantly greater proportion of published GVA is allocated to the workforce in the real estate sector in London. Therefore, this increases the estimates of GVA per workforce job for both the real estate sector and for the London economy as a whole, as shown in the following table:

Method	Proportion of GVA apportioned to workforce, Real Estate section, %	GVA per workforce job – Real Estate section (2012)	GVA per workforce job – Whole London economy (2012)
Central methodology	16.0	£48,656	£56,687
Alternative Method	36.1	£109,830	£58,144

Source: GLA Economics calculations

While this alternative method based on the use of Census and house price data also provides a useful method in terms of apportioning out the published imputed rental data, it is limited by the fact that it uses the Census, which is only updated once every ten years; and subsequent survey data will not be as full, complete or accurate as this. This model was also applied to other sectors (and for other regions), however has not been proposed as the central methodology at this time since minor outliers are witnessed for some sectors. However, this is an area which can be reviewed further going forward.

Appendix C: Model for attribution of GVA to the workforce for London and the UK

This section outlines the modelling steps to calculate the proportion of published GVA that is attributable to the workforce. The model requires component data of GVA, which was drawn directly from the Supply and Use tables, consistent with Blue Book 2014 and the European System of Accounts 2010 (ESA10). A data request was made to the ONS requesting GOS/MI with the self-employment and rental income components presented separately. Through this request and the published component data of GVA, we are then able to estimate the proportion of published GVA that would be attributable to the workforce.

Attribution model for the UK

Table C-1 shows the raw data drawn from ONS's Regional GVA (Income Approach) and Supply Use table publications, with the data request to the ONS providing a breakdown of GOS/MI; showing self-employment income and rental income presented separately.

Table C-1: Published component data of GVA for the UK, 2012; all values in £ million

Section	Published CoE	Self-employment Income	Rental Income (market rents)	Rental Income (imputed rents of owner occupiers)	Gross Operating Surplus / Mixed Income	Taxes less subsidies	Published GVA
A	4,690	4,335	693		7,480	-2,173	9,997
B	6,207	37	41		23,001	107	29,315
C	106,144	5,215	550		38,386	2,331	146,861
D	6,724	110	149		12,748	1,254	20,726
E	7,363	342	69		8,258	683	16,304
F	46,871	24,503	4,158		40,708	1,137	88,716
G	106,009	14,781	1,284		47,358	8,618	161,985
H	44,793	4,777	396		16,401	951	62,145
I	25,270	3,966	355		15,604	2,458	43,332
J	57,040	3,011	853		34,062	1,112	92,214
K	59,698	1,212	8,445		57,362	2,701	119,761
L	11,082	2,528	28,325	117,901	156,604	-401	167,285
M	62,245	22,770	530		43,277	571	106,093
N	40,613	6,502	750		28,064	1,007	69,684
O	61,021	0	0		18,484	0	79,505
P	86,479	1,421	116		12,007	252	98,738
Q	83,916	11,811	318		19,461	257	103,634
R	11,026	3,661	128		10,551	574	22,151
S	16,602	9,321	94		14,400	450	31,452

Source: Regional Gross Value Added (Income Approach), Supply Use tables and ad-hoc data request reference 003460, Office for National Statistics.

The model looks to remove the effects of rental incomes from the published GVA estimates, therefore enabling an estimation of the proportion of published GVA that is attributable to the economic activity of the workforce. Table C-2 removes rental incomes from GOS/MI. For example in section A, the calculation would be: $7,480 - 693 = £6,787$ million.

Table C-2: Calculation of GOS/MI excluding rentals, all values in £ million

Section	Gross Operating Surplus/Mixed Income	Rental Income (market rents)	Rental income (imputed rents of owner occupiers)	Gross Operating Surplus/Mixed Income less rentals
A	7,480	693		6,787
B	23,001	41		22,960
C	38,386	550		37,836
D	12,748	149		12,599
E	8,258	69		8,189
F	40,708	4,158		36,550
G	47,358	1,284		46,074
H	16,401	396		16,005
I	15,604	355		15,249
J	34,062	853		33,209
K	57,362	8,445		48,917
L	156,604	28,325	117,901	10,378
M	43,277	530		42,747
N	28,064	750		27,314
O	18,484	0		18,484
P	12,007	116		11,891
Q	19,461	318		19,143
R	10,551	128		10,423
S	14,400	94		14,306

Source: Office for National Statistics, GLA Economics calculations

Tables C-3 to C-6 outline the model steps that have been used to allocate proportions of taxes less subsidies, to employees, the self-employed and rental income. This step is undertaken to ensure that shares of taxes less subsidies between these three areas, when calculated, constrains to the estimate of taxes less subsidies outlined in Table C-1.

In Table C-3, the proportion of GVA attributable to employees is estimated as the sum of published CoE and GOS/MI (excluding the self-employment and rental income components). For example in section A, the calculation would be: $4,690 + 2,452 = £7,142$ million. Compared with the published GVA for the section of £9,997 million, the proportion of GVA attributed to employees is estimated at 71.4 per cent.

Table C-3: Calculation of the proportion of published GVA attributable to employees

Section	Published CoE	Gross Operating Surplus/Mixed Income excluding self-employment and rental component	Sum of GVA associated with employees	Published GVA	Proportion (%)
A	4,690	2,452	7,142	9,997	71.4
B	6,207	22,923	29,130	29,315	99.4
C	106,144	32,621	138,765	146,861	94.5
D	6,724	12,489	19,213	20,726	92.7
E	7,363	7,847	15,210	16,304	93.3
F	46,871	12,047	58,918	88,716	66.4
G	106,009	31,293	137,302	161,985	84.8
H	44,793	11,228	56,021	62,145	90.1
I	25,270	11,283	36,553	43,332	84.4
J	57,040	30,198	87,238	92,214	94.6
K	59,698	47,705	107,403	119,761	89.7
L	11,082	7,850	18,932	167,285	11.3
M	62,245	19,977	82,222	106,093	77.5
N	40,613	20,812	61,425	69,684	88.1
O	61,021	18,484	79,505	79,505	100.0
P	86,479	10,470	96,949	98,738	98.2
Q	83,916	7,332	91,248	103,634	88.0
R	11,026	6,762	17,788	22,151	80.3
S	16,602	4,985	21,587	31,452	68.6

Source: Office for National Statistics, GLA Economics calculations

The calculation steps for the proportion of published GVA to that of the self-employed and rental incomes are easier, and are shown in Tables C-4 and C-5. For the self-employed, it is simply the estimate of self-employment income divided by published GVA. For rental income, only market rents are shown; imputed rents of owner occupiers are excluded because there are no taxes less subsidies associated with imputed rentals in the Supply and Use tables.

Table C-4: Calculation of the proportion of published GVA attributed to the self-employed

Section	Self-employment income	Published GVA	Proportion (%)
A	4,335	9,997	43.4
B	37	29,315	0.1
C	5,215	146,861	3.6
D	110	20,726	0.5
E	342	16,304	2.1
F	24,503	88,716	27.6
G	14,781	161,985	9.1
H	4,777	62,145	7.7
I	3,966	43,332	9.2
J	3,011	92,214	3.3
K	1,212	119,761	1.0
L	2,528	167,285	1.5
M	22,770	106,093	21.5
N	6,502	69,684	9.3
O	0	79,505	0.0
P	1,421	98,738	1.4
Q	11,811	103,634	11.4
R	3,661	22,151	16.5
S	9,321	31,452	29.6

Source: Office for National Statistics, GLA Economics calculations

Table C-5: Calculation of the proportion of published GVA attributed to rental income (market rents)

Section	Rental income (market rents)	Published GVA	Proportion (%)
A	693	9,997	6.9
B	41	29,315	0.1
C	550	146,861	0.4
D	149	20,726	0.7
E	69	16,304	0.4
F	4,158	88,716	4.7
G	1,284	161,985	0.8
H	396	62,145	0.6
I	355	43,332	0.8
J	853	92,214	0.9
K	8,445	119,761	7.1
L	28,325	167,285	16.9
M	530	106,093	0.5
N	750	69,684	1.1
O	0	79,505	0.0
P	116	98,738	0.1
Q	318	103,634	0.3
R	128	22,151	0.6
S	94	31,452	0.3

Source: Office for National Statistics, GLA Economics calculations

Finally, these proportions are brought together and are shown in Table C-6. Note that because estimates of taxes less subsidies apportioned to each component are to be constrained to the published estimate of taxes less subsidies (as per Table C-1), it is not an issue that the sum of proportions do not sum to 100.

Table C-6: Proportions of GVA attributed to employees, self-employed and rental income (market rents), used to allocate proportions of taxes less subsidies

Section	Proportion attributed to employees	Proportion attributed to self-employed	Proportion attributed to rental income (market rents)	Sum of proportions
A	71.4	43.4	6.9	121.7
B	99.4	0.1	0.1	99.6
C	94.5	3.6	0.4	98.4
D	92.7	0.5	0.7	93.9
E	93.3	2.1	0.4	95.8
F	66.4	27.6	4.7	98.7
G	84.8	9.1	0.8	94.7
H	90.1	7.7	0.6	98.5
I	84.4	9.2	0.8	94.3
J	94.6	3.3	0.9	98.8
K	89.7	1.0	7.1	97.7
L	11.3	1.5	16.9	29.8
M	77.5	21.5	0.5	99.5
N	88.1	9.3	1.1	98.6
O	100.0	0.0	0.0	100.0
P	98.2	1.4	0.1	99.7
Q	88.0	11.4	0.3	99.8
R	80.3	16.5	0.6	97.4
S	68.6	29.6	0.3	98.6

Source: Office for National Statistics, GLA Economics calculations

Given these proportions, estimates of taxes less subsidies attributable to each component are now shown in Table C-7. The final column in the table is a summation of the three columns that precede it, and these correctly sum to the taxes less subsidies outlined in Table C-1.

Table C-7: Taxes less subsidies attributed to employees, self-employed and rental income (market rents)

Section	Taxes less subsidies (total)	Taxes less subsidies attributed to employees	Taxes less subsidies attributed to self-employed	Taxes less subsidies attributed to rental income (market rents)	Check: Summation of previous three columns
A	-2,173	-1,275	-774	-124	-2,173
B	107	107	0	0	107
C	2,331	2,238	84	9	2,331
D	1,254	1,237	7	10	1,254
E	683	665	15	3	683
F	1,137	765	318	54	1,137
G	8,618	7,715	831	72	8,618
H	951	871	74	6	951
I	2,458	2,198	238	21	2,458
J	1,112	1,065	37	10	1,112
K	2,701	2,478	28	195	2,701
L	-401	-152	-20	-228	-401
M	571	445	123	3	571
N	1,007	901	95	11	1,007
O	0	0	0	0	0
P	252	248	4	0	252
Q	257	227	29	1	257
R	574	473	97	3	574
S	450	313	135	1	450

Source: Office for National Statistics, GLA Economics calculations

The final step towards generating the estimate of the proportion of published GVA attributable to the workforce is to then remove the proportion of taxes less subsidies attributable to rentals (Table C-8).

Table C-8: Calculation of taxes less subsidies, excluding rentals, all values in £ million

Section	Taxes less subsidies	Taxes less subsidies attributable to rentals	Taxes less subsidies excluding rentals
A	-2,173	-124	-2,049
B	107	0	107
C	2,331	9	2,322
D	1,254	10	1,244
E	683	3	680
F	1,137	54	1,083
G	8,618	72	8,546
H	951	6	945
I	2,458	21	2,437
J	1,112	10	1,102
K	2,701	195	2,506
L	-401	-228	-173
M	571	3	568
N	1,007	11	996
O	0	0	0
P	252	0	252
Q	257	1	256
R	574	3	571
S	450	1	449

Source: Office for National Statistics, GLA Economics calculations

Finally, attributable GVA can be estimated which sums the published CoE; GOS/MI excluding the rental income component, and taxes less subsidies excluding the rental component. Therefore for section A (Table C-9), the calculation is: 4,690 + 6,787 + (-2,049) = £9,428 million

Table C-9: Calculation of attributable GVA, all values in £ million

Section	Published CoE	Gross Operating Surplus/Mixed Income excluding rental component	Taxes less subsidies excluding rental component	Attributable GVA
A	4,690	6,787	-2,049	9,428
B	6,207	22,960	107	29,274
C	106,144	37,836	2,322	146,302
D	6,724	12,599	1,244	20,567
E	7,363	8,189	680	16,232
F	46,871	36,550	1,083	84,504
G	106,009	46,074	8,546	160,629
H	44,793	16,005	945	61,743
I	25,270	15,249	2,437	42,956
J	57,040	33,209	1,102	91,351
K	59,698	48,917	2,506	111,121
L	11,082	10,378	-173	21,287
M	62,245	42,747	568	105,560
N	40,613	27,314	996	68,923
O	61,021	18,484	0	79,505
P	86,479	11,891	252	98,622
Q	83,916	19,143	256	103,315
R	11,026	10,423	571	22,020
S	16,602	14,306	449	31,357

Source: Office for National Statistics, GLA Economics calculations

The proportion of published GVA that has been modelled as attributable to the workforce is shown in Table C-10, and is used towards the estimation of GVA per workforce job.

Table C-10: Proportion of total published GVA attributable to the workforce, values in £ million

Section	Attributable GVA	Published GVA	Proportion (%)
A	9,428	9,997	94.3
B	29,274	29,315	99.9
C	146,302	146,861	99.6
D	20,567	20,726	99.2
E	16,232	16,304	99.6
F	84,504	88,716	95.3
G	160,629	161,985	99.2
H	61,743	62,145	99.4
I	42,956	43,332	99.1
J	91,351	92,214	99.1
K	111,121	119,761	92.8
L	21,287	167,285	12.7
M	105,560	106,093	99.5
N	68,923	69,684	98.9
O	79,505	79,505	100.0
P	98,622	98,738	99.9
Q	103,315	103,634	99.7
R	22,020	22,151	99.4
S	31,357	31,452	99.7

Source: Office for National Statistics, GLA Economics calculations.

Attribution model for London

This sub-section outlines the modelling steps to calculate the proportion of published GVA attributable to the workforce, specifically using the adapted model for London (and other regions). This model differs from the UK model since it uses a combination of published regional data along with assumptions based on the UK model. Table C-11 shows the published GVA and CoE data for London by sector; and the residual, which is the difference between published GVA and CoE, which is assumed to be equal to GOS/MI and taxes less subsidies.

Table C-11: Published component data of GVA and CoE; and the calculated residual, London, 2012; all values in £ million

Section	Published GVA	Published CoE	Residual - equal to GOS/MI + taxes less subsidies
A	81	19	62
B	1,087	203	884
C	7,996	5,322	2,674
D	2,843	503	2,340
E	1,613	750	863
F	15,170	7,336	7,834
G	26,215	17,244	8,971
H	13,938	10,021	3,917
I	9,943	6,027	3,916
J	33,508	20,301	13,207
K	60,473	31,714	28,759
L	36,701	3,772	32,929
M	36,496	22,405	14,091
N	18,740	10,273	8,467
O	12,664	11,102	1,562
P	17,195	14,854	2,341
Q	16,551	13,409	3,142
R	5,817	2,699	3,118
S	7,287	4,976	2,311

Source: Office for National Statistics, GLA Economics calculations.

The attribution model assumes that the same share of taxes less subsidies will be removed from GOS/MI in London and in other regions. Table C-12 shows the calculated residual from the previous table as well as the UK data on the share of taxes less subsidies as a function of GOS/MI and taxes less subsidies.

Table C-12: Estimated taxes less subsidies for London based on UK data; all values in £ million

Section	Calculated residual	UK GOS/MI	UK Taxes less subsidies (T-S)	Total GOS/MI and taxes less subsidies	Share of taxes less subsidies of total GOS/MI and T-S, (%)	Estimated taxes less subsidies, London	Estimated GOS/MI; London
A	62	7,480	-2,173	5,307	-40.9	-25	87
B	884	23,001	107	23,108	0.5	4	880
C	2,674	38,386	2,331	40,717	5.7	153	2,521
D	2,340	12,748	1,254	14,002	9.0	210	2,130
E	863	8,258	683	8,941	7.6	66	797
F	7,834	40,708	1,137	41,845	2.7	213	7,621
G	8,971	47,358	8,618	55,976	15.4	1381	7,590
H	3,917	16,401	951	17,352	5.5	215	3,702
I	3,916	15,604	2,458	18,062	13.6	533	3,383
J	13,207	34,062	1,112	35,174	3.2	418	12,789
K	28,759	57,362	2,701	60,063	4.5	1293	27,466
L	32,929	156,604	-401	156,203	-0.3	-85	33,014
M	14,091	43,277	571	43,848	1.3	183	13,908
N	8,467	28,064	1,007	29,071	3.5	293	8,174
O	1,562	18,484	0	18,484	0.0	0	1,562
P	2,341	12,007	252	12,259	2.1	48	2,293
Q	3,142	19,461	257	19,718	1.3	41	3,101
R	3,118	10,551	574	11,125	5.2	161	2,957
S	2,311	14,400	450	14,850	3.0	70	2,241

Source: Office for National Statistics, GLA Economics calculations.

An assumption is also made that in each sector the same proportion of rental incomes (both market rents and imputed rental income) in GOS/MI applies for London and for other regions. Table C-13 provides the UK share of rental incomes to GOS/MI; and follows with the estimate of rental incomes for London.

Table C-13: Share of rental incomes to published GOS/MI (UK); estimate of rental incomes, London, values in £ million

Section	Rental income (market rents)	Rental income (inputted rents of owner occupiers)	Published GOS/MI	Share of rental incomes to GOS/MI; (%)	London GOS/MI estimate	Assumed London rental incomes based on UK share
A	693		7,480	9.3	87	8
B	41		23,001	0.2	880	2
C	550		38,386	1.4	2,521	36
D	149		12,748	1.2	2,130	25
E	69		8,258	0.8	797	7
F	4,158		40,708	10.2	7,621	778
G	1,284		47,358	2.7	7,590	206
H	396		16,401	2.4	3702	89
I	355		15,604	2.3	3,383	77
J	853		34,062	2.5	12,789	320
K	8,445		57,362	14.7	27,466	4,044
L	28,325	117,901	156,604	93.4	33,014	30,826
M	530		43,277	1.2	13,908	170
N	750		28,064	2.7	8,174	218
O	0		18,484	0.0	1,562	0
P	116		12,007	1.0	2,293	22
Q	318		19,461	1.6	3,101	51
R	128		10,551	1.2	2,957	36
S	94		14,400	0.7	2,241	15

Source: Office for National Statistics, GLA Economics calculations.

Table C-14 presents the estimation of the attributable GVA to the workforce for London, used towards the calculation of regional GVA per workforce job. For example in section A the calculation is published CoE + (GOS/MI – rental income) + (taxes less subsidies). More precisely, $19 + (87 - 8) + (-25) = 73$.

Table C-14: Attributable GVA by sector, London, 2012; all values in £ million

Section	Published CoE	Estimated GOS/MI	Estimated rental income	Estimated taxes less subsidies	Attributable GVA
A	19	87	8	-25	73
B	203	880	2	4	1,085
C	5,322	2,521	36	153	7,960
D	503	2,130	25	210	2,818
E	750	797	7	66	1,606
F	7,336	7,621	778	213	14,392
G	17,244	7,590	206	1381	26,009
H	10,021	3,702	89	215	13,849
I	6,027	3,383	77	533	9,866
J	20,301	12,789	320	418	33,188
K	31,714	27,466	4,044	1293	56,429
L	3,772	33,014	30,826	-85	5,875
M	22,405	13,908	170	183	36,326
N	10,273	8,174	218	293	18,522
O	11,102	1,562	0	0	12,664
P	14,854	2,293	22	48	17,173
Q	13,409	3,101	51	41	16,500
R	2,699	2,957	36	161	5,781
S	4,976	2,241	15	70	7,272

Source: Office for National Statistics, GLA Economics calculations.

Table C-15 below provides the estimate of the proportion of published GVA to that of the workforce in London for 2012:

Section	Published GVA	Attributable GVA	Proportion (%)
A	81	73	90.0
B	1,087	1,085	99.9
C	7,996	7,960	99.5
D	2,843	2,818	99.1
E	1,613	1,606	99.6
F	15,170	14,392	94.9
G	26,215	26,009	99.2
H	13,938	13,849	99.4
I	9,943	9,866	99.2
J	33,508	33,188	99.0
K	60,473	56,429	93.3
L	36,701	5,875	16.0
M	36,496	36,326	99.5
N	18,740	18,522	98.8
O	12,664	12,664	100.0
P	17,195	17,173	99.9
Q	16,551	16,500	99.7
R	5,817	5,781	99.4
S	7,287	7,272	99.8

Source: Office for National Statistics, GLA Economics calculations.

Modelling for the period 2007 – 2012

This process was followed identically for all years within the bounds of this paper; data was obtained on the components of GVA for the UK, and the data request made to the ONS provided the equivalent data for 2007 – 2012. Full details of the calculation steps of the attribution model have not been provided here; however the following tables outline the proportion of published GVA attributable to the activity of the workforce; used for the calculations of GVA per workforce job for each year and sector.

Table C-16: Proportion of published GVA attributable to the workforce, UK, 2007 – 2012

		2007	2008	2009	2010	2011	2012
A	Agriculture, Forestry and Fishing	94.6	93.8	93.2	93.7	93.2	94.3
B	Mining and Quarrying	99.9	99.9	99.9	99.9	99.9	99.9
C	Manufacturing	99.6	99.6	99.6	99.6	99.6	99.6
D	Electricity, Gas, Steam and Air Conditioning Supply	99.5	99.1	99.4	99.0	99.3	99.2
E	Water Supply, Sewerage, Waste Management	99.8	99.7	99.7	99.7	99.8	99.6
F	Construction	93.9	94.6	94.5	94.7	94.9	95.3
G	Wholesale and Retail Trade, Repair of Motor Vehicles	99.1	98.8	98.8	99.0	99.0	99.2
H	Transportation and Storage	99.2	99.4	99.3	99.3	99.4	99.4
I	Accommodation and Food Service	99.3	99.2	99.2	99.3	99.4	99.1
J	Information and Communication	99.4	99.1	99.1	99.2	99.1	99.1
K	Financial and Insurance Activities	92.2	91.8	93.4	92.3	92.8	92.8
L	Real Estate	9.8	10.4	12.4	12.3	12.0	12.7
M	Professional, Scientific and Technical Activities	99.6	99.5	99.5	99.5	99.6	99.5
N	Administrative and Support Services	98.9	98.9	99.0	98.8	98.9	98.9
O	Public Administration and Defence	100.0	100.0	100.0	100.0	100.0	100.0
P	Education	99.9	99.9	99.9	99.9	99.9	99.9
Q	Human Health and Social Work	99.7	99.7	99.7	99.8	99.8	99.7
R	Arts, Entertainment and Recreation	99.1	99.5	99.6	99.4	99.5	99.4
S	Other Service Activities	99.6	99.7	99.7	99.8	99.8	99.7
A-S	Overall	90.3	89.6	90.5	89.4	89.1	88.8

Source: GLA Economics calculations

Table C-17: Proportion of published GVA attributable to the workforce, London, 2007 – 2012

		2007	2008	2009	2010	2011	2012
A	Agriculture, Forestry and Fishing	93.3	90.2	84.0	89.1	85.8	90.0
B	Mining and Quarrying	99.9	99.9	99.9	99.9	99.9	99.9
C	Manufacturing	99.5	99.6	99.5	99.6	99.6	99.5
D	Electricity, Gas, Steam and Air Conditioning Supply	99.5	99.0	99.3	98.8	99.1	99.1
E	Water Supply, Sewerage, Waste Management	99.8	99.7	99.7	99.7	99.8	99.6
F	Construction	93.7	94.0	93.7	94.2	94.2	94.9
G	Wholesale and Retail Trade, Repair of Motor Vehicles	99.0	98.6	98.7	99.0	99.0	99.2
H	Transportation and Storage	99.2	99.4	99.4	99.3	99.4	99.4
I	Accommodation and Food Service	99.3	99.3	99.1	99.3	99.4	99.2
J	Information and Communication	99.4	99.1	99.1	99.2	99.1	99.0
K	Financial and Insurance Activities	92.8	92.5	93.8	93.0	93.3	93.3
L	Real Estate	12.8	14.3	16.6	16.0	15.0	16.0
M	Professional, Scientific and Technical Activities	99.7	99.6	99.5	99.6	99.7	99.5
N	Administrative and Support Services	98.8	98.9	99.1	98.8	98.9	98.8
O	Public Administration and Defence	100.0	100.0	100.0	100.0	100.0	100.0
P	Education	99.9	99.9	99.9	99.9	99.9	99.9
Q	Human Health and Social Work	99.7	99.7	99.7	99.7	99.8	99.7
R	Arts, Entertainment and Recreation	99.0	99.4	99.5	99.4	99.5	99.4
S	Other Service Activities	99.7	99.8	99.8	99.9	99.8	99.8
A-S	Overall	90.8	90.0	90.7	89.6	89.3	88.6

Source: GLA Economics calculations

Appendix D: Full calculations for estimates of division level GVA per workforce job, London, 2012

This appendix provides the full calculations in deriving the estimates of GVA per workforce job at the divisional level.

Chapters 4 and 5 note that caution should be used in the use of the estimates developed for the primary and utilities sectors, where the levels of employment in London are much lower than for service sectors, and where actual physical activity does not take place in London; therefore data for sections F – S only have been included here (with the exception of sections L, P and O; where the section only contains one division). Section C has not been included since there are divisions within the section which contain potentially disclosive data and have been suppressed.

Table D-1: Calculation method for estimation of GVA per workforce job at division level, London, 2012. Sections F – S (except L, P and O)

Section and Division	Published GVA (£million)	Proportion of attributable GVA (%)	Attributable GVA (£million)	Employee jobs (BRES)	Self-employment jobs (APS)	Attributable GVA (£million)	Gross hourly wage, all employee jobs (£)	Proportion of productivity adjusted wage (%)	Productivity adjusted GVA (£million)	Modelled workforce jobs	GVA per workforce job estimate (£)
F – 41	15,170	94.9	14,392	50,400	61,000	5,498	21.04	41.2	5,935	103,339	57,433
F – 42				20,400	5,000	1,254	17.88	8.0	1,150	23,562	48,807
F – 43				81,800	73,000	7,640	18.64	50.8	7,307	143,599	50,881
G – 45	26,215	99.2	26,009	29,900	8,000	1,602	11.7	4.9	1,275	38,673	32,963
G – 46				150,700	9,000	6,752	18.73	33.1	8,599	162,958	52,769
G – 47				377,600	40,000	17,655	13.44	62.0	16,135	426,119	37,866
H – 49	13,938	99.4	13,849	82,300	42,000	6,452	17.33	44.7	6,191	121,132	51,113
H – 50				2,900	1,000	202	23.26	1.9	261	3,801	68,603
H – 51				37,700	0	1,957	24.18	18.9	2,620	36,739	71,316
H – 52				62,900	3,000	3,421	18.27	25.0	3,461	64,220	53,885
H – 53				32,000	3,000	1,817	13.08	9.5	1,316	34,108	38,578
I – 55	9,943	99.2	9,866	60,900	1,000	1,736	10.68	19.7	1,940	59,709	32,491
I – 56				274,800	15,000	8,130	9.32	80.3	7,926	279,541	28,354
J – 58	33,508	99.0	33,188	54,100	10,000	5,606	23.65	16.8	5,590	61,609	90,728
J – 59				45,500	24,000	6,078	22.33	17.2	5,722	66,799	85,664
J – 60				26,900	7,000	2,965	24.08	9.1	3,010	32,582	92,377
J – 61				38,900	3,000	3,664	22.33	10.4	3,450	40,271	85,664
J – 62				127,500	21,000	12,986	24.51	40.4	13,420	142,728	94,027
J – 63				20,600	1,000	1,889	25.06	6.0	1,996	20,760	96,137
K – 64	60,473	93.3	56,429	174,600	11,000	27,112	37.36	50.4	28,421	184,135	154,347
K – 65				17,000	2,000	2,775	32.6	4.5	2,539	18,850	134,682
K – 66				164,700	17,000	26,542	34.2	45.1	25,470	180,265	141,292
M – 69	36,496	99.5	36,326	164,300	41,000	11,093	28.79	34.1	12,395	191,619	64,686
M – 70				170,700	28,000	10,736	27.45	31.5	11,438	185,459	61,675
M – 71				75,800	17,000	5,014	22.22	11.9	4,324	86,616	49,924

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M – 72				15,900	2,000	967	27.48	2.8	1,032	16,707	61,743
M – 73				73,400	13,000	4,668	23.85	11.9	4,321	80,643	53,587
M – 74				38,000	32,000	3,782	18.86	7.6	2,769	65,335	42,375
M – 75				1,200	0	65	18.53	0.1	47	1,120	41,634
N – 77				15,600	4,000	710	13.61	3.9	715	19,408	36,855
N – 78				152,900	6,000	5,759	14.66	33.7	6,246	157,345	39,699
N – 79				26,600	3,000	1,073	17.57	7.5	1,395	29,310	47,579
N – 80				57,900	3,000	2,207	10.37	9.1	1,693	60,304	28,082
N – 81				139,200	34,000	6,278	10.42	26.1	4,839	171,505	28,217
N – 82				65,800	3,000	2,494	19.69	19.6	3,633	68,127	53,320
Q – 86				268,700	34,000	9,830	20.03	68.2	11,249	308,747	36,434
Q – 87				64,300	4,000	2,218	13.54	10.4	1,716	69,664	24,629
Q – 88				118,100	19,000	4,452	13.9	21.4	3,536	139,839	25,284
R – 90				29,400	41,000	2,288	16.81	43.8	2,532	66,482	38,091
R – 91				18,300	2,000	660	16.22	12.2	705	19,170	36,754
R – 92				23,100	0	751	12.76	10.9	631	21,815	28,914
R – 93				48,100	16,000	2,083	13.95	33.1	1,913	60,533	31,610
S – 94				58,500	8,000	3,399	20.26	54.7	3,978	60,752	65,485
S – 95				8,200	7,000	777	15.78	9.7	708	13,886	51,005
S – 96				41,600	19,000	3,097	14.45	35.6	2,586	55,362	46,706

Sources: Office for National Statistics source data including Business Register and Employment Survey, Annual Population Survey, Annual Survey of Hours and Earnings; GLA Economics calculations. Zero values for Divisions 51, 75 and 92 are modelled as zero self-employment to replace values that were suppressed to avoid disclosure.

Appendix E: Summary of section and division level estimates for GVA per workforce job, London and UK

This appendix provides details of the estimates of section and division level GVA per workforce job. At the section level, the data runs from 2007 to 2012; at the division level, these data run from 2009 to 2012 for London due to the availability of ASHE data based on SIC07, and a consistent time series using BRES on employee jobs. As the estimates for the UK do not use this source, the data is presented for 2007 – 2012.

As mentioned in Chapter 5, data within sections A and B have been removed; as have some divisions within manufacturing due to the use of potentially disclosive data to derive estimates of GVA per workforce job.

London

Section level estimates, nominal prices, all values in £

		2007	2008	2009	2010	2011	2012
A	Agriculture, Forestry and Fishing	29,430	25,918	33,611	77,500	100,708	97,205
B	Mining and Quarrying	146,773	187,460	203,796	278,966	232,369	173,669
C	Manufacturing	53,167	51,723	59,073	62,363	69,466	64,846
D	Electricity, Gas, Steam and Air Conditioning Supply	278,261	272,839	545,696	277,482	218,749	469,683
E	Water Supply, Sewerage, Waste Management	87,233	91,355	88,364	87,639	90,316	88,019
F	Construction	45,798	47,140	44,118	52,860	54,495	53,204
G	Wholesale and Retail Trade, Repair of Motor Vehicles	39,791	42,178	40,021	42,454	45,665	41,432
H	Transportation and Storage	49,260	51,241	47,850	53,923	51,308	53,264
I	Accommodation and Food Service	27,816	26,743	27,276	26,758	29,354	29,082
J	Information and Communication	81,589	88,672	84,672	91,070	89,447	90,988
K	Financial and Insurance Activities	141,277	124,717	148,977	150,163	155,104	147,239
L	Real Estate	32,919	40,562	40,713	43,297	42,977	48,656
M	Professional, Scientific and Technical Activities	53,066	56,573	53,823	53,073	59,197	57,890
N	Administrative and Support Services	29,561	30,418	30,811	33,168	34,261	36,604
O	Public Administration and Defence	46,280	47,041	46,614	52,063	53,026	56,284
P	Education	41,089	43,112	43,398	42,395	46,560	45,825
Q	Human Health and Social Work	34,178	32,044	31,450	31,369	32,053	31,839
R	Arts, Entertainment and Recreation	36,076	36,081	36,818	32,268	34,157	34,411
S	Other Service Activities	36,404	39,903	42,050	51,040	52,197	55,941
A-S	Overall	51,697	52,128	52,919	54,844	57,419	56,687

Division level estimates, nominal prices, all values in £

		2009	2010	2011	2012
C	10: Manufacture of food products	54,962	57,441	61,278	62,674
C	11: Manufacture of beverages	86,347	88,418	90,694	78,820
C	13: Manufacture of textiles	45,586	44,476	73,716	70,389
C	14: Manufacture of wearing apparel	51,431	56,785	61,016	49,790
C	15: Manufacture of leather and related products	65,908	37,296	73,716	70,389
C	16: Manufacture of wood and products of wood and cork	65,908	47,553	40,677	52,891
C	17: Manufacture of paper and paper products	65,084	68,232	84,409	73,253
C	18: Printing and reproduction of recorded media	62,455	61,626	72,538	68,759
C	20: Manufacture of chemicals and chemical products	58,885	62,406	67,170	88,007
C	21: Manufacture of basic pharmaceutical products and preparations	120,634	75,330	109,243	96,477
C	22: Manufacture of rubber and plastic products	54,688	53,010	56,651	60,089
C	23: Manufacture of other non-metallic mineral products	45,664	55,882	48,577	49,511
C	24: Manufacture of basic metals	56,178	63,185	73,716	70,389
C	25: Manufacture of fabricated metal products, except machinery	47,194	43,245	60,536	53,488
C	26: Manufacture of computer, electronic and optical products	67,477	73,648	89,516	70,389
C	27: Manufacture of electrical equipment	50,490	52,271	61,714	51,539
C	28: Manufacture of machinery and equipment (other)	63,828	59,041	77,514	66,492
C	29: Manufacture of motor vehicles, trailers and semi-trailers	85,327	97,404	107,498	84,507
C	30: Manufacture of other transport equipment	72,537	63,185	78,910	72,258
C	31: Manufacture of furniture	44,409	50,917	62,325	49,392
C	32: Other manufacturing	54,138	59,287	56,913	61,799
C	33: Repair and installation of machinery and equipment	70,537	75,617	88,861	80,530
D	35: Electricity, gas, steam and air conditioning supply	545,696	277,482	218,749	469,683
E	36: Water collection, treatment and supply	89,602	88,015	--	87,456
E	37: Sewerage	110,600	101,627	--	78,181
E	38: Waste collection, treatment and disposal activities	83,007	85,494	89,601	89,611
E	39: Remediation activities and other waste management services	89,602	88,015	90,494	87,456
F	41: Construction of buildings	48,794	63,071	62,309	57,433
F	42: Civil engineering	46,391	50,848	47,126	48,807
F	43: Specialised construction activities	40,610	44,962	49,098	50,881
G	45: Wholesale and retail trade and repair of motor vehicles/cycles	35,938	34,764	37,741	32,963
G	46: Wholesale trade, except of motor vehicles/cycles	47,280	56,207	59,535	52,769
G	47: Retail trade, except of motor vehicles/cycles	37,936	38,397	41,243	37,866
H	49: Land transport and transport via pipelines	46,069	51,886	48,979	51,113
H	50: Water transport	49,446	55,235	66,012	68,603
H	51: Air transport	64,239	71,383	69,218	71,316
H	52: Warehousing and support activities for transportation	48,187	58,083	52,480	53,885
H	53: Postal and courier activities	37,714	39,744	38,183	38,578
I	55: Accommodation	29,373	29,590	34,017	32,491
I	56: Food and beverage service activities	26,817	26,287	28,215	28,354
J	58: Publishing activities	78,155	85,106	91,020	90,728
J	59: Motion picture, video and television programme	80,138	88,832	88,215	85,664

	production, sound and music publishing activities				
J	60: Programming and broadcasting activities	91,576	87,680	97,386	92,377
J	61: Telecommunications	78,615	84,722	85,677	85,664
J	62: Computer programming, consulting and related activities	91,116	96,167	89,049	94,027
J	63: Information service activities	85,521	94,554	90,868	96,137
K	64: Financial service activities, except insurance and pension funding	149,833	153,419	164,899	154,347
K	65: Insurance, reinsurance and pension funding, except compulsory social security	141,363	133,250	121,710	134,682
K	66: Activities auxiliary to financial services and insurance	149,142	148,651	148,616	141,292
L	68: Real estate activities	40,713	43,297	42,977	48,656
M	69: Legal and accounting activities	57,889	57,462	63,849	64,686
M	70: Activities of head offices; management consultancy activities	59,714	59,510	66,750	61,675
M	71: Architectural and engineering activities; technical testing	44,430	45,398	50,821	49,924
M	72: Scientific research and development	54,218	48,074	63,470	61,743
M	73: Advertising and market research	48,542	51,400	56,666	53,587
M	74: Other professional, scientific and technical activities	42,785	37,531	39,844	42,375
M	75: Veterinary activities	31,833	31,103	39,242	41,634
N	77: Rental and leasing activities	30,310	33,194	36,561	36,855
N	78: Employment activities	31,301	34,724	36,410	39,699
N	79: Travel agency, tour operator and other reservation services	34,633	38,998	41,784	47,579
N	80: Security and investigation activities	21,370	23,408	25,308	28,082
N	81: Services to buildings and landscape activities	27,653	26,468	26,645	28,217
N	82: Office administrative, office support and other business support	45,397	48,419	49,051	53,320
O	84: Public administration and defence; compulsory social security	46,614	52,063	53,026	56,284
P	85: Education	43,398	42,395	46,560	45,825
Q	86: Human health activities	35,790	35,610	36,598	36,434
Q	87: Residential care activities	23,687	24,362	21,582	24,629
Q	88: Social work activities without accommodation	27,037	26,712	26,630	25,284
R	90: Creative, arts and entertainment activities	37,341	32,111	37,838	38,091
R	91: Libraries, archives, museums and other cultural activities	35,530	31,827	35,143	36,754
R	92: Gambling and betting activities	29,443	26,831	23,048	28,914
R	93: Sports activities and amusement and recreation activities	39,080	34,305	33,375	31,610
S	94: Activities of membership organisations	46,328	62,736	60,823	65,485
S	95: Repair of computers and personal and household goods	57,579	45,808	49,802	51,005
S	96: Other personal service activities	34,243	42,384	42,783	46,706

Source: GLA Economics calculations. “---” denotes that data have been removed to prevent disclosure.

UK

Section level estimates, nominal prices, all values in £

		2007	2008	2009	2010	2011	2012
A	Agriculture, Forestry and Fishing	20,725	21,848	18,102	21,493	20,658	23,322
B	Mining and Quarrying	445,723	552,431	430,569	484,366	520,251	386,453
C	Manufacturing	48,165	51,480	51,365	55,678	57,066	56,993
D	Electricity, Gas, Steam and Air Conditioning Supply	189,342	164,538	192,833	117,967	122,151	179,237
E	Water Supply, Sewerage, Waste Management	95,302	96,543	91,807	95,645	87,596	84,213
F	Construction	37,075	36,897	34,549	38,549	42,351	41,363
G	Wholesale and Retail Trade, Repair of Motor Vehicles	29,543	30,116	30,458	32,353	32,925	33,157
H	Transportation and Storage	39,164	39,707	38,585	41,270	40,420	40,883
I	Accommodation and Food Service	19,864	19,215	19,839	20,532	20,874	21,481
J	Information and Communication	68,048	71,423	68,835	72,625	72,101	74,178
K	Financial and Insurance Activities	93,590	82,710	100,499	99,602	97,587	97,113
L	Real Estate	26,014	29,896	31,903	38,449	39,238	42,788
M	Professional, Scientific and Technical Activities	42,050	42,532	39,719	40,505	43,059	42,157
N	Administrative and Support Services	23,579	24,621	26,243	26,065	25,814	27,103
O	Public Administration and Defence	39,642	41,863	43,246	45,428	48,099	50,375
P	Education	32,319	34,075	34,034	34,651	35,604	35,616
Q	Human Health and Social Work	24,834	25,143	25,359	25,106	25,309	25,474
R	Arts, Entertainment and Recreation	22,373	23,007	24,164	22,560	24,063	24,693
S	Other Service Activities	30,996	32,810	32,615	38,013	37,564	39,843
A-S	Overall	37,553	38,225	38,561	39,844	40,695	41,088

Division level estimates, nominal prices, all values in £

		2007	2008	2009	2010	2011	2012
A	01: Crop and animal production, hunting and related services	20,082	21,748	17,604	20,960	20,430	23,525
A	02: Forestry and logging	23,280	16,648	17,505	19,126	14,131	11,270
A	03: Fishing and aquaculture	34,117	33,699	36,723	43,208	37,776	43,480
B	05: Mining of coal and lignite	1,256,136	1,592,215	1,110,206	1,387,176	1,335,750	984,294
B	06: Extraction of crude petroleum and natural gas	1,256,136	1,592,215	1,110,206	1,387,176	1,335,750	984,294
B	07: Mining of metal ores	81,162	102,919	104,237	114,149	155,836	140,380
B	08: Other mining and quarrying	81,162	102,919	104,237	114,149	155,836	140,380
B	09: Mining support service activities	110,699	132,214	102,472	97,935	114,614	108,553
C	10: Manufacture of food products	42,107	43,816	46,870	47,457	48,505	49,117
C	11: Manufacture of beverages	106,710	116,444	108,415	107,428	97,286	130,778
C	12: Manufacture of tobacco products	106,710	116,444	108,415	107,428	97,286	130,778
C	13: Manufacture of textiles	31,533	31,303	27,946	35,949	38,304	38,619

C	14: Manufacture of wearing apparel	34,313	35,116	28,679	38,391	47,750	49,837
C	15: Manufacture of leather and related products	42,582	53,836	55,775	61,493	69,402	55,687
C	16: Manufacture of wood and products of wood and cork	28,953	33,573	28,627	27,846	27,191	30,794
C	17: Manufacture of paper and paper products	53,826	59,682	70,955	69,961	64,597	64,347
C	18: Printing and reproduction of recorded media	36,751	35,234	33,740	34,161	34,547	41,346
C	19: Manufacture of coke and refined petroleum products	282,007	193,953	366,734	377,619	270,567	238,992
C	20: Manufacture of chemicals and chemical products	84,000	86,014	80,216	82,393	78,945	61,530
C	21: Manufacture of basic pharmaceutical products and preparations	196,075	286,933	345,549	383,341	313,142	284,025
C	22: Manufacture of rubber and plastic products	37,078	40,185	45,825	46,812	46,209	52,757
C	23: Manufacture of other non-metallic mineral products	44,415	46,414	45,025	47,578	42,846	44,576
C	24: Manufacture of basic metals	43,993	41,212	34,464	38,515	42,160	40,503
C	25: Manufacture of fabricated metal products, except machinery	39,201	40,366	37,231	39,730	39,492	45,376
C	26: Manufacture of computer, electronic and optical products	48,172	53,149	61,423	67,122	68,713	75,314
C	27: Manufacture of electrical equipment	44,456	54,317	54,522	54,231	44,011	49,046
C	28: Manufacture of machinery and equipment (other)	43,372	51,623	50,624	55,495	58,327	60,011
C	29: Manufacture of motor vehicles, trailers and semi-trailers	44,015	49,542	46,332	64,314	78,978	74,988
C	30: Manufacture of other transport equipment	61,839	57,484	45,905	50,212	82,753	54,513
C	31: Manufacture of furniture	31,903	31,967	30,167	35,024	35,124	34,732
C	32: Other manufacturing	38,050	38,943	40,421	42,713	43,855	41,133
C	33: Repair and installation of machinery and equipment	49,413	45,967	41,429	44,423	46,916	46,860
D	35: Electricity, gas, steam and air conditioning supply	189,342	164,538	192,833	118,434	122,402	179,237
E	36: Water collection, treatment and supply	119,677	123,707	133,792	137,287	149,140	140,226
E	37: Sewerage	229,324	248,177	228,164	248,650	289,038	244,132
E	38: Waste collection, treatment and disposal activities	64,625	64,316	57,247	63,105	50,255	48,449
E	39: Remediation activities and other waste management services	64,625	64,316	57,247	63,105	50,255	48,449
F	41: Construction of buildings	80,714	83,781	45,973	52,316	58,672	55,269
F	42: Civil engineering	62,071	61,409	55,893	62,165	69,825	71,560
F	43: Specialised construction activities	20,629	19,925	23,879	26,284	27,806	27,832
G	45: Wholesale and retail trade and repair of motor vehicles/cycles	40,559	43,557	40,356	45,454	46,223	44,816
G	46: Wholesale trade, except of motor vehicles/cycles	40,621	40,908	41,974	43,683	44,156	43,711
G	47: Retail trade, except of motor vehicles/cycles	23,253	23,593	24,430	25,731	26,232	27,040

H	49: Land transport and transport via pipelines	33,469	32,766	31,097	35,035	34,297	34,726
H	50: Water transport	222,407	222,890	208,520	224,156	314,339	295,427
H	51: Air transport	70,303	82,020	77,312	81,010	88,200	77,193
H	52: Warehousing and support activities for transportation	41,531	42,386	41,881	42,024	37,503	36,781
H	53: Postal and courier activities	30,029	29,809	32,997	34,282	33,814	36,238
I	55: Accommodation	27,333	26,582	28,581	28,124	26,057	28,144
I	56: Food and beverage service activities	17,828	17,314	17,555	18,546	19,375	19,620
J	58: Publishing activities	57,140	60,805	57,754	62,135	61,611	58,771
J	59: Motion picture, video and television programme production, sound and music publishing activities	52,885	56,038	61,117	61,313	63,484	64,951
J	60: Programming and broadcasting activities	164,365	160,086	123,891	139,531	109,626	98,125
J	61: Telecommunications	106,577	117,840	105,453	110,077	118,431	120,667
J	62: Computer programming, consulting and related activities	56,177	57,897	55,826	59,482	56,388	62,147
J	63: Information service activities	60,421	63,804	72,542	85,115	98,836	92,668
K	64: Financial service activities, except insurance and pension funding	107,437	94,472	127,402	124,618	115,414	123,049
K	65: Insurance, reinsurance and pension funding, except compulsory social security	158,835	153,628	190,405	202,534	254,518	238,029
K	66: Activities auxiliary to financial services and insurance	39,683	39,780	40,635	41,326	36,572	33,727
L	68: Real estate activities	26,014	29,912	31,887	38,470	39,280	42,788
M	69: Legal and accounting activities	44,941	47,257	49,746	51,389	54,280	52,198
M	70: Activities of head offices; management consultancy activities	27,195	28,274	25,157	24,811	26,152	25,698
M	71: Architectural and engineering activities; technical testing	44,189	42,064	41,262	41,824	44,025	46,710
M	72: Scientific research and development	70,980	83,084	68,508	66,858	76,521	74,439
M	73: Advertising and market research	49,157	49,176	45,234	41,642	46,657	45,281
M	74: Other professional, scientific and technical activities	41,540	36,768	27,902	32,893	34,050	29,757
M	75: Veterinary activities	38,798	41,070	42,508	45,631	37,633	42,008
N	77: Rental and leasing activities	70,385	75,919	84,155	93,281	87,651	88,426
N	78: Employment activities	18,198	19,218	20,663	20,357	19,141	18,522
N	79: Travel agency, tour operator and other reservation services	52,457	56,343	68,756	65,334	78,439	83,056
N	80: Security and investigation activities	13,519	13,177	13,071	13,611	12,922	14,918
N	81: Services to buildings and landscape activities	10,361	11,017	9,741	9,893	8,980	8,982
N	82: Office administrative, office support and other business support	31,044	34,040	46,271	43,372	45,895	52,241
O	84: Public administration and defence; compulsory social security	44,672	47,213	48,774	51,300	54,499	57,013
P	85: Education	32,378	34,120	34,134	34,784	35,679	35,642
Q	86: Human health activities	31,882	31,806	31,981	32,817	33,653	34,405
Q	87: Residential care activities	16,723	18,430	19,640	17,385	15,307	15,195
Q	88: Social work activities without	14,447	14,340	13,939	13,126	13,774	12,984

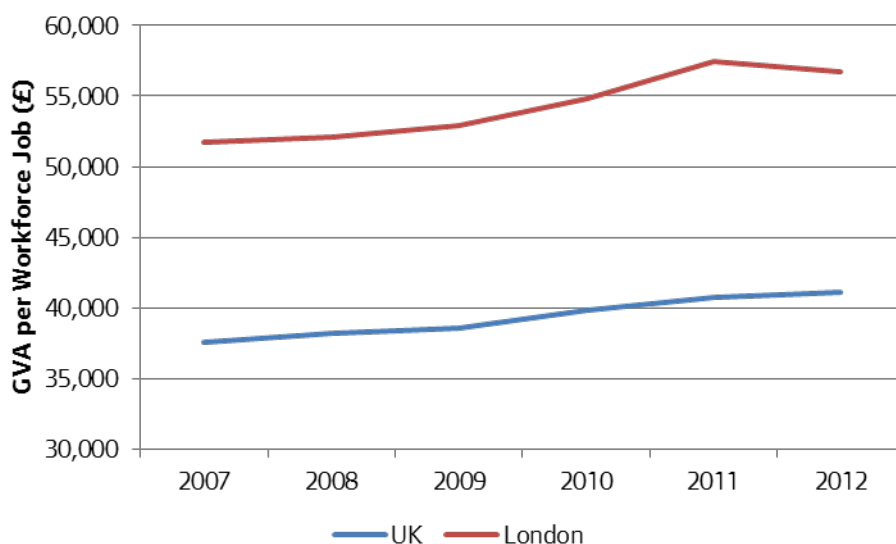
	accommodation						
R	90: Creative, arts and entertainment activities	14,396	14,335	16,924	17,648	17,562	16,725
R	91: Libraries, archives, museums and other cultural activities	20,015	22,442	24,326	24,263	28,849	30,148
R	92: Gambling and betting activities	95,517	103,157	112,074	94,147	100,985	102,391
R	93: Sports activities and amusement and recreation activities	9,100	8,842	9,271	8,834	8,805	10,146
S	94: Activities of membership organisations	45,189	47,243	40,762	50,471	49,221	53,866
S	95: Repair of computers and personal and household goods	31,344	34,293	24,246	21,928	24,158	28,417
S	96: Other personal service activities	24,274	26,056	29,881	34,177	33,155	33,677

Note: For divisions 05 and 06; and 07 and 08, data on employee and self-employed jobs are combined, therefore the estimate of GVA per workforce job is based on the sum of total GVA in each division divided by the sum of employee and self-employed jobs.

Comparisons between estimates of GVA per workforce job over time

The following chart shows how estimates of GVA per workforce job have changed over the period of 2007 – 2012. Figure E-1 shows how nominal GVA per workforce job in London has risen steadily over the period of 2007 – 2011, however it fell by 1.3 per cent in 2012. Over the period of 2007 – 2012, nominal GVA per workforce job increased by 9.7 per cent. For the UK as a whole, between 2007 and 2012, nominal GVA per workforce job increased by 9.4 per cent; increased in each individual year, and increased by 1.0 per cent in 2012.

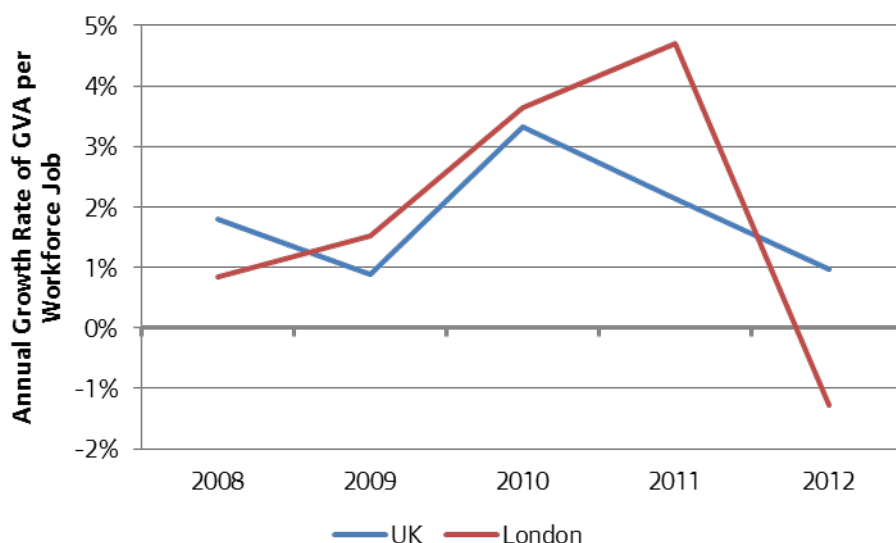
Chart E-1: Nominal GVA per workforce job, London and the UK, 2007-2012



Source: GLA Economics calculations

Figure E-1 therefore shows that there is largely correlation in the movements of GVA per workforce job, which is partially to be expected since London comprises over 22 per cent of total UK GVA. However when looking at annual growth rates (in Figure E-2), there is significant divergence over the last three years. This might perhaps be explained by differing timing and level of recovery following the recession.

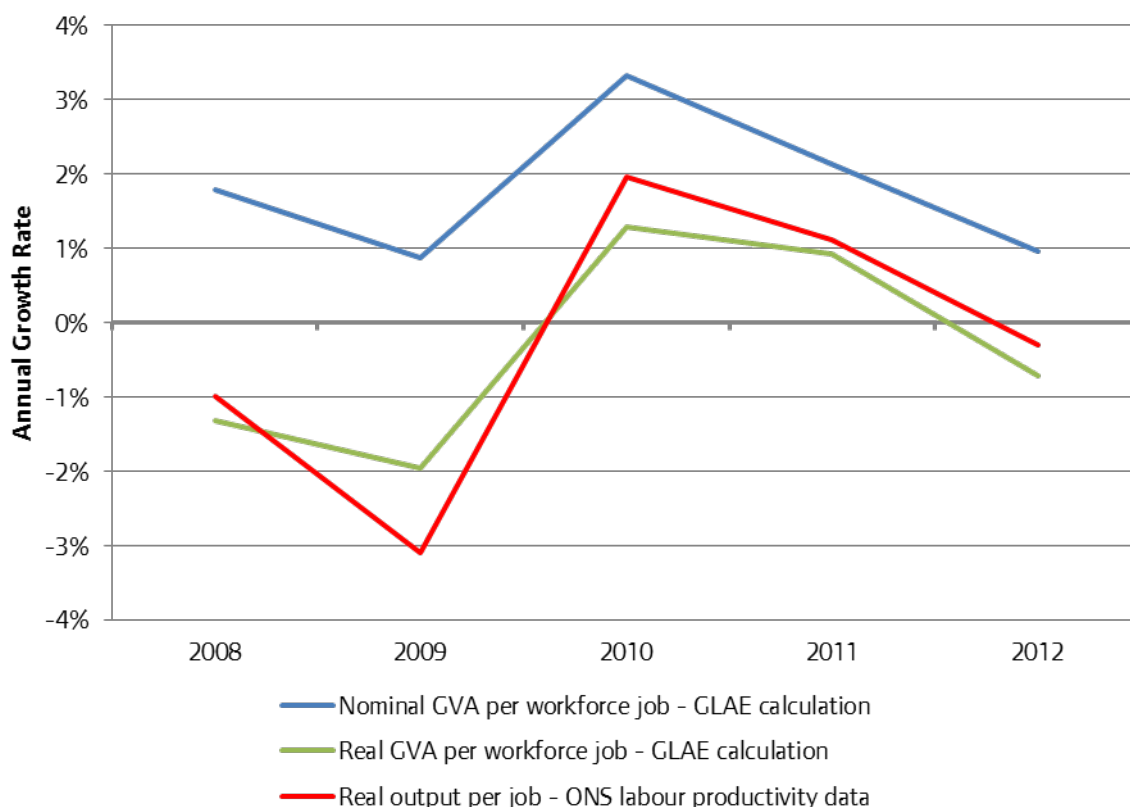
Chart E-2: Annual growth rate of nominal GVA per workforce job, London and the UK, 2008-2012



Source: GLA Economics calculations

The estimates of GVA per workforce job provided in this paper could lead to an assertion (for the UK at least) that labour productivity has been increasing in recent times, as shown by increases in the estimate of nominal GVA per workforce job. However, to understand labour productivity changes over time, it is important to consider the changes in real terms. Chart E-3 shows the comparison between changes in nominal and real UK GVA per workforce job over the period 2008 – 2012, as calculated by GLA Economics. ‘Nominal GVA per workforce job’ uses the GLA Economics estimate for attributable GVA per workforce job in SIC07 sections A – S, as shown in Table 4.4 (Chapter 4). ‘Real GVA per workforce job’ uses the same methodology as within Chapter 3, but uses the ONS chained volume measure of UK GVA (for sections A – S). Chart E-3 shows that, over this time period, UK labour productivity has fallen.

Chart E-3: Changes in GVA per workforce job and the official labour productivity measure; UK, 2008 – 2012



Source: GVA per workforce job series, GLA Economics calculations; Real output per job series drawn from Labour Productivity, ONS; series code: LNNN (output per job).

The official measures of real change in labour productivity over time for the UK are published by the ONS¹⁸. Chart E-3 shows this on an output per job basis, for comparison with the results presented in this paper. There is similarity between the pattern of change in estimated real GVA per workforce job and the official estimate of change in output per job for the UK. Productivity growth was limited in 2010 and 2011, with falls observed in 2012. Falls in productivity in 2008 and 2009 were more significant.

¹⁸ Labour Productivity, Q3 2014; Office for National Statistics, available at <http://www.ons.gov.uk/ons/rel/productivity/labour-productivity/index.html>

Appendix F: Standard Industrial Classification codes; section and division level, based on SIC 2007

The following table provides detail of the sections and division names as given by the SIC07 classification:

Within this paper, data and modelling for sections A – S have been used; section T relates to activities of households and comprises less than 0.5% of total GVA in London, therefore detailed modelling has not been undertaken; data is not published for section U at the regional level.

Section	Division	Description
A		Agriculture, forestry and fishing
	01	Crop and animal production, hunting and related service activities
	02	Forestry and logging
	03	Fishing and aquaculture
B		Mining and quarrying
	05	Mining of coal and lignite
	06	Extraction of crude petroleum and natural gas
	07	Mining of metal ores
	08	Other mining and quarrying
	09	Mining support service activities
C		Manufacturing
	10	Manufacture of food products
	11	Manufacture of beverages
	12	Manufacture of tobacco products
	13	Manufacture of textiles
	14	Manufacture of wearing apparel
	15	Manufacture of leather and related products
	16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
	17	Manufacture of paper and paper products
	18	Printing and reproduction of recorded media
	19	Manufacture of coke and refined petroleum products
	20	Manufacture of chemicals and chemical products
	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
	22	Manufacture of rubber and plastic products
	23	Manufacture of other non-metallic mineral products
	24	Manufacture of basic metals
	25	Manufacture of fabricated metal products, except machinery and equipment
	26	Manufacture of computer, electronic and optical products
	27	Manufacture of electrical equipment
	28	Manufacture of machinery and equipment n.e.c.
	29	Manufacture of motor vehicles, trailers and semi-trailers
	30	Manufacture of other transport equipment
	31	Manufacture of furniture
	32	Other manufacturing
	33	Repair and installation of machinery and equipment

D	35	Electricity, gas, steam and air conditioning supply
E		Water supply; sewerage, waste management and remediation activities
	36	Water collection, treatment and supply
	37	Sewerage
	38	Waste collection, treatment and disposal activities; materials recovery
	39	Remediation activities and other waste management services
F		Construction
	41	Construction of buildings
	42	Civil engineering
	43	Specialised construction activities
G		Wholesale and retail trade; repair of motor vehicles and motorcycles
	45	Wholesale and retail trade and repair of motor vehicles and motorcycles
	46	Wholesale trade, except of motor vehicles and motorcycles
	47	Retail trade, except of motor vehicles and motorcycles
H		Transportation and storage
	49	Land transport and transport via pipelines
	50	Water transport
	51	Air transport
	52	Warehousing and support activities for transportation
	53	Postal and courier activities
I		Accommodation and food service activities
	55	Accommodation
	56	Food and beverage service activities
J		Information and communication
	58	Publishing activities
	59	Motion picture, video and television programme production, sound recording and music publishing activities
	60	Programming and broadcasting activities
	61	Telecommunications
	62	Computer programming, consultancy and related activities
	63	Information service activities
K		Financial and insurance activities
	64	Financial service activities, except insurance and pension funding
	65	Insurance, reinsurance and pension funding, except compulsory social security
	66	Activities auxiliary to financial services and insurance activities
L	68	Real estate activities
M		Professional, scientific and technical activities
	69	Legal and accounting activities
	70	Activities of head offices; management consultancy activities
	71	Architectural and engineering activities; technical testing and analysis
	72	Scientific research and development
	73	Advertising and market research
	74	Other professional, scientific and technical activities
	75	Veterinary activities
N		Administrative and support service activities
	77	Rental and leasing activities
	78	Employment activities
	79	Travel agency, tour operator and other reservation service and related activities

	80	Security and investigation activities
	81	Services to buildings and landscape activities
	82	Office administrative, office support and other business support activities
O	84	Public administration and defence; compulsory social security
P	85	Education
Q		Human health and social work activities
	86	Human health activities
	87	Residential care activities
	88	Social work activities without accommodation
R		Arts, entertainment and recreation
	90	Creative, arts and entertainment activities
	91	Libraries, archives, museums and other cultural activities
	92	Gambling and betting activities
	93	Sports activities and amusement and recreation activities
S		Other service activities
	94	Activities of membership organisations
	95	Repair of computers and personal and household goods
	96	Other personal service activities
T		Activities of householders as employers; undifferentiated goods- and services-producing activities of households for own use
	97	Activities of householders as employers of domestic personnel
	98	Undifferentiated goods- and services-producing activities of households for own use
U	99	Activities of extraterritorial organisations and bodies

Source: Office for National Statistics

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