Current Issues Note 48

London in comparison with other global cities

Mark Wingham

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Contents

Executive summary

This paper compares London's economic structure with other global cities, particularly looking at its economic output, employment and productivity. Although differences in definitions and measurement approaches across the global cities mean that the analysis should be treated with caution, the key points are:

- London's economy has grown on average by 2.4 per cent per annum in real terms between 2006 and 2014. Although that was faster than other Western global cities like New York and Paris, emerging global cities such as Shanghai and Singapore have seen rates of growth that were twice as fast.

- Subsequently, these emerging global cities will likely have larger economies than London in output terms in the future, with Shanghai already having overtaken London back in 2009.

- London's economy is predominantly services driven with primary and secondary industries contributing only 9 per cent of total output in 2014. Although other global cities are also orientated towards services, cities like Berlin and Shanghai have much larger manufacturing sectors.

- Looking at the labour market, London has one of the highest employment rates among the global cities, especially for women.

- However, in terms of productivity, London has some of the lowest estimates of output per job and output per hour. Moreover, while the average rates of productivity growth in London were similar to other Western global cities, they were weaker than emerging global cities like Singapore.

- These productivity differences cannot be explained by industrial composition or workforce characteristics like skills.

1   Introduction

London is widely regarded as being a global city. As such, London is, arguably, better compared, in economic terms, with other global cities like New York, Paris and Shanghai rather than other UK cities such as Manchester and Birmingham.

Most comparisons between London and other global cities to date have focussed on particular topics or sectors, such as the Global Financial Centres Index[1] that concentrates on the financial industry. Therefore, this paper attempts to make a broader comparison of global cities by looking at their different economic structures. This includes looking at the characteristics of the economies in terms of output and employment, as well as looking at differences in productivity. Comparisons using other indicators like tourism and city rankings can be found in Chapter 3 of the Draft Economic Evidence Base produced by GLA Economics[2].

However, international comparisons are fraught with difficulty - differences in definitions, geography and data collection methods are well documented[3]. This paper uses various national definitions and statistics (see Appendix 2); as a result many of these difficulties are likely to remain. This means that this analysis should be considered as experimental and should be treated with some caution.

This paper begins by first outlining the global cities included in this analysis and the definitions used. The next three chapters then compare the global cities in terms of their economic output, labour markets and productivity. The final chapter seeks to explain any differences in productivity by looking at the characteristics of the city economies and their workforces.

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[1] Zyen (2016). GFCI – Global Financial Centres Index. Available at: http://www.zyen.com/research/gfci.html
[2] GLA Economics (2016). Draft economic evidence base 2016. Available at: https://www.london.gov.uk/business-and-economy-publications/draft-economic-evidence-base-2016
[3] See GLA Economics Working Papers 9, 13 and 21 as well as Current Issues Note 17.

2   Definitions

The cities that are included in this paper include both traditional and emerging cities that compete with London. While not a comprehensive list of all global cities, they include:

- New York
- Paris
- Berlin
- Tokyo
- Singapore[4]
- Hong Kong[5]
- Shanghai
- Dubai

In most cases, the definition of a city used is the metropolitan statistical area such as the NUTS1 region. The exceptions are for Singapore and Hong Kong where the whole state/region area is used. However, differences in the city definitions vary which means the statistics and analysis used in this paper are not presented on a consistent basis. For example, the New York definition includes Newark and Jersey which themselves are cities.

A broad overview of these global cities in terms of their size, location and definition is given in Table 2.1. Geographical maps of the global cities are also in Appendix 1.

Table 2.1: Key facts for the global cities

City	Definition	Population	Area	Implied population density
London	London NUTS 1 region	8.7m (2015)	1,597 km^2	5,448 / km^2
New York	New York, Newark and Jersey City MSA	20.1m (2014)	13,346 km^2	1,506 / km^2
Paris	Île-de-France NUTS 1 region	11.9m (2012)	12,012 km^2	991 / km^2
Berlin	Berlin NUTS 1 region	3.5m (2015)	892 km^2	3,924 / km^2
Tokyo	Tokyo metropolitan area	13.5m (2015)	2,191 km^2	6,162 / km^2
Singapore	State of Singapore	5.5m (2015)	719 km^2	7,650 / km^2
Hong Kong	Hong Kong SAR	7.2m (2014)	1,104 km^2	6,522 / km^2
Shanghai	Shanghai province	24.2m (2015)	6,334 km^2	3,821 / km^2
Dubai	Emirate of Dubai	2.4m (2015)	3,885 km^2	618 / km^2

Source: GLA Intelligence, US Census Bureau, INSEE, Statistik Berlin-Brandenburg, Tokyo General Bureau of Statistics, SingStat, HK Census and Statistics Department, National Bureau of Statistics of China, Dubai Statistics Centre

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[4] This is not strictly a city, but a city state.
[5] This is not strictly a city, but a special administrative region of the People's Republic of China.

3   Economic output

This chapter compares the output of global cities, particularly looking at which ones have seen the fastest growth in recent years.

Initially, there are two measures of output that are used in this note. The first is gross value added (GVA) which measures the value of goods and services produced less intermediate consumption[6]. The second is gross domestic product (GDP) and measures the value of all final goods and services. Therefore, some caution should be used when making comparisons between these two measures as they are not on a like-for-like basis.

Box 3.1: Relationship between GVA and GDP in the UK

GVA measures the value of goods and services produced by each individual producer, area, industry or sector of an economy. It is used in the estimation of GDP which is a key indicator for the economy as a whole.

The relationship between GVA and GDP is:

GDP = GVA + taxes on products – subsidies on products

In the UK, data for taxes and subsidies on products are only available at the whole economy level. This means that while GVA estimates are available regionally, GDP figures are only available for the UK as a whole.

Acknowledging the above, Figure 3.1 shows the total economic output for the global cities considered in this report. These are all presented in pounds sterling (GBP) having been converted from their national currencies using purchasing power parities (PPPs) from the World Bank[7] (see Box 3.2). London's total output using the GVA measure was £364.3bn in 2014. In comparison, Paris was larger at £486.7bn though this refers to 2013. New York, Tokyo and Shanghai's economies were also larger than London – £1,089.9bn, £625bn and £466.8bn respectively – although these were based on the GDP measure. In contrast, London was larger than Singapore (£297.5bn: GDP) and Hong Kong (£272.6bn: GDP).

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[6] Intermediate consumption refers to the consumption of goods and services used to produce other goods and services.
[7] World Bank (2016). PPP conversion factor, GDP (LCU per international $). Available at:
http://data.worldbank.org/indicator/PA.NUS.PPP

Figure 3.1: Total economic output for the global cities in 2014, £ millions
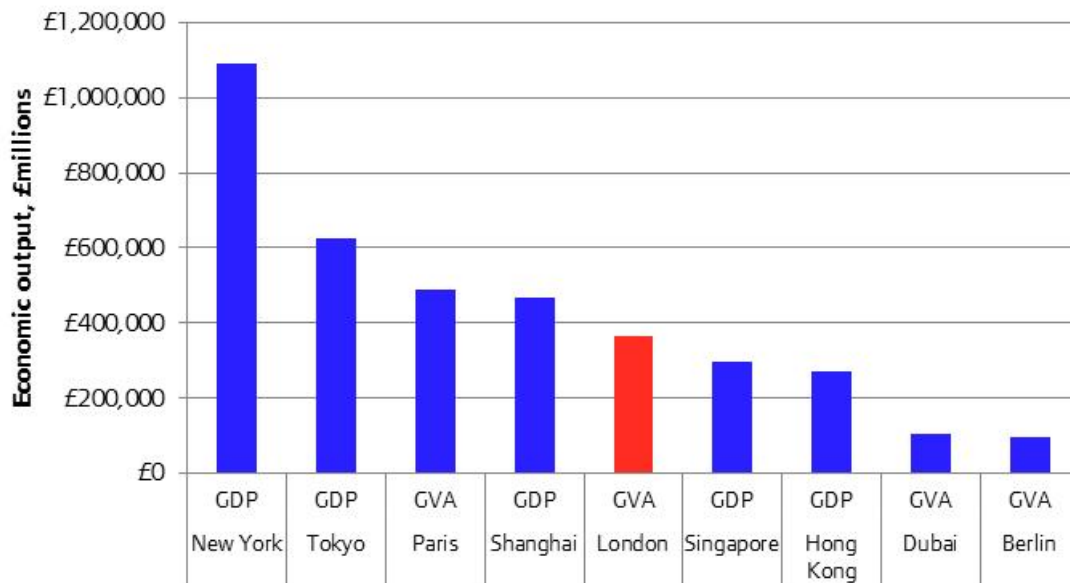
Source: ONS, US BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:
1. These figures may not include all industries. Missing industries are indicated by "..." in Table 3.6.
2. Data for Paris and Tokyo refer to 2013 and in 2013 prices.
3. Shanghai only includes urban units (i.e. business units in towns or cities).

Box 3.2: Purchasing Power Parities

Purchasing Power Parities (PPPs) are the currency conversion rates that equalise both price levels and currencies between countries. That is, it shows the amount in the respective country's currency needed to buy the same basket of goods in a different country. Given this, PPPs are only available at the national level and there are no regional breakdowns. The basket of goods and services used in calculating PPPs includes over 3,000 different items and is purposefully large in order to be representative of expenditure patterns.

PPPs are mainly used when making inter-country comparisons. For example, it is commonly used for converting GDP expressed in national currencies into a common currency to enable more like-for-like comparisons. They can also be used to internationally compare the value of other economic indicators free from the 'noise' of exchange rate fluctuations.

The PPPs used in this analysis are from the World Bank and are replicated in Table 3.1 below. As the base currency is US dollars (USD), values have first been converted into USD and then converted again into pounds sterling (GBP). For example, €100 for France would be equivalent to $122 (100 ÷ 0.82) as well as £85 (122 x 0.7) in 2014.

Table 3.1: Purchasing Power Parities conversion factors to USD, 2006 to 2014

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
US	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
UK	0.63	0.65	0.65	0.66	0.69	0.70	0.70	0.69	0.70
France	0.90	0.89	0.88	0.86	0.86	0.84	0.85	0.82	0.82
Germany	0.84	0.83	0.81	0.81	0.80	0.78	0.79	0.78	0.78
Japan	124.66	120.30	116.85	115.50	111.63	107.45	104.27	102.74	104.72
Singapore	0.89	0.92	0.89	0.91	0.90	0.89	0.89	0.87	0.86
Hong Kong	5.49	5.51	5.48	5.42	5.37	5.46	5.56	5.58	5.65
China	2.84	2.99	3.16	3.13	3.31	3.51	3.53	3.55	3.53
UAE	1.91	2.09	2.43	2.04	2.24	2.54	2.51	2.45	2.39

Source: World Bank (last updated 1 June 2016)

Table 3.2 shows the rates of output growth in real terms – that is, excluding the impact of general inflation by using the respective country's GDP deflator (see Box 3.3). These estimates may differ from other published figures, such as those available on Eurostat, as different price deflators may have been used.

London posted the second-fastest expansion in 2014 (5 per cent), behind Shanghai (7.1 per cent). Over time, London has generally seen stronger rates of growth than its traditional competitors like New York and Paris, but slower rates than its emerging competitors such as Singapore[8] and Hong Kong. This can clearly be seen by looking at the compound annual rate of growth[9] (CAGR) between 2006 and 2014[10]. This gave an annual average real output growth rate of 2.4 per cent for London, which was faster than New York at 1.4 per cent and Paris at 1.9 per cent[11]. However, this was less than half Shanghai's rate of expansion of 5.8 per cent, though this only refers to growth in urban areas which have higher concentrations of economic activity that potentially skews the trend upwards.

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[8] As can be seen in Table 3.2, the annual rate of growth in 2010 for Singapore was much faster than the rest of its trend. This was partly a result of a resurgent manufacturing sector, resilient exports and a large increase in tourism. Therefore, if this year is treated as an anomaly, the mean rate of growth between 2006 and 2014 is 3.7 per cent instead of a mean rate of 5 per cent. (Note: removing this anomaly has no effect on the CAGR as this is calculated using the first and last observations which, in this case, remain the same.)

[9] The compound annual rate of growth shows the rate of growth needed each year to reach the final figure.

[10] Although some cities have data series starting before 2006, this year has been selected for consistency across all global cities where 2006 may represent the first data point.

[11] This refers to the 2006 to 2013 period.

Table 3.2: Annual rates of real output growth for the global cities, 2006 to 2014

City	Output measure	2007	2008	2009	2010	2011	2012	2013	2014	CAGR (06-14)
London	GVA	5.1%	0.9%	-2.0%	0.8%	4.6%	2.1%	2.7%	5.0%	**2.4%**
New York	GDP	1.8%	-2.9%	0.6%	3.2%	0.5%	3.9%	1.5%	3.0%	**1.4%**
Paris	GVA	4.7%	5.5%	-3.4%	4.8%	-0.3%	1.1%	1.2%	..	**1.9%**
Berlin	GVA	2.5%	3.9%	-2.0%	3.6%	3.6%	-0.2%	0.6%	2.7%	**1.8%**
Tokyo	GVA	..	..	..	..	..	..	..	..	**..**
Singapore	GVA	7.4%	2.3%	-0.3%	14.5%	5.9%	3.1%	4.0%	3.4%	**5.0%**
Hong Kong	GDP	5.6%	-0.4%	-2.0%	9.5%	5.3%	2.3%	2.3%	2.1%	**3.0%**
Shanghai	GDP	9.6%	4.5%	7.1%	6.7%	3.4%	2.7%	5.7%	7.1%	**5.8%**
Dubai	GVA	15.6%	-4.4%	0.7%	-7.2%	-10.4%	6.5%	-4.8%	4.9%	**-0.2%**

Source: ONS, US BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:
1. These figures may not include all industries. Missing industries are indicated by "..” in Table 3.6.
2. Output estimates was originally in current prices, but to show the underlying output trend these have been converted into constant 2014 prices using the national GDP deflators.
3. Paris data is only up to 2013, so the CAGR refers to the 2006 to 2013 period.
4. Shanghai only includes urban units (i.e. business units in towns or cities).

Box 3.3: Current vs real prices

Output data for the global cities were all originally in current prices – that is, the value given the level of prices in that given year. However, price levels are not constant over time meaning that any growth in output may be a reflection of an increase in prices rather than a genuine increase in output. Subsequently, the output data can be adjusted so that it is presented in constant (or real) prices using a price deflator and, consequently, illustrate the underlying output trend.

There are a number of price deflators available such as the inflation rate, producer price indices and those based on output[12]. The deflator used in this analysis for all global cities is the national GDP deflator. Although other deflators may be more appropriate – for example, the GVA deflator for cities using the GVA series or regional deflators to account for different price levels at the regional level – the GDP deflator is the only one consistently available for all global cities and is therefore preferred. This means that the real GVA series used for London could be different from other GLA Economics analysis (such as the forthcoming Working Paper: Modelling real quarterly Gross Value Added data for London) that uses different deflators. A comparison of the real GVA used in this paper and other GLA Economics analysis is shown in Appendix 3.

The national GDP deflators used in this analysis are all from the World Bank[13] for consistency purposes and are shown below in Table 3.3. These can be used as an index. For example, £100 in current 2006 prices would be the equivalent of £120 in constant 2014 prices (100 ÷ 89.82 x 107.62).

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[12] For a discussion of the main types of price deflators see: https://www.statisticsauthority.gov.uk/wp-content/uploads/2015/12/images-monitoringreview215measuringrealvalue_tcm97-44516.pdf
[13] World Bank (2016). GDP deflator (base year varies by country). Available at: http://data.worldbank.org/indicator/NY.GDP.DEFL.ZS

Table 3.3: National GDP deflators index (base year varies), 2006 to 2014

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
US	93.67	96.16	98.05	98.79	100.00	102.06	103.90	105.45	106.98
UK	89.82	92.39	95.04	96.98	100.00	102.10	103.76	105.82	107.62
France	94.13	96.54	98.84	98.93	100.00	100.94	102.11	102.89	103.47
Germany	95.11	96.72	97.53	99.25	100.00	101.07	102.59	104.73	106.55
Japan	105.02	104.04	102.73	102.21	100.00	98.15	97.23	96.70	98.29
Singapore	92.67	98.11	96.64	100.05	100.00	101.16	102.34	102.27	102.50
Hong Kong	87.45	90.20	91.35	91.01	91.26	94.81	98.18	100.00	102.90
China	121.50	131.02	141.25	141.10	150.89	163.17	167.07	170.81	172.26
UAE	88.86	100.00	118.53	100.54	111.60	129.24	129.55	128.76	127.03

Source: World Bank (last updated 1 June 2016)

This information can be broken down by industry. Tables 3.4 to 3.6 show the value and share of output by sector, as well as the compound annual rates of growth by sector. It should be noted, however, that different industry definitions (including the individual sector components) are used across the various cities meaning that not all sectors can be compared for all cities (indicated by a hash). This might also be the case even where there are standard industry definitions (i.e. in Europe) as this is dependent on the way that the data is available. For example, many of the service industries in Berlin have been grouped meaning that individual sector comparisons cannot be done.

To increase the number of comparisons, industry proxies have been calculated based on the sector groupings used by some of the global cities. These have been calculated by aggregating some sectors. Specifically, the industry proxies included in this analysis and their encompassing sectors are:

- Leisure & Hospitality
  – Accommodation & Food
  – Arts, Entertainment & Recreation

- Financial Activities
  – Finance & Insurance Activities
  – Real Estate Activities

- Professional & Business Services
  – Professional, Scientific & Technical Activities
  – Administrative & Support Services

- Public Admin, Education and Health
  – Public Administration
  – Education
  – Human Health & Social Work

A list of the sector definitions and how they have been used in this paper for the global cities can be found in Appendix 2.

Table 3.4: Output by industry for the global cities in 2014, current prices, £ millions

City	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	GVA	GDP	GVA	GVA	GDP	GVA	GDP	GDP	GVA
Primary & Utilities	£6,100	#	£11,400	#	£9,500	..	£200	£2,500	£5,600
Manufacturing	£9,600	#	£32,600	£11,800	£43,400	£56,000	£3,400	£145,800	£11,600
Construction	£16,900	#	£20,600	£3,700	£26,800	£15,400	£11,900	£16,500	£7,700
Wholesale & Retail Trade	£27,200	£116,000	£51,000	#	£129,700	£49,900	£65,700	£72,200	£30,000
Transportation & Storage	£16,700	#	£24,100	#	£24,900	£21,900	£17,000	£20,700	#
Leisure & Hospitality	£18,300	#	#	#	#	#	#	#	#
Accommodation & Food	£11,000	£24,900	£13,800	#	#	£6,500	£9,700	£7,100	£5,600
Arts, Entertainment & Recreation	£7,400	#	#	#	#	#	#	#	#
Information & Communication	£37,600	£84,100	£47,000	#	£71,700	£12,500	£9,600	#	#
Financial activities	£114,700	£371,700	£98,600	#	£141,100	#	#	£97,700	#
Finance & Insurance	£68,700	£190,700	£36,400	#	£59,800	£36,200	£45,300	£67,400	£12,100
Real Estate	£46,000	£180,900	£62,200	#	£81,200	#	#	£30,300	#
Professional & Business Services	£61,000	#	£92,100	#	#	#	#	#	#
Profess, Scientific & Tech Services	£40,800	#	#	#	#	#	#	#	#
Administrative & Support Services	£20,200	#	#	#	#	#	#	#	#
Public Admin, Education & Health	£46,400	£187,600	£79,800	#	£39,400	..	£28,700	..	£8,000
Public Administration	£12,700	£100,400	#	#	#	..	#	..	£5,700
Education	£17,000	£14,900	#	#	#	..	#	..	#
Human Health & Social Work	£16,800	£72,300	#	#	#	..	#	..	#
Other Services	£8,100	£20,800	£15,700	#	#	#	#	#	#
Activities of Households	£1,600	#	#	#	£10,400	#	#	#	£400
Total	**£364,300**	**£1,089,900**	**£486,700**	**£95,100**	**£625,000**	**£297,500**	**£272,600**	**£466,800**	**£103,200**

Source: ONS, US BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

<u>Notes:</u>
1. Only data that fits the industry definitions are shown in this table, but still contributes to the total. These are indicated by "#" and means that the sum of the sectors may not equal the total. Industries that are genuinely not included in the data (and the total) are indicated by "..".
2. Data for Paris and Tokyo refer to 2013 and shown in 2013 prices.
3. Shanghai only includes urban units (i.e. business units in towns or cities).

Table 3.5: Industry share of total output for the global cities in 2014

City	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	GVA	GVA	GVA	GVA	GDP	GDP	GDP	GDP	GVA
Primary & Utilities	1.7%	#	2.4%	#	1.5%	..	0.1%	0.5%	5.4%
Manufacturing	2.6%	#	6.7%	12.5%	6.9%	18.8%	1.3%	31.2%	11.3%
Construction	4.7%	#	4.2%	3.9%	4.3%	5.2%	4.4%	3.5%	7.4%
Wholesale & Retail Trade	7.5%	10.6%	10.5%	#	20.8%	16.8%	24.1%	15.5%	29.1%
Transportation & Storage	4.6%	#	5.0%	#	4.0%	7.4%	6.2%	4.4%	#
Leisure & Hospitality	5.0%	#	#	#	#	#	#	#	#
Accommodation & Food	3.0%	2.3%	2.8%	#	#	2.2%	3.6%	1.5%	5.4%
Arts, Entertainment & Recreation	2.0%	#	#	#	#	#	#	#	#
Information & Communication	10.3%	7.7%	9.7%	#	11.5%	4.2%	3.5%	#	#
Financial Activities	31.5%	34.1%	20.3%	#	22.6%	#	#	20.9%	#
Finance & Insurance	18.9%	17.5%	7.5%	#	9.6%	12.2%	16.6%	14.4%	11.7%
Real Estate	12.6%	16.6%	12.8%	#	13.0%	#	#	6.5%	#
Professional & Business Services	16.7%	#	18.9%	#	#	#	#	#	#
Profess, Scientific & Tech Services	11.2%	#	#	#	#	#	#	#	#
Administrative & Support Services	5.5%	#	#	#	#	#	#	#	#
Public Admin, Education & Health	12.7%	17.2%	16.4%	#	6.3%	..	10.5%	..	7.7%
Public Administration	3.5%	9.2%	#	#	#	..	#	..	5.5%
Education	4.7%	1.4%	#	#	#	..	#	..	#
Human Health & Social Work	4.6%	6.6%	#	#	#	..	#	..	#
Other Services	2.2%	1.9%	3.2%	#	#	#	#	#	#
Activities of Households	0.4%	#	#	#	1.7%	#	#	#	0.3%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: ONS, US BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:
1. Only data that fits the industry definitions are shown in this table, but still contributes to the total and these are indicated by "#". Industries that are genuinely not included in the data (and the total) are indicated by "..". Consequently, the sum of the industries shown in this table may not equal to 100%.
2. Output estimates were originally in current prices, but to show the underlying output trend these have been adjusted into constant 2014 prices using the national GDP deflators.
3. Shanghai only includes urban units.

Table 3.6: Compound annual rates of real output growth by industry for the global cities

City	London GVA 2006-2014	New York GVA 2006-2014	Paris GVA 2006-2013	Berlin GVA 2006-2014	Tokyo GDP ..	Singapore[2] GDP 2006-2014	Hong Kong GDP 2006-2014	Shanghai GDP 2006-2014	Dubai GVA 2006-2014
Primary & Utilities	4.3%	#	-0.3%	#	..	..	-3.6%	#	3.8%
Manufacturing	-1.5%	#	-1.1%	0.5%	..	0.3%	-6.2%	1.6%	-0.3%
Construction	1.0%	#	3.0%	5.5%	..	12.8%	9.6%	5.1%	-5.0%
Wholesale & Retail Trade	-0.7%	#	2.5%	#	..	3.5%	2.6%	9.8%	-0.4%
Transportation & Storage	2.2%	#	1.4%	#	..	2.0%	0.1%	1.7%	#
Leisure & Hospitality	1.3%	#	#	#	..	#	#	#	#
Accommodation & Food	2.2%	2.6%	2.3%	#	..	6.8%	5.8%	3.4%	4.8%
Arts, Entertainment & Recreation	0.1%	#	#	#	..	#	#	#	#
Information & Communication	2.1%	1.8%	2.9%	#	..	6.5%	3.8%	..	#
Financial Activities	4.7%	2.0%	2.2%	#	..	#	#	10.2%	#
Finance & Insurance	2.7%	1.7%	3.3%	#	..	7.1%	3.0%	15.2%	2.7%
Real Estate	8.6%	2.2%	1.6%	#	..	#	#	-6.5%	#
Professional & Business Services	2.5%	#	2.7%	#	..	#	#	#	#
Profess, Scientific & Tech Services	2.3%	#	#	#	..	#	#	#	#
Administrative & Support Services	3.0%	#	#	#	..	#	#	#	#
Public Admin, Education & Health	0.8%	1.4%	2.3%	#	..	..	3.2%	..	7.0%
Public Administration	-0.3%	0.8%	#	#	..	..	#	..	#
Education	2.0%	3.3%	#	#	..	..	#	..	#
Human Health & Social Work	0.6%	2.1%	#	#	..	..	#	..	#
Other Services	4.2%	0.8%	-2.7%	#	..	#	#	#	#
Activities of Households	6.7%	#	#	#	..	#	#	#	#
Total	**2.4%**	**1.4%**	**1.9%**	**1.8%**	**..**	**5.0%**	**3.0%**	**5.8%**	**-0.2%**

Source: ONS, US BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:
1. *Only data that fits the industry definitions are shown in this table, but still contributes to the total and these are indicated by "#". Industries that are genuinely not included in the data (and the total) are indicated by "..".*
2. *Output estimates were originally in current prices, but to show the underlying output trend these have been converted into constant 2014 prices using the national GDP deflators. As noted in Box 3.3, the ideal deflator is one that is based on regional prices by industry.*
3. *Shanghai only includes urban units.*

To provide a quick summary of the sector breakdowns, industries can be grouped into the broad primary, secondary and tertiary sectors. These groups and the encompassing sectors are shown in Table 3.7.

Table 3.7: Broad industry groups definitions

Primary and secondary broad industries	Tertiary (services) broad industry
Primary & Utilities	Wholesale & Retail Trade
Manufacturing	Transportation & Storage
Construction	Accommodation & Food Services
	Information & Communication
	Finance & Insurance Activities
	Real Estate Activities
	Professional, Scientific & Technical Services
	Administrative & Support Services
	Public Administration & Defence
	Education
	Human Health & Social Work
	Arts, Entertainment & Recreation
	Other Service Activities
	Activities of Households

London's economy is predominantly services based, with only 9 per cent of its output coming from primary and secondary industries like manufacturing and construction. In fact, all global cities included in this analysis are services based, though to a lesser extent for the emerging cities (Figure 3.2). For example, 35.2 per cent of output in Shanghai was from primary and secondary industries.

Figure 3.2: Output by broad industry for the global cities in 2014
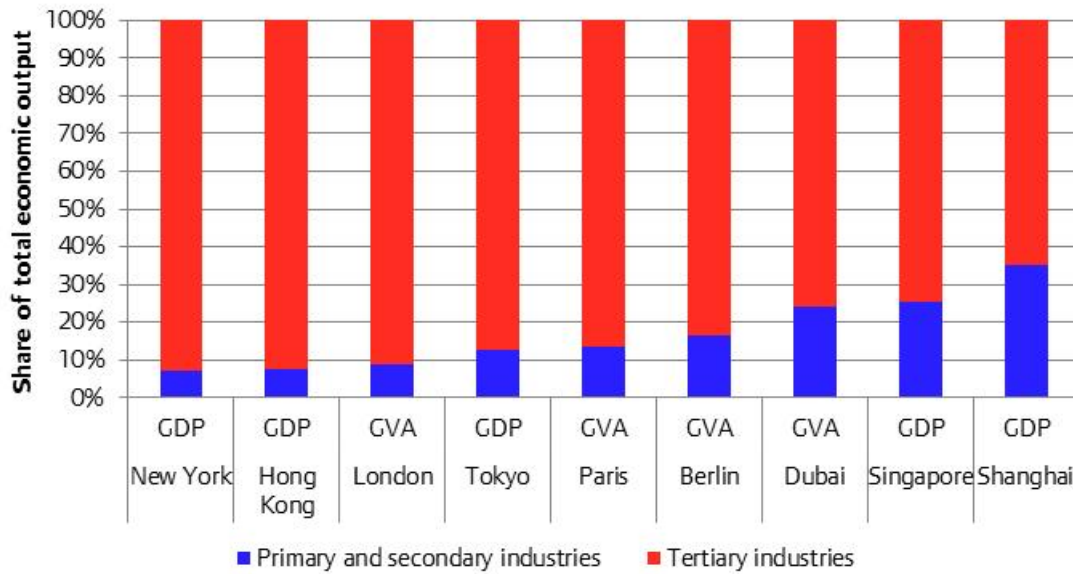
Notes:
1. These figures may not include all industries. Missing industries are indicated by ".." in Table 3.4.
2. Data for Paris and Tokyo refer to 2013.
3. Shanghai only includes urban units (i.e. business units in towns or cities).

Although all three broad industries grew on average between 2006 and 2014 in London, real output growth was stronger in the services industry. As shown in Figure 3.3, growth by broad industry was stronger in London than other Western global cities like New York and Paris, but weaker than emerging cities like Shanghai.

Figure 3.3: Compound annual rates of real output growth by broad industry for the global cities, 2006 to 2014
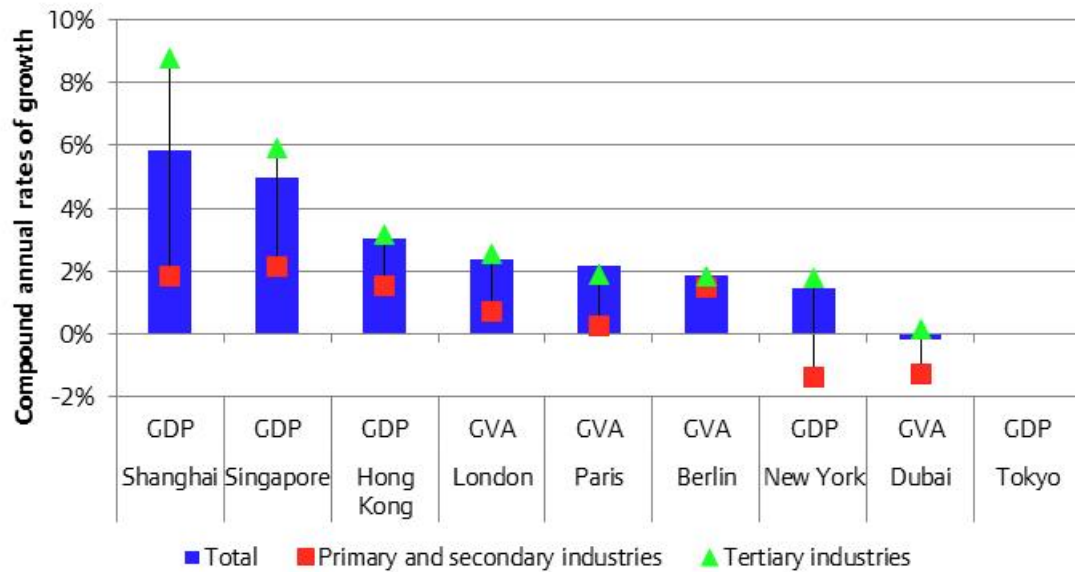

Source: ONS, US BEA, INSEE, Statistik Berlin-Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by "..." in Table 3.6.
2. Output estimates were originally in current prices, but to show the underlying output trend these have been converted into constant 2014 prices using the national GDP deflators.
3. Data for Paris is up to 2013, so the CAGR covers the 2006 to 2013 period.
4. Shanghai only includes urban units (i.e. business units in towns or cities).

4 Labour markets

Another dimension to a city's economy besides output is its labour force. Therefore, having discussed the economic output, this section will look at the various labour market differences for the global cities.

At the headline level, there were approximately 4.2m London residents aged 16 years and above in employment during 2014. However, solely looking at the number of people in work does not account for population differences. Instead, it is better to look at the employment rates for global cities – that is, the percentage of the population that are in work – as shown in Figure 4.1.

For London, the employment rate was 62.7 per cent[14] and was higher than New York which was 57.8 per cent, though this uses a different geographic definition to that used elsewhere in this paper[15]. The other global cities look at the population aged 15 years and above meaning there is some discrepancy in definitions and these comparisons should be used with caution. For example, most people aged 15 years in London would be in full-time education and therefore considered to be economically inactive. If this age was included in London's employment statistics, this would have the effect of decreasing the employment rate as the population denominator would increase to a greater extent than the employment nominator. Consequently, acknowledging that, London's employment rate was also above Paris and Berlin, but below Singapore and Dubai.

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[14] Generally, the employment rate for the working age population (16-64 years) is quoted for London, but the 16 years and over figure has been used here for comparison purposes.
[15] This refers to New York, Northern New Jersey and Long Island. This is broadly comparable to the New York, Newark and Jersey City definition used elsewhere in this paper, though it excludes Poughkeepsie, Newburgh and Middletown.

Figure 4.1: Employment rates for the global cities in 2014
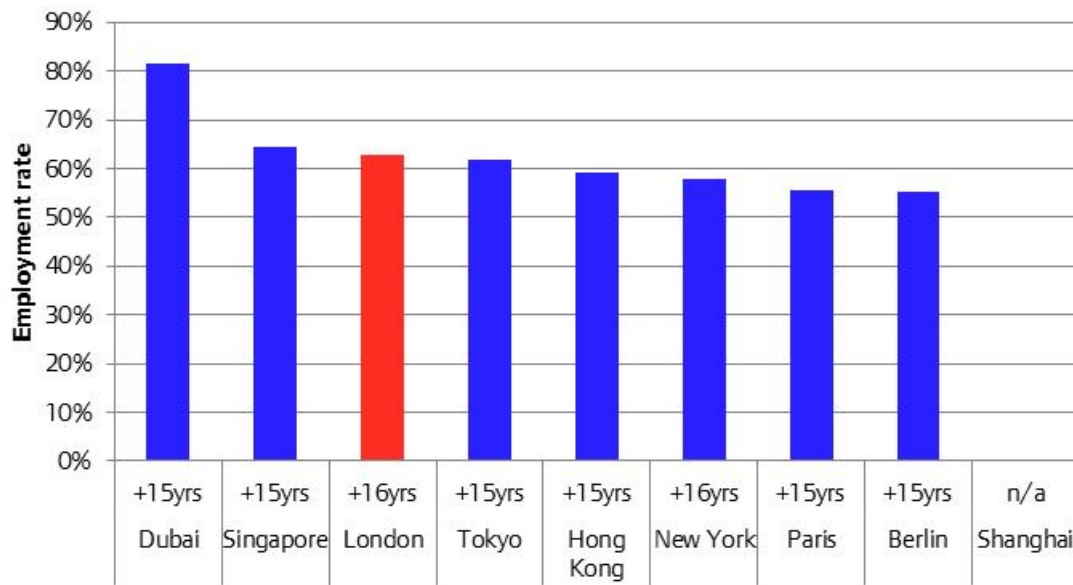
Note: New York refers to the New York, Northern New Jersey and Long Island metropolitan area and is not directly comparable with the definition used elsewhere in this paper. Source: ONS, US Census Bureau, Eurostat, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Historically, Dubai has consistently posted a higher employment rate than the other global cities[16] as shown in Figure 4.2.

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[16] This excludes New York and Shanghai where only one year's of data is available.

Figure 4.2: Employment rates for the global cities, 2006 to 2014
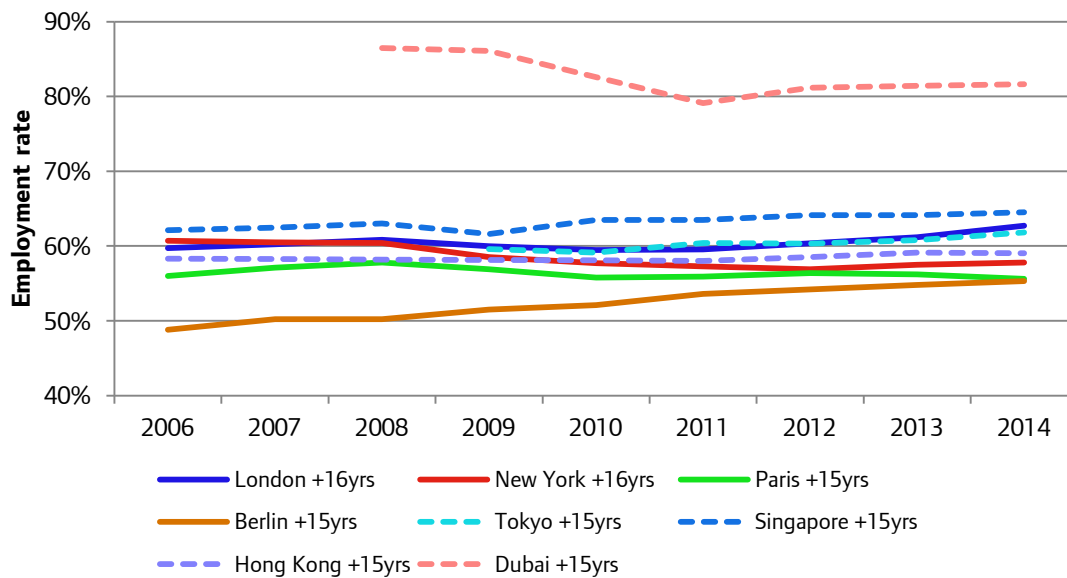
City	Age range	2006	2007	2008	2009	2010	2011	2012	2013	2014
London	+16yrs	59.7%	60.3%	60.8%	60.0%	59.5%	59.6%	60.3%	61.2%	62.7%
New York	+16yrs	60.7%	60.5%	60.4%	58.5%	57.7%	57.3%	56.9%	57.5%	57.8%
Paris	+15yrs	56.0%	57.1%	57.8%	56.9%	55.8%	55.9%	56.4%	56.2%	55.6%
Berlin	+15yrs	48.8%	50.2%	50.2%	51.5%	52.1%	53.6%	54.2%	54.8%	55.3%
Tokyo	+15yrs	..	..	..	59.6%	59.1%	60.4%	60.3%	60.8%	61.8%
Singapore	+15yrs	62.1%	62.5%	63.0%	61.6%	63.5%	63.5%	64.1%	64.1%	64.5%
Hong Kong	+15yrs	58.3%	..	..	..	..	58.0%	58.5%	59.1%	59.0%
Shanghai	..	..	..	..	..	..	..	..	..	..
Dubai	+15yrs	..	..	86.5%	86.1%	..	79.1%	81.2%	81.7%	81.7%

Source: ONS, US BLS, Eurostat, Tokyo Bureau of Statistic, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
*1. New York refers to the New York, Northern New Jersey and Long Island metropolitan area and is not directly comparable with the definition used elsewhere in this paper.*
2. Hong Kong and Dubai have some missing years (as shown in the data table) and so the trend has been interpolated for these gaps in the chart.

Conversely, unemployment, using the ILO (International Labour Organization) definition[17], in 2014 was lowest in Dubai (0.3 per cent) and highest in Berlin and Paris (9.8 per cent and 9.7 per cent respectively). As can be seen in Figure 4.3, London generally had a higher unemployment rate than other global cities, though this has continued to fall from its 2011 peak of 9.5 per cent. Generally, unemployment rates have fallen since 2006 for most global cities, with this decline most pronounced in Berlin having almost halved.

[17] The ILO definition of unemployment is people who are out of work but wants a job, has actively looked for work in the previous four weeks and are available to start within two weeks, as well as people who have accepted a job but are waiting to start in the next two weeks.

Figure 4.3: Unemployment rates for the global cities, 2006 to 2014
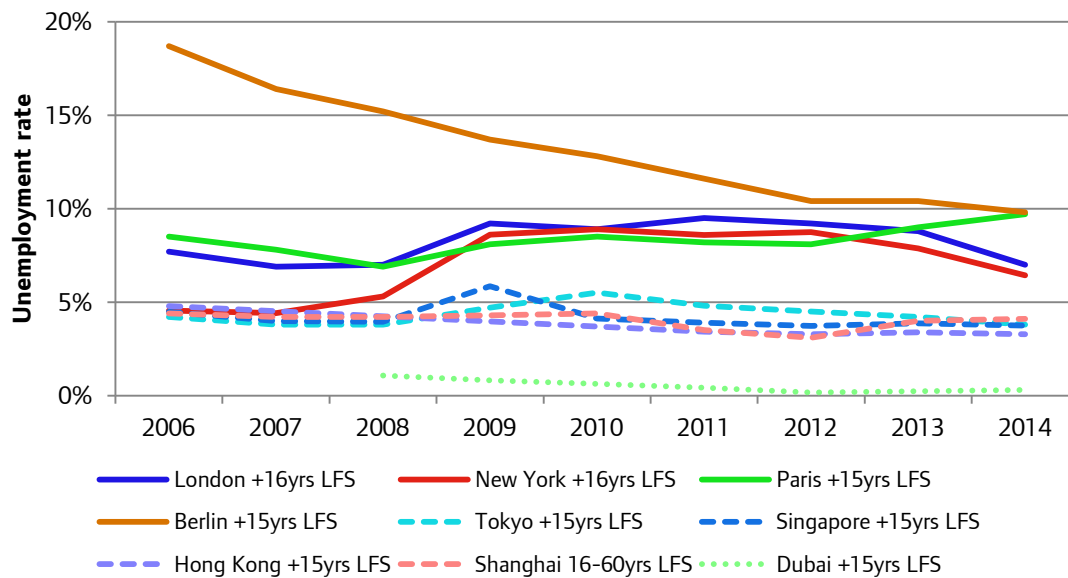
City	Age range	2006	2007	2008	2009	2010	2011	2012	2013	2014
London	+16yrs	7.7%	6.9%	7.0%	9.2%	8.9%	9.5%	9.2%	8.8%	7.0%
New York	+16yrs	4.6%	4.4%	5.3%	8.6%	8.9%	8.6%	8.7%	7.9%	6.4%
Paris	+15yrs	8.5%	7.8%	6.9%	8.1%	8.5%	8.2%	8.1%	9.0%	9.7%
Berlin	+15yrs	18.7%	16.4%	15.2%	13.7%	12.8%	11.6%	10.4%	10.4%	9.8%
Tokyo	+15yrs	4.2%	3.8%	3.8%	4.7%	5.5%	4.8%	4.5%	4.2%	3.8%
Singapore	+15yrs	4.5%	4.0%	4.0%	5.9%	4.1%	3.9%	3.7%	3.9%	3.7%
Hong Kong	+15yrs	4.8%	..	..	..	..	3.4%	3.3%	3.4%	3.3%
Shanghai	16-60yrs	4.4%	4.2%	4.2%	4.3%	4.4%	3.5%	3.1%	4.0%	4.1%
Dubai	+15yrs	..	..	1.1%	0.8%	..	0.4%	0.2%	0.2%	0.3%

Source: ONS, US BLS, Eurostat, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. Shanghai only includes the urban population (i.e. residents in towns or cities)
2. Hong Kong and Dubai have some missing years (as shown in the data table) and so the trend has been interpolated for these gaps in the chart.

Looking at the unemployment rates for the entire workforce may not be the best comparison for the global cities as these can be influenced by people who are in full-time education or retired. These people are considered to be economically inactive (i.e. not looking for work) and not included in the population figures when calculating unemployment. Therefore, Table 4.1 shows the unemployment rates by age groups for the global cities. Here it should be noted that figures for New York (referring to the New York, Newark and Jersey City metropolitan area) are from the US Census Bureau American Community Survey, which is not directly comparable with official labour market statistics from the US Bureau of Labor Statistics[18].

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[18] For a more detailed comparison between the two surveys, see:
http://www.census.gov/hhes/www/laborfor/laborguidance092209.html

Table 4.1: Unemployment rates by age group for the global cities in 2014

City	16-24yrs	25-34yrs	35-44yrs	45-54yrs	55-64yrs	+65yrs
London	20.5%	5.5%	5.3%			2.5%
New York	19.2%	6.6%		5.6%	5.9%	5.1%
Paris	21.4%	9.5%				..
Berlin	15.3%	9.4%	8.7%	9.0%	9.4%	..
Tokyo	5.2%	4.7%	3.6%	3.2%	3.7%	2.4%
Singapore	8.8%	4.4%	3.1%	2.6%	3.1%	3.4%
Hong Kong	..	..	..	..	..	..
Shanghai	..	..	..	..	..	..
Dubai	..	..	..	..	..	..

Source: ONS, US Census Bureau, INSEE, Statistik Berlin-Brandenburg, Tokyo Bureau of Statistics, SingStat, China NBS, Dubai Statistics Centre

Notes:
1. Paris, Berlin, Tokyo and Singapore all refer to the 15-24 age group.
2. The figures for New York are from the US Census Bureau American Community Survey and are not directly comparable with the official labour market statistics from the US Bureau of Labor Statistics.

By age group, unemployment was highest for young people for all global cities. For example, London's unemployment rate for the 16-24 age group was 20.5 per cent, which was almost four times as large as that for the 25-34 age group. The unemployment rates for London were either in line or below that for New York and Paris for all ages, though generally above that for Tokyo and Singapore.

Noticeably, employment rates vary by gender and global city as shown in Figure 4.4. For all global cities, men had a higher employment rate than women. For example, the employment rate for men in London was 70.3 per cent in 2014, compared with 55.3 per cent for women giving a difference of 15 percentage points. However, this gap was as large as 47.6 percentage points in Dubai (mainly a reflection of men having near full employment) and as little as 7.1 percentage points in Berlin. Interestingly, on this basis, London had the second-highest female employment rate among the selected global cities, behind Singapore.
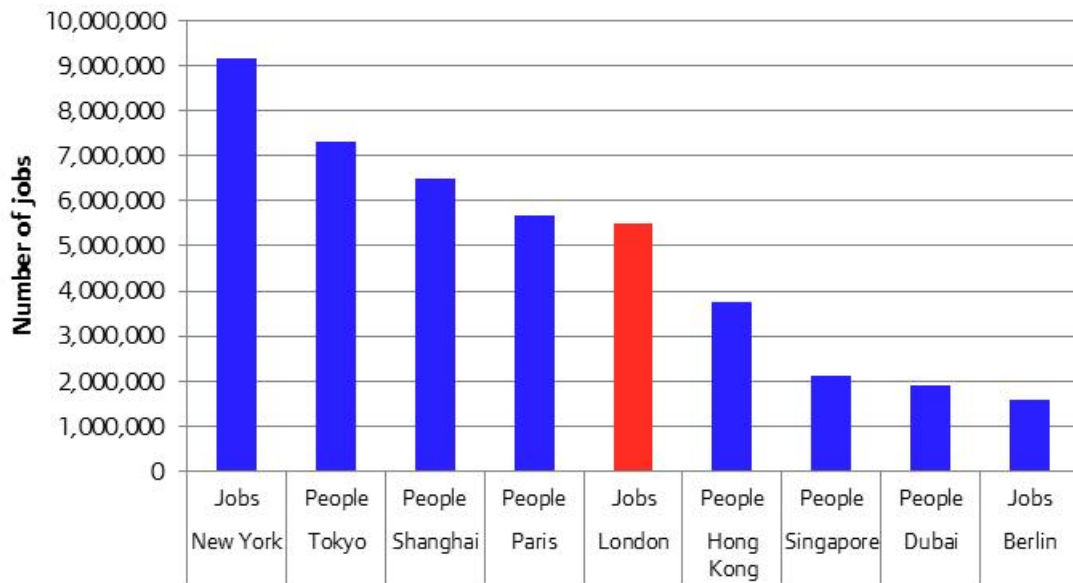
Figure 4.4: Employment rates by gender for the global cities in 2014
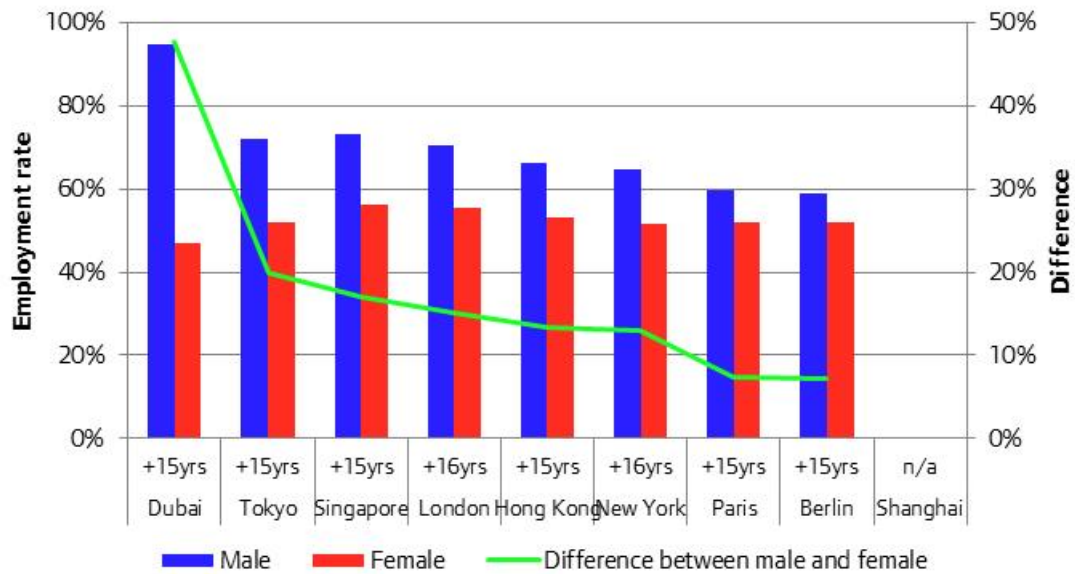
Source: Source: ONS, US BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

A global city is likely to be a place of work for people who live outside the city boundaries. These commuters contribute to the city's economy, but are not captured in the resident-based labour statistics discussed above. The reverse is true for those living in the city and commute out. Therefore, to estimate the total number of jobs in the economy a workplace-based measure is alternatively used. This also accounts for people who may have more than one job, particularly those working part-time. However, this information is only available for London, New York and Berlin (Figure 4.5). Therefore, for the remaining cities, it is assumed that the number of employed people (discussed above; based on residents) is equivalent to the number of jobs, though in all likelihood the latter would be higher. Given this, the number of jobs in London was estimated at 5.5m in 2014. Although that was larger than Berlin (1.6m jobs), it was smaller than New York though this city definition also includes areas like Newark which are cities in their own right (9.1m jobs).

Figure 4.5: Number of jobs for the global cities in 2014

Source: Source: ONS, US BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by ".." in Table 4.2.
2. Data for Paris refers to 2013.
3. Data for Shanghai refers to urban units only (i.e. in towns or cities).

As with output, the employment data can also be split by sector. Tables 4.2 and 4.3 show the number and relative share of jobs by industry for the global cities in 2014; and Table 4.4 shows the compound annual rates of employment growth by industry for the 2006 to 2014 period. One thing to note is that the relative contribution of each industry to the total number of jobs differs to that for total output as shown in Table 3.5. This gives rise to differences in productivity by industry which is discussed in greater depth in the next chapter.

Table 4.2: Employment by industry for the global cities in 2014

City	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	Jobs	Jobs	People	Jobs	People	People	People	People	People
Primary & Utilities	32,500	..	85,600	19,800	#	#	..	155,900	43,700
Manufacturing	133,000	368,800	375,400	114,000	733,000	#	101,500	2,061,000	171,000
Construction	280,000	350,200	275,100	61,900	455,000	98,200	86,300	372,800	471,300
Wholesale & Retail Trade	642,300	1,369,100	688,800	#	1,235,000	346,300	827,700	780,100	275,600
Transportation & Storage	274,000	327,400	358,800	#	388,000	188,900	176,600	513,700	152,000
Leisure & Hospitality	570,000	841,700	381,500	#	777,000	172,200	337,400	300,600	134,900
Accommodation & Food	375,800	#	283,500	#	490,000	137,100	285,600	243,900	119,700
Arts, Entertainment & Recreation	194,300	#	98,000	#	287,000	35,100	51,800	56,700	15,200
Information & Communication	426,300	284,000	380,500	#	686,000	87,800	105,200	247,800	39,900
Financial Activities	481,500	753,500	403,600	#	495,000	221,200	346,000	586,200	87,400
Finance & Insurance	365,500	#	325,300	#	257,000	165,600	217,200	330,300	55,100
Real Estate	116,000	#	78,300	#	238,000	55,600	128,800	255,900	32,300
Professional & Business Services	1,294,500	1,434,900	968,800	#	#	255,700	358,100	714,600	269,900
Profess Scientific & Tech Services	740,800	#	525,700	#	430,000	153,000	165,300	225,400	34,200
Administrative & Support Services	553,800	#	443,100	#	#	102,700	192,800	489,200	235,600
Public Sector	1,195,300	3,010,000	1,491,300	#	..	392,900	..	..	140,600
Public Administration	227,300	1,288,800	621,300	#	..	#	..	..	81,700
Education	413,300	351,400	348,900	#	378,000	#	188,400	294,200	36,100
Human Health & Social Work	554,800	1,369,800	521,200	#	713,000	107,700	173,400	190,300	22,800
Other Services	152,300	402,800	141,500	#	534,000	66,300	77,400	66,500	15,200
Activities of Households	27,800	#	135,500	#	487,000	24,800	..	#	98,800
Total	**5,509,300**	**9,142,300**	**5,686,400**	**1,582,100**	**7,311,000**	**2,103,500**	**2,789,200**	**6,488,800**	**1,900,400**

Source: ONS, US BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

<u>Notes:</u>
1. Only data that fits the industry definitions are shown in this table, but still contributes to the total. These are indicated by "#" and means that the sum of the sectors may not equal the total. Industries that are genuinely not included in the data (and the total) are indicated by "..".Also, figures for some global cities are rounded to nearest hundred.
2. Data for Paris refers to 2013.
3. Data for Shanghai refers to urban units only (i.e. in towns or cities).
4. Data for Hong Kong uses a different data source shown in Figure 4.5 meaning the totals may not be equal to one another.

Table 4.3: Industry share of total employment for the global cities in 2014

City	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	Jobs	Jobs	People	Jobs	People	People	People	People	People
Primary & Utilities	0.6%	..	1.5%	1.2%	#	#	#	2.4%	2.3%
Manufacturing	2.4%	4.0%	6.6%	7.2%	10.0%	#	3.6%	31.8%	9.0%
Construction	5.1%	3.8%	4.8%	3.9%	6.2%	4.7%	3.1%	5.7%	24.8%
Wholesale & Retail Trade	11.7%	15.0%	12.1%	#	16.9%	16.5%	29.7%	12.0%	14.5%
Transportation & Storage	5.0%	3.6%	6.3%	#	5.3%	9.0%	6.3%	7.9%	8.0%
Leisure & Hospitality	10.3%	9.2%	6.7%	#	10.6%	8.2%	12.1%	4.6%	7.1%
Accommodation & Food	6.8%	#	5.0%	#	6.7%	6.5%	10.2%	3.8%	6.3%
Arts, Entertainment & Recreation	3.5%	#	1.7%	#	3.9%	1.7%	1.9%	0.9%	0.8%
Information & Communication	7.7%	3.1%	6.7%	#	9.4%	4.2%	3.8%	3.8%	2.1%
Financial Activities	8.7%	8.2%	7.1%	#	6.8%	10.5%	12.4%	9.0%	4.6%
Finance & Insurance	6.6%	#	5.7%	#	3.5%	7.9%	7.8%	5.1%	2.9%
Real Estate	2.1%	#	1.4%	#	3.3%	2.6%	4.6%	3.9%	1.7%
Professional & Business Services	23.5%	15.7%	17.0%	#	#	12.2%	12.8%	11.0%	14.2%
Profess, Scientific & Tech Services	13.4%	#	9.2%	#	5.9%	7.3%	5.9%	3.5%	1.8%
Administrative & Support Services	10.1%	#	7.8%	#	#	4.9%	6.9%	7.5%	12.4%
Public Admin, Education & Health	21.7%	32.9%	26.2%	#	..	18.7%	..	..	7.4%
Public Administration	4.1%	14.1%	10.9%	#	..	#	..	..	4.3%
Education	7.5%	3.8%	6.1%	#	5.2%	#	6.8%	4.5%	1.9%
Human Health & Social Work	10.1%	15.0%	9.2%	#	9.8%	5.1%	6.2%	2.9%	1.2%
Other Services	2.8%	4.4%	2.5%	#	7.3%	3.2%	2.8%	1.0%	0.8%
Activities of Households	0.5%	#	2.4%	#	6.7%	1.2%	..	#	5.2%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: ONS, US BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:
1. Only data that fits the industry definitions are shown in this table, but still contributes to the total. These are indicated by "#" and means that the sum of the sectors may not equal the total. Industries that are genuinely not included in the data (and the total) are indicated by "..". Consequently, the sum of the industries shown in this table may not equal 100%.
2. Data for Paris refers to 2013.
3. Data for Shanghai refers to urban units only (i.e. in towns or cities).
4. Data for Hong Kong uses a different data source shown in Figure 4.5 meaning the totals may not be equal to one another.

Table 4.4: Compound annual rates of growth in employment by industry for the global cities, 2006 to 2014

City	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	Jobs	Jobs	People	Jobs	People	People	People	People	People
Primary & Utilities	1.0%	..	1.4%	-1.3%	#	-2.4%	..	0.5%	..
Manufacturing	-2.8%	-3.2%	-4.7%	0.6%	-1.7%	0.0%	..	6.3%	..
Construction	0.9%	#	1.2%	1.4%	1.1%	0.4%	..	22.4%	..
Wholesale & Retail Trade	0.1%	0.3%	-0.3%	#	1.2%	1.8%	..	21.6%	..
Transportation & Storage	0.5%	-0.1%	-0.2%	#	1.2%	1.0%	..	7.1%	..
Leisure & Hospitality	2.1%	3.1%	1.1%	#	0.4%	#	..	13.3%	..
Accommodation & Food	2.1%	#	1.1%	#	0.8%	0.8%	..	16.3%	..
Arts, Entertainment & Recreation	2.3%	#	1.1%	#	-0.2%	#	..	4.4%	..
Information & Communication	2.5%	-0.4%	0.3%	#	4.4%	2.0%	..	28.0%	..
Financial Activities	1.6%	-0.8%	0.2%	#	-1.5%	5.3%	..	11.0%	..
Finance & Insurance	0.9%	#	0.1%	#	-3.2%	5.7%	..	8.1%	..
Real Estate	3.9%	#	0.5%	#	0.4%	4.2%	..	15.7%	..
Professional & Business Services	2.8%	1.2%	0.6%	#	#	4.7%	..	11.9%	..
Profess, Scientific & Tech Services	3.7%	#	1.0%	#	1.8%	5.6%	..	3.7%	..
Administrative & Support Services	1.6%	#	0.1%	#	#	3.4%	..	17.8%	..
Public Admin, Education & Health	2.6%	0.9%	0.3%	#	..	3.7%	..	2.1%	..
Public Administration	-1.2%	-0.4%	-0.3%	#	..	#	..	2.5%	..
Education	3.9%	3.0%	0.0%	#	3.6%	#	..	1.4%	..
Human Health & Social Work	3.5%	1.9%	1.4%	#	5.1%	5.4%	..	3.0%	..
Other Services	1.2%	1.1%	1.2%	#	-5.2%	#	..	8.7%	..
Activities of Households	0.7%	#	1.8%	#	6.2%	1.2%	..	#	..
Total	**1.8%**	**0.6%**	**0.2%**	**1.9%**	**1.2%**	**2.0%**	**..**	**9.5%**	**..**

Source: ONS, US BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

<u>Notes:</u>

1. Only data that fits the industry definitions are shown in this table, but still contributes to the total and these are indicated by "#". Industries that are genuinely not included in the data (and the total) are indicated by "..".
*2. Data for Paris ends in 2013, so the CAGR covers the 2006 to 2013 period.*
3. Data for Tokyo starts in 2011, so the CAGR covers the 2011 to 2014 period.
4. Data for Shanghai refers to urban units only (i.e. in towns or cities). It also starts in 2008, so the CAGR covers the 2008 to 2014 period.

As with output (and using the same definitions shown in Table 3.7), the majority of jobs in London were in the broad services industry (91.9 per cent). Although other global cities similarly had more jobs in services, they generally had a larger share of jobs in the primary and secondary sectors than London (Figure 4.6).

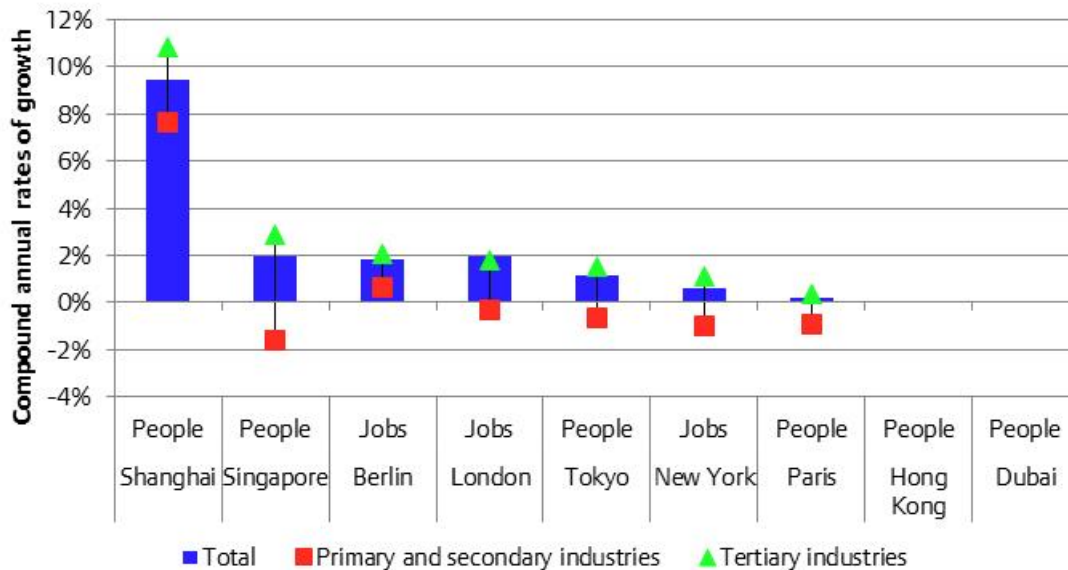**Figure 4.6: Number of jobs for the global cities in 2014**
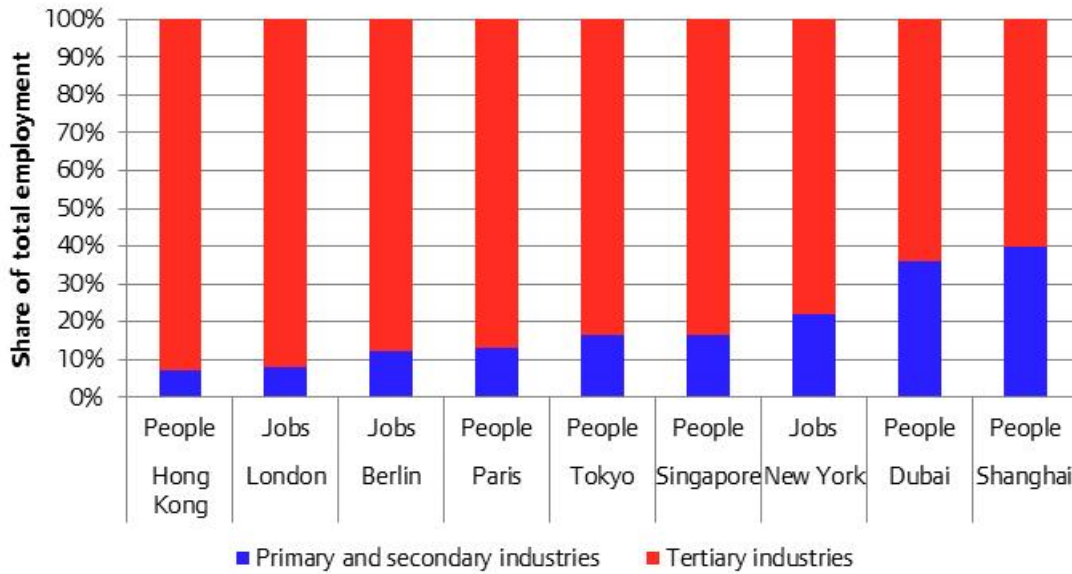
Source: Source: ONS, US BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by ".." in Table 4.2.
2. Data for Paris refers to 2013.
3. Data for Shanghai refers to urban units only (i.e. towns or cities).

As shown in Figure 4.7, employment growth in the broad services industry was faster than the primary and secondary industries for all global cities. In fact, the number of jobs in the primary and secondary industries was broadly stagnant between 2006 and 2014 in London, which contrasted with declines in New York, Paris and Tokyo.

Figure 4.7: Compound annual rates of employment growth by broad industry for the global cities, 2006 to 2014

Source: Source: ONS, US BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by ".." in Table 4.2.
2. Data for Paris ends in 2013, so the CAGR covers the 2006 to 2013 period.
3. Data for Tokyo starts in 2011, so the CAGR covers the 2011 to 2014 period.
4. Data for Shanghai refers to urban units only (i.e. towns or cities). Also, data starts in 2008, so the CAGR covers the 2008 to 2014 period.

Hours worked

There are also differences between the global cities when looking at the average number of actual total hours worked. For example, the average (median) number of hours worked in London for all employees – both full and part-time – was 36.1 hours per week in 2014. This had not changed significantly over time as shown in Table 4.5. Nonetheless, it was lower than Hong Kong (44.3 hours) and Tokyo (41.1 hours), though the latter only included full-time workers in establishments with more than five employees.

New York statistics consider the mean number of hours worked, which is typically lower than the median. This is because part-time employees generally work fewer hours than full-time workers which would therefore affect the mean. However, as part-time workers also represent a relatively smaller share of the workforce, the median is likely to be representative of a full-time employee. Acknowledging this difference, the mean number of hours worked in New York[19] was 34 hours in 2014. To put this in perspective, the mean number of hours worked in London was also 34 hours in 2014 (in contrast with the median of 36.1 hours).

There was no information for Singapore, Shanghai or Dubai.

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[19] This only includes private non-farm employees. This compares with the mean number of hours worked by private all-sector employees of 34.6 hours in London during 2014.

Table 4.5: Average hours worked per employee for the global cities, 2006 to 2014

City	Average hours measure	2006	2007	2008	2009	2010	2011	2012	2013	2014
London	Median	36.1	36.1	36.5	36.1	36.1	36.1	36.1	36.1	36.1
	Mean	34.9	34.8	34.9	34.4	34.4	34.1	34.2	34.1	34.0
New York	Mean	..	..	..	..	..	34.5	34.4	34.2	34.0
Paris	Median	38.5	38.8	39.1	39.0	39.1	39.2	38.9	37.9	37.7
Berlin	Median	36.1	35.8	35.8	35.7	36.0	35.9	35.8	35.6	35.6
Tokyo	Median	41.3	41.5	41.2	40.6	40.9	40.8	41.6	41.2	41.1
Singapore	n/a	..	..	..	..	..	..	..	..	..
Hong Kong	Median	..	..	..	44.3	44.3	45.0	45.0	45.0	44.3
Shanghai	n/a	..	..	..	..	..	..	..	..	..
Dubai	n/a	..	..	..	..	..	..	..	..	..

Source: ONS, US BLS, Eurostat, Tokyo Bureau of Statistic, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by "..' in Table 4.6.
2. Tokyo only includes full-time employees at establishments with five or more employees.
3. Paris and Berlin refers to the average number of usual hours in their main job.

Although there is information showing the average number of hours worked by industry, there are a number of data gaps meaning the number of comparisons between global cities is small[20]. Nevertheless, the sector breakdowns are shown in Table 4.6. Generally, Londoners worked fewer hours than Tokyo and Hong Kong (for which sector data is available) across all industries.

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[20] Also, as the sector data are averages and consequently cannot be aggregated, no industry proxies are calculated here.

Table 4.6: Average number of hours worked by industry for the global cities in 2014

City	London		New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	Median	Mean	Mean	Median	Median	Median	n/a	Median	n/a	n/a
Primary & Utilities	#	#	..	#	#	..	..	..	..	..
Manufacturing	37.5	38.3	#	#	#	40.1	..	48.0	..	..
Construction	40.0	39.4	#	#	#	44.2	..	49.4	..	..
Wholesale & Retail Trade	37.0	32.4	#	#	#	40.9	..	44.6	..	..
Transportation & Storage	37.5	37.9	#	#	#	44.5	..	46.9	..	..
Accommodation & Food Services	37.5	33.6	#	#	#	45.9	..	51.1	..	..
Information & Communication	37.5	36.2	#	#	#	41.4	..	40.6	..	..
Finance & Insurance	35.0	35.2	#	#	#	40.0	..	40.6	..	..
Real Estate	36.8	35.2	#	#	#	41.3	..	46.9	..	..
Profess, Scientific & Tech. Services	36.1	34.9	#	#	#	42.2	..	40.6	..	..
Administrative & Support Services	37.5	34.0	#	#	#	#	..	40.6	..	..
Public Administration	37.0	37.2	#	#	#	..	..	..	..	..
Education	34.9	29.2	#	#	#	35.2	..	..	..	..
Human Health & Social Care	37.5	33.0	#	#	#	38.8	..	42.3	..	..
Arts, Entertainment & Recreation	36.0	30.7	#	#	#	42.1	..	#	..	..
Other Services	35.0	32.0	#	#	#	40.6	..	48.2	..	..
Activities of households	34.1	29.0	#	#	#	#	..	#	..	..
Total	**36.1**	**34.0**	**34.0**	**37.7**	**35.6**	**41.1**	**..**	**44.3**	**..**	**..**

Source: ONS, US BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:

1. Only data that fits the industry definitions are shown in this table, but still contributes to the total and these are indicated by "#". Industries that are genuinely not included in the data (and the total) are indicated by "..".
2. Tokyo only includes full-time employees working at establishments with five or more employees.
3. Some industry figures for Hong Kong are an average of sub-sectors.

5   Productivity

Productivity is an important indicator of economic performance by measuring the efficiency of converting inputs into outputs and, as such, is often used when making international comparisons. There are many different types of productivity measures including:

- Labour productivity
  This is one of the most widely used measures of productivity and shows the amount of output generated by a unit of labour such as the number of jobs or hours worked.

- Capital productivity
  Similarly to labour productivity, this shows the amount of output generated by a unit of capital. It is usual practice to look at the flow of capital rather than the stock to better illustrate the change and can include machinery, equipment and buildings.

- Multi or total factor productivity
  This is the change in output attributable to several types of inputs and, as such, is viewed as the most complete measure of productivity. Often multifactor productivity is measured by looking at the residual – that is, the change in output that is not attributed to both labour and capital – and represents the efficiency of using inputs in production. Things like economies of scale and changes in management or the organisation can all influence multifactor productivity.

Ideally, multifactor productivity would be the focus of any analysis, but this cannot be done at the city level due to a lack of regional data. Instead, multifactor (and capital) productivity are usually calculated at the national level and these are discussed in the OECD Compendium of Productivity Indicators[21] for example. Given this, labour productivity in terms of output per job and output per hour worked is of focus in this paper.

Box 5.1: Definition of labour productivity

The definition of labour productivity is the amount of output generated by a single unit of labour. In most cases, the measure of output used is GVA and the measure of labour is the number of jobs or the number of hours worked.

$$\text{Labour productivity} = \frac{\text{Output}}{\text{Unit of labour}}$$

Output per job

Firstly, estimates of output per job[22] in 2014 are shown in Figure 5.1. However, as noted earlier, definitions of output and jobs vary by city – some measure output in terms of GVA and others in GDP, and some measure jobs in terms of jobs themselves or people – meaning some caution should be used when making comparisons. Acknowledging this, Singapore had the highest output per job of the selected global cities at approximately £149,800 in 2014. This was

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[21] http://www.oecd.org/std/productivity-stats/oecd-compendium-of-productivity-indicators-22252126.htm
[22] It should be noted that this approach differs from that used in GLA Economics Working Paper 63 which looked at self-employment income and rental income separately.

followed by New York at £119,200. London had the third-lowest figure of the global cities covered with its output per job estimated at £66,100[23].

Figure 5.1: Output per job for the global cities in 2014, current prices
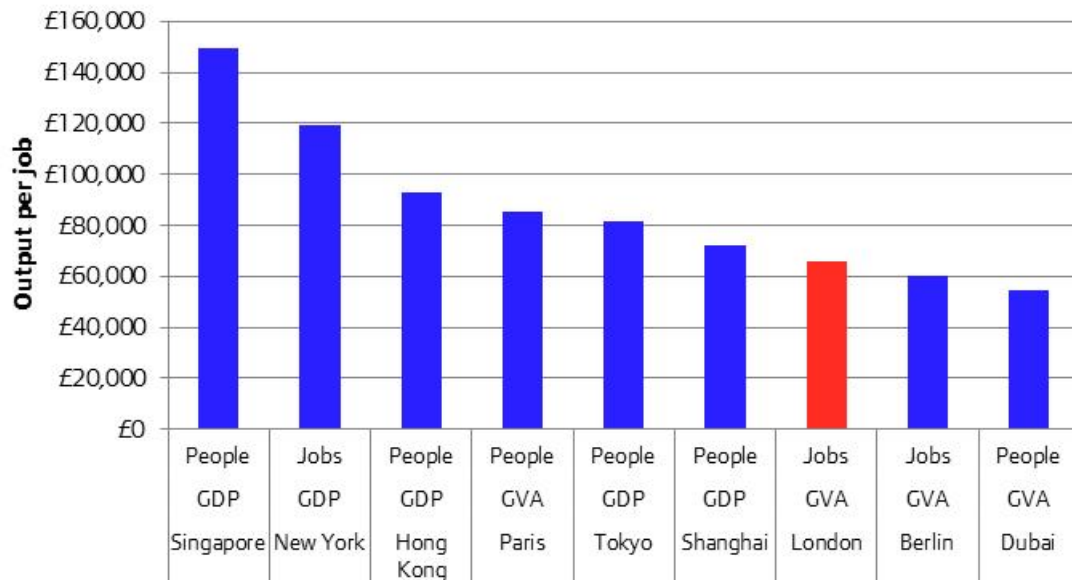
Source: ONS, US BLS/BEA, Eurostat, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by ".." in Tables 3.4 and 4.2.
2. Data for Paris and Tokyo refer to 2013 and in 2013 prices.
3. Shanghai only includes urban units.

Looking over time, London had historically had one of the lowest output per job figures among the selected global cities. This can be seen from Figure 5.2 that shows output per job in constant prices between 2006 and 2014. That said, the average rate of growth during this period was 0.6 per cent for London which was broadly in line with New York (0.8 per cent), but slower than Paris (1.7 per cent) and Singapore (3.1 per cent).

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[23] This figure differs slightly from that published in GLA Economics Current Issues Note 46 due to revisions made in the workforce jobs series. This was caused by an improvement to the coverage of businesses on the Inter-Departmental Business Register which is used by the ONS as the sampling frame for its business surveys. For more information on these changes see: http://www.ons.gov.uk/ons/guide-method/method-quality/specific/business-and-energy/business-population/improving-the-coverage-of-the-standard-business-survey-population.pdf

Figure 5.2: Output per job for the global cities between 2006 and 2014, constant 2014 prices
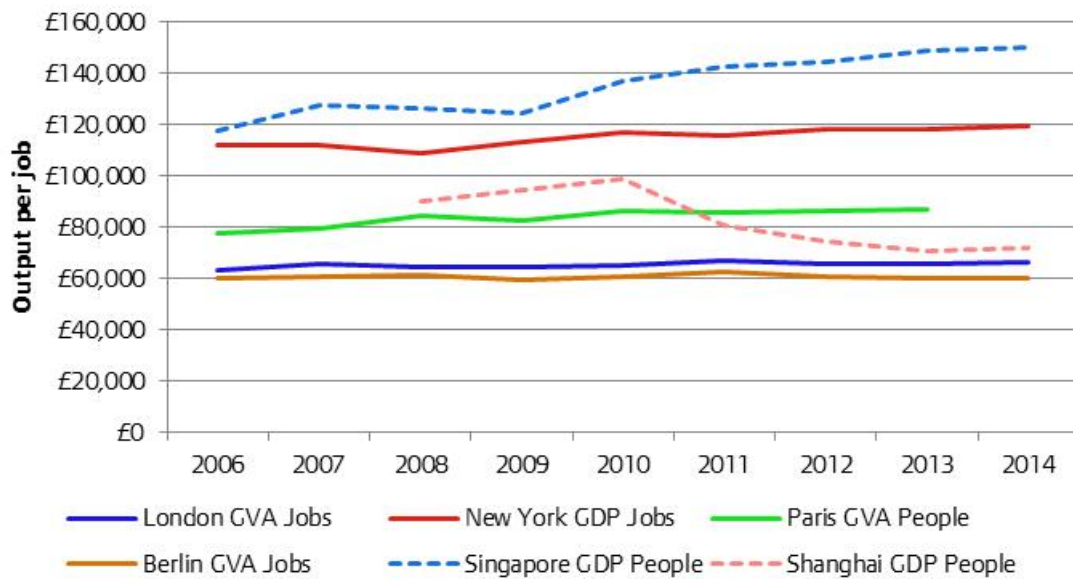
City			Output per job in 2014	CAGR in real prices (06-14)
London	GVA	Jobs	£66,100	0.6%
New York	GDP	Jobs	£119,200	0.8%
Paris	GVA	People	£87,000	1.7%
Berlin	GVA	Jobs	£60,100	0.0%
Tokyo	GDP	People	£82,000	..
Singapore	GDP	People	£149,800	3.1%
Hong Kong	GDP	People	£92,900	..
Shanghai	GDP	People	£71,900	-3.7%
Dubai	GVA	People	£54,300	..

Source: ONS, US BLS/BEA, Eurostat, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by ".." in Tables 3.4 and 4.2.
2. Data for Tokyo and Dubai are not shown in the chart as there is only one year's of data
3. Output estimates was originally in current prices, but to show the underlying output trend these have been converted into constant 2014 prices using the national GDP deflators. As noted in Box 3.3, the ideal deflator is one that is based on regional prices by industry.
3. Paris data is only up to 2013, so the CAGR covers the 2006 to 2013 period.
4. Shanghai only includes urban units (i.e. towns or cities). The data is also from 2008, so the CAGR covers the 2008 to 2014 period.

By sector, output per job in London was highest in the financial sectors (Tables 5.1 and 5.2). For example, output per job in the Finance & Insurance and Real Estate sectors were £188,000 and £396,500 respectively during 2014, which were well above the London average of £66,100. While acknowledging industry data gaps, financial sectors also had the highest output per job estimates for New York, Hong Kong and Shanghai.

Box 5.2: Real Estate

The Real Estate sector has the highest output per job figure for London in 2014. However, as discussed in Working Paper 63, this is mostly reflective of rental income, especially owner-occupied dwellings, which is not directly attributed to the workforce[24]. For example, it was estimated that only 16 per cent of the Real Estate sector's GVA in London was attributed to the workforce. That was by far the lowest proportion with the next smallest – Agriculture, Forestry & Fishing – at 90 per cent.

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[24] GLA Economics (2015). GVA per workforce job in London and the UK, GLA Economics Working Paper 63. Available at:
https://www.london.gov.uk/working-paper-63-gva-workforce-job-london-and-uk

Table 5.1: Output per job by industry for the global cities in 2014, current prices

City	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	GVA	GDP	GVA	GVA	GDP	GDP	GDP	GDP	GVA
	Jobs	Jobs	People	Jobs	People	People	People	People	People
Primary & Utilities	£187,800	..	£95,500	#	#	..	#	£16,300	£128,100
Manufacturing	£71,900	#	£86,800	#	£59,200	£224,500	£34,000	£70,800	£68,100
Construction	£60,500	#	£74,800	£60,500	£64,900	£156,700	£137,800	£44,200	£16,300
Wholesale & Retail Trade	£42,300	£84,700	£66,700	#	£108,500	£144,200	£79,400	£92,600	£108,900
Transportation & Storage	£61,000	#	£67,200	#	£64,700	£115,900	£96,400	£40,300	£79,100
Leisure & Hospitality	£32,100	#	#	#	..	#	#	#	#
Accommodation & Food	£29,100	#	£48,700	#	#	£47,400	£34,100	#	£46,900
Arts, Entertainment & Recreation	£37,900	#	#	#	#	#	#	#	#
Information & Communication	£88,300	£296,100	£123,600	#	£112,500	£141,800	£91,400	#	#
Financial Activities	£238,200	£493,300	£244,300	#	£281,600	#	#	£166,600	#
Finance & Insurance	£188,000	#	£111,900	#	£211,400	£218,700	£208,300	£203,900	£218,800
Real Estate	£396,500	#	£794,100	#	£372,600	#	#	£118,500	#
Professional & Business Services	£47,100	#	£95,000	#	#	#	#	#	#
Profess, Scientific & Tech Services	£55,100	#	#	#	#	#	#	#	#
Administrative & Support Services	£36,400	#	#	#	#	#	#	#	#
Public Admin, Education & Health	£38,900	£62,300	£53,500	#	#	..	#	..	£56,800
Public Administration	£56,000	£77,900	#	#	..	..	..	..	£69,700
Education	£41,000	£42,300	#	#	#	..	#	..	#
Human Health & Social Work	£30,200	£52,800	#	#	#	..	#	..	#
Other Services	£53,300	£51,700	£41,900	#	#	#	#	#	#
Activities of Households	£56,500	#	#	#	£22,400	#	..	#	£3,600
Total	**£66,100**	**£119,200**	**£85,600**	**£60,100**	**£81,300**	**£149,800**	**£92,900**	**£71,900**	**£54,300**

Source: ONS, US BLS/BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:
1. Only data that fits the industry definitions are shown in this table, but still contributes to the total and these are indicated by "#". Industries that are genuinely not included in the data (and the total) are indicated by "..".
2. Data for Paris and Tokyo refer to 2013.
3. Data for Shanghai refer to urban units only (i.e. towns or cities).

Table 5.2: Compound annual rates of real output per job growth by industry for the global cities, 2006 to 2014

City	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	GVA	GDP	GVA	GVA	GDP	GDP	GDP	GDP	GVA
	Jobs	Jobs	People	Jobs	People	People	People	People	People
Primary & Utilities	3.2%	..	1.2%	#	..	..	..	-4.5%	..
Manufacturing	1.3%	#	1.4%	..	..	2.7%	..	-4.7%	..
Construction	0.1%	#	1.8%	4.0%	..	12.4%	..	-14.2%	..
Wholesale & Retail Trade	-0.8%	#	2.8%	#	..	1.7%	..	-11.6%	..
Transportation & Storage	1.7%	#	1.6%	#	..	0.9%	..	-3.7%	..
Leisure & Hospitality	-0.8%	#	#	#	..	#	..	#	..
Accommodation & Food	0.2%	#	1.2%	#	..	5.9%	..	-11.3%	..
Arts, Entertainment & Recreation	-2.1%	#	#	#	..	#	..	#	..
Information & Communication	-0.4%	2.2%	2.6%	#	..	4.4%	..	#	..
Financial Activities	3.1%	2.8%	2.0%	#	..	#	..	-1.4%	..
Finance & Insurance	1.7%	#	3.1%	#	..	1.3%	..	3.5%	..
Real Estate	4.6%	#	1.1%	#	..	#	..	-9.3%	..
Professional & Business Services	-0.3%	#	2.2%	#	..	#	..	#	..
Profess, Scientific & Tech Services	-1.4%	#	#	#	..	#	..	#	..
Administrative & Support Services	1.3%	#	#	#	..	#	..	#	..
Public Admin, Education & Health	-1.7%	0.5%	1.9%	#	..	..	..	..	..
Public Administration	0.9%	1.2%	#	#	..	..	..	..	..
Education	-1.9%	0.3%	#	#	..	..	..	..	..
Human Health & Social Work	-2.8%	0.2%	#	#	..	..	..	..	..
Other Services	3.0%	-0.3%	-4.1%	#	..	#	..	#	..
Activities of Households	6.0%	#	#	#	..	#	..	#	..
Total	**0.6%**	**0.8%**	**1.7%**	**0.0%**	**..**	**3.1%**	**..**	**-3.7%**	**..**

Source: ONS, US BLS/BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.
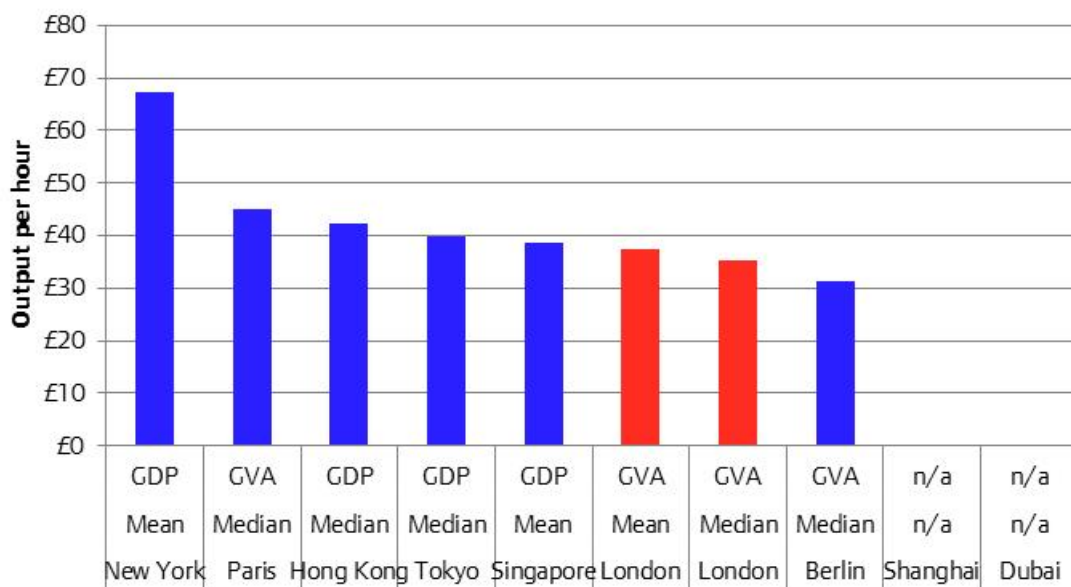
Notes:
1. Only data that fits the industry definitions are shown in this table, but still contributes to the total and these are indicated by "#". Industries that are genuinely not included in the data (and the total) are indicated by "..".
2. Output estimates was originally in current prices, but to show the underlying output trend these have been converted into constant 2014 prices using the national GDP deflators. As noted in Box 3.3, the ideal deflator is one that is based on regional prices by industry.
3. Data for Paris ends in 2013, so the CAGR covers the 2006 to 2013 period.
4. Data for Shanghai refers to urban units only (i.e. towns or cities). It also starts in 2008, so the CAGR covers the 2008 to 2014 period.

Output per hour worked

The second measure of productivity is output per hour worked. This measure accounts for differences in full-time/part-time working patterns across countries. The same caveats mentioned earlier – that is, different measures of output and industry definitions for example – apply here as well. Therefore, caution should also be exercised when making comparisons across cities. Given this, Figure 5.3 shows the estimates of output per hour worked for the selected cities in 2014, though it should be noted that there is no information for Shanghai and Dubai. New York had the highest output per hour at £67 per hour (mean), followed by Paris at £45 per hour (median). Similarly to output per job, London posted one of the lowest estimates of output per hour with this at £35 per hour (median).

Figure 5.3: Output per hour worked for the global cities in 2014, current prices

Source: ONS, US BEA/BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by ".." in Tables 3.4 and 4.6.
2. Tokyo refers to 2013 and only includes hours of full-time employees working at establishments with five or more employees.

Figure 5.4 shows the trends over time using constant 2014 prices. London has historically had comparatively low productivity estimates. In fact, London used to have higher estimates of output per hour worked (in mean terms) than Singapore in 2009 but while the latter has since grown modestly, London's productivity has increased only marginally. This can easily be seen by the average annual rates of growth – this was 0.9 per cent for London (mean), but Singapore's rate of growth was three times as fast at 2.8 per cent.

Figure 5.4: Output per hour worked for the global cities between 2006 and 2014, constant 2014 prices
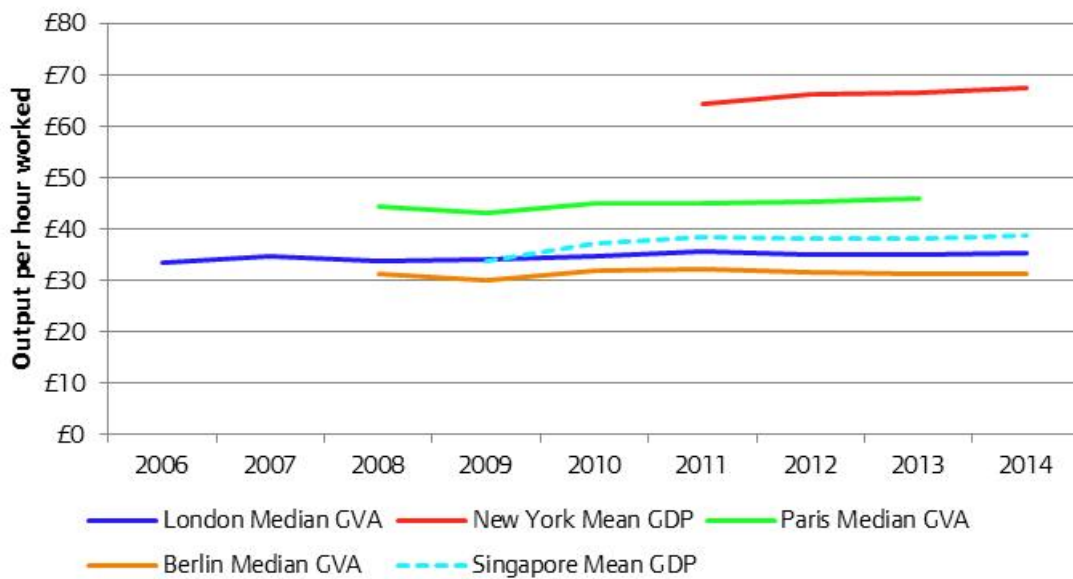
Year	London		New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	Median	Mean	Mean	Median	Median	Median	Mean	Median	n/a	n/a
	GVA	GVA	GDP	GVA	GVA	GDP	GDP	GDP	n/a	n/a
2006	£34	£35	..	..	..	..	..	..	..	..
2007	£35	£36	..	..	..	..	..	..	..	..
2008	£34	£35	..	£44	£31	..	..	..	..	..
2009	£34	£36	..	£43	£30	..	£34	..	..	..
2010	£35	£36	..	£45	£32	..	£37	..	..	..
2011	£36	£38	£64	£45	£32	..	£39	..	..	..
2012	£35	£37	£66	£45	£31	..	£38	..	..	..
2013	£35	£37	£66	£46	£31	£40	£38	..	.	..
2014	£35	£37	£67	..	£31	..	£39	£42	..	..
CAGR (06-14)	**0.6%**	**0.9%**	**1.5%**	**0.6%**	**0.0%**	**..**	**2.8%**	**..**	**..**	**..**

Source: ONS, US BEA/BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. These figures may not include all industries. Missing industries are indicated by ".." in Tables 3.4 and 4.6.
2. Output estimates was originally in current prices, but to show the underlying output trend these have been converted into constant 2014 prices using the national GDP deflators.
3. Due to data gaps, the CAGR for New York covers the 2011 to 2014 period, Paris covers the 2008 to 2013 period, Berlin covers the 2008 to 2014 period and Singapore covers the 2009 to 2014 period.
4. Tokyo only includes hours of full-time employees at establishments with five or more employees.

Interestingly, by sector, London's output per hour worked were broadly in line with or higher than other global cities for a number of industries (Table 5.3). For example, productivity in London's Accommodation & Food sector (£15 using the median number of hours worked) was higher than Singapore (£13: mean) and Hong Kong (£12: median) and London's Transport & Storage industry (£31: median) was broadly in line with Tokyo (£30: median). In contrast, output per hour in London's Wholesale & Retail Trade industry (£22: median) was lower than

Tokyo (£55: median) and Singapore (£49: mean). The compound annual rates of growth in output per job in real terms are also shown in Table 5.4.

Table 5.3: Output per hour worked by industry for the global cities in 2014, current prices

City	London		New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	Median	Mean	Mean	n/a	Mean	Median	Mean	Median	n/a	n/a
	GVA	GVA	GDP	n/a	GVA	GDP	GDP	GDP	n/a	n/a
Primary & Utilities	£93	£91	#	#	#	#	..	..	..	..
Manufacturing	£37	£36	#	#	#	£31	£46	£14	..	..
Construction	£29	£30	#	#	#	£31	£13	£54	..	..
Wholesale & Retail Trade	£22	£25	#	#	#	£55	£49	£34	..	..
Transportation & Storage	£31	£31	#	#	#	£30	£42	£39	..	..
Accommodation & Food Services	£15	£17	#	#	#	#	£13	£12	..	..
Information & Communication	£45	£47	#	#	#	£56	£53	£43	..	..
Finance & Insurance	£103	£103	#	#	#	£110	£88	£99	..	..
Real Estate	£207	£217	#	#	#	£191	#	#	..	..
Profess, Scientific & Tech Services	£29	£30	#	#	#	#	#	#	..	..
Administrative & Support Services	£19	£21	#	#	#	#	#	#	..	..
Public Administration	£29	£29	#	#	#	#	..	#	..	..
Education	£23	£27	#	#	#	#	..	#	..	..
Human Health & Social Care	£15	£18	#	#	#	#	..	#	..	..
Arts, Entertainment & Recreation	£20	£24	#	#	#	#	#	#	..	..
Other Services	£29	£32	#	#	#	#	#	#	..	..
Activities of households	£32	£37	#	#	#	#	#	#	..	..
Total	**£35**	**£37**	**£67**	**£45**	**£31**	**£40**	**£39**	**£42**	**..**	**..**

Source: ONS, US BEA/BLS, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

<u>Notes:</u>
1. Only data that fits the industry definitions are shown in this table, but still contributes to the total and these are indicated by "#". Industries that are genuinely not included in the data (and the total) are indicated by "..".
2. Data for Tokyo and Paris refer to 2013 and are in 2013 prices. Tokyo also only includes full-time employees at establishments with five or more employees.

Table 5.4: Compound annual rates of real output per hour worked growth by industry for the global cities, 2006 to 2014

City	London		New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
	Median	Mean	Mean	Median	Median	n/a	Mean	n/a	n/a	n/a
	GVA	GVA	GDP	GVA	GVA	n/a	GDP	n/a	n/a	n/a
Primary & Utilities	#	#	#	#	#	..	..	..	..	..
Manufacturing	1.3%	0.9%	#	#	#	..	3.9%	..	..	..
Construction	0.1%	0.7%	#	#	#	..	-1.5%	..	..	..
Wholesale & Retail Trade	-0.7%	-0.5%	#	#	#	..	1.4%	..	..	..
Transportation & Storage	#	#	#	#	#	..	1.6%	..	..	..
Accommodation & Food Services	0.2%	0.4%	#	#	#	..	5.8%	..	..	..
Information & Communication	#	#	#	#	#	..	1.6%	..	..	..
Finance & Insurance	1.7%	1.7%	#	#	#	..	2.4%	..	..	..
Real Estate	#	#	#	#	#	..	#	..	..	..
Profess, Scientific & Tech Services	#	#	#	#	#	..	#	..	..	..
Administrative & Support Services	#	#	#	#	#	..	#	..	..	..
Public Administration	1.9%	1.3%	#	#	#	..	..	..	..	..
Education	-1.9%	-1.8%	#	#	#	..	..	..	..	..
Human Health & Social Care	-3.1%	-2.6%	#	#	#	..	..	..	..	..
Arts, Entertainment & Recreation	#	#	#	#	#	..	#	..	..	..
Other Services	3.7%	4.1%	#	#	#	..	#	..	..	..
Activities of households	#	#	#	#	#	..	#	..	..	..
Total	**0.6%**	**0.9%**	**1.5%**	**0.6%**	**0.0%**	**..**	**2.8%**	**..**	**..**	**..**

Source: ONS, US BLS/BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:

1. Only data that fits the industry definitions are shown in this table, but still contributes to the total and these are indicated by "#". Industries that are genuinely not included in the data (and the total) are indicated by "..".

2. Output estimates was originally in current prices, but to show the underlying output trend these have been converted into constant 2014 prices using the national GDP deflators. As noted in Box 3.3, the ideal deflator is one that is based on regional prices by industry.

3. Due to data gaps, the CAGR for New York covers the 2011 to 2014 period, Paris covers the 2008 to 2013 period, Berlin covers the 2008 to 2014 period and Singapore covers the 2009 to 2014 period.

6   Discussion

Given that London's labour productivity tends to be below that for other global cities, this chapter attempts to explain why these differences occur.

Data measurement differences

An explanation as to why productivity varies across the global cities could be down to the different measurement approaches and definitions used. As noted throughout this paper, the output and labour measures vary across the global cities and can have a profound effect on estimates of labour productivity. For example, GDP tends to be higher than GVA which means – all other things being equal – the numerator of the labour productivity formula (shown in Box 5.1) would be larger and derive higher estimates of output per job and output per hour worked. Also, the number of people in employment tends to be less than the total number of jobs which would similarly result in larger estimates of labour productivity by decreasing the denominator in the formula.

Also, differences in the definitions used can similarly affect the calculation of labour productivity. Here, for example, New York does not include Agriculture in the job figures but are included in the output numbers. Although an adjustment could have been made to allow for these differences (i.e. removing Agriculture from the output numbers so that they are on a like-for-like basis with employment), this is not always possible. That is, in this example, the output number for Agriculture is not available due to disclosure controls. Other examples include Singapore and Shanghai which both exclude Public Administration, Education and Human Health from their output measures. Therefore, the output estimates would be higher if these sectors were included as per the other global cities.

Although it would have been ideal for the data used in this paper to be consistent across the global cities, as it uses national statistics and definitions, differences remain and should be acknowledged when using this analysis.

Sector breakdowns

As shown in Tables 5.1 and 5.3, productivity varies by industry and across the global cities. For example, the sector with one of the highest output per jobs in London was Finance & Insurance at £188,000; that was almost six-and-a-half times as large as the lowest estimate of £29,100 for the Accommodation & Food industry. Consequently, this section will look at whether differences at this industry level can explain the differences in productivity for the global cities as a whole. That is, whether London is more orientated towards sectors that traditionally have low productivity.

Box 6.1: Focus on the Finance & Insurance sector

The Finance & Insurance sector was the largest industry in terms of its contribution to output for London in 2014 (see Table 3.5). At 18.9 per cent of the total, this share was also larger than any other global city suggesting the importance of finance to London. This industry was also the largest contributor to total output for New York though, as shown in Figure 6.1, it was larger than London in absolute terms. Nonetheless, London saw a faster average rate of real output growth than New York between 2006 and 2014 (2.7 per cent versus 1.7 per cent), but this was slower than Shanghai (15.2 per cent) and Singapore (7.1 per cent).

Figure 6.1: Finance & Insurance sector's share of total output for the global cities in 2014, £ millions
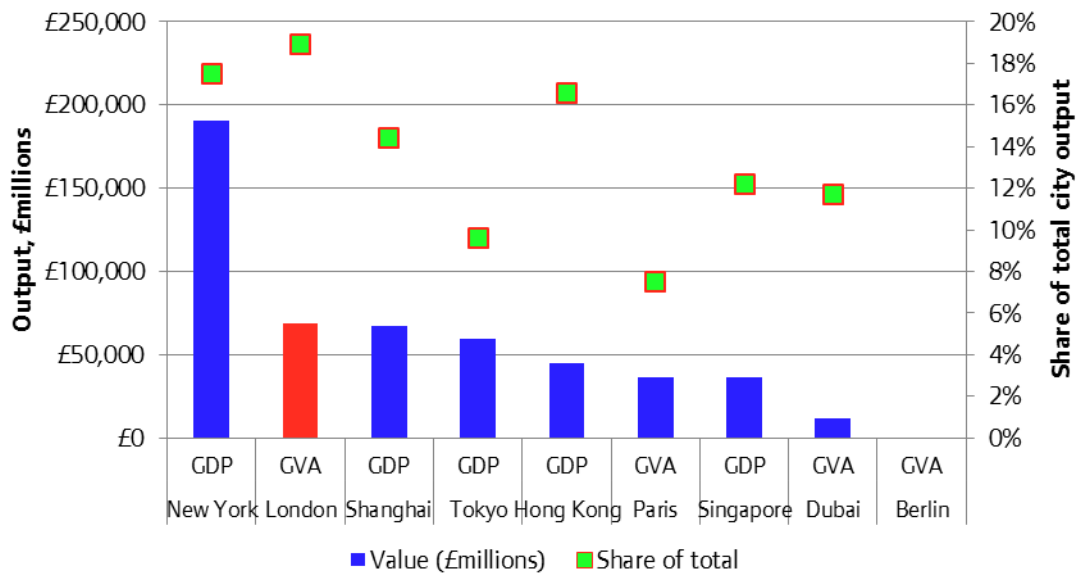
Source: ONS, US BEA, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:
1. Data for Paris and Tokyo refer to 2013.

Meanwhile, Table 6.1 shows the labour productivity estimates for this sector in 2014, as well as the compound annual rates of growth since 2006. London had one of the lowest estimates of output per job at £188,000, which was lower than other financial centres such as Tokyo (£211,400) and Hong Kong (£208,300). London also had a lower output per hour worked than Tokyo, but interestingly higher than Singapore and Hong Kong.

Table 6.1: Labour productivity for the Finance & Insurance sector for the global cities in 2014

City	Output measure	Labour measure	Average hours measure	Output per job		Output per hour	
				Value	Real CAGR (06-14)	Value	Real CAGR (06-14)
London	GVA	Jobs	Median	£188,000	1.7%	£103	1.7%
New York	GDP	Jobs	Mean	#	#	#	..
Paris	GVA	People	n/a	£111,900	3.1%	..	..
Berlin	GVA	Jobs	Mean	#	#	#	#
Tokyo	GDP	People	Median	£211,400	..	£110	..
Singapore	GDP	People	Mean	£218,700	1.3%	£88	2.4%
Hong Kong	GDP	People	Median	£208,300	..	£99	..
Shanghai	GDP	People	n/a	£203,900	3.5%	..	..
Dubai	GVA	People	n/a	£218,800	..	..	..

Source: ONS, US BLS/BEA, Eurostat, INSEE, Statistik Berlin Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. Data for Paris refers to 2013. As such, the CAGR for Paris covers the 2006 to 2013 period.
2. Data for Shanghai only includes urban units (i.e. towns or cities) and starts from 2008, so the CAGR covers the 2008 to 2014 period.
3. Data for Singapore (output per hour) starts from 2009, so the CAGR covers the 2009 to 2014 period.
4. Data for Tokyo refers to 2013 and the number of hours only includes full-time employees at establishments with five or more employees.

However, in relative terms, the Finance & Insurance sector's output per job estimate was almost three times (2.8 times) larger than the London average in 2014. The same was true for Tokyo (2.6 times bigger) and Shanghai (2.8 times larger).

Overall, this indicates that London has a larger share of a typically 'highly productive' sector than other global cities. Subsequently, if London's Finance & Insurance sector had the same, lower share of total output as other global cities, its overall productivity would be lower.

To account for these different economic structures, an implied equivalent output per job can be estimated for each city[25]. This is the headline productivity estimate if the global cities had the same economic structure in terms of output as London, but retained their specific output by job and industry figures.

Figure 6.2 shows the equivalent output per job estimates for the global cities and London's actual output per job figure. This indicates that all other global cities would still be more productive than London if they looked the same in terms of economic structures. In fact, the

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[25] Here it is argued that London-specific characteristics such as the different economic structure mean that London's productivity is not necessarily directly comparable with other global cities. The adjustment process will instead allow for like-for-like comparisons with specific global cities (and not across all of them) and is done in a two-step process. First, an estimate of the implied number of jobs by industry is calculated by assuming each global city has the same economic structure (in terms of jobs) as London. For example, in 2014, the share of total jobs by the Wholesale & Retail Trade sector in New York was assumed to be 11.7 per cent (the same as London) or 1.1m jobs, down from its actual figure of 15 per cent or 1.4m jobs. The second step is multiplying this implied number of jobs by industry with the actual output per job estimate by industry in the respective global city (£84,700 as shown in Table 5.1) to give an estimate of total output by industry (1.1m x £84,733 = £91.7bn). The overall implied output per job figure can be calculated by summing these numbers and dividing by the total number of jobs (9.1m as shown in Table 4.2).

equivalent output per job estimates was higher than the actual figures for New York, Paris, Berlin and Dubai. This was mainly a reflection of sectors that typically had higher than average output per job estimates (i.e. Information & Communication and Finance & Insurance) being more represented after accounting for different economic structures. Therefore, different economic structures cannot explain why London's productivity is lower than other global cities.

Figure 6.2: London equivalent output per job estimates in 2014, current prices
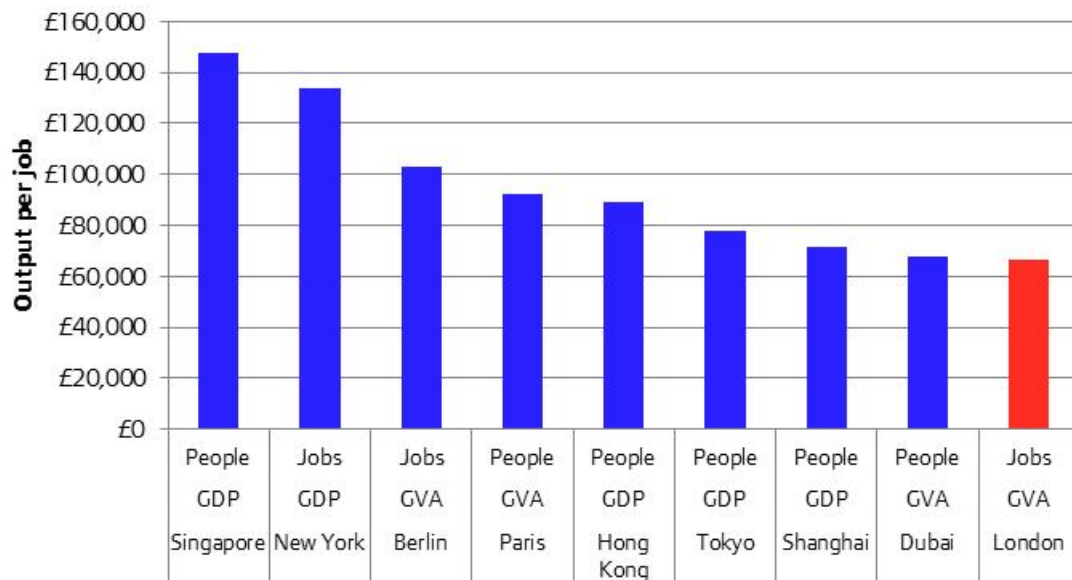
Source: ONS, US BLS/BEA, Eurostat, INSEE, Tokyo Bureau Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre.

Notes:
1. These equivalent output per job estimates are the productivity for the respective global city if it had the same economic structure (in terms of output) as London, while keeping the actual output per job figures by industry the same as the global city itself. For industries where there was no output per job estimate (due to different industry definitions or information not being available) – see Table 5.2 – it is assumed this would be equal to the overall 'headline' output per job. Therefore, the London equivalent output per job estimates takes into account any sectoral differences between the global cities.
2. Data for Paris and Tokyo refer to 2013.
3. Data for Shanghai only includes urban units (i.e. towns or cities).

Workforce characteristics

Besides from the economic structures, global cities are also different in terms of the workforce such as age and qualifications. These characteristics could also explain the difference in productivity for the global cities.

It should be noted that the data used in this section are all based on residents who are in employment. This is not necessarily the best measure of workforce characteristics as a global city's workforce is likely to also consist of commuters. As noted earlier in this paper, commuters are not captured in the residence-based statistics and are instead included in the workplace-based indicators. However, for a number of global cities, people characteristics are only available for residents. Therefore, although a workplace measure is preferred, this section uses a resident measure for consistency across all global cities.

Age
There are some studies that suggest that an individual's productivity increases during the initial few years in the labour market, stabilises and then starts to fall towards the end of their working life[26]. However, Age UK suggests that there is only a limited connection between productivity and age, and when there is a relationship it is likely to be one where productivity increases with age[27]. Therefore, although the connection between age and productivity is weak and the direction is disputed, the relative age of the workforce could potentially explain the differences in productivity across global cities.

London's workforce is generally younger than other global cities as shown in Figure 6.3. For example, 10.1 per cent of all those in employment in London were aged 16-24 years in 2014, which was on par with New York (10.1 per cent) yet higher than Paris (7.1 per cent). Instead other global cities tended to have a higher percentage of workers aged 35-64 years and, to less of an extent, 65 years and over. For the latter, only 2.7 per cent of workers were aged 65 years and over in London, which was almost four times smaller than Tokyo where this age group represented 10.4 per cent of all those in employment.

Figure 6.3: Percentage of those in employment by age groups for the global cities in 2014
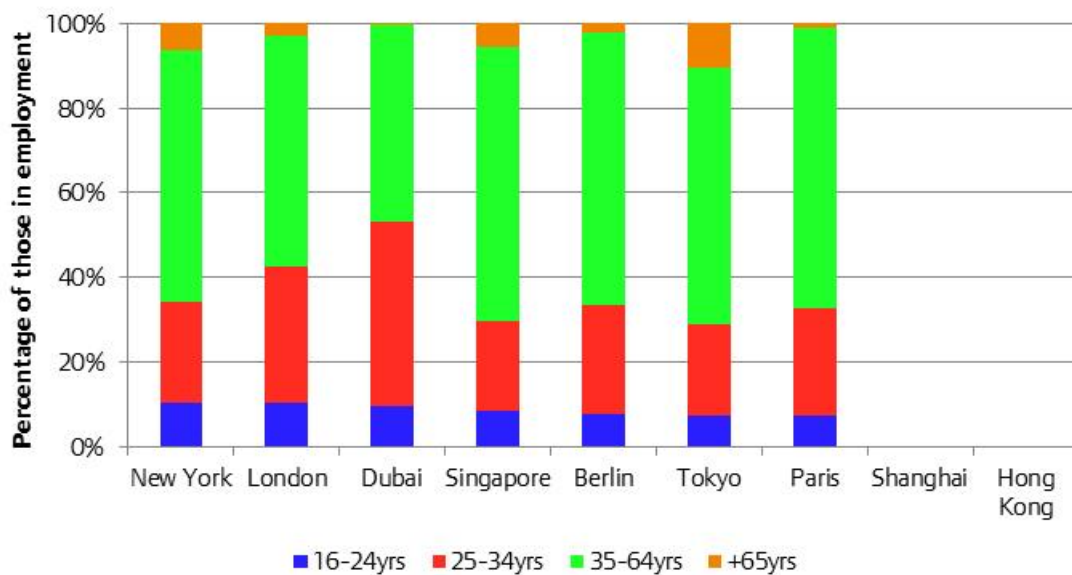
Source: ONS, US BLS, Eurostat, INSEE, Statistik Berlin-Brandenburg, Tokyo Bureau of Statistics, SingStat, China NBS, Dubai Statistics Centre
<u>*Notes:*</u>
1. Data for Paris, Berlin, Tokyo, Singapore and Dubai all refer to the 15-24yrs age group.

Table 6.2 shows the employment rates by age groups for the global cities in 2014. Interestingly, employment rates tended to vary the most between the global cities for the 16-24 years and 65 years and over age groups. Here London's employment rate for young people (43.3 per cent)

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[26] For example, see:
Skirbekk, V (2008). Age and productivity capacity: descriptions, causes and policy options, *Ageing Horizons*, 8, pg. 4-12.
Dickerson, A & McIntosh, S (2011). An investigation into the relationship between productivity, earnings and age in the early years of a working life.
[27] Age UK (2014). Productivity and age, March 2014 briefing. Available at:
http://www.ageuk.org.uk/PageFiles/12808/Age%20and%20productivity%20briefing%20(March%202014).pdf?dtrk=true

was 18.5 percentage points higher than Paris (24.8 per cent) but, for older people, London's employment rate (11.9 per cent) was more than half that for Tokyo (25.4 per cent).

Table 6.2: Employment rates by age groups for the global cities in 2014

City	16-24yrs	25-34yrs	35-44yrs	45-54yrs	55-64yrs	+65yrs	All ages
London	43.3%	80.1%		75.2%		11.9%	**62.7%**
New York	37.6%	76.2%	76.7%	75.9%	65.7%	20.1%	**58.1%**
Paris	24.8%	77.2%	83.7%	82.7%	56.0%	3.4%	**55.6%**
Berlin	37.1%	74.4%	79.7%	78.4%	63.3%	6.1%	**55.3%**
Tokyo	41.2%	82.8%	81.5%	82.4%	69.3%	25.4%	**61.8%**
Singapore	34.3%	85.5%	85.2%	81.1%	66.3%	24.3%	**64.5%**
Hong Kong	..	..	..	..	..	..	**59.0%**
Shanghai	..	..	..	..	..	..	**..**
Dubai	..	..	..	..	..	..	**81.7%**

Source: ONS, US BLS, Eurostat, INSEE, Statistik Berlin-Brandenburg, Tokyo Bureau of Statistics, SingStat, China NBS, Dubai Statistics Centre

Notes:

1. Data for Paris, Berlin, Tokyo and Singapore all refer to the 15-24yrs age group.

Foreign-born workers
Some studies suggest that foreign-born workers can increase labour productivity. For example, the Federal Reserve Bank of San Francisco suggested that immigrants can improve productivity by stimulating investment and promoting specialisation which in turn leads to efficiency gains[28]. Similarly, NIESR found that labour productivity increased slightly when the immigrant share of the labour force rises, which they link to foreign-born workers bringing specific skills and knowledge that can improve the way people work[29]. Therefore, the share of foreign-born workers in the global cities could potentially explain the difference in labour productivity.

In London, 57.2 per cent of those in work were born in the UK or British Territory in 2014, meaning the remaining 42.8 per cent were foreign born. This compared with 36.4 per cent of workers in New York[30] being foreign born[31].

Other global cities have data based on citizenship which is not necessarily the same as country of birth and therefore caution should be used when making comparisons. That said, Dubai has the highest percentage of foreign workers at 95.7 per cent – suggesting that only 4.3 per cent of those in employment were native Emiratis (Figure 6.4).

[28] Peri, G (2010). The effect of immigrants on US employment and productivity, *FRBSF Economic Letters,* August, 30.

[29] Ports, J et al (2013). Migration and productivity: employers' practices, public attitudes and statistical evidence.

[30] The New York definition used here is New York, New Jersey and Long Island metropolitan statistical area which, as noted in footnote 15, is similar to the New York, Newark and Jersey City definition used previously but excludes Poughkeepsie, Newburgh and Middletown.

[31] Not born in the US, Puerto Rica or US outlaying area and not born abroad of US parents.

Figure 6.4: Percentage of those in employment by country of birth for the global cities in 2014
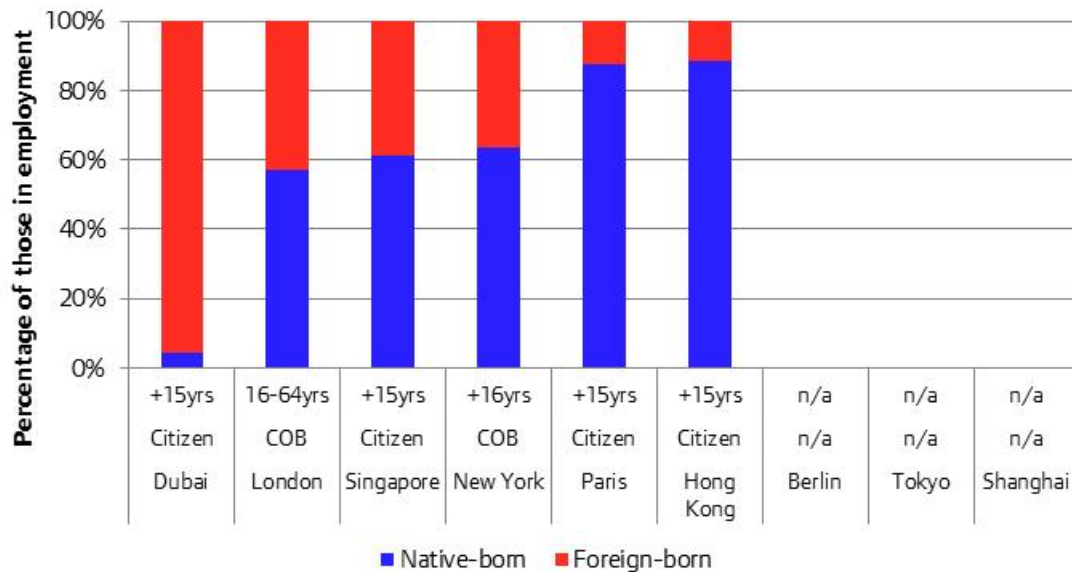
Source: ONS, US Census Bureau, INSEE, Statistik Berlin-Brandenburg, Tokyo Bureau of Statistics, SingStat, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

Notes:
1. Data for Paris refers to 2012.
2. Data for Hong Kong refers to 2011.
3. Data for Paris, Singapore, Hong Kong and Dubai refer to citizenships rather than country of birth. As someone born abroad can gain citizenships, these are two different indicators. Therefore, caution should be used when making comparisons.

Qualifications

Education and skills are known to be important drivers of productivity. For example, research by NIESR for the Department for Business, Innovation & Skills suggested that a change in the labour composition (i.e. an improvement in skills) can directly account for approximately one-fifth of the growth in labour productivity in the UK[32]. Other studies such as that by Holland et al similarly found that a 1 per cent rise in the share of the workforce with a university degree raises productivity by 0.2-0.5 percentage points in the long-run[33]. Therefore, the share of the workforce with higher levels of qualification could partly explain the differences in productivity across the global cities.

Approximately three in every five (60.2 per cent) workers in London had tertiary education[34] as their highest qualification in 2014. This includes higher education and ordinary and higher degrees. Although there is likely to be differences in the quality of education provision, that was higher than New York (54.9 per cent) and was in fact the highest of all global cities covered. This is shown in Figure 6.5 which excludes people whose highest qualifications are unknown.

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[32] Aznar, A (2015). UK skills and productivity in an international context, *BIS Research Paper*, Number 262.
[33] Holland, D et al (2013). The relationship between graduates and economic growth across countries, *BIS Research Papers*, Number 110.
[34] This is in line with the UNESCO International Standard Classification of Education.

Figure 6.5: Percentage of employed people by highest qualification achieved (excluding unknowns) for the global cities in 2014
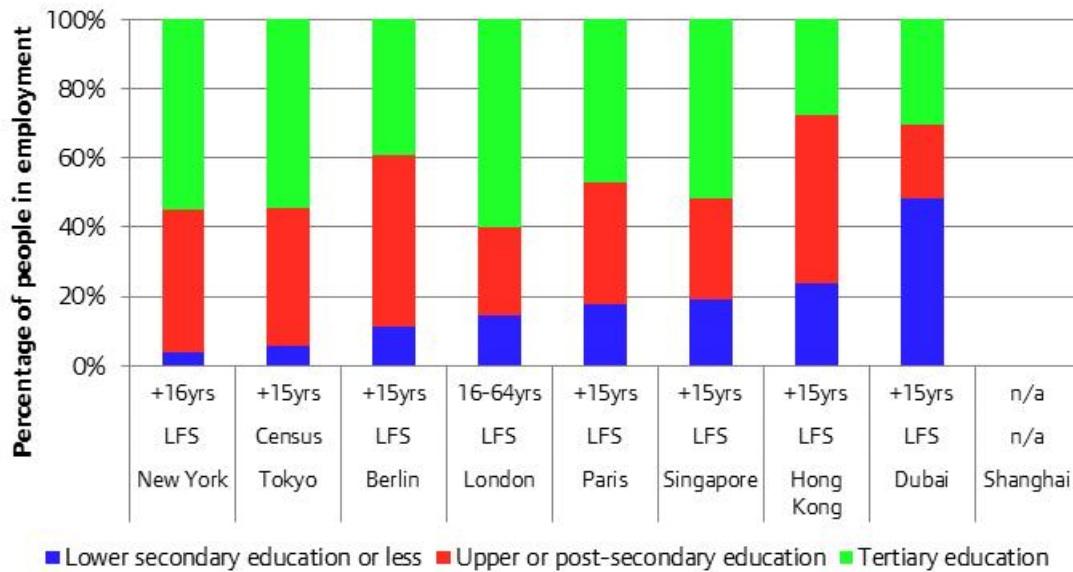
Source: ONS, US Census Bureau, Eurostat, INSEE, Statistik Berlin-Brandenburg, Tokyo Bureau of Statistics, Singapore Ministry of Manpower, HK Census and Statistics Department, China NBS, Dubai Statistics Centre
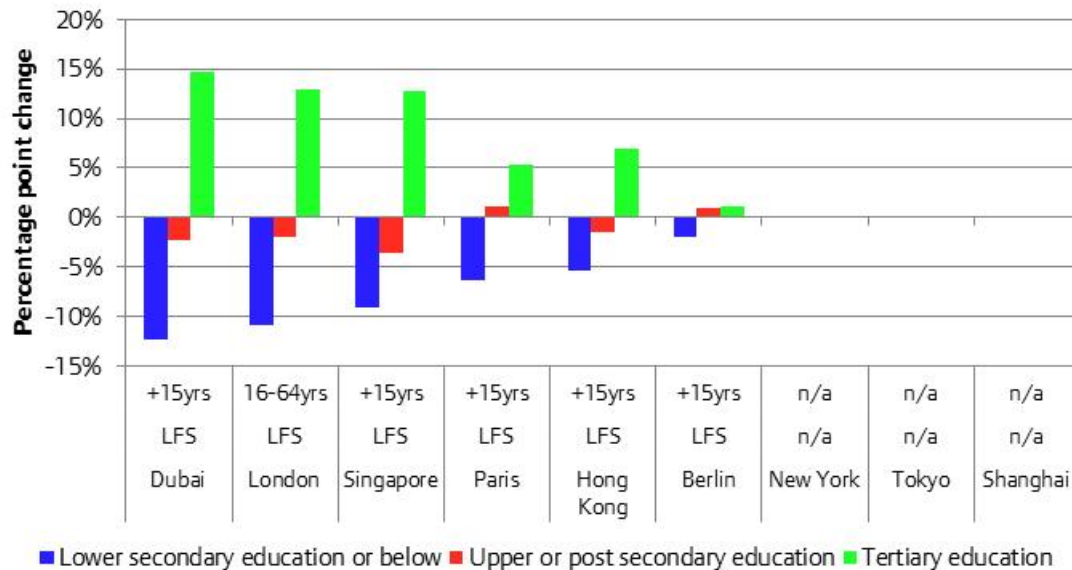
<u>*Note:*</u>

1. Data for Tokyo refers to 2012.

A further 25.3 per cent of workers in London had upper secondary or post-secondary education which is the equivalent of GCSE grades A*-C and A Levels. The remaining 14.6 per cent of London's workforce had lower secondary school education (i.e. GCSE grades D-G) or less as their highest qualification. Although that compares favourably to some emerging global cities like Hong Kong where the equivalent figure was 23.8 per cent, it was much higher than for New York (4 per cent) and Tokyo (5.5 per cent).

Looking over time, all cities, for which historical data is available, have seen a decrease in the percentage of those in employment with lower secondary education or below and a rise in those with tertiary education. The largest change was for Dubai followed by London, but this excludes New York, Tokyo and Shanghai (Figure 6.6).

Figure 6.6: Change in the percentage of employed people by highest qualification (excluding unknowns) for the global cities, 2006 to 2014

Source: ONS, US Census Bureau, Eurostat, INSEE, Statistik Berlin-Brandenburg, Tokyo Bureau of Statistics, Singapore Ministry of Manpower, HK Census and Statistics Department, China NBS, Dubai Statistics Centre

<u>Note:</u>

1. Data for Dubai refers to the change between 2008 and 2014.

Given that Londoners are more likely to have tertiary education than other global cities; this would theoretically suggest that they should have the skills and knowledge to do their roles more effectively and productively. However, as London has lower labour productivity than other cities, qualifications can therefore not explain this difference.

7   Conclusions

This paper compares London's economy with other global cities, looking particularly at output, employment and labour productivity.
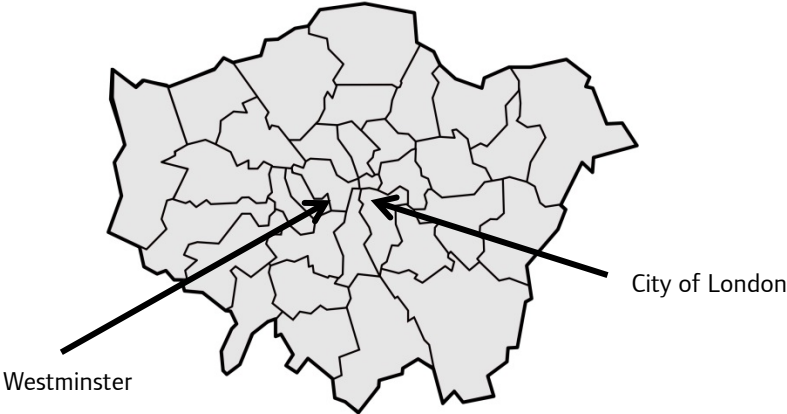
Employment rates in London have historically been higher than New York, Paris and Tokyo. Moreover, economic growth in London was similarly faster on average than New York and Paris, but was outpaced by emerging global cities like Shanghai and Hong Kong. In fact, Shanghai overtook London in terms of its size back in 2009. All global cities are predominantly services focussed, with financial sectors being of particular importance to London in terms of output.

However, London's labour productivity is relatively poor, with its output per job and output per hour worked some of the lowest among the global cities included in this paper. As shown by this analysis, these differences cannot be explained by industrial composition or workforce characteristics like skills.
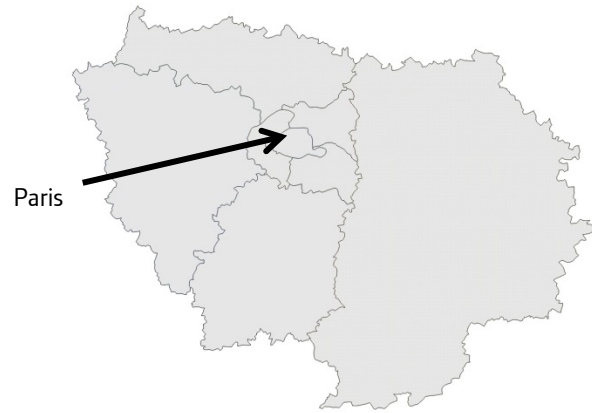
Appendix 1: Maps of global cities

This appendix presents the geographical maps of the global cities included in this paper.
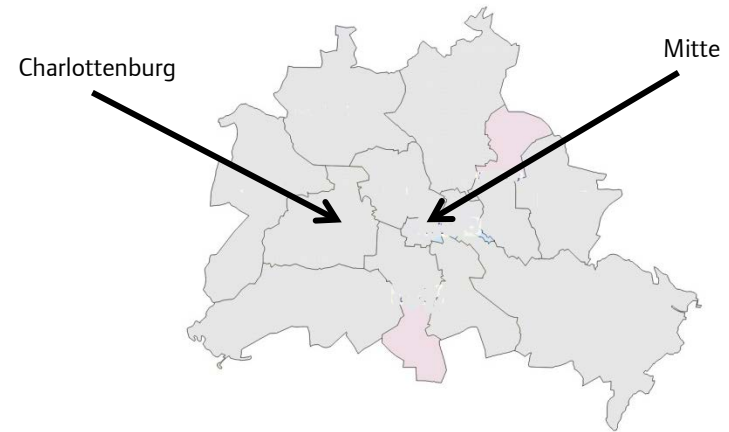
Table A1.1: Maps of global cities

London	New York

Paris	Berlin

Paris

Charlottenburg　　　　　Mitte

Tokyo	Singapore

Tokyo Bay

Changi

Downtown

Hong Kong	Shanghai

Hong Kong Island

Chongming

Shanghai City Centre (Puxi)

Pudong

Dubai	

City of Dubai

Emirate of Dubai

UAE
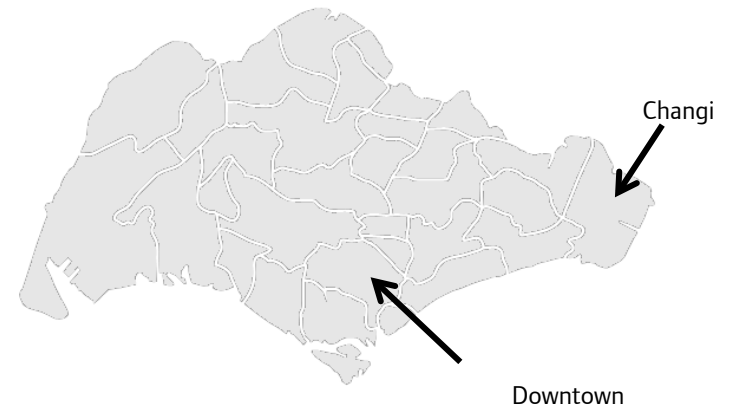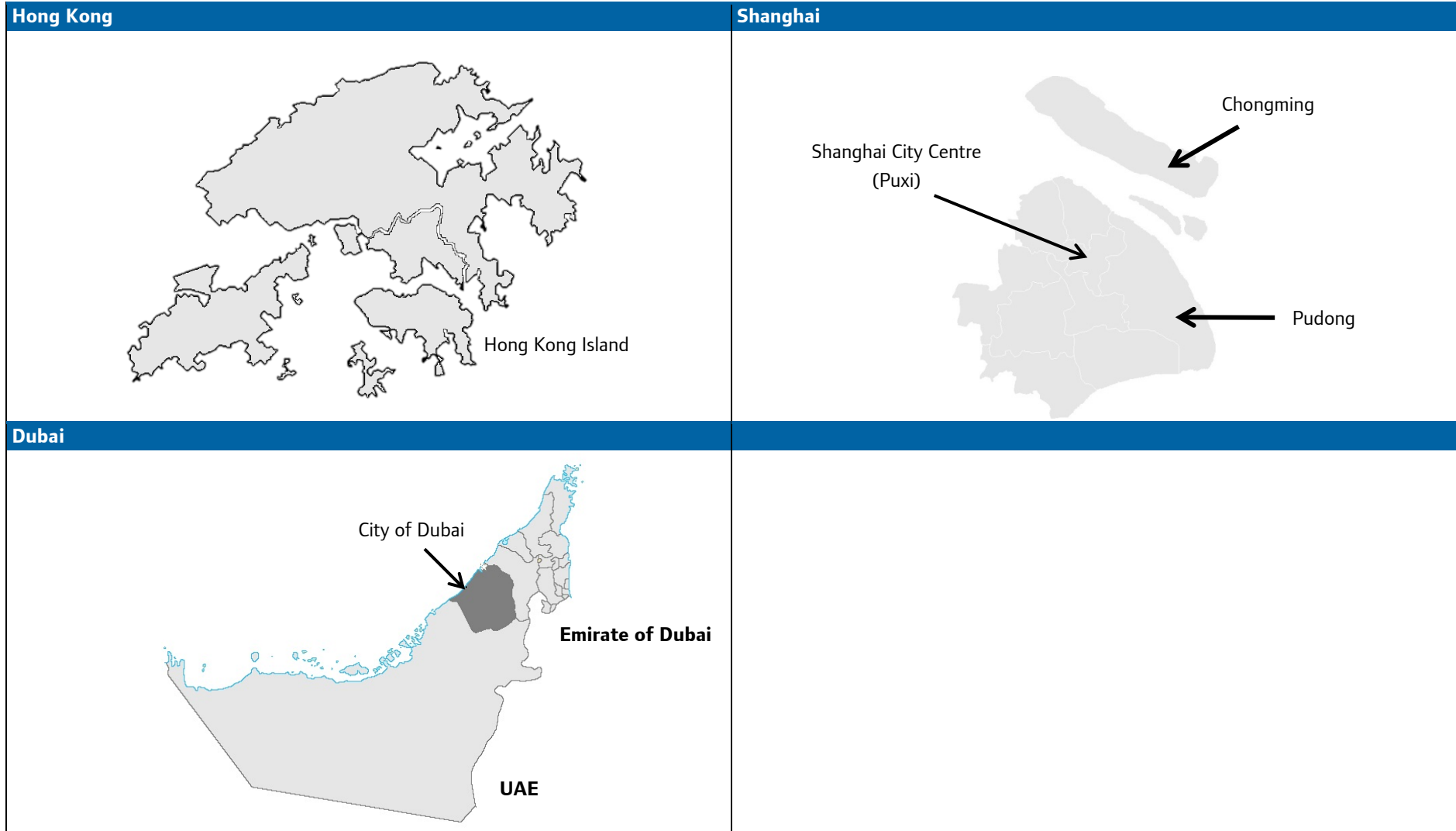
Appendix 2: Data sources and definitions

This appendix lists the data sources and definitions used in this paper for the global cities.

Table A2.1: List of data sources for the global cities

City	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
Output	**GVA**	**GDP**	**GVA**	**GVA**	**GDP**	**GDP**	**GDP**	**GDP**	**GVA**
Source	ONS	BEA	INSEE	Statistik Berlin-Brandenburg	Statistics of Tokyo	SingStat	Census and Statistics Department	NBS	Dubai Statistics Centre
Survey or indicator	Regional GVA (income approach)	GDP by Metropolitan Area	Regional GDP and GVA	National Accounts	Statistical Yearbook 2014	GDP at Current Market Prices by Industry	GDP Yearly Report, 2013 edition	Gross Regional Product	GVA by Economic Sector and Activity
Time period	1997-2015	2001-2014	1990-2013	2000-2014	2013	1960-2015	2000-2014	1995-2014	2006-2015
Coverage	All sectors	All sectors	All sectors	All sectors	All sectors	Excludes Agriculture, Forestry & Fishing, Public Administration, Education and Human Health & Social Work	All sectors	Excludes Public Administration, Education and Human Health & Social Work. Business units in urban areas only.	All sectors
Employment rates	**People**	**People**	**People**	**People**	**People**	**People**	**People**	**n/a**	**People**
Source	ONS	Census Bureau	Eurostat	Eurostat	Statistics of Tokyo	Ministry of Manpower	Census and Statistics Department	n/a	Dubai Statistics Centre
Survey or indicator	Annual Population Survey	Current Population Survey	Employment Rates by Sex, Age and NUTS2	Employment Rates by Sex, Age and NUTS2	Labour Force Survey	Labour Force Survey	Labour Force Characteristics	n/a	Labour Force Survey
Time period	2004-2015	2014	1999-2015	1999-2015	2009-2015	1990-2015	1986-2014	n/a	2008-2014
Coverage	+16 years	+16 years	+15 years	+15 years	+15 years	+15 years	+15 years	n/a	+15 years
Unemployment rates	**People**	**People**	**People**	**People**	**People**	**People**	**People**	**People**	**People**

Source	ONS	BLS	Eurostat	Eurostat	Statistics of Tokyo	SingStat	Census and Statistics Department	NBS	Dubai Statistics Centre
Survey or indicator	Annual Population Survey	Local Area Unemployment Statistics	Unemployment Rates by Sex, Age and NUTS2	Unemployment Rates by Sex, Age and NUTS2	Labour Force Survey	Labour Force Survey	Labour Force Characteristics	Unemployment rates	Labour Force Survey
Time period	2004-2015	1990-2014	1999-2015	1999-2015	2005-2015	1990-2015 (as at June)	2001-2014	1995-2014	2008-2014
Coverage	+16 years	+16 years	+15 years	+15 years	+15 years	+15 years	+15 years	Up to retirement age (men: 16 to 60 years and women: 16 to 50-55 years). Residents in urban areas only.	+15 years
Labour	**Jobs**	**Jobs**	**People**	**Jobs**	**People**	**People**	**People**	**People**	**People**
Source	ONS	BLS	INSEE	Statistik Berlin–Brandenburg	Statistics of Tokyo	SingStat	Census and Statistics Department	NBS	Dubai Statistics Centre
Survey or indicator	Workforce Jobs	State and Metro Area Employment, Hours & Earnings	Jobs at December 31 by Status, Activity and Metropolitan Area	Employment Accounts	Labour Force Survey	Labour Force Survey	Quarterly Report of Employment and Vacancies Statistics	Number of Employed Persons in Urban Units by Sector	Labour Force Survey
Time period	1981-2015	1990-2015	1989-2013	1991-2015	2011-2015	1990-2015 (as at June)	2014 (quarterly)	2008-2014	2014
Coverage	All sectors	Excludes Agriculture, Forestry & Fishing	All sectors	All sectors	Excludes Agriculture, Forestry & Fishing and Public Administration	All sectors	Excludes Agriculture, Forestry & Fishing, Public Administration and Activities of Households	All sectors. Residents in urban areas only.	All sectors
Hours worked	**Median/mean**	**Mean**	**Median**	**Median**	**Median**	**Mean**	**Median**	**n/a**	**n/a**
Source	ONS	BLS	Eurostat	Eurostat	Statistics of	Ministry of	Census and	n/a	n/a

					Tokyo	Trade and Industry	Statistics Department		
Survey or indicator	Annual Survey of Hours and Earnings	State and Metro Area Employment, Hours & Earnings	Average Number of Usual Weekly Hours in Main Job by Sex, Age and NUTS2	Average Number of Usual Weekly Hours in Main Job by Sex, Age and NUTS2	Monthly Labour Force Statistics	Value Added per Actual Hour Worked at 2010 Market Prices by Industry	Annual Digest of Statistics	n/a	n/a
Time period	1997-2015	2011-2015	2008-2014	2008-2014	2006-2015	2009-2015	2014 (May to June period)	n/a	n/a
Coverage	All sectors	Excludes Agriculture, Forestry & Fishing	All sectors	All sectors	Excludes Agriculture, Forestry & Fishing and Public Administration	Excludes Agriculture, Forestry & Fishing, Public Administration, Education and Human Health & Social Work	Excludes Agriculture, Forestry & Fishing, Public Administration and Activities of Households	n/a	n/a
Employment by age									
Source	ONS	Census Bureau	Eurostat	Eurostat	Statistics of Tokyo	SingStat	n/a	n/a	Dubai Statistics Centre
Survey or indicator	Annual Population Survey	Current Population Survey	Employment by Sex, Age and NUTS2	Employment by Sex, Age and NUTS2	Labour Force Survey	Labour Force Survey	n/a	n/a	Labour Force Survey
Time period	2004-2015	2014	1999-2015	1999-2016	2005-2015	1990-2015	n/a	n/a	2014
Coverage	+16 years	+16 years	+15 years	+15 years	+15 years	+15 years	Data is available, but for inconsistent age groups	n/a	+15 years
Foreign-born workers	**Country of birth**	**Country of birth**	**Nationality**	**n/a**	**n/a**	**Nationality**	**Nationality**	**n/a**	**n/a**
Source	ONS	Census Bureau	INSEE	n/a	n/a	SingStat	Census and Statistics Department	n/a	n/a
Survey or indicator	Annual Population	Current Population	Population aged 15 Years	n/a	n/a	Labour Force Survey	Census 2011	n/a	n/a

	Survey	Survey	and Over by Sex, Type of Activity and Nationality						
Time period	2014	2014	2012	n/a	n/a	2006-2015	2011	n/a	n/a
Coverage	16-64 years	+16 years	+15 years	n/a	n/a	+15 years	+15 years	n/a	n/a
Qualifications									
Source	ONS	Census Bureau	Eurostat	Eurostat	Statistics of Tokyo	Ministry of Manpower	Census and Statistics Department	n/a	Dubai Statistics Centre
Survey or indicator	Annual Population Survey	Current Population Survey	Employment by Sex, Age, Educational Level and NUTS2	Employment by Sex, Age, Educational Level and NUTS2	Employment Status Survey Report	Labour Force Survey	Labour Force Characteristics	n/a	Labour Force Survey
Time period	2004-2015	2014	1999-2015	1999-2015	2012	2006-2015	1986-2014	n/a	2008-2014
Coverage	16-64 years	+16 years	+15 years	+15 years	15 years and over	+15 years	+15 years	n/a	+15 years

The following table shows the different industry definitions used by the global cities and how these aligned with the sector definitions used in this paper (Table A2.2).

Table A2.2: Industry definitions for the global cities

Industry	London	New York	Paris	Berlin	Tokyo	Singapore	Hong Kong	Shanghai	Dubai
Primary & Utilities	Agriculture, Forestry & Fishing; Mining & Quarrying; Electricity, Gas, Steam & Air Conditioning; Water & Waste Remediation	Agriculture, Forestry, Fishing & Hunting; Mining; Utilities; Waste Management & Remediation	Agriculture, Forestry & Fishing; Mining, Energy, Water & Waste Management	#	Agriculture, Forestry & Fishing; Mining; Electricity, Gas & Water Supply	..	Agriculture, Fishing, Mining & Quarrying; Electricity, Gas, Water Supply & Waste Management	#	Agriculture, Live Stock & Fishing; Mining & Quarrying; Electricity, Gas & Water
Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing	Manufacturing

				(excluding Construction)					
Construction	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Construction
Wholesale & Retail Trade	Wholesale & Retail Trade	Wholesale Trade; Retail Trade	Trade	#	Wholesale & Retail Trade	Wholesale & Retail Trade	Import/Export, Wholesale & Retail Trade	Wholesale & Retail Trade	Wholesale, Retail Trade & Repairing Services
Transportation & Storage	Transportation & Storage	Transportation & Warehousing	Transportation & Warehousing	#	Transport	Transportation & Storage	Transport, Storage, Postal & Courier Services	Transport, Storage & Post	#
Leisure & Hospitality	Accommodation & Food; Arts, Entertainment & Recreation	Leisure & Hospitality	#	#	#	#	#	#	#
Accommodation & Food	Accommodation & Food	Accommodation & Food	Accommodation & Food	#	#	Accommodation & Food	Accommodation & Food	Hotels & Catering Services	Restaurants & Hotels
Arts, Entertainment & Recreation	Arts, Entertainment & Recreation	Arts, Entertainment & Recreation	#	#	#	#	#	#	#
Information & Communication	Information & Communication	Information	Information & Communication	#	Information & Communication	Information & Communication	Information & Communication	#	#
Financial Activities	Finance & Insurance; Real Estate	Financial Activities	Finance & Insurance; Real Estate	#	Finance & Insurance; Real Estate	#	#	Financial Intermediation; Real Estate	#
Finance & Insurance	Finance & Insurance	Finance & Insurance	Finance & Insurance	#	Finance & Insurance	Finance & Insurance	Finance & Insurance	Financial Intermediation	Financial Corporations
Real Estate	Real Estate	Real Estate, Rental & Leasing	Real Estate	#	Real Estate	#	#	Real Estate	#
Professional & Business Services	Professional, Scientific & Technical; Administrative & Support Services	Professional & Business Services	Professional, Scientific & Technical; Administrative & Support Services	#	#	#	#	#	#

Professional, Scientific & Technical	Professional, Scientific & Technical	Professional, Scientific & Technical	#	#	#	#	#	#	#
Administrative & Support Services	Administrative & Support Services	Administration & Support Services	#	#	#	#	#	#	#
Public Admin, Education & Health	Public Administration; Education; Human Health & Social Work	Government, Education Services; Health Care & Social Assistance	Public Administration; Education; Human Health & Social Work	#	Public Administration (inclusive of Education and Health)	..	Public Administration, Social & Personal Services	..	Government Services; Social & Personal Services
Public Administration	Public Administration	Government	#	#	#	..	#	..	Government Services
Education	Education	Education Services	#	#	#	..	#	..	#
Human Health & Social Work	Human Health & Social Work	Health Care & Social Assistance	#	#	#	..	#	..	#
Other Services	Other Services	Other Services (except Government)	Other Services	#	#	#	#	#	#
Activities of Households	Activities of Households	#	#	#	Producers of Private Non-Profit Services to Households	#	#	#	Domestic Services of Households
Industries that do not fit the above definitions and are not presented in this paper									
				Trade, Transport, Hotels & Restaurants and Information & Communication	Service Activities	Business Services	Real Estate, Professional & Business Services	Other Services	Transport, Storage & Communication
				Finance, Insurance, Business Services and Real Estate		Other Service Industries	Ownership of Premises		Real Estate & Business Services

			Public and Other Service Providers, Education and Health						

Table A2.3 shows the qualifications that align with the ISCED education level definitions for the global cities.

Table A2.3: Qualification definitions for the global cities

ISCED level	Lower secondary education or less Levels 0-2	Upper or post-secondary education Levels 3 and 4	Tertiary education Levels 5-8
London	Other and NVQ1	NVQ2, NVQ3 and Trade	NVQ4 or higher
New York	1st-9th grades	10th grade to high school degree	College and above
Paris	ISCED Levels 0-2	ISCED Levels 3-4	ISCED Levels 5-8
Berlin	ISCED Levels 0-2	ISCED Levels 3-4	ISCED Levels 5-8
Tokyo	Elementary or primary schools	High or vocational schools	College, university or grade schools
Singapore	Lower secondary, primary or below	Secondary and post-secondary	Degree, diploma and professional qualifications
Hong Kong	Primary and lower secondary	Upper or post-secondary (no degree)	Post-secondary degree
Shanghai	n/a	n/a	n/a
Dubai	Illiterate, read/write, primary and lower secondary	Upper or post-secondary (no degree)	Short-cycle, degree and postgraduate

Appendix 3: Comparisons with previous GLA Economics analysis

As noted in the main body of this paper, the output measure used for London may differ from other GLA Economics publications. This appendix sets out these differences and compares the variations in the estimates.

Nominal GVA

The GVA series used in this paper is that estimated using the income approach and published by the ONS (GVA (I)). This involves "adding up incomes generated by resident individuals or corporations in the production of goods and services. It is calculated gross of deductions for consumption of fixed capital, which is the amount of fixed assets used up in the process of production in any period"[35].

The ONS also now produces an estimate of GVA using the production approach (GVA (P)). These are currently experimental statistics and calculates the total value of all goods and services that are produced during the reference period (output), "less goods and services used up or transformed in the production process, such as raw materials and other inputs (intermediate consumption)"[36].

More detail about the differences between GVA (I) and GVA (P) are given in GLA Economics Current Issues Note 46[37]. Concurrently, a comparison of these two measures are shown in Figure A3.1 though, given the experimental nature of GVA (P), the preferred series for describing London's economy is GVA (I).

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[35] ONS (2015). Regional Gross Value Added (Income Approach), 1997 to 2014. Available at: http://www.ons.gov.uk/ons/dcp171778_426841.pdf
[36] ONS (2015). Regional Gross Value Added (Production Approach), 1997 to 2014. Available at: http://www.ons.gov.uk/ons/dcp171778_428097.pdf
[37] GLA Economics (2016). Regional, sub-regional and local GVA estimates for London, 1997-2014, Current Issues Note 46. Available at: https://www.london.gov.uk/sites/default/files/current_issues_note_46.pdf

Figure A3.1: Comparison of nominal GVA (I) and GVA (P) for London, 1997 to 2014
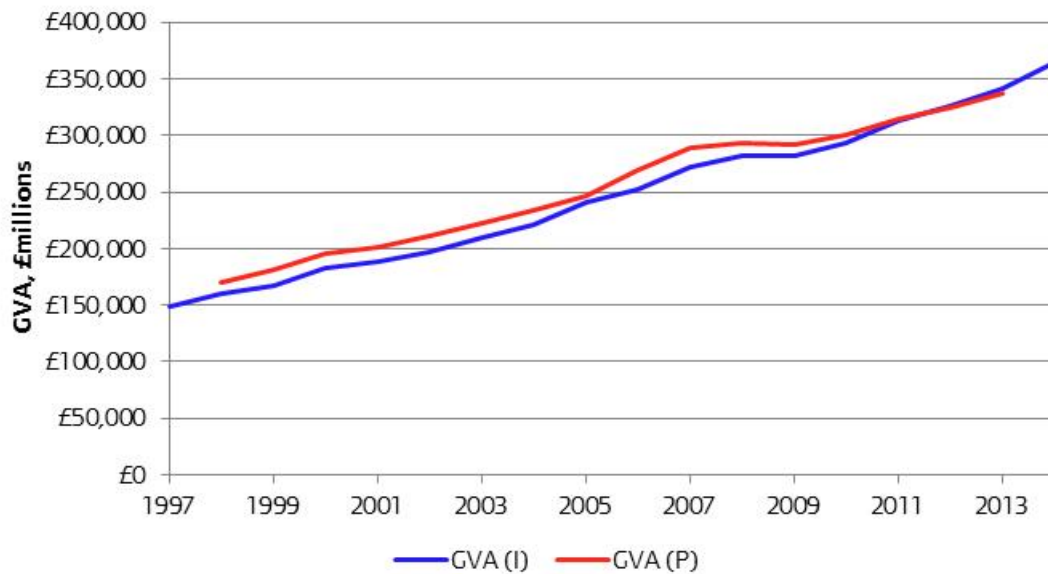
Real GVA

The GVA (I) series is not adjusted for the effects of inflation. Over time, even if the true (economic) value of GVA is unchanged, GVA in current or nominal prices would increase in line with price rises (i.e. inflation). Given this, adjustments are needed in order to show the underlying output trend typically using a price deflator.

As discussed in Box 3.3, the approach taken in this paper to reach estimates of real GVA is by using the UK's GDP deflator. However, other deflators that are more suited to a GVA series (instead of GDP) and account for regional rather than national prices would be preferred. Although the UK GDP deflator was used to remain consistent with other global cities, a forthcoming GLA Economics Working Paper uses two deflators – the UK GVA deflator and the implied London GVA deflator – to create two estimates of real GVA. That said, issues still remain with using these deflators. For example, both use the experimental GVA (P) series meaning they are not definitive measures. Also, due to the way that the implied London deflator is calculated, both are based on national prices and are therefore not a true regional price index.

These real GVA series in constant 2012 prices[38] are shown in Figure A3.2 and illustrate that the differences between them are relatively small.

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[38] The real GVA series used in this paper is constant 2014 prices, but 2012 prices are used here for comparative reasons.

Figure A3.2: Comparison of real GVA (I) for London, 1997 to 2014, constant 2012 prices
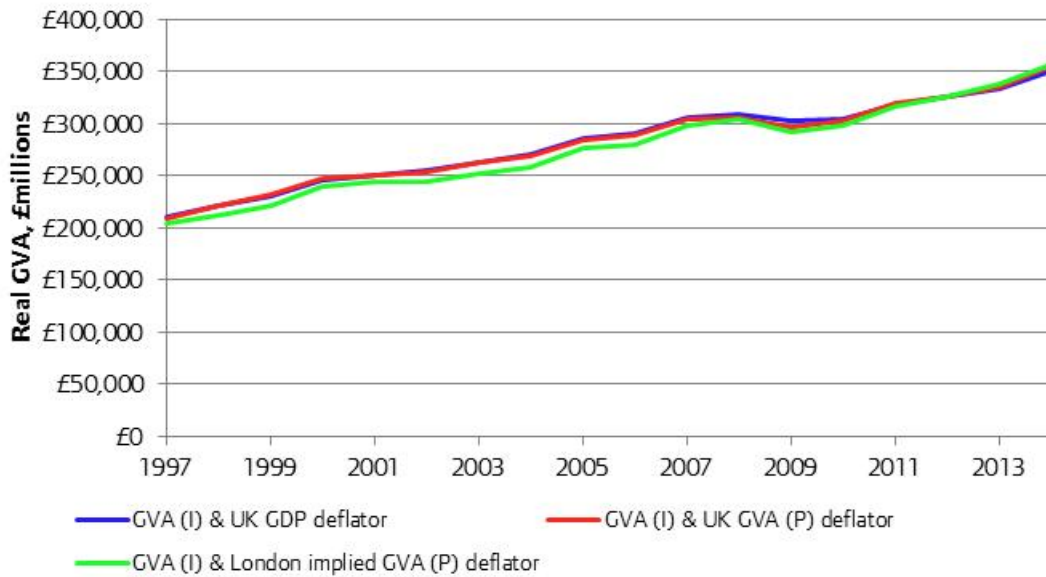
Source: ONS

Output per job

Some estimates of productivity were also included in Current Issues Note 46 and these may also differ from the ones presented in this paper. For example, output per job was estimated at £66,600 in 2014[39]. Although the same methodological approach was used in this paper, due to revisions in the number of jobs (see footnote 18 for a discussion on these changes) which have been accounted here but not in the previous work, this is now estimated at £66,100.

Concurrently, Working Paper 63 also looked at output per job for London in 2012[40]. This was also before the revision to the number of jobs, though also took a different methodology approach by only looking at the proportion of GVA attributed to the activities of the workforce. Acknowledging these differences, output per job was estimated at £56,700 for London as a whole in 2012 prices, which compared with £63,300 in 2012 prices estimated by this paper.

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[39] Ibid.
[40] Ibid.

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