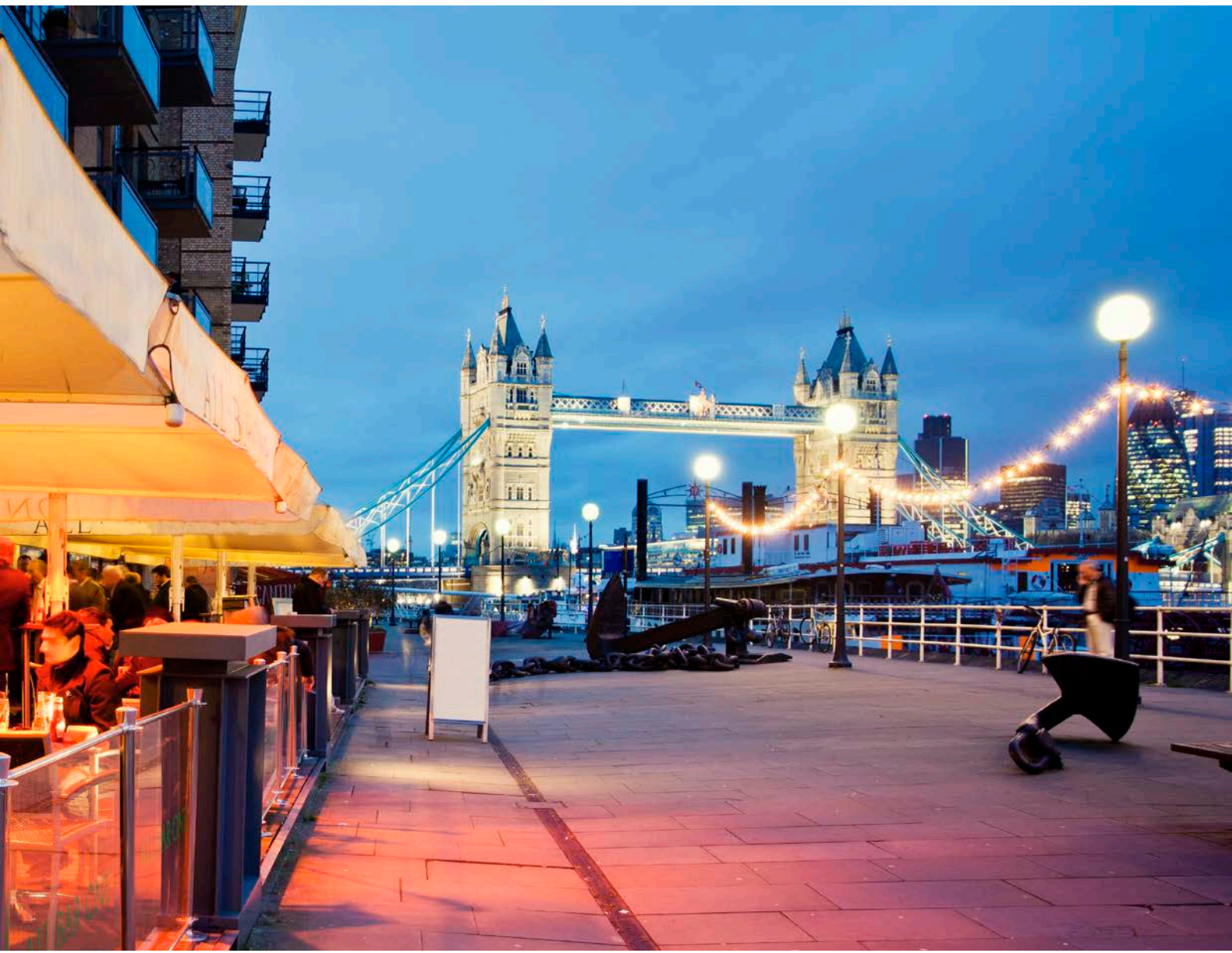


Current Issues Note 50

Modelling real quarterly GVA data for London

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Executive summary

Annual measures of the size of London's economy (in terms of Gross Value Added (GVA)) provide the Greater London Authority (GLA) with an understanding of the position of London's economy at the national and international level. A quarterly measure provides an indication of the recent economic performance of London's economy. In both situations these measures arguably need to be in inflation adjusted or 'real' terms in order to remove the distorting effects that price rises can have on GVA. For example, if GVA did not increase but prices rose on average by 10 per cent this would give a rise in the money value or 'nominal' GVA of 10 per cent while the inflation adjusted or 'real' measure of GVA stayed constant.

However, as of yet, no official measure of quarterly growth in London's economy on either a nominal or real measure exists. At the annual level nominal GVA data is available (with a lag), but real GVA data remains experimental in nature and is not classified as a national statistic. GLA Economics has therefore undertaken analysis to calculate this data at the London level. This current issues note sets out the methodology that has been used for this analysis.

Introduction

The official regional GVA¹ data estimate for London's output is one of the key official information sources for the GLA in its assessment of the state of London's economy. However, the regional GVA measure for London published by the Office for National Statistics (ONS) lags significantly behind the national publication; the first annual estimate of total nominal GVA for London is available 12 months after the final reference year and real GVA is published 24 months after the end of the reference period. Further, the data are only provided on an annual and not on a quarterly basis. For these reasons, historically, GLA Economics have used estimates produced by private providers to analyse more recent developments in economic conditions in the capital. These timelier data have helped to inform GLA Economics' understanding of the current state of London's economy and feed into GLA Economics regular publications, such as 'London's Economic Outlook' and 'London's Economy Today'.

Given the limitations of the currently available data, GLA Economics has worked to create its own estimate of London's real GVA in order to produce a timelier measure of economic conditions in London. These timelier estimates will benefit GLA Economics analysis and enable a better understanding of London's economy, while also supporting the forecasts of economic activity in the capital going forward.

In the absence of official, published quarterly real terms GVA data for London some modelling has been required in order to generate the estimates. The analysis has used official data to inform the modelling as far as possible and the underlying assumptions are outlined in the methodological section of this document. The estimates presented in this current issues note should be considered as interim estimates; GLA Economics together with the ONS are working to improve the existing regional real estimates, and is supportive of any future work the ONS will undertake to produce official, timely real estimates of economic activity in London.

¹ Gross Value Added (GVA) measures the contribution of the economy of each individual producer, industry, or sector in the UK. It is used in the estimation of gross domestic product (GDP) which is a key indicator of the state of the whole economy. In the UK, three theoretical approaches are used to estimate GDP: 'production' (P); 'income' (I); and 'expenditure' (E). When using the production or income approaches, the contribution of each industry or sector is measured using GVA. It should be noted that GVA (I) is the official national statistic.

1. Methodological approach: choice of data and modelling

1.1 Choice and format of the base data

Currently, the official statistics measuring economic activity of regions and devolved nations within the UK are available in nominal terms on an annual basis, and are measured by regional Gross Value Added (using the Income Approach)². The income approach estimates of GVA are designated as national statistics. The ONS also publishes a series of regional real GVA estimates (Production Approach), but this measure is less timely, and is currently designated as an experimental statistic. There are also significant differences between the nominal estimates of economic activity using the production approach compared to the income approach for particular sectors, some of which are of great significance to London³. The relative importance of sectors, in terms of their nominal value, also changes if GVA (P) data are used instead of GVA (I) data⁴. Appendix A demonstrates some of the differences in these two nominal estimates by providing annual GVA growth by sector using both approaches with ONS data.

Table 1: Differences in Gross Value Added estimates available for London

Estimate	Prices	Approach	Certified
GVA (I)	Nominal	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.	National statistic
GVA (P)	Nominal / real	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)".	Experimental

Source: *The Office for National Statistics (ONS)*

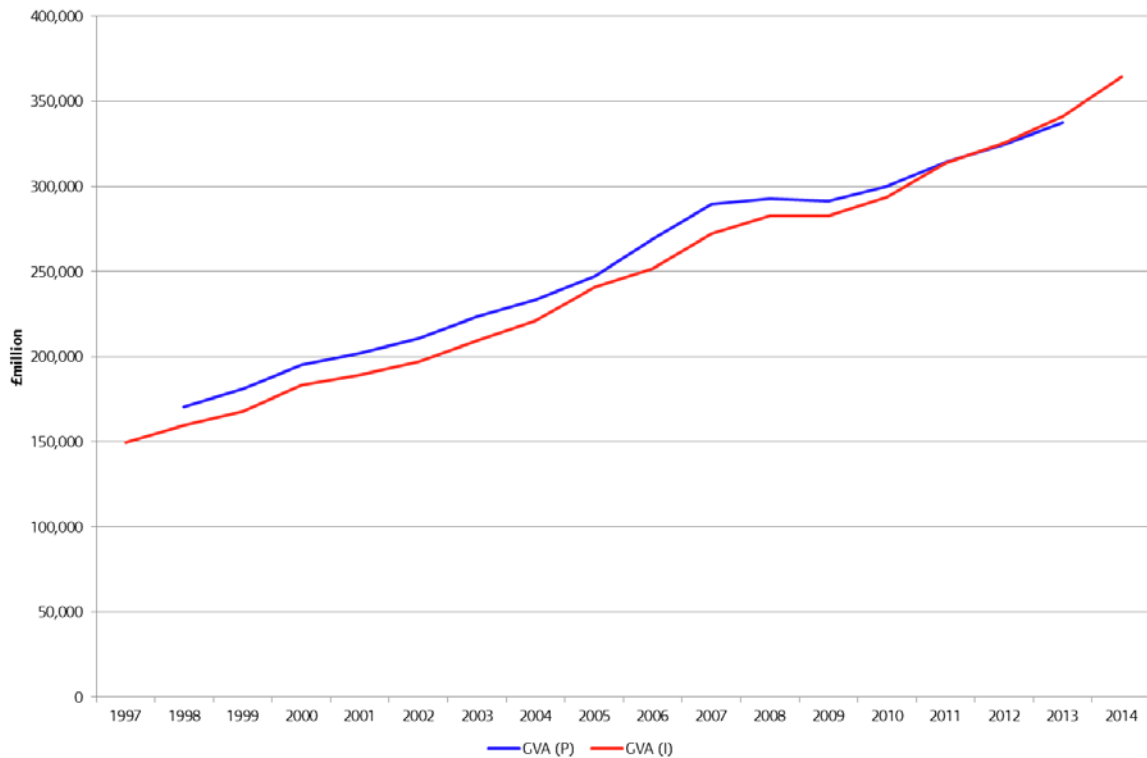
As these data suggest, the discrepancies in growth estimates vary across sectors (although some are minor). However, in some sectors of particular importance to London, the absolute differences in sector values can be substantial. For example, the value of the Financial and insurance activities sector differed by over £17.7 billion in 2013 depending on whether one looked at activity using the income approach or the production approach. Figure 1 displays the differences in terms of value and Figure 2 in terms of annual growth between the two ONS measures of London's GVA.

² This approach uses the sum of income from employment (compensation of employees), self-employment (mixed income) and other income generated by the production of goods and services (gross operating surplus). Regional GVA (I) is produced by apportioning national level data to the regions; each component is allocated using proportions from regional data sources. There is no satisfactory method of deflating gross operating surplus and, for this reason; GVA (I) figures are only available in nominal terms. For more information see: ONS, 26 March 2015, '[Quality and Methodology Information: Regional Gross Value Added \(Income Approach\)](#)', .

³ The Office for National Statistics (ONS) is currently undertaking a balancing project that seeks to produce a balanced GVA measure with the aim to publish one GVA measure in December 2017.

⁴ Using GVA (I), the Financial and insurance activities sector was the largest sector of London's economy in 2013 accounting for 18.1 per cent of economic activity, and the Real estate activities sector was the second largest accounting for around 12.0 per cent of activity. In contrast, looking at GVA (P) the relative importance of these two sectors changes; Financial and insurance activities account for around 13.0 per cent of economic activity, whilst Real estate activities account for approximately 13.5 per cent of London's activity.

Figure 1: Published GVA (I)⁵ and GVA (P)⁶ in London in nominal terms, 1997-2014



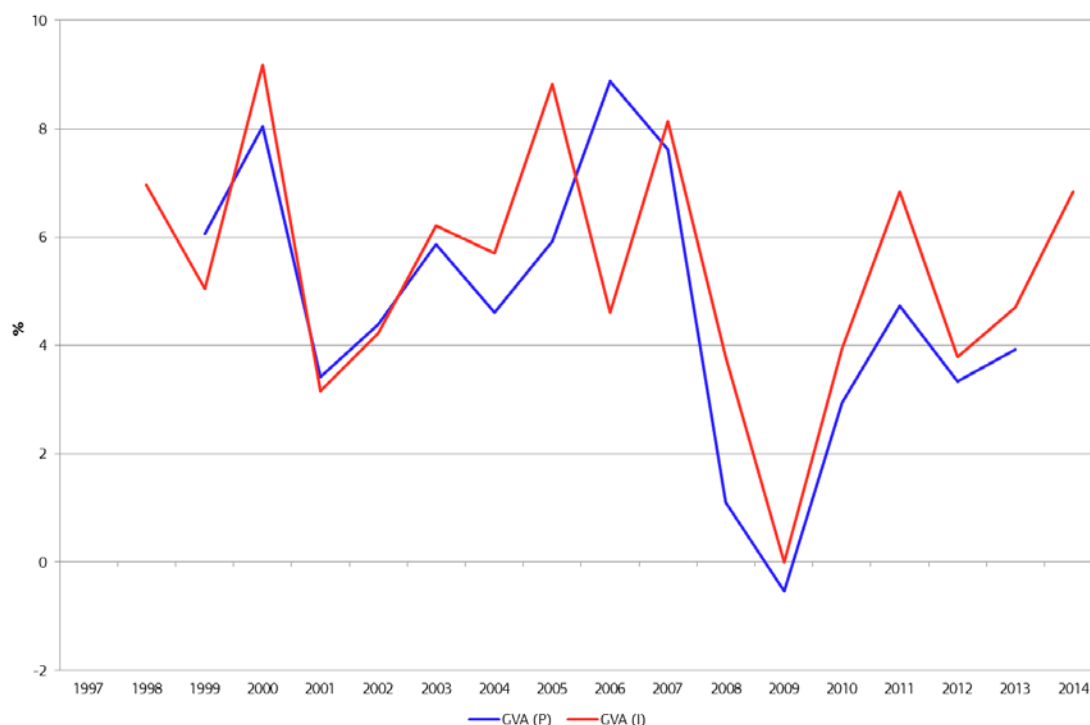
Source: *Regional Accounts releases, ONS*

Time series data of GVA (P) suggest that, on average, annual nominal growth in GVA (P) has been slower than GVA (I), with GVA (I) now higher in absolute terms, when historically it has been lower (Figure 1). However, whilst the patterns of growth in these two measures are broadly similar over time, there are some years in which differences are relatively large, e.g. in 2005 and 2006 when the discrepancy in growth was around 2.8 percentage points and 4.1 percentage points respectively (Figure 2).

⁵ The ONS observes that GVA measured by the income approach “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”. Source: ONS, December 2015, [‘Regional Gross Value Added \(Income Approach\), 1997 to 2014’](#).

⁶ The GVA estimates measured by the production approach 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)”. Source: ONS, December 2015, [‘Regional Gross Value Added \(Production Approach\), 1998 to 2013’](#).

Figure 2: Published official GVA annual growth in London in nominal terms, 1997-2014



Source: *Regional Accounts releases, ONS*

Based on our understanding of London’s economy, the sector level estimates produced using the GVA (I) approach seem more plausible for a number of large London sectors, in particular during periods in which large differences between these two estimates prevail (Appendix A provides figures of growth rates by sector for GVA (I) and GVA (P))⁷. For this reason, and given that the GVA (P) measure is currently an experimental statistic, our modelled estimates of real GVA for London are based on GVA compiled using the income approach (GVA (I)) - the official national statistic. Additionally, GLA Economics data analysis suggest that external consultancies’ real GVA estimates are based on GVA (I) that have been deflated using national level deflators.

1.2 Converting nominal GVA to real GVA

Given that the GVA (I) is in nominal terms, the series needs to be deflated by changes in price in order to derive real regional quarterly GVA estimates for London. One would ideally use regional price indices. Unfortunately, there are currently no timely official regional price indices available to use. In the absence of such data the EU manual of Regional Accounts recommends the use of national prices applied at a detailed industry level in order to model regional differences in the composition of products⁸. Using this method, “the regional variation in products serves in place of actual regional price differences”.

The ONS deflates industry level aggregates to create estimates of real GVA using the production approach (GVA (P)). This process provides a set of implied aggregate level deflators for each industry within each UK region. Although these ‘implied’ regional deflators are not true regional

⁷ E.g. in the case of Financial and insurance activities, Information and communication, and Real estate activities, annual growth rates in nominal terms for the GVA (I) estimates seem more feasible than the current GVA (P) based estimates.

⁸ ONS, [‘Deflation Methodology for Regional Gross Value Added \(Production Approach\)’](#),

price indices, since they are based on national prices, they do reflect regional differences in the products contributing to GVA, and can better reflect London's industry mix than national level deflators.

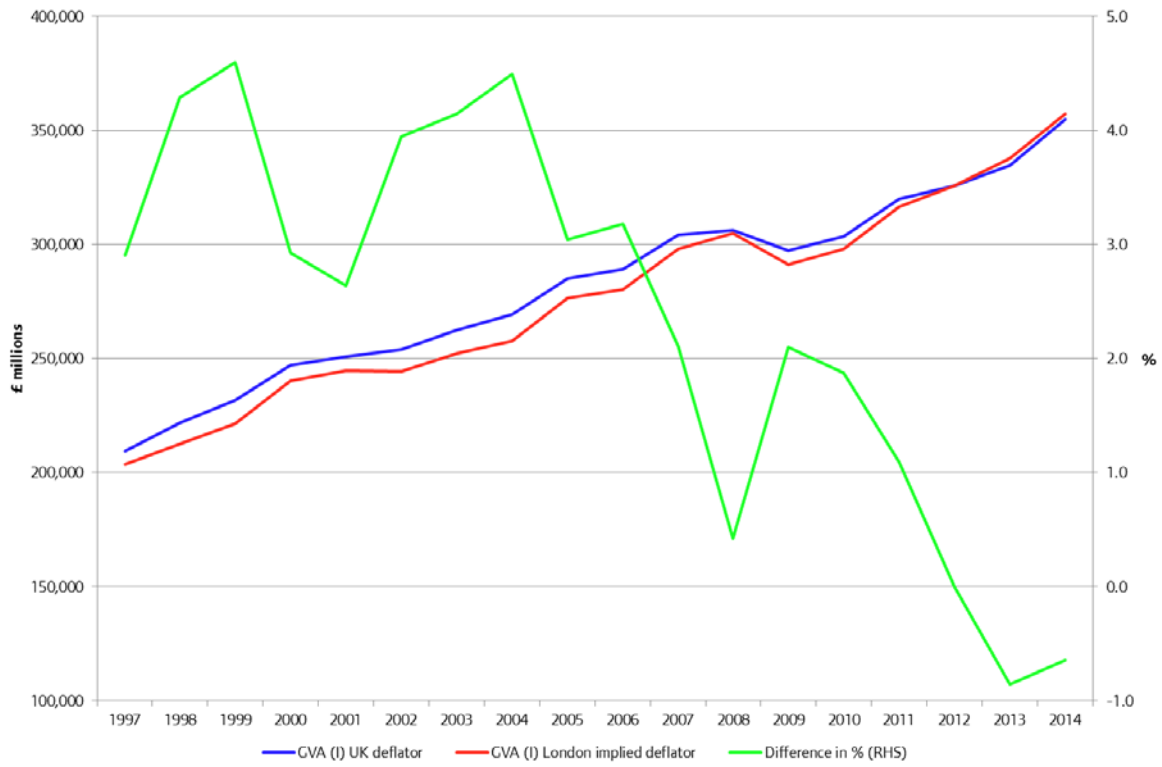
Out of these two options of either using national level deflators or implied London level deflators, our analysis takes the view that these implied deflators are likely to provide a better representation of industry distribution than using national level deflators alone. For this reason, the real GVA estimates for London described in this current issues note were derived using the implied deflators from the GVA (P) release for London. As these London level implied deflators are only available for a period between 1998 and 2013, this analysis makes the assumption that London implied deflators in 1997 and 2014 change in line with the UK level implied deflators.

Figures 3 (value of GVA) and 4 (growth in GVA) demonstrate that differences between using national level deflators and implied London level deflators are not substantial when looking at the total GVA (up to 4.6 per cent in 1999). Yet, looking at the sectors of significant importance to London, such as Financial and insurance activities, and Real estate activities, the discrepancy is greater. The difference between using national and London implied deflators for deflating GVA (I) nominal estimates is up to around 10.0 per cent in Financial and insurance activities (in 2014), and 16.8 per cent in Real estate activities (in 1997).

Figure 4 also suggests that when adjusting for London's industry mix through the deflator, changes in economic activity are more volatile, and in periods of growth or decline swings in the data are greater. This can be at least partially driven by London's two largest sectors that have experienced more volatile growth rates than the industry average across all sectors of London's economy⁹. Appendix B at the end of this document includes figures on growth rates for each sector based on both deflation methods.

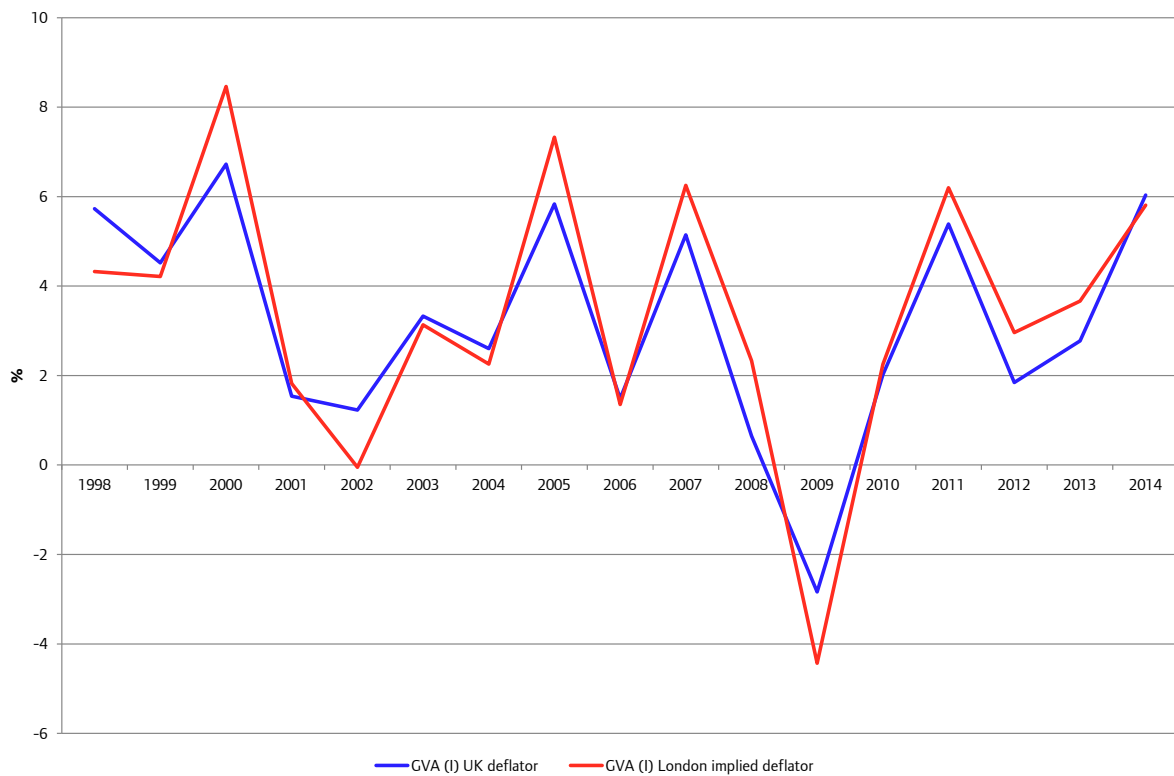
⁹ Looking at the two largest sectors in London by GVA (I) in nominal terms, Financial and insurance activities, and Real estate activities both tend to be more volatile in terms of annual growth than all sectors on average.

Figure 3: Modelled real GVA in London, 1997-2014



Source: ONS, and GLA Economics

Figure 4: Modelled real GVA growth in London, 1997-2014



Source: ONS, and GLA Economics

1.3 Modelling quarterly GVA data for London

One of the key aims of this analysis is to produce a real terms quarterly estimate of London's GVA to better understand the shorter-term trends of the economy. To achieve this aim, one of the first steps involved identifying the best method to apportion annual data to quarters given the available official data. Based on existing statistical guidance from the ONS, Eurostat and IMF using a quarterly economic indicator that mimics the trends in the annual data can be an effective option to distribute and apportion annual data into quarters^{10,11,12}. Therefore, the second element of producing a framework for this analysis looked at identifying a suitable indicator for the modelling.

1.3.1 Identifying a framework for modelling quarterly GVA data for London

Eurostat Handbook on quarterly national accounts outlines a number of options for the 'quarterlyisation' of annual data, and different approaches depending on data availability¹³. In the absence of suitable economic indicators that can help to inform the quarterly profiles of GVA, simple disaggregation methods may be used to produce higher frequency GVA estimates¹⁴. However, if a quarterly economic indicator exists, using this method may produce a more informed and accurate profile for these quarterly estimates than using a simple disaggregation approach^{15,16}. Secondly, to ensure a smooth quarterly profile of GVA is produced a more sophisticated statistical approach may be desirable.

One of these statistical approaches is the Denton proportional method with indicators, or the modified Denton, and this is the approach that was used to address the step change issue that may arise if a rise in quarterly growth rates between two calendar years is put into a single quarter^{17,18}. Existing research suggests that the enhanced proportional Denton technique is a good alternative as it is relatively simple, robust, and well suited for large-scale applications¹⁹. Research published by the U.S. Bureau of Economic Analysis also supports the use of the Denton proportional method when both annual and indicator data are available. For the purposes of our analysis the Denton proportional method was chosen for the ease of use and availability²⁰.

¹⁰ IMF, 2001, '[Quarterly National Accounts Manual – Concepts, Data Sources, and Compilation](#)', Chapter VI. Benchmarking'.

¹¹ Chamberlin, G., November 2010, 'Methods Explained: Temporal disaggregation'. ONS.

¹² Eurostat, 2013, '[Handbook on quarterly national accounts](#)'.

¹³ Ibid.

¹⁴ Chamberlin, G., November 2010, 'Methods Explained: Temporal disaggregation'. ONS.

¹⁵ IMF, 2001, '[Quarterly National Accounts Manual – Concepts, Data Sources, and Compilation](#)', Chapter VI. Benchmarking'.

¹⁶ However, distributing annual level GVA data into quarters based on annual sector breakdown and trends in workforce jobs may result in a 'step' change in the data, where growth between Q4 of one year and Q1 of the next is biased, not reflecting purely genuine growth. With this 'pro-rata' distribution or adjustment, the entire increase in the quarterly growth rates between two calendar years is put into a single quarter, while other quarterly growth rates are left unchanged.

¹⁷ The objective of the Denton additive method is to keep the difference between the estimated quarterly series and the indicator series as constant as possible under the annual benchmarks. The final estimates tend to have the same growth rates as the indicator series. For more information on other methods and review of some available options see: Bureau of Economic Analysis (BEA), 2008, '[Empirical Review of Methods for Temporal Distribution and Interpolation in the National Accounts](#)'.

¹⁸ The Denton proportional method minimises the (sum of squares of the) differences of proportional adjustments of two neighbouring quarters. Further details on the choice method and what factors to consider are outlined in the Eurostat [Handbook on Quarterly National Accounts](#).

¹⁹ IMF, 2001, '[Quarterly National Accounts Manual – Concepts, Data Sources, and Compilation](#)', Chapter VI. Benchmarking'.

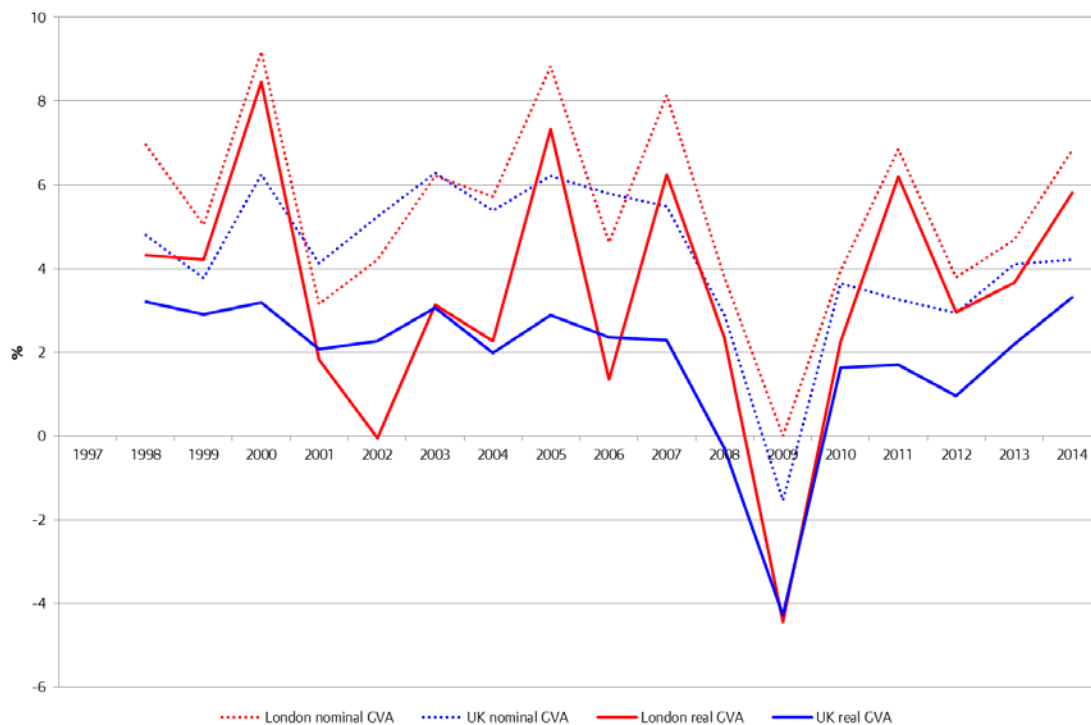
²⁰ The software used for this analysis provides an option of using the Denton method or a regression-based approach to benchmarking. For further information, see 'Benchmarking and temporal disaggregation plug-in for JDemetra+: User guide', Version 2.0.0, November 2015.

1.3.2 Choice of indicator data

As suggested above, using an indicator variable to inform the quarterly profile of GVA estimates for London may produce a better estimate of quarterly level economic activity than using a purely statistical modelling methodology. Therefore, our analysis looked at identifying a suitable timely measure for London that would provide us with information about the trends in economic activity at the total output level as well as at the sector level. Indicators investigated included workforce jobs for London, UK GVA, and the Purchasing Managers' Index (PMI) of business activity in London. Estimates of London GVA based on workforce jobs and PMI data both produced relatively more volatile patterns in total quarterly GVA, compared to estimates produced using UK GVA data as an indicator. Sector level analysis was carried out using both workforce jobs as well as UK GVA, with UK sector data producing more realistic estimates of sector level GVA for London (PMI data are not available for individual sectors of the economy).

Furthermore, historically there has been a close relationship between the patterns of economic growth in London and the UK as a whole, even if economic activity in London has been more volatile during periods of growth and recessions as demonstrated in Figure 5²¹. As the data suggest that there is a strong relationship between London's and the UK's economic activity, this analysis has made the assumption that growth patterns in the UK provide a reasonably good proxy of growth patterns in London²².

Figure 5: Annual growth in nominal and modelled real GVA in London compared to economic growth in the UK as a whole, 1997-2014



Source: ONS, and GLA Economics

²¹ London real GVA data are based on an official estimate of GVA (I) deflated using implied London deflators from the GVA (P) release.

²² Correlation coefficients between different London real term GVA growth measures and UK GVA growth are high; between 0.75 and 0.85 depending on the estimation method used.

GLA Economics analysis also looked at using workforce jobs (WFJ) to estimate GVA sector profiles for London. A benefit of the WFJ series is that it is timely and comprehensive data in terms of coverage of London's sectors. However, given the recent trends in relatively weak economic activity compared to the strong observed jobs growth there is some doubt whether this jobs series is the best measure to use to inform on the quarterly economic performance in London as this relationship has clearly changed over time.

Shortcomings of this approach include changes in job numbers seems to lag behind economic activity. Additionally, estimates based on sector level jobs data were more volatile and produced unrealistic patterns in activity at the sector level, compared to when UK economic activity was used as an indicator to provide a guideline for London's sector level performance.

For these reasons, for this analysis, historic UK GVA series by sector were used as an indicator to inform the path of our quarterly estimates of London's GVA over time.

1.4 Limitations

There are a number of limitations to this estimation approach. Future analysis by GLA Economics will seek to address some of these shortcomings as more official data become available. However, the fact that there is no conceptual way to deflate GVA (I), specifically the gross operating surplus element of GVA (I), it is unlikely that future work will be able to address all of these shortcomings. In the absence of GVA (I) based deflator data, GVA (P) based deflators applied to GVA (I) data is the best available option, despite that conceptually this is not correct²³.

Secondly, another shortfall arises from the lack of double deflation around producing annual real term estimates of GVA for London. Applying double deflation would imply deflating the input and output of an industry separately. In the absence of double deflation, the ONS guidance on deflating regional GVA suggests that one should either apply national level deflators, and accept the difference in growth of the economy at a regional level from the national growth pattern, or the regional constant price data should be constrained to correspond to the national total which in itself would distort the true distribution of industry level activity²⁴. However, GLA Economics' approach adopts the implied London level deflators and as London's economic performance has been considered in isolation of the other regions then these industry estimates combined with activity in the other UK regions may not equal to the UK total²⁵. Additionally, the implied deflators that have been used are only available for a limited period of time, and to extend this analysis from 1997 to 2014, the analysis has assumed that prices in London grew in line with the UK in both 1997 and 2014.

Currently, the estimates are based on UK level quarterly data, but a better way to reflect activity in London may be to use alternative series of high frequency data for sectors to inform the path of quarterly GVA. For example, smoothed series of workforce jobs at the sector level in London may be an alternative way to assess activity. Furthermore, future work should try to investigate the possibility of using alternative sector level indicators that could help to inform the level of activity in London. With this in mind, the estimates presented using this analysis can only be considered to be interim estimates, and will be subject to future methodological developments.

²³ Adjusting GVA based on income measures is different to making adjustments to GVA that is based on production measures as the changes in prices in components feeding into these two methods are likely to be fairly different. For this reason, applying production based implied deflator to an income based GVA measure is not strictly correct.

²⁴ ONS, January 2014, '[Deflation Methodology for Regional Gross Value Added \(Production Approach\)](#)'.

²⁵ See page 5 of '[Deflation Methodology for Regional Gross Value Added \(Production Approach\)](#)' for further detail.

2 Modelled quarterly GVA for London

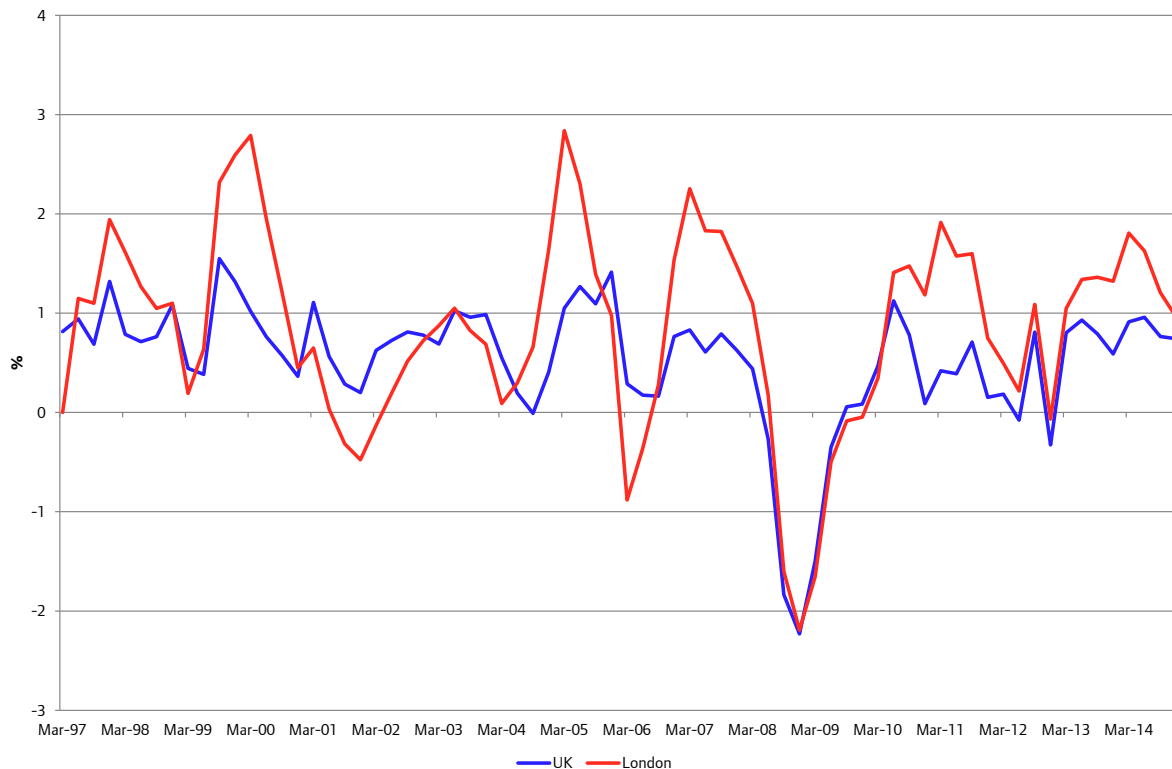
This section analyses the results of the modelling approach that has been adopted.

2.1 Total quarterly GVA in London

A number of economic indicators suggest that growth in London has exceeded that of the UK as a whole since the financial crisis, and generally since the beginning of official GVA data for London in 1997²⁶. These patterns are also obvious in Figure 6 that demonstrate the path of London's real quarterly GVA activity as modelled by GLA Economics, in comparison to UK real GVA growth over time²⁷. A comparison between London and the UK reveals that average quarterly growth since the financial crisis was higher in London than in the UK as a whole. In London, real quarterly growth in GVA averaged 1.1 per cent compared to 0.5 per cent in the UK as a whole between Q4 2009 and Q4 2014.

GLA Economics estimates that in 2014 London real GVA stood at £357.9 billion, accounting for around 22.8 per cent of UK GVA.

Figure 6: Modelled quarterly real GVA growth in London and the UK



Source: ONS and GLA Economics

²⁶ GLA Economics, October 2015, '[London's changing economy since 2008](#)'.

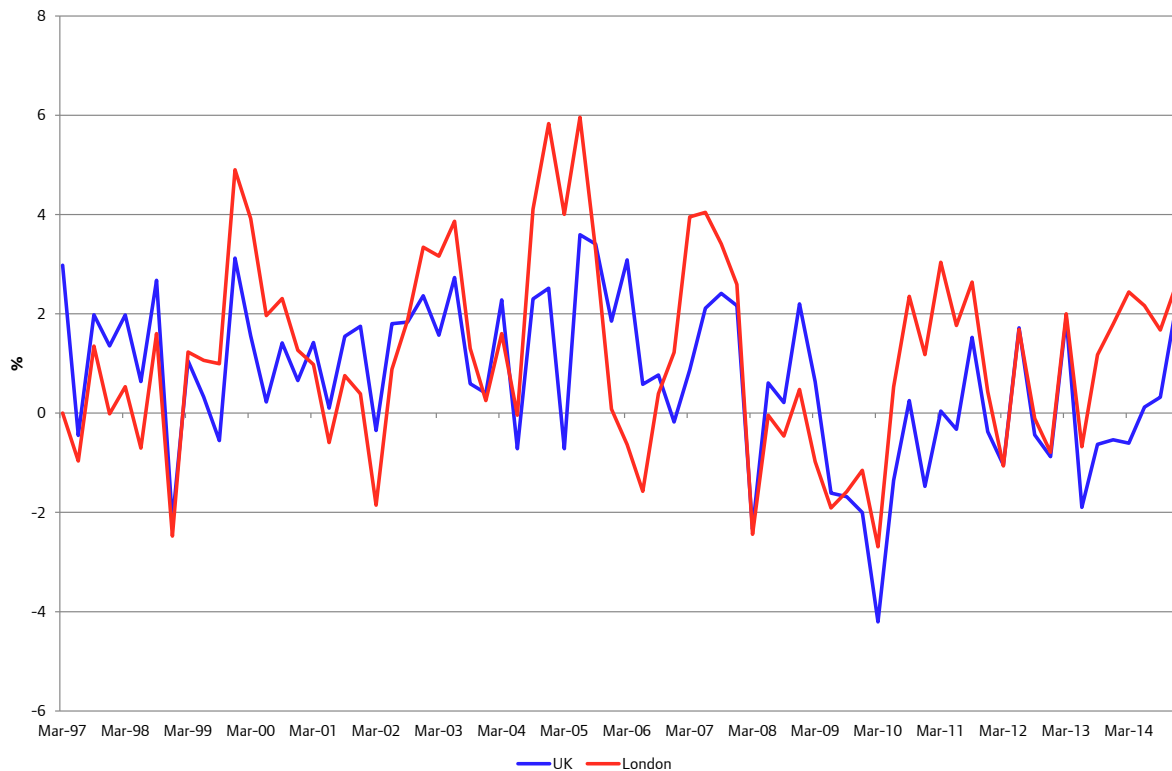
²⁷ These estimates are based on GVA (I) data deflated using London's implied deflators from the [Regional Gross Value Added \(Production Approach\): 1998 to 2013 release](#).

2.2 Sector level GVA estimates

Looking across the largest sectors of London’s economy by GVA, it is evident that this growth difference persists across most of London’s key sectors following the financial crisis. And, only more recently, the UK as a whole has caught up in terms of quarterly growth.

Figure 7 demonstrates GVA growth performance in London and the UK for the Financial and insurance activities sector, a sector in which London accounts for over half of total output as based on nominal GVA (I) (in 2014 nominal annual output in this sector in London was around 51.8 per cent of the UK total). Since the financial crisis and recession, GVA in the Financial and insurance activities sector in London reached a recent low in Q1 2010; since then, quarterly real growth in the sector in London has averaged around 1.3 per cent, whilst activity in the UK as a whole has fallen by 0.2 per cent on average a quarter. The latest estimates suggest that real GVA in the Financial and insurance activities sector in London totalled around £62.6 billion in 2014, accounting for approximately 56.3 per cent of the industry total in the UK.

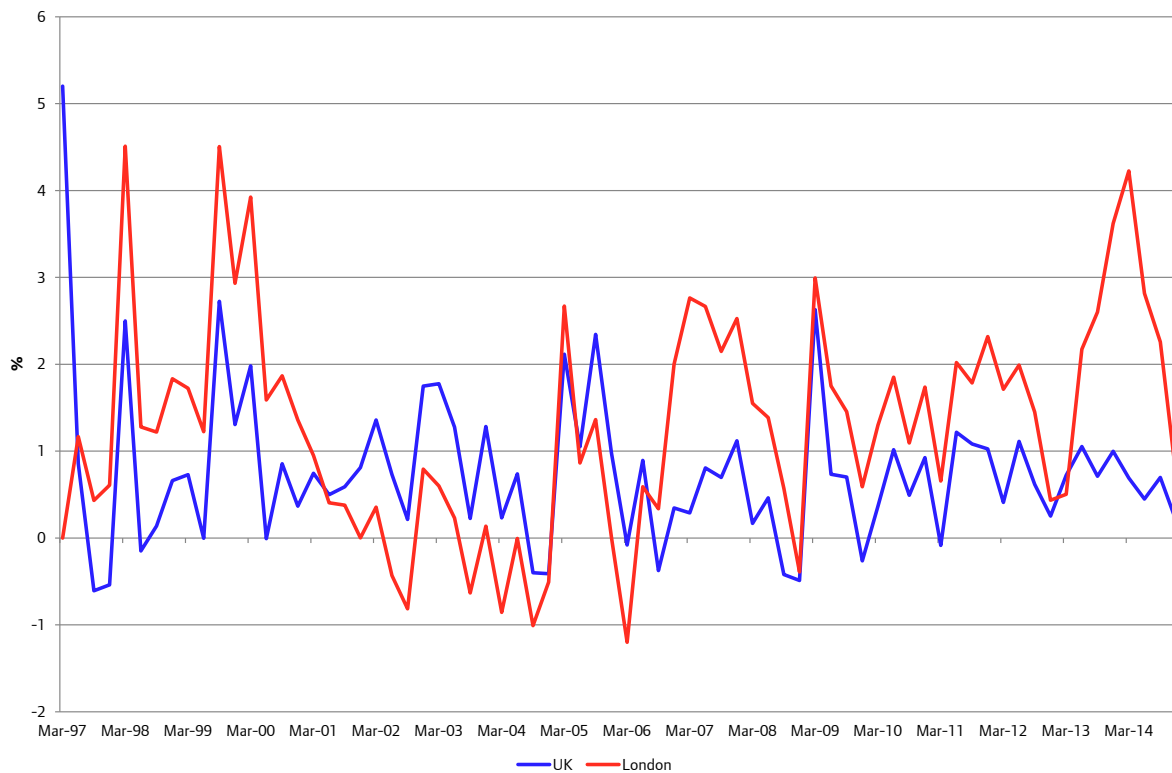
Figure 7: Modelled quarterly real GVA growth in Financial and insurance activities in London



Source: ONS and GLA Economics

Similar patterns occur in the Real estate activities sector (Figure 8) and, looking at the average quarterly real GVA growth from when the UK economy officially entered recession in Q3 2008 to the end of 2014, growth in London has exceeded that of the UK as a whole. London’s quarterly real GVA has grown at an average rate of 1.7 per cent over that period, compared to UK growth of 0.7 per cent. In 2014, our estimates suggest that real economic activity in the sector was worth around £47.3 billion, and accounted for 25.8 per cent of the UK industry total.

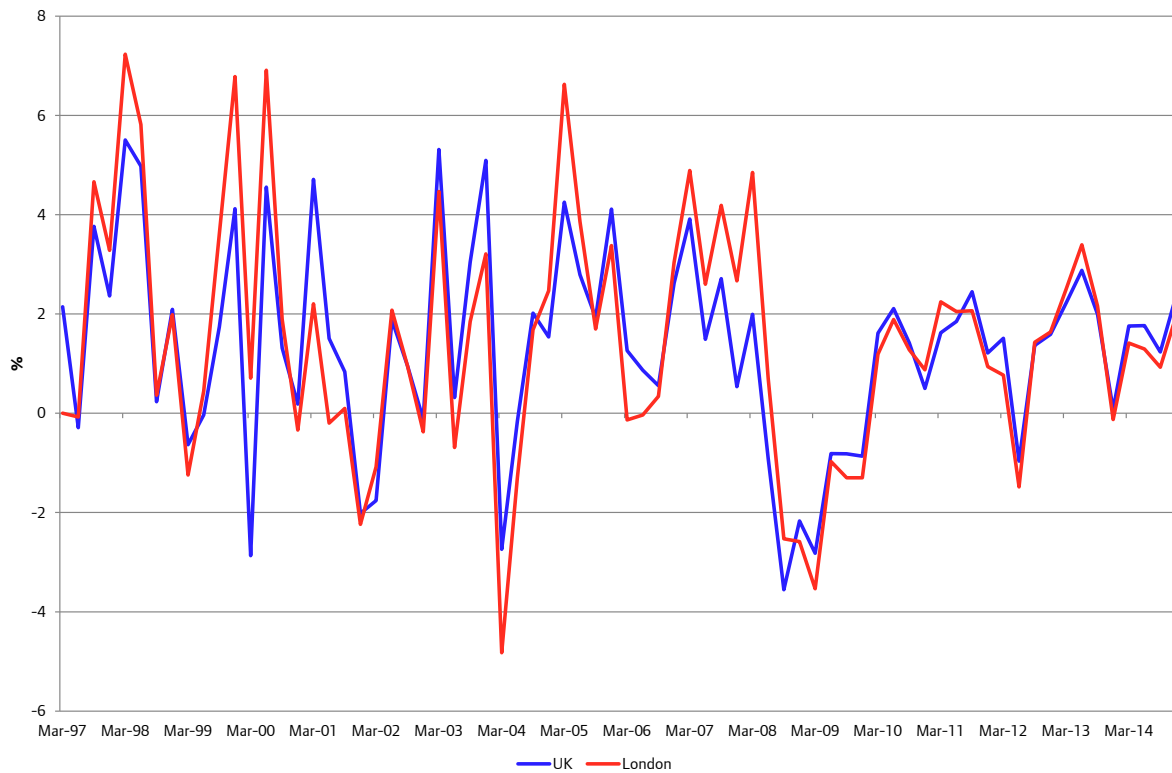
Figure 8: Modelled quarterly real GVA growth in Real estate activities in London



Source: ONS and GLA Economics

In contrast to the other key sectors in London, our modelled data suggests that the picture for real GVA performance in the Professional, scientific and technical activities sector since the financial crisis is more mixed (Figure 9), and that activity in the UK as a whole has been slightly stronger than in London. Real GVA growth in London averaged around 1.4 per cent a quarter between Q4 2009 and Q4 2014, compared to 1.5 per cent in the UK as a whole. Based on the latest growth estimates, real GVA in the Professional, scientific and technical activities sector totalled around £41.6 billion in 2014. This was a 5.2 per cent increase compared with 2013, and activity in London accounted for around 34.1 per cent of total UK real GVA.

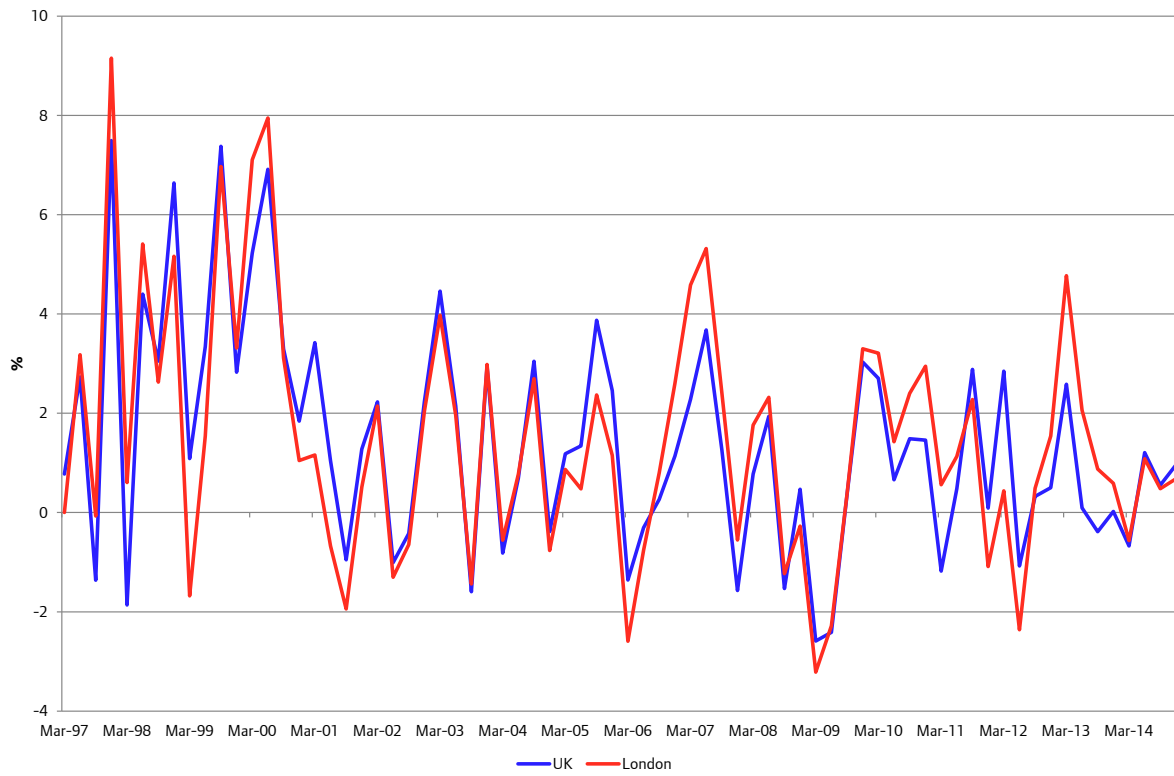
Figure 9: Modelled quarterly real GVA growth in Professional, scientific and technical activities in London



Source: ONS and GLA Economics

GVA estimates presented in Figure 10 suggest that the recovery in the Information and communication sector in London was stronger than in the UK as a whole, following the recession. And, looking at growth between Q2 2009 and Q4 2014 London’s estimated quarterly real growth in the sector averaged around 1.4 per cent, compared to 0.9 per cent in the UK as a whole. The latest GLA Economics estimates suggest that real GVA in the Information and communication sector in London was around £37.4 billion in 2014, a 2.1 per cent increase from 2013. Activity in London accounted for approximately 38.9 per cent of total industry real GVA in the UK in 2014.

Figure 10: Modelled quarterly real GVA growth in Information and communication activities in London



Source: ONS and GLA Economics

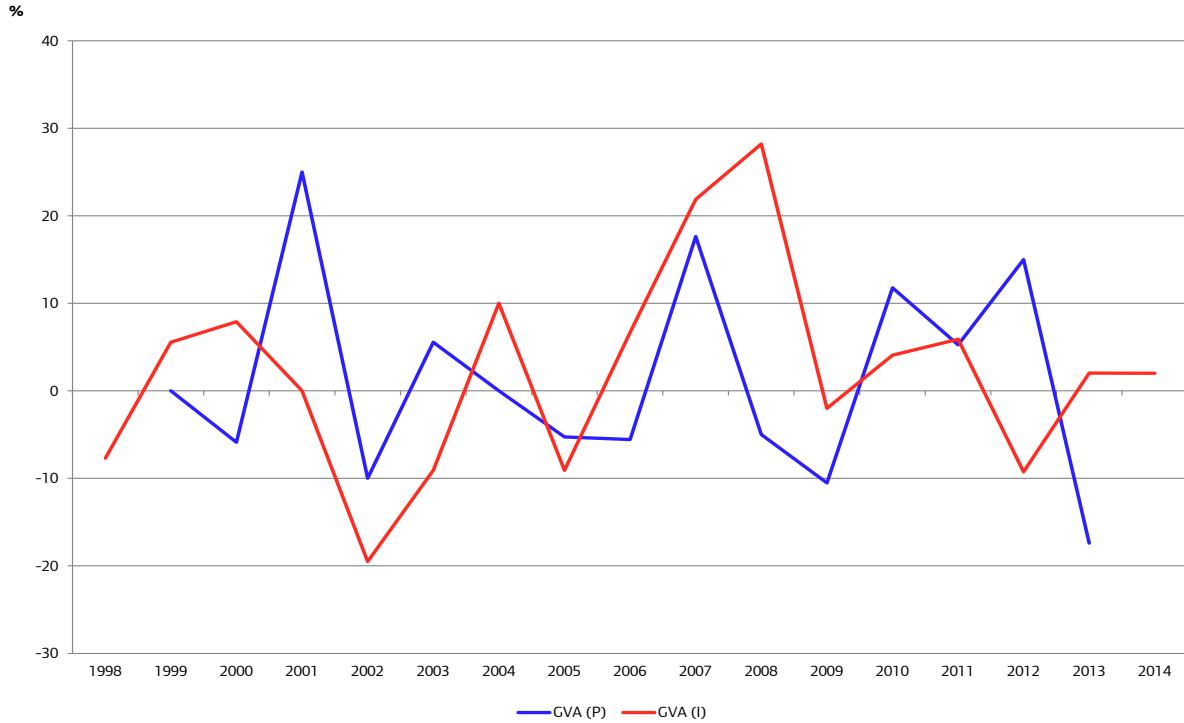
Conclusions

This current issues note has outlined the methodology and the first estimates of quarterly real GVA for London. The methodology and estimates presented as a part of this analysis should be treated as interim estimates that are likely to be revised as our understanding of London's economy and the availability and robustness of data improves.

Going forward, GLA Economics will seek to continue to develop this methodology and to estimate quarterly economic activity in London until official ONS estimates become available.

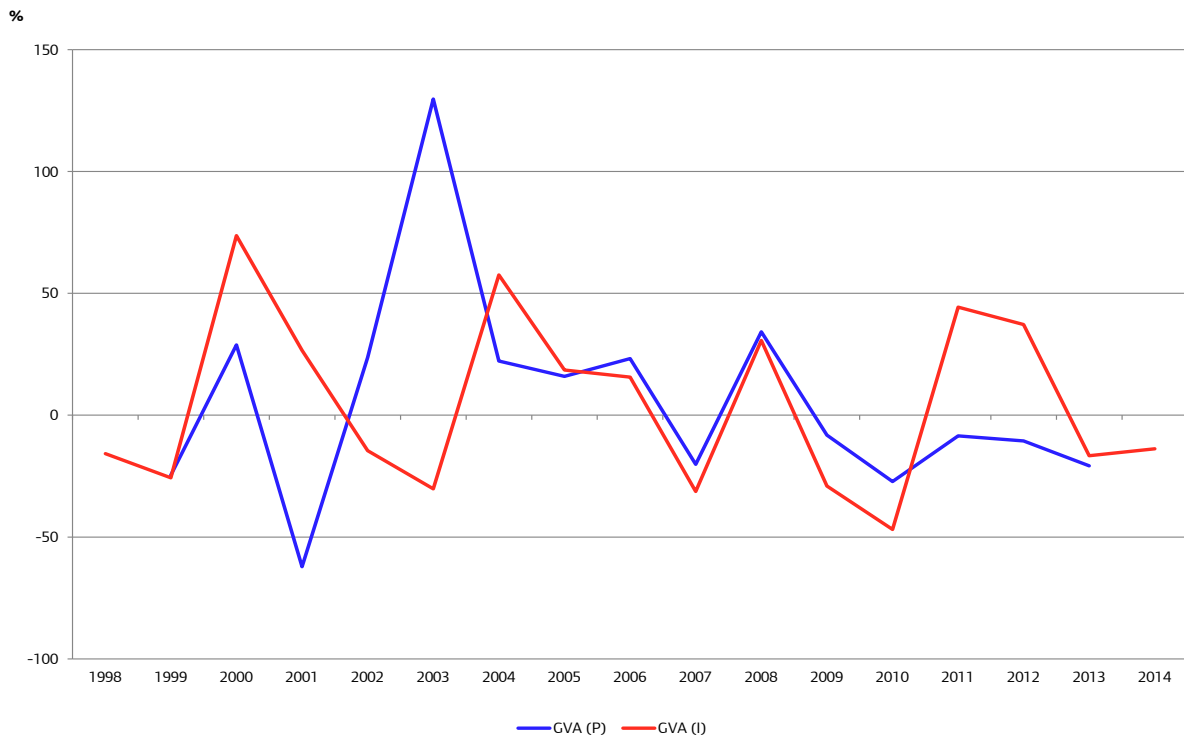
Appendix A: Annual GVA (I) & (P) growth by sector in London in nominal prices

Figure A1: Agriculture, forestry and fishing



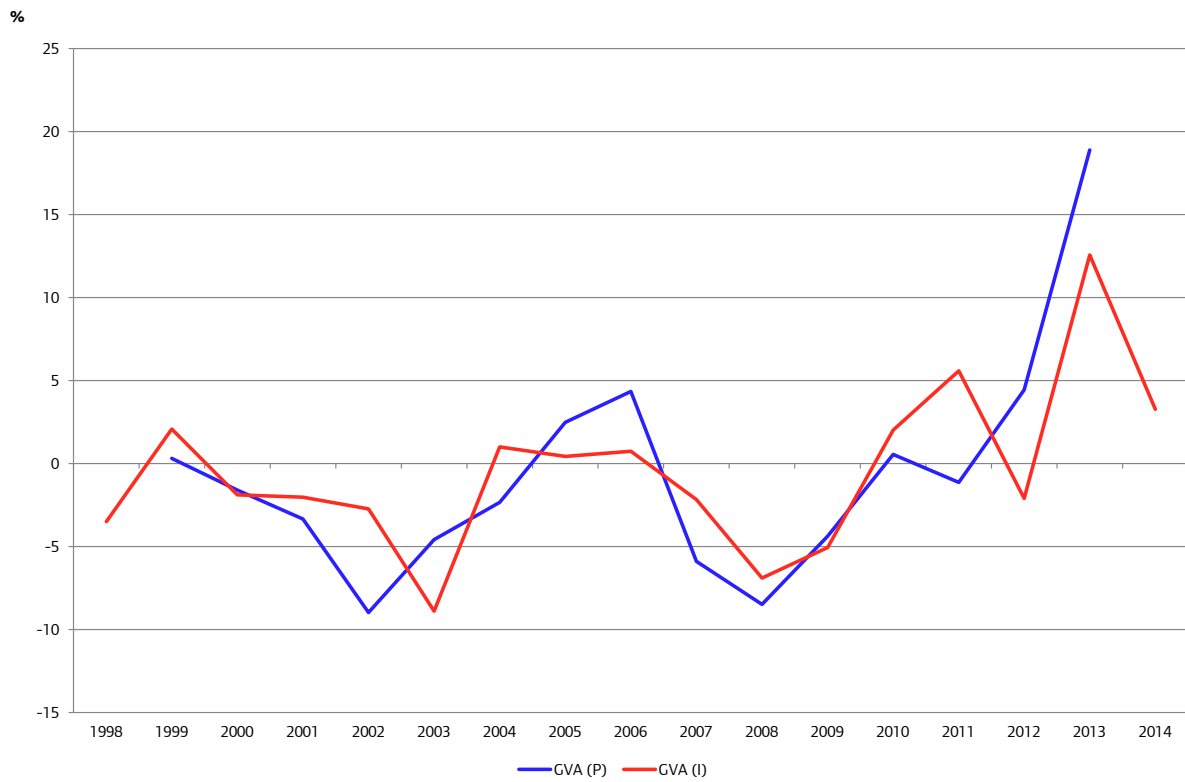
Source: ONS and GLA Economics

Figure A2: Mining and quarrying



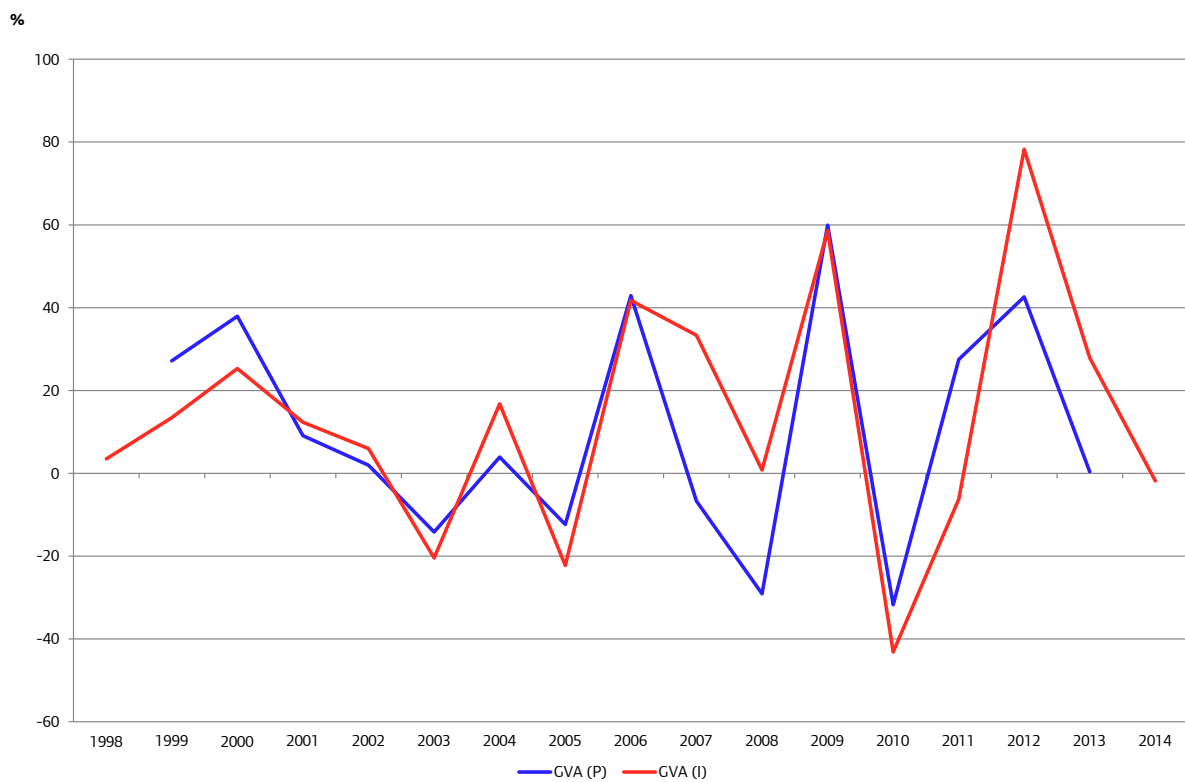
Source: ONS and GLA Economics

Figure A3: Manufacturing



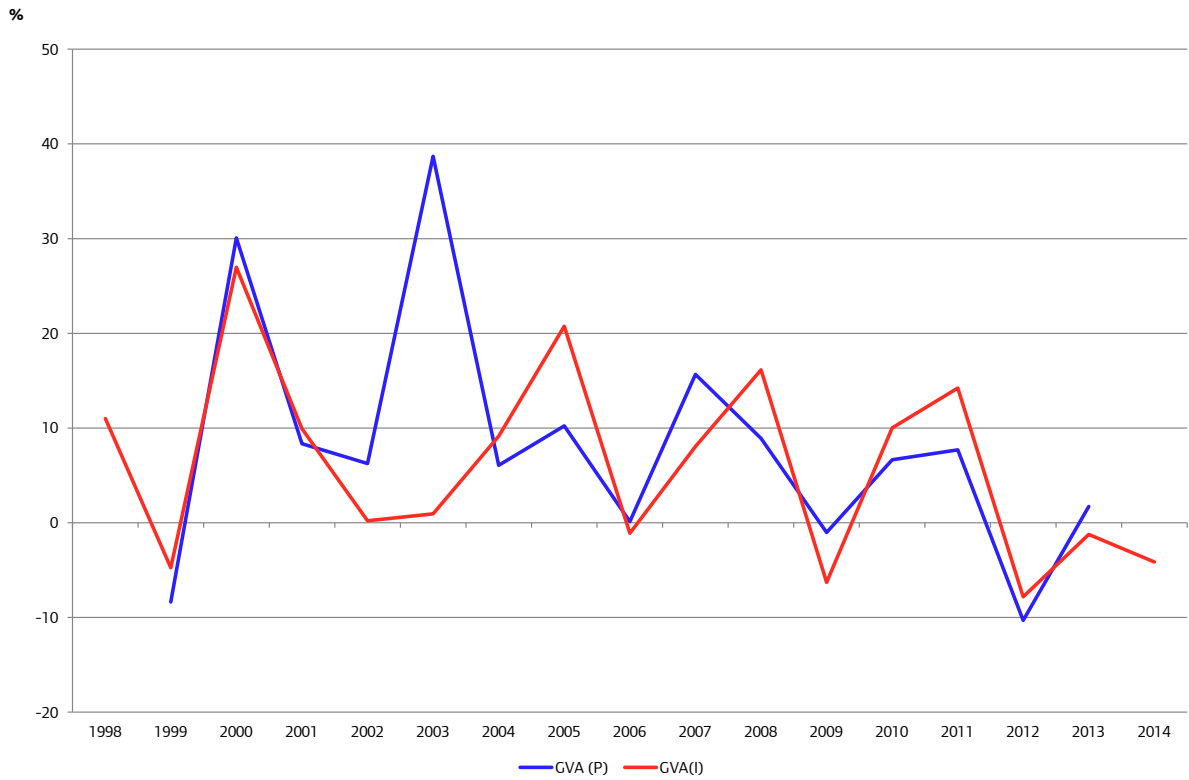
Source: ONS and GLA Economics

Figure A4: Electricity, gas, steam and air-conditioning supply



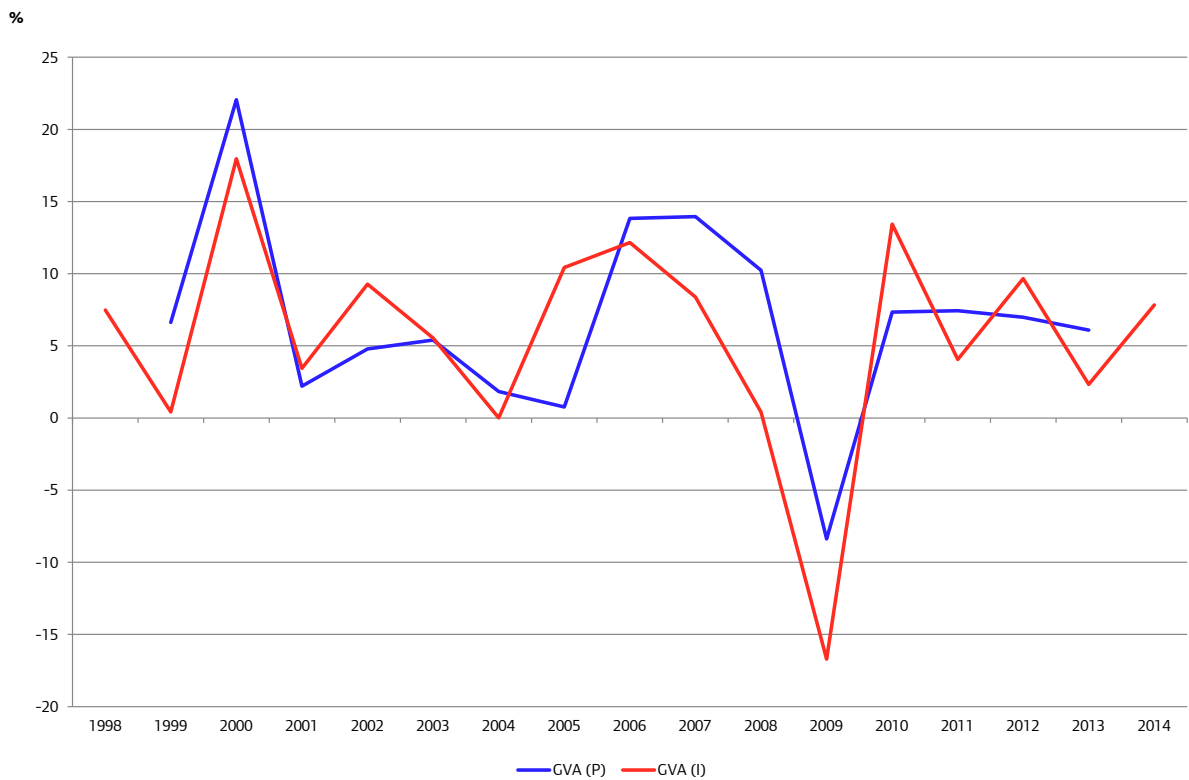
Source: ONS and GLA Economics

Figure A5: Water supply; sewerage and waste management



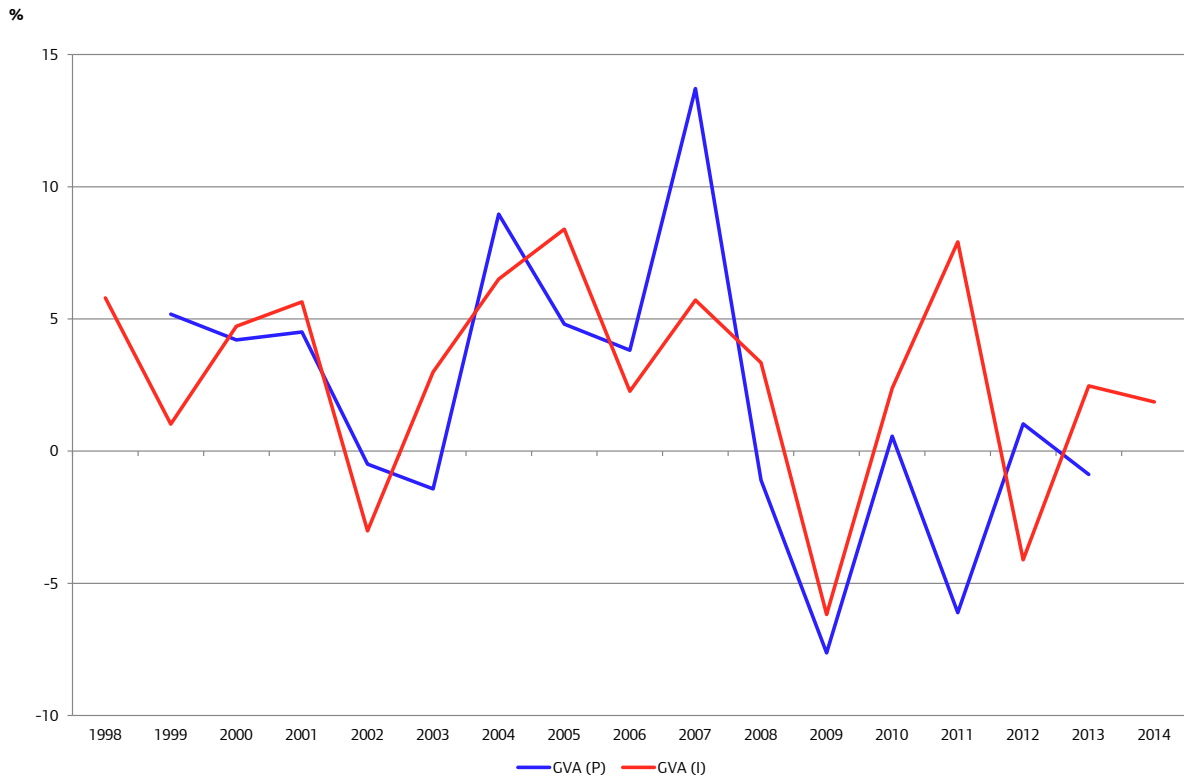
Source: ONS and GLA Economics

Figure A6: Construction



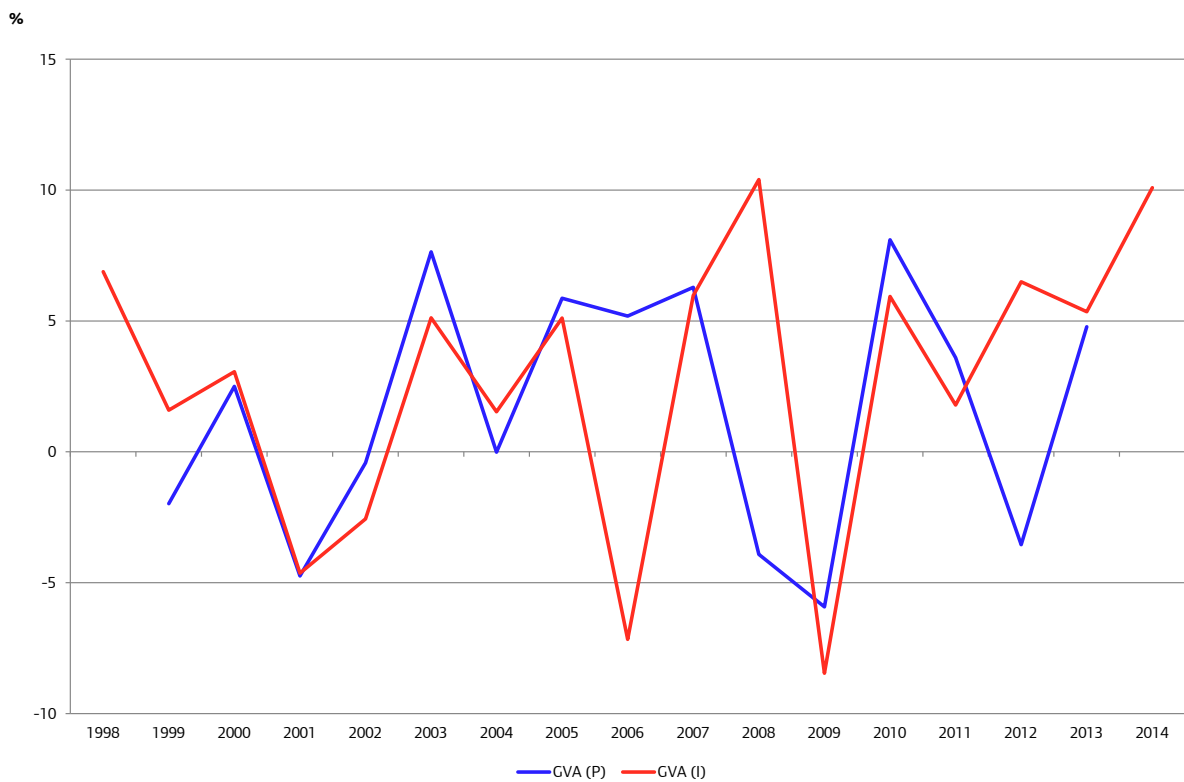
Source: ONS and GLA Economics

Figure A7: Wholesale and retail trade; repair of motor vehicles



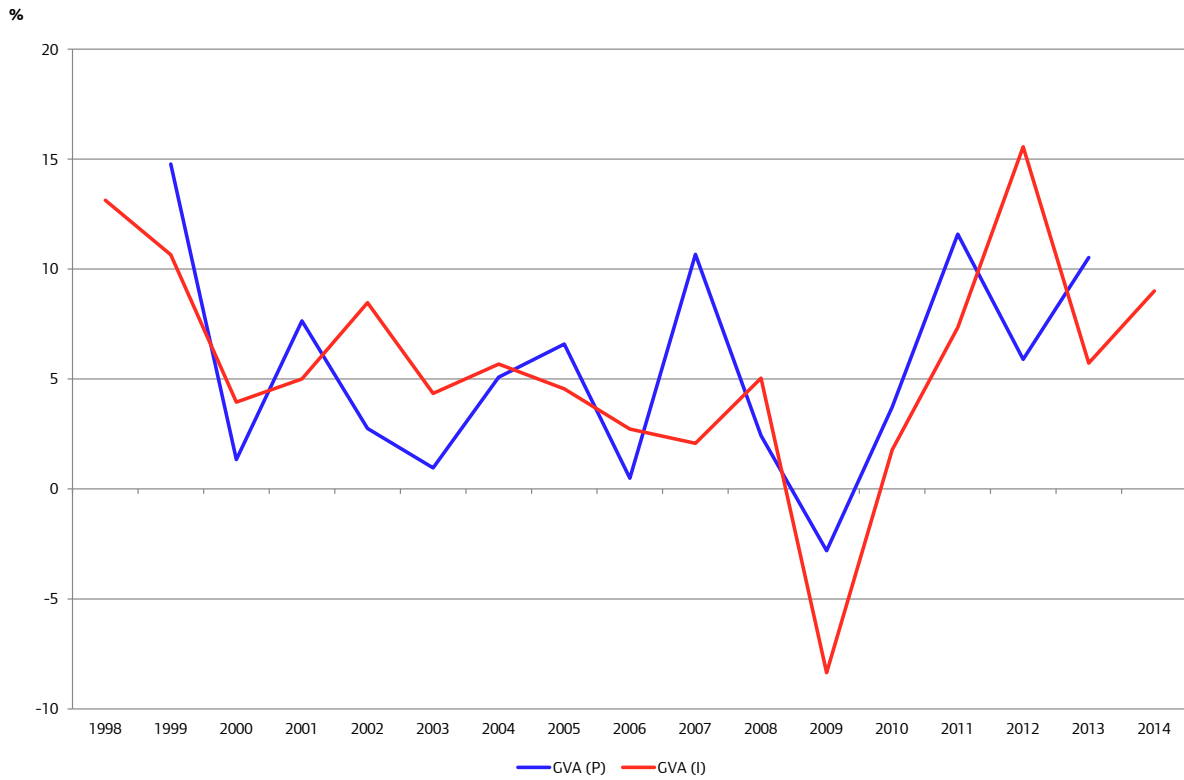
Source: ONS and GLA Economics

Figure A8: Transportation and storage



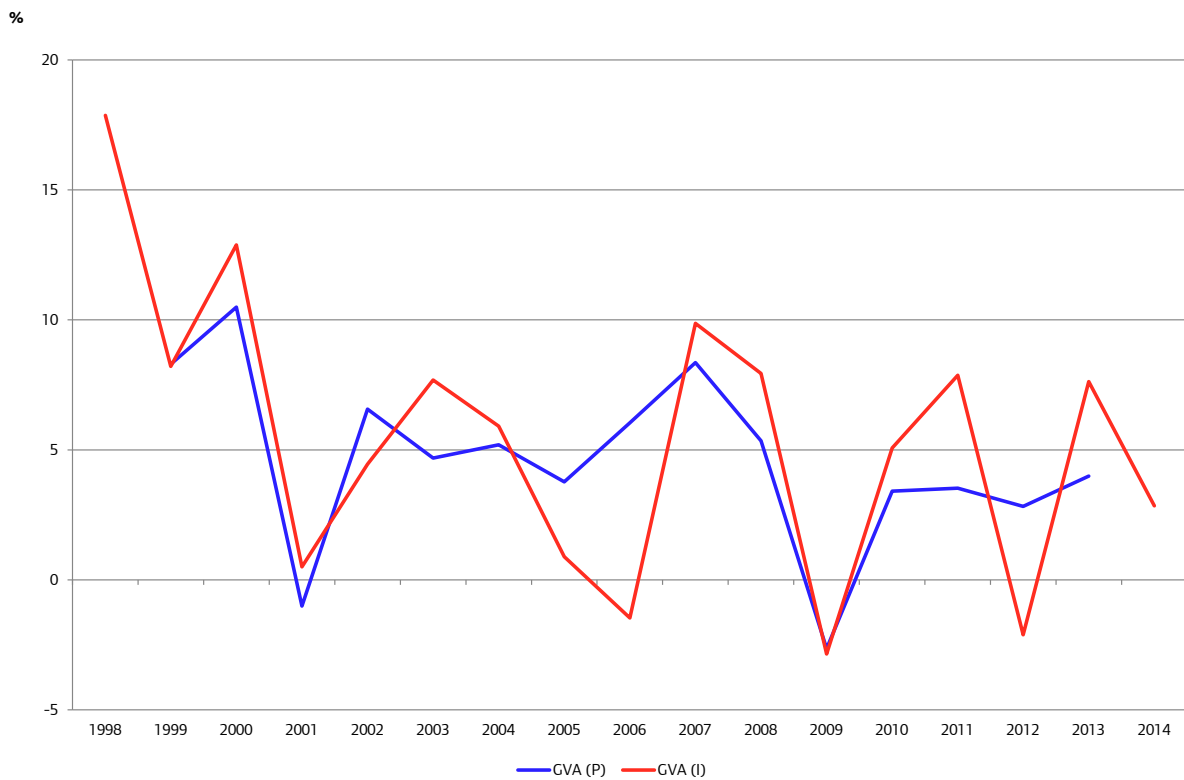
Source: ONS and GLA Economics

Figure A9: Accommodation and food service activities



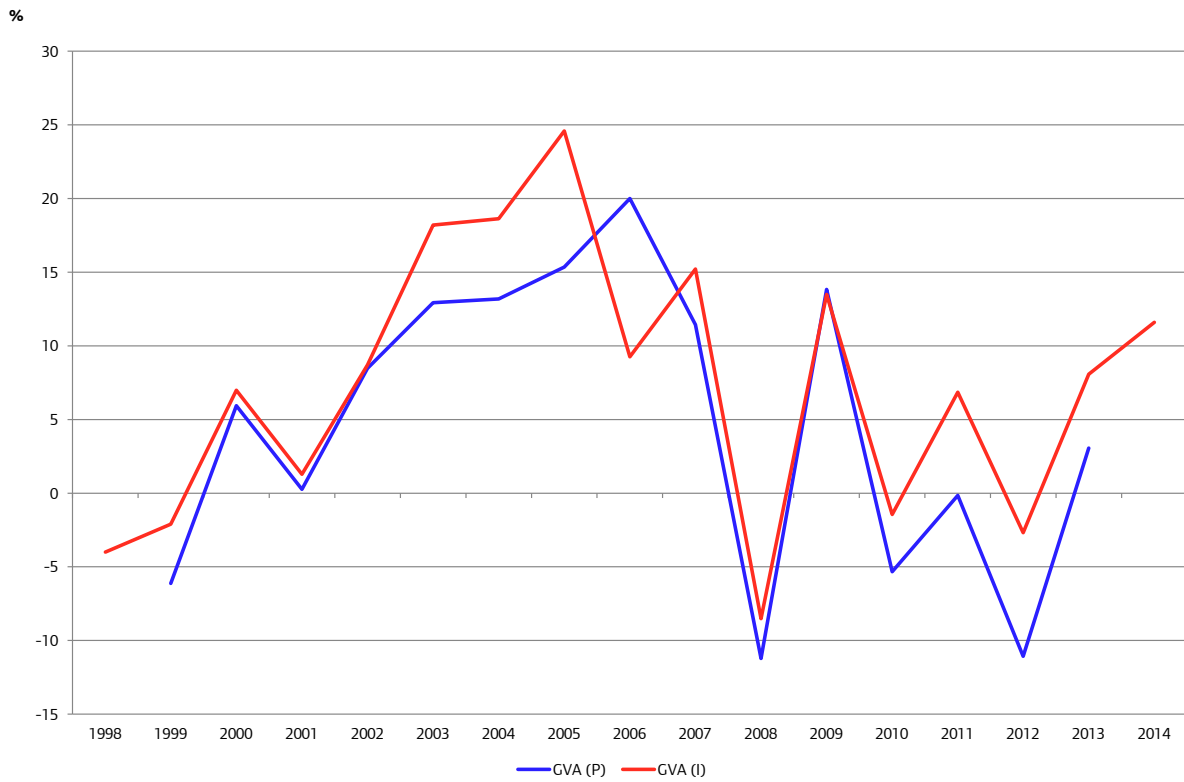
Source: ONS and GLA Economics

Figure A10: Information and communication



Source: ONS and GLA Economics

Figure A11: Financial and insurance activities



Source: ONS and GLA Economics

Figure A12: Real estate activities



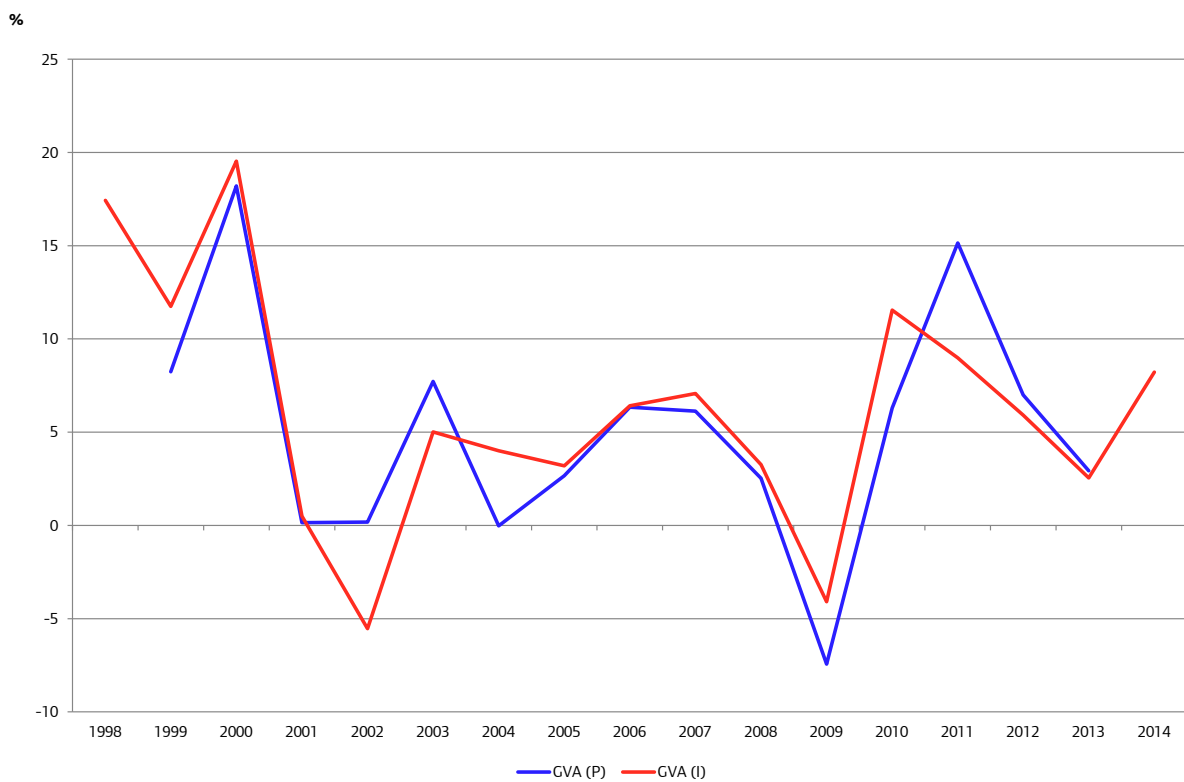
Source: ONS and GLA Economics

Figure A13: Professional, scientific and technical activities



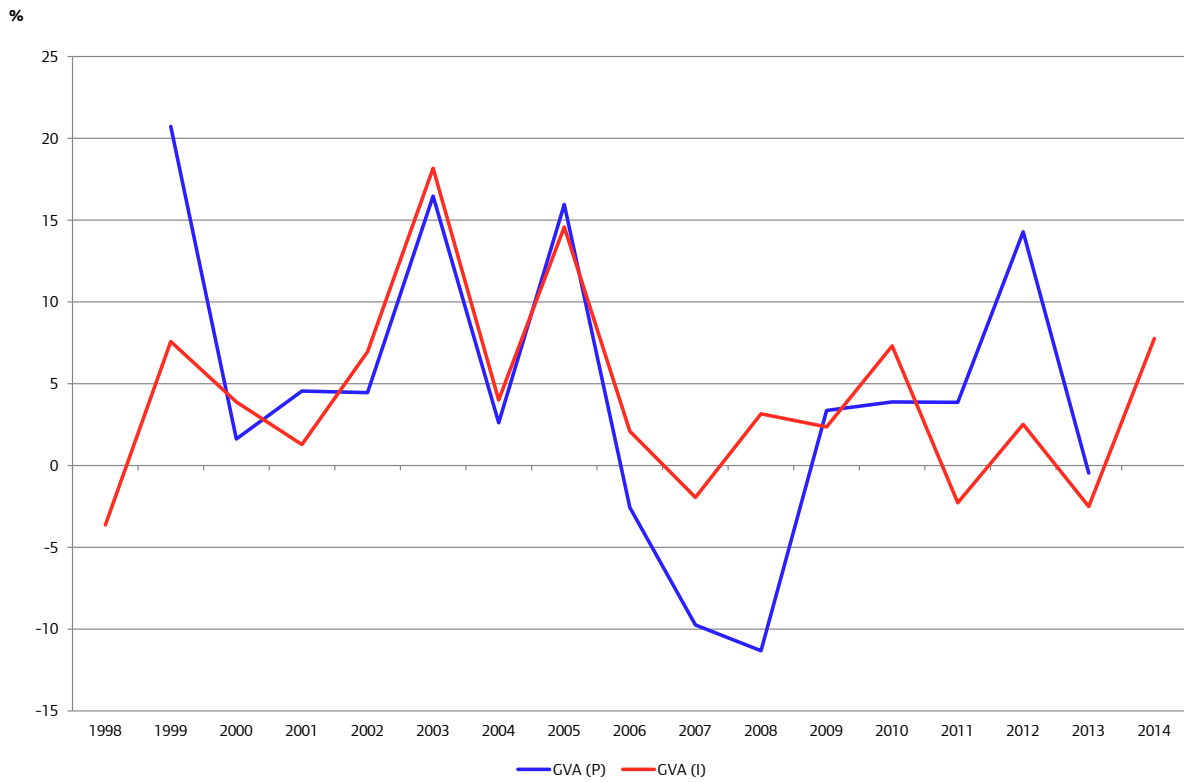
Source: ONS and GLA Economics

Figure A14: Administrative and support service activities



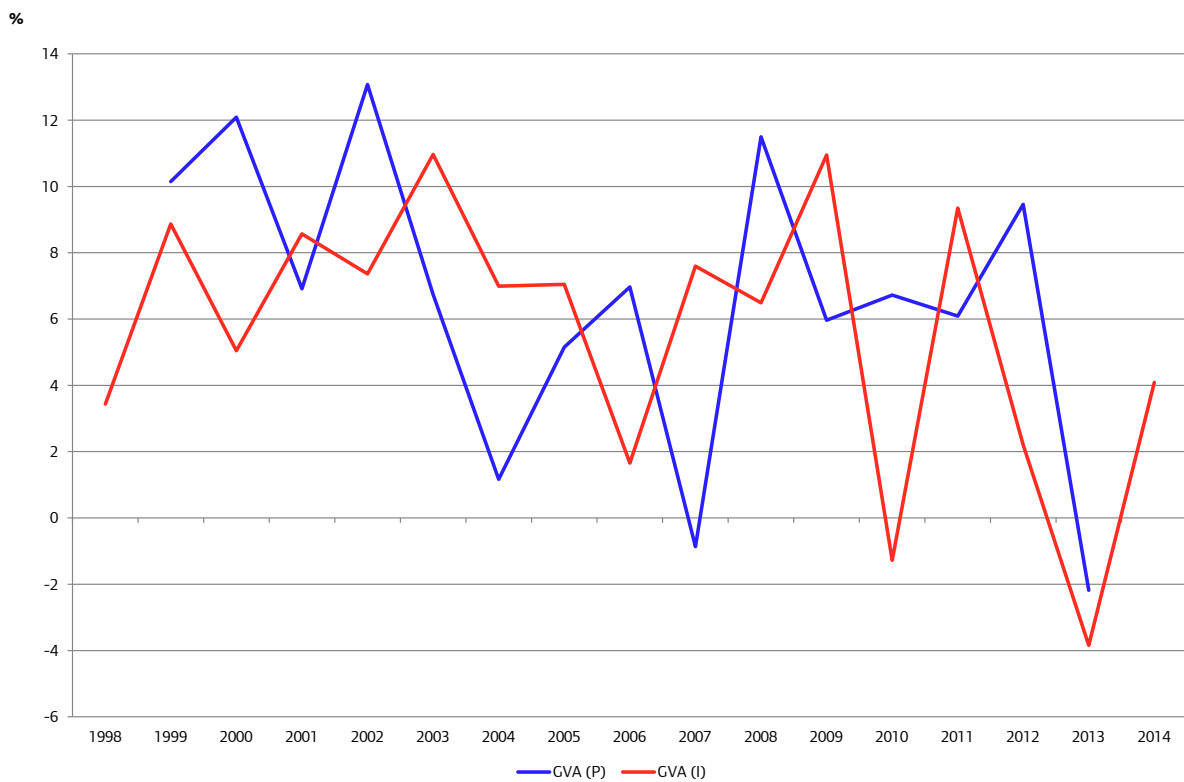
Source: ONS and GLA Economics

Figure A15: Public administration and defence; compulsory social security



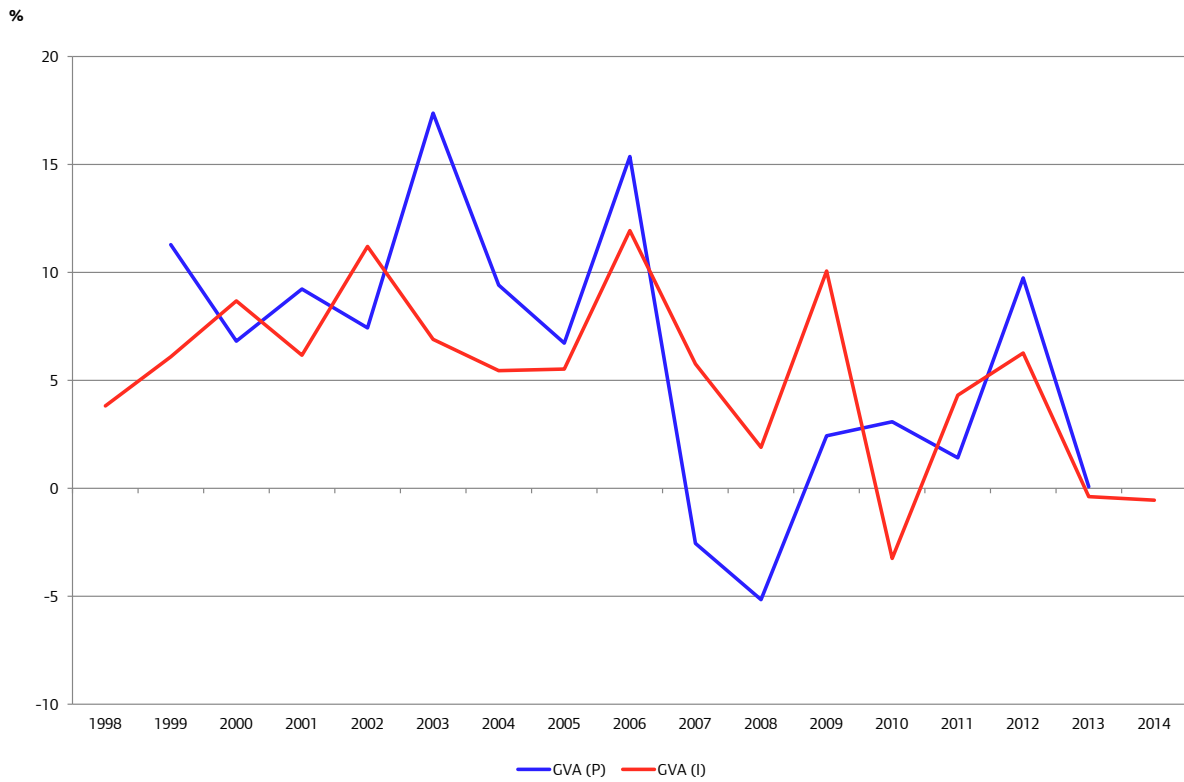
Source: ONS and GLA Economics

Figure A16: Education



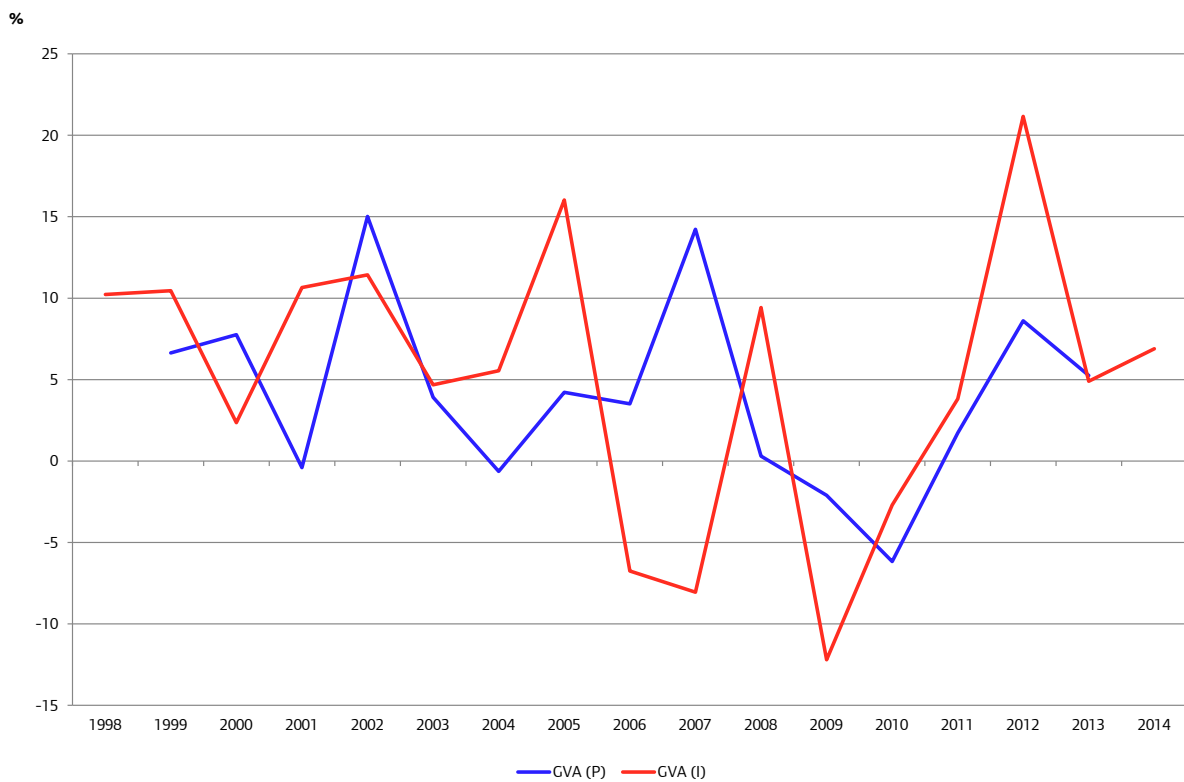
Source: ONS and GLA Economics

Figure A17: Human health and social work activities



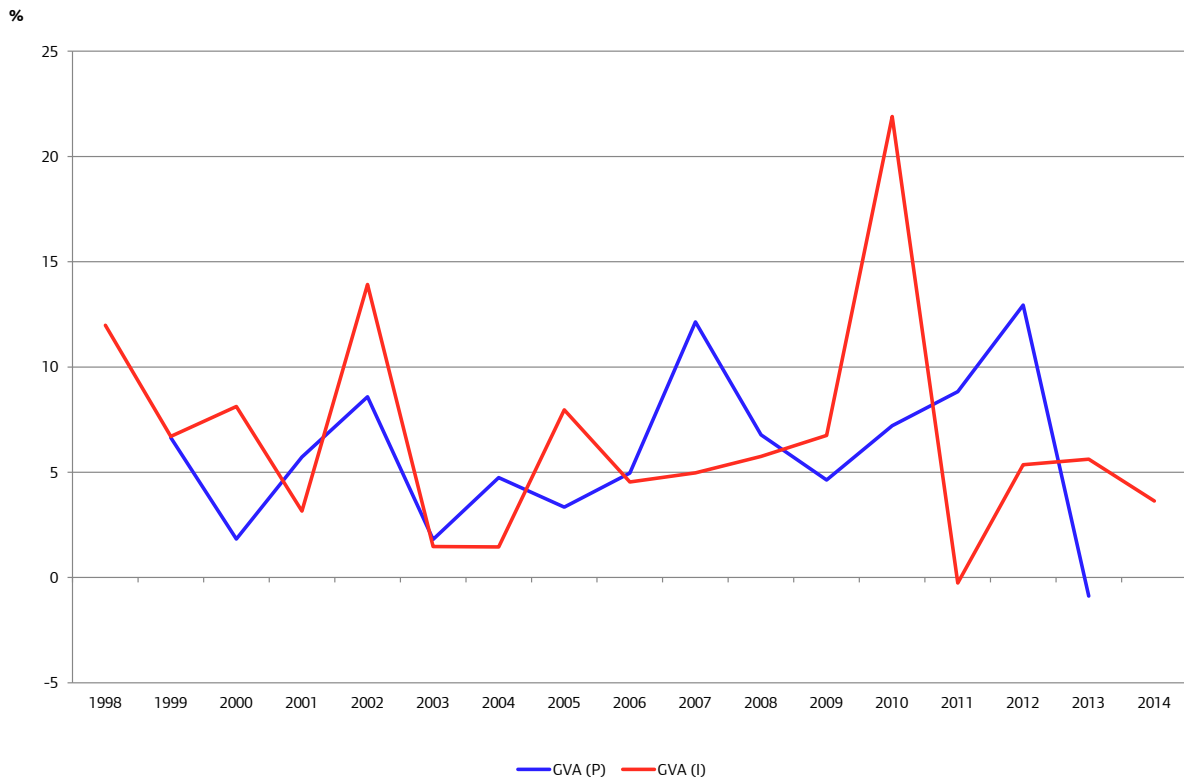
Source: ONS and GLA Economics

Figure A18: Arts, entertainment and recreation



Source: ONS and GLA Economics

Figure A19: Other service activities



Source: ONS and GLA Economics

Figure A20: Activities of households

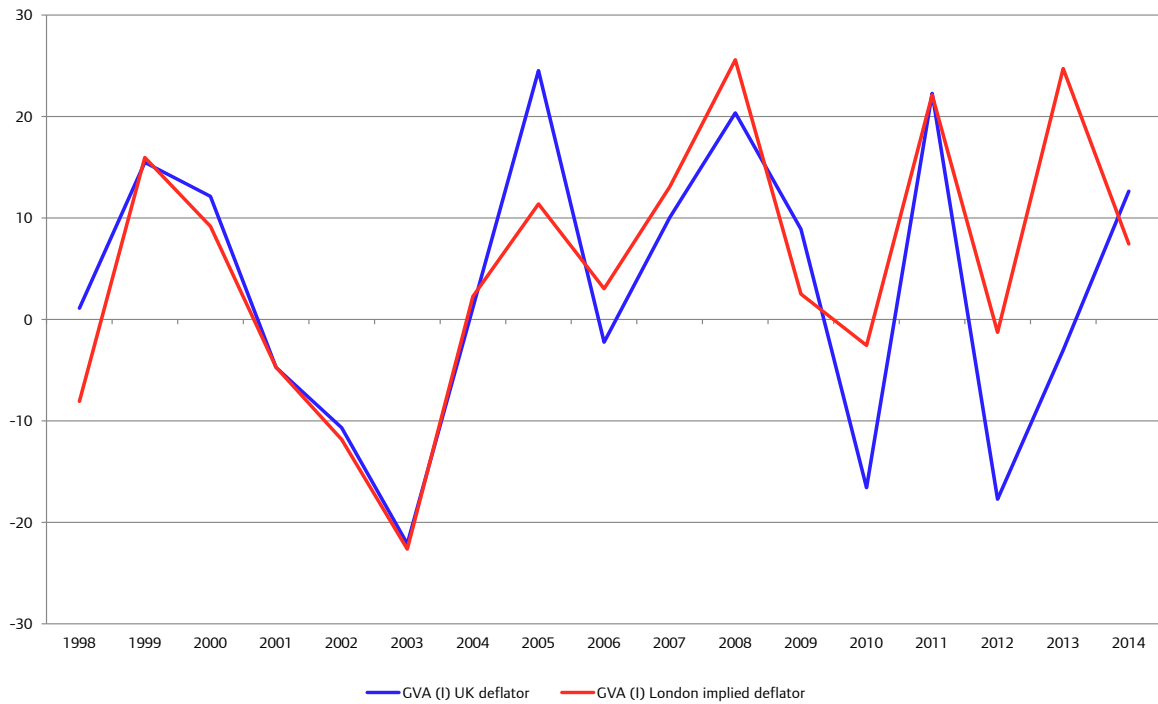


Source: ONS and GLA Economics

Appendix B: Real GVA (I) growth by sector in London (alternative deflators)

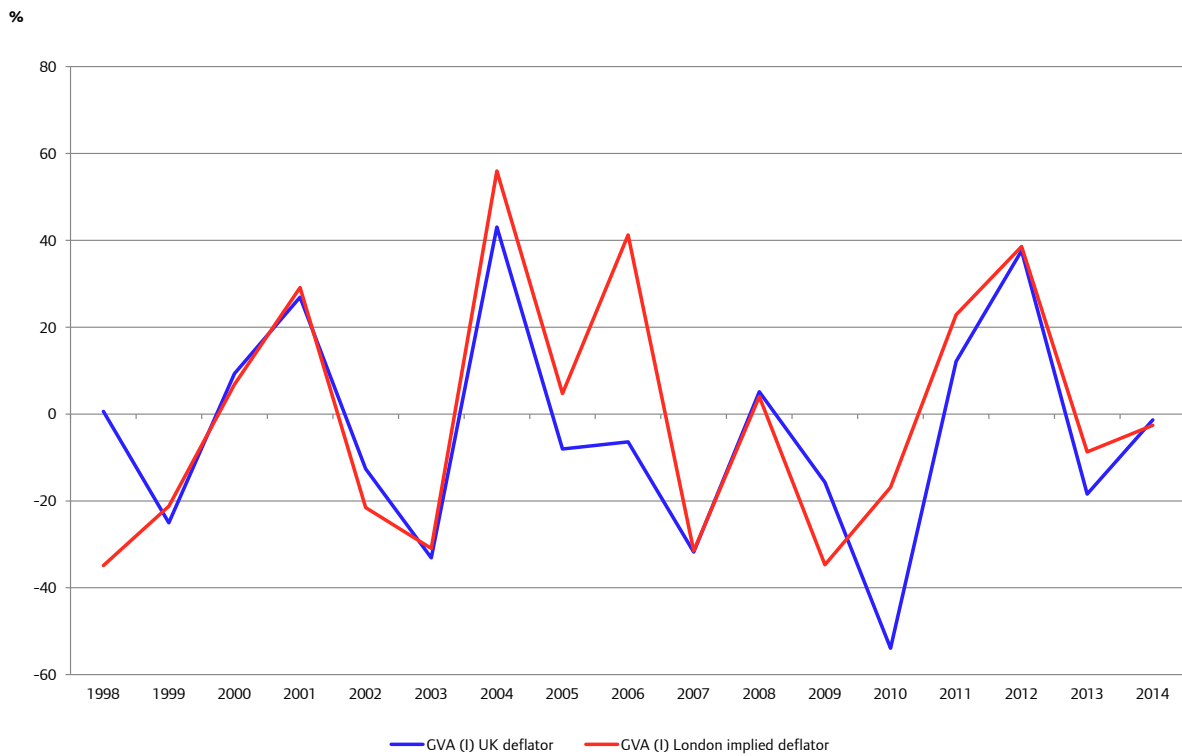
Note on alternative deflators: The difference between each of these series which follow is just the deflator used – one using UK deflators – the other using implied industry deflators.

Figure B1: Agriculture, forestry and fishing
%



Source: ONS and GLA Economics

Figure B2: Mining and quarrying



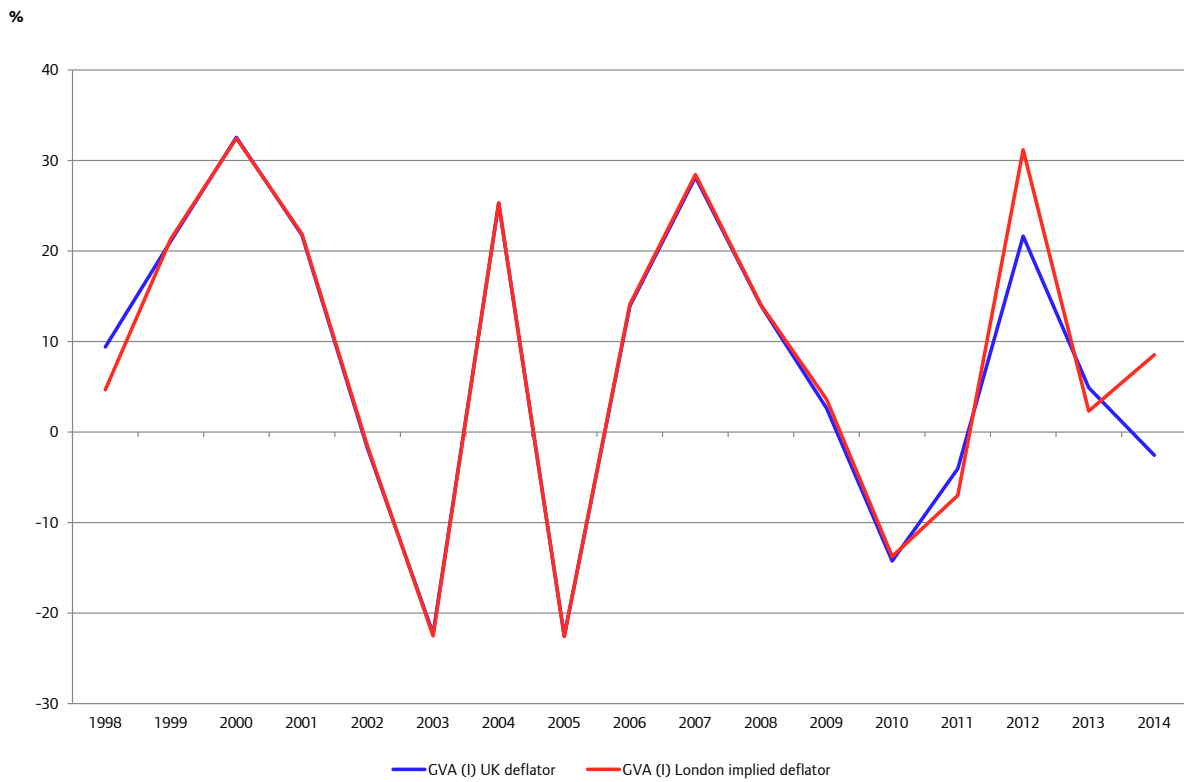
Source: ONS and GLA Economics

Figure B3: Manufacturing



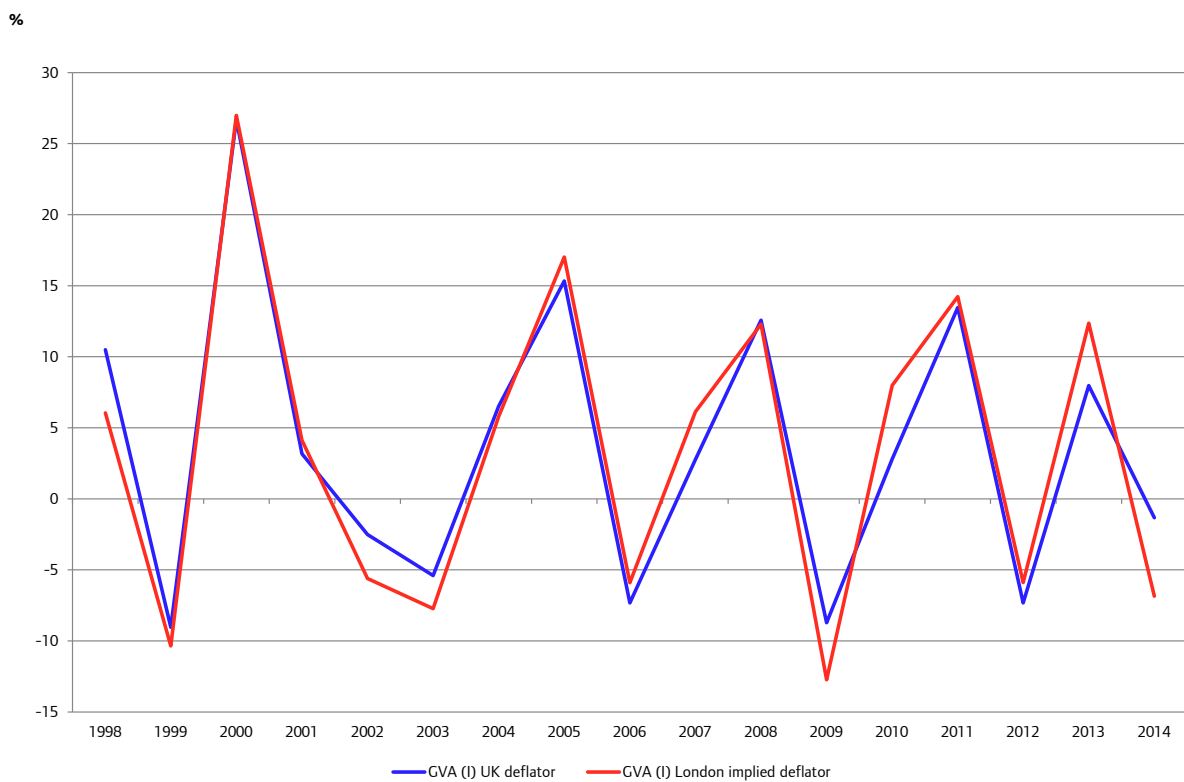
Source: ONS and GLA Economics

Figure B4: Electricity, gas, steam and air-conditioning supply



Source: ONS and GLA Economics

Figure B5: Water supply; sewerage and waste management



Source: ONS and GLA Economics

Figure B6: Construction



Source: ONS and GLA Economics

Figure B7: Wholesale and retail trade; repair of motor vehicles



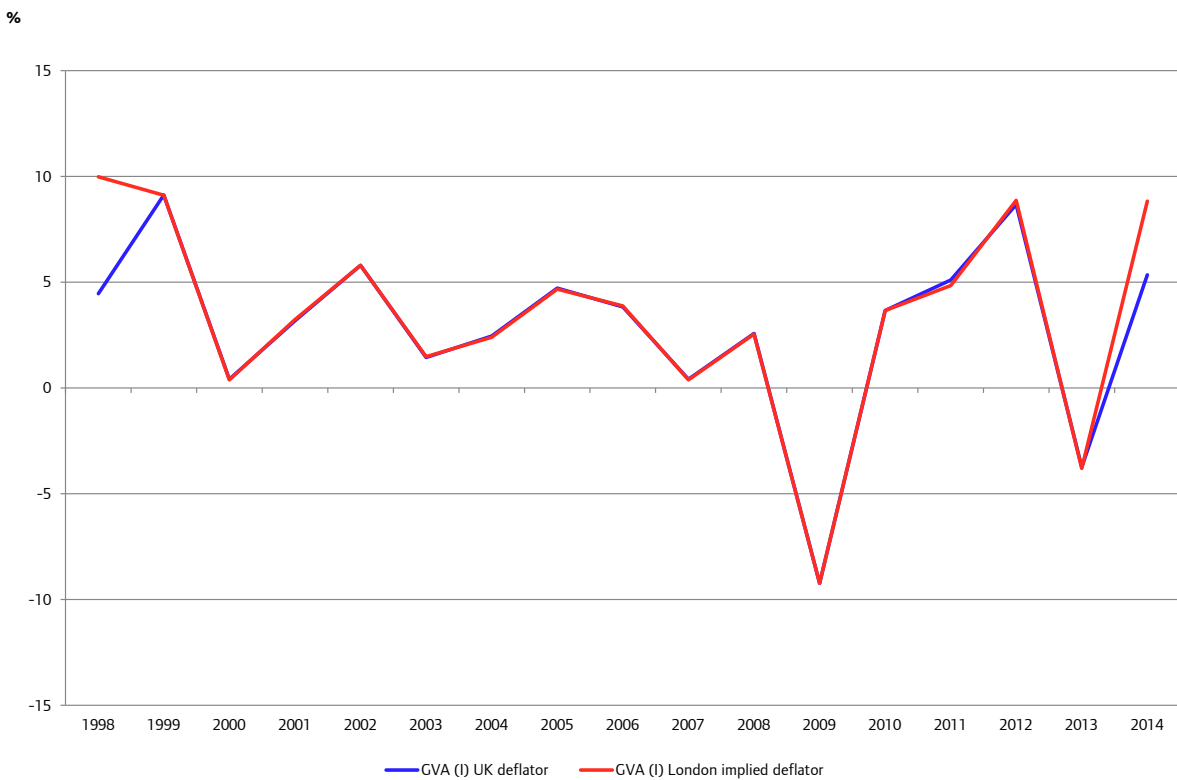
Source: ONS and GLA Economics

Figure B8: Transportation and storage



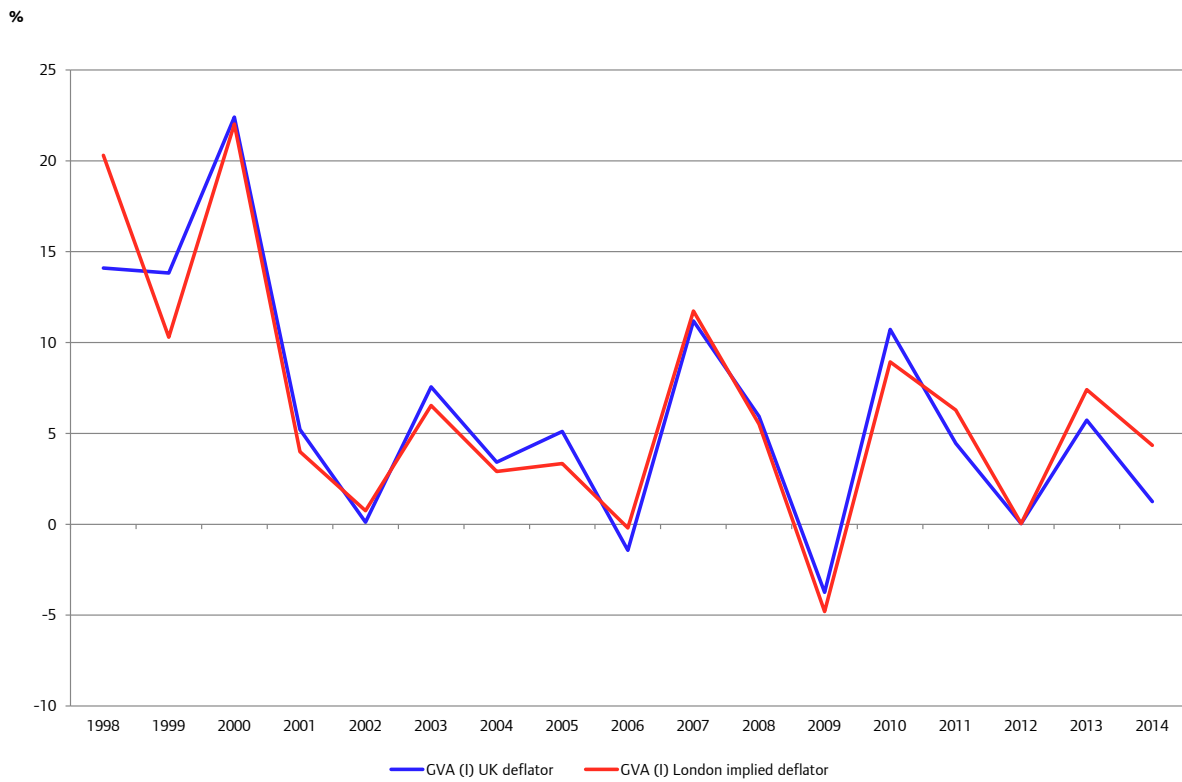
Source: ONS and GLA Economics

Figure B9: Accommodation and food service activities



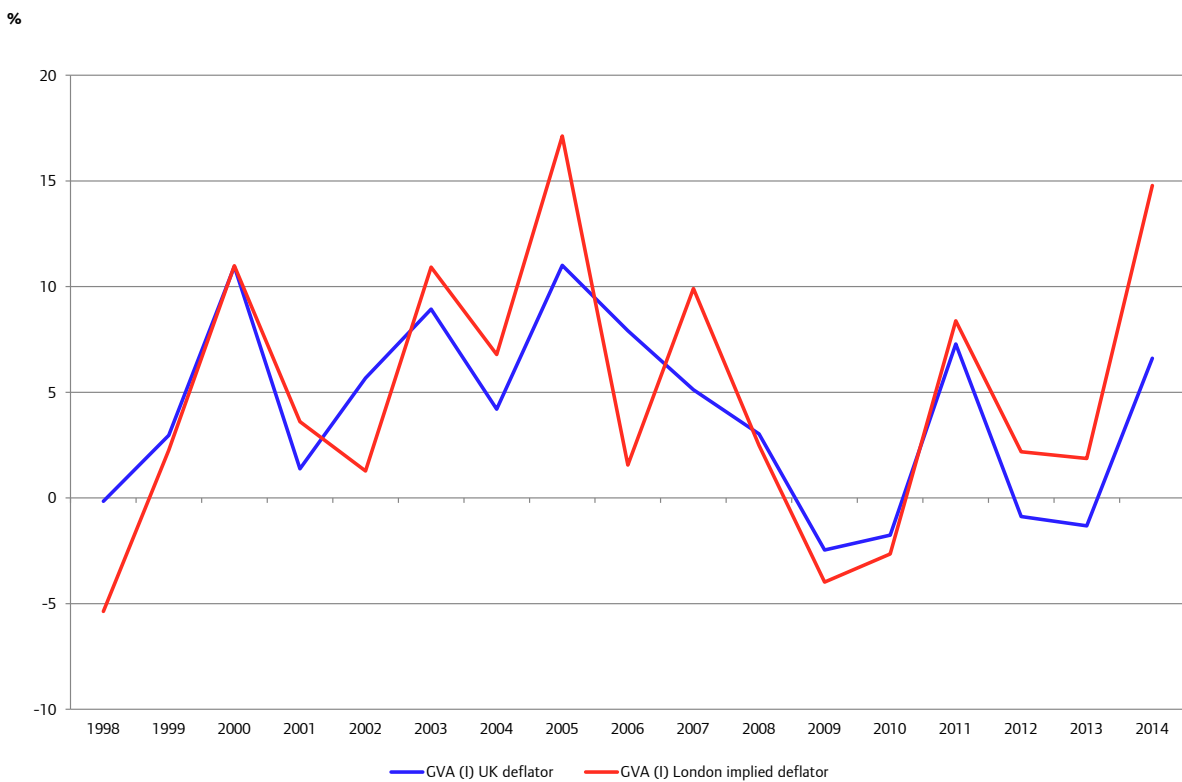
Source: ONS and GLA Economics

Figure B10: Information and communication



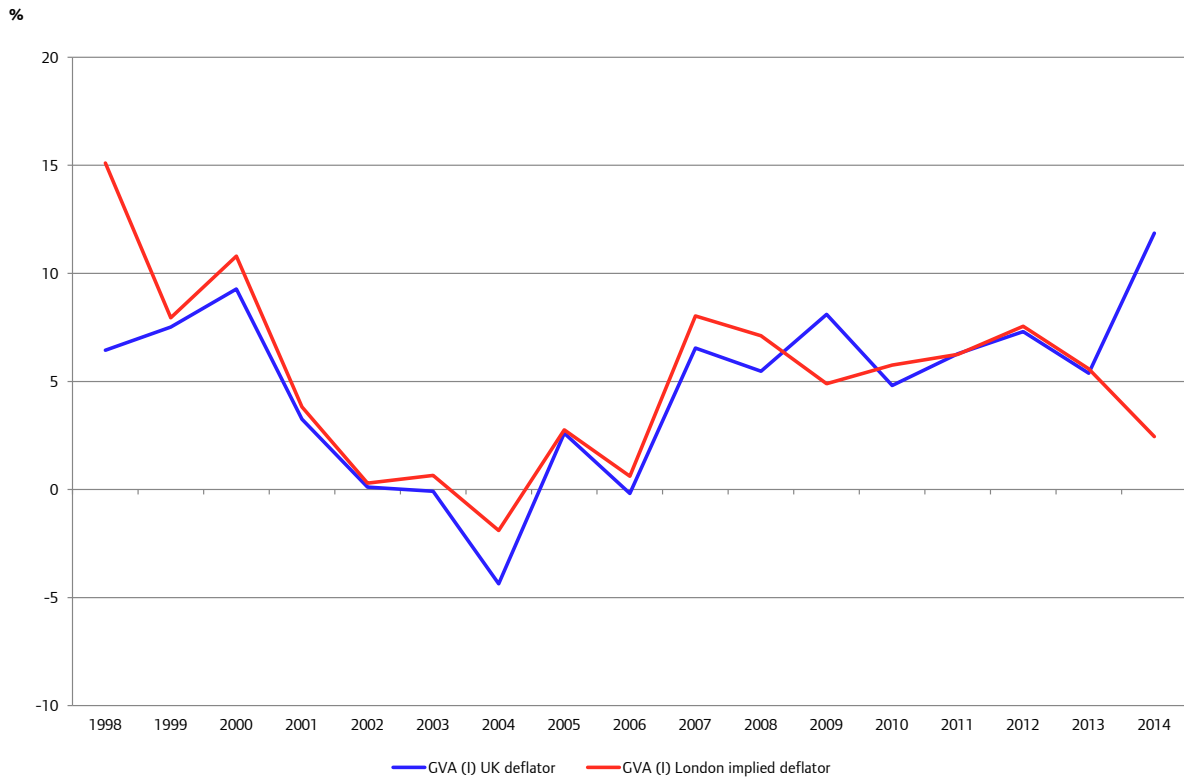
Source: ONS and GLA Economics

Figure B11: Financial and insurance activities



Source: ONS and GLA Economics

Figure B12: Real estate activities



Source: ONS and GLA Economics

Figure B13: Professional, scientific and technical activities



Source: ONS and GLA Economics

Figure B14: Administrative and support service activities



Source: ONS and GLA Economics

Figure B15: Public administration and defence; compulsory social security



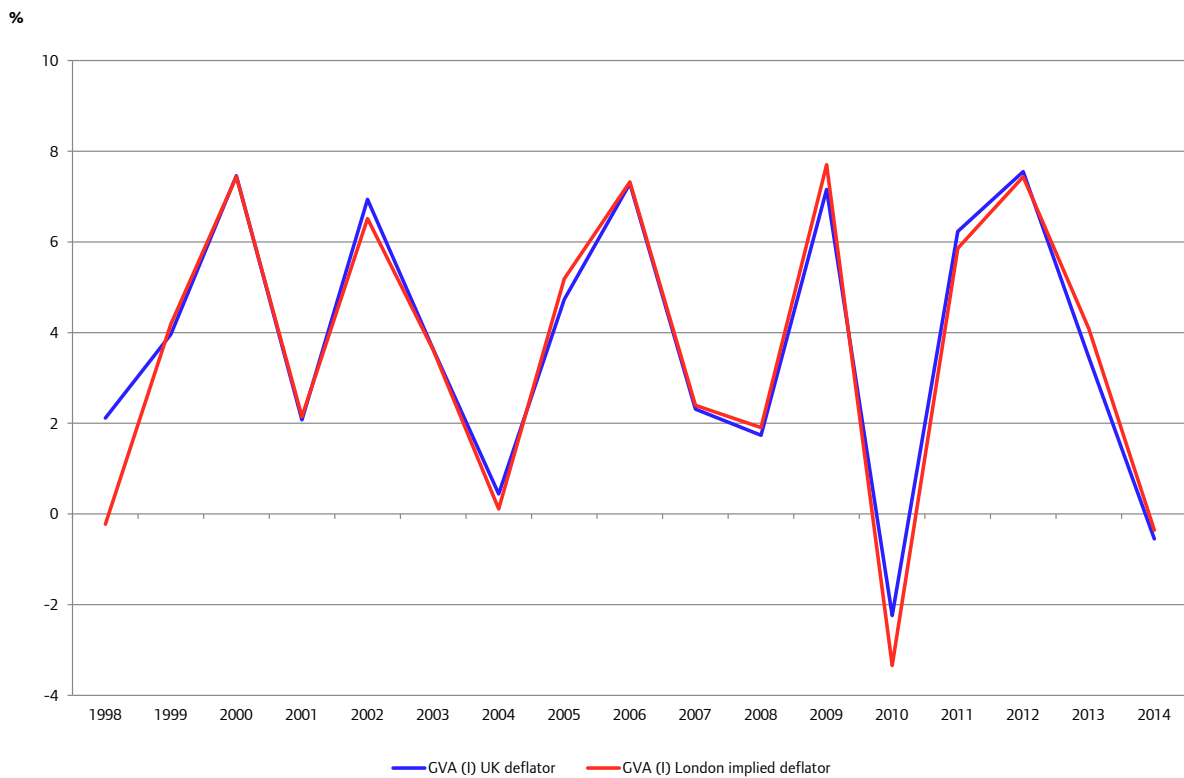
Source: ONS and GLA Economics

Figure B16: Education



Source: ONS and GLA Economics

Figure B17: Human health and social work activities



Source: ONS and GLA Economics

Figure B18: Arts, entertainment and recreation



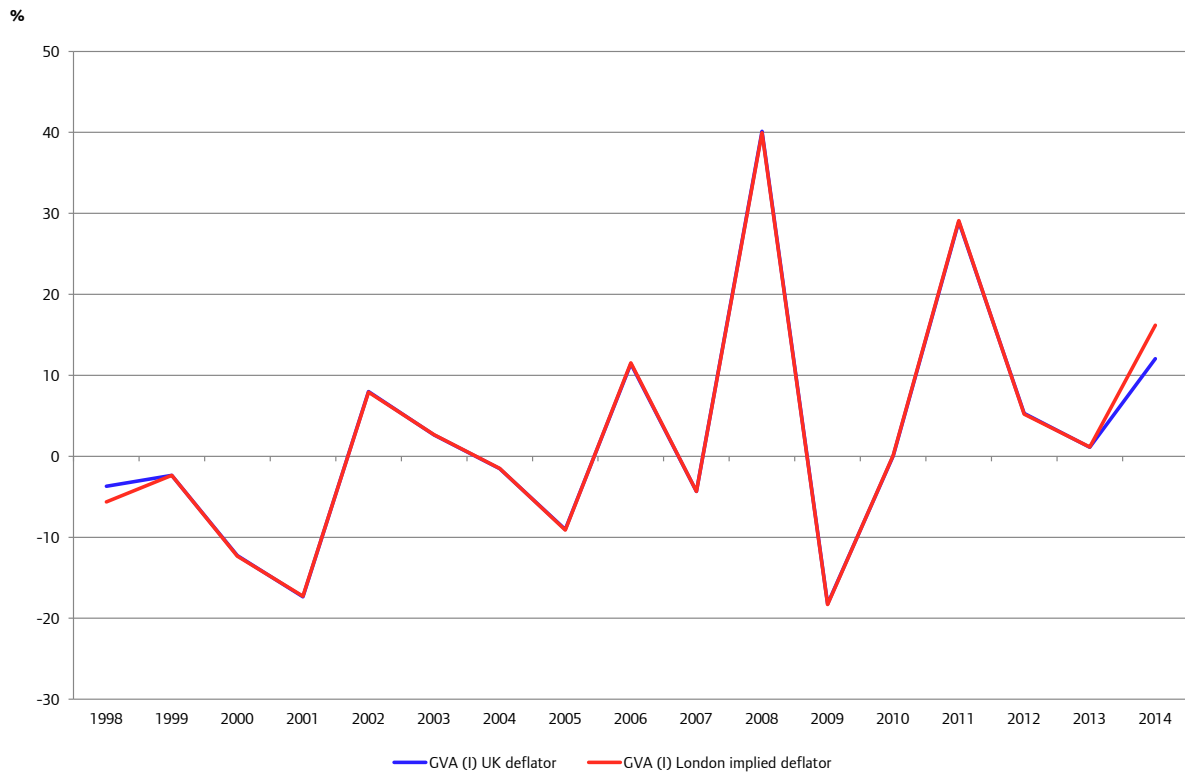
Source: ONS and GLA Economics

Figure B19: Other service activities



Source: ONS and GLA Economics

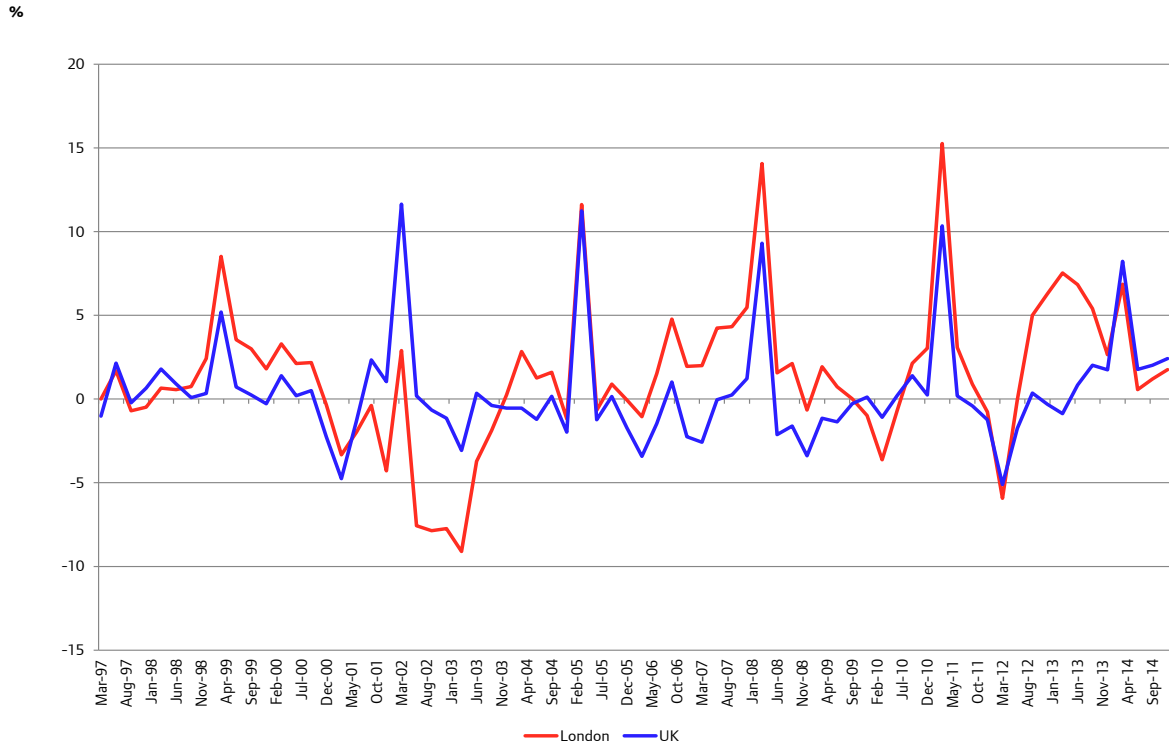
Figure B20: Activities of households



Source: ONS and GLA Economics

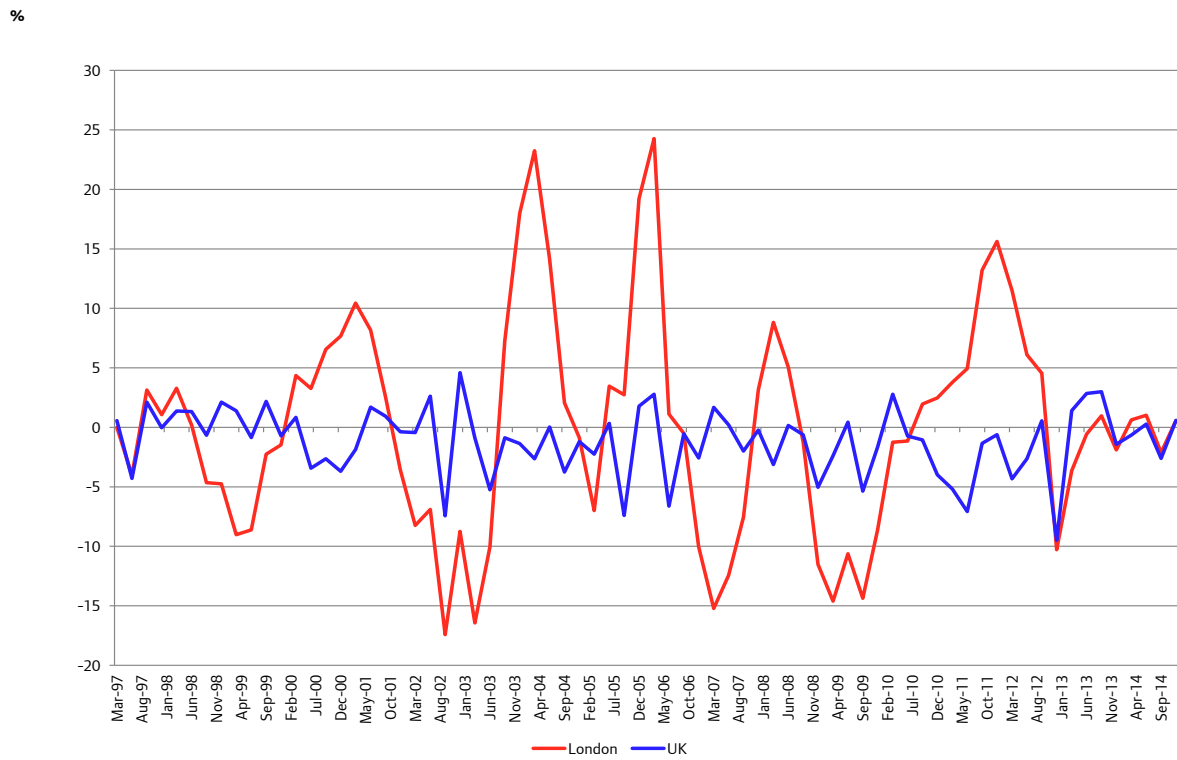
Appendix C: Modelled quarterly real GVA by sector in London & the UK

Figure C1: Agriculture, forestry and fishing



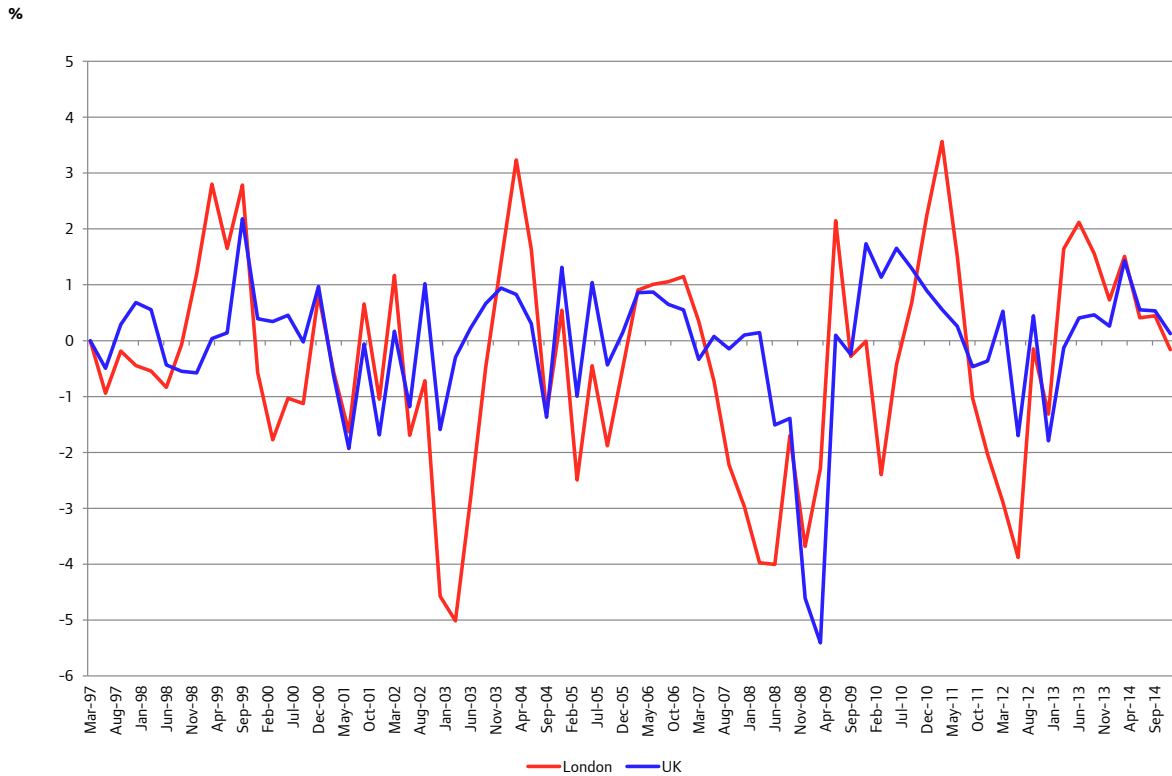
Source: ONS and GLA Economics

Figure C2: Mining and quarrying



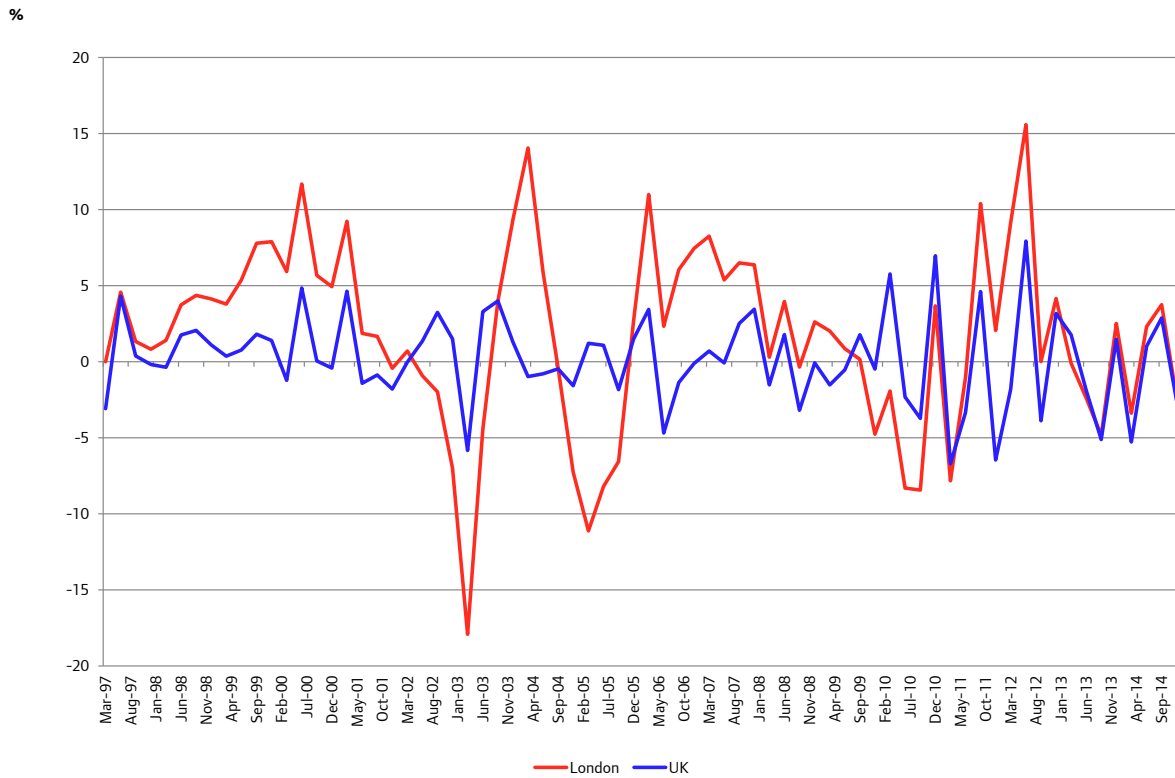
Source: ONS and GLA Economics

Figure C3: Manufacturing



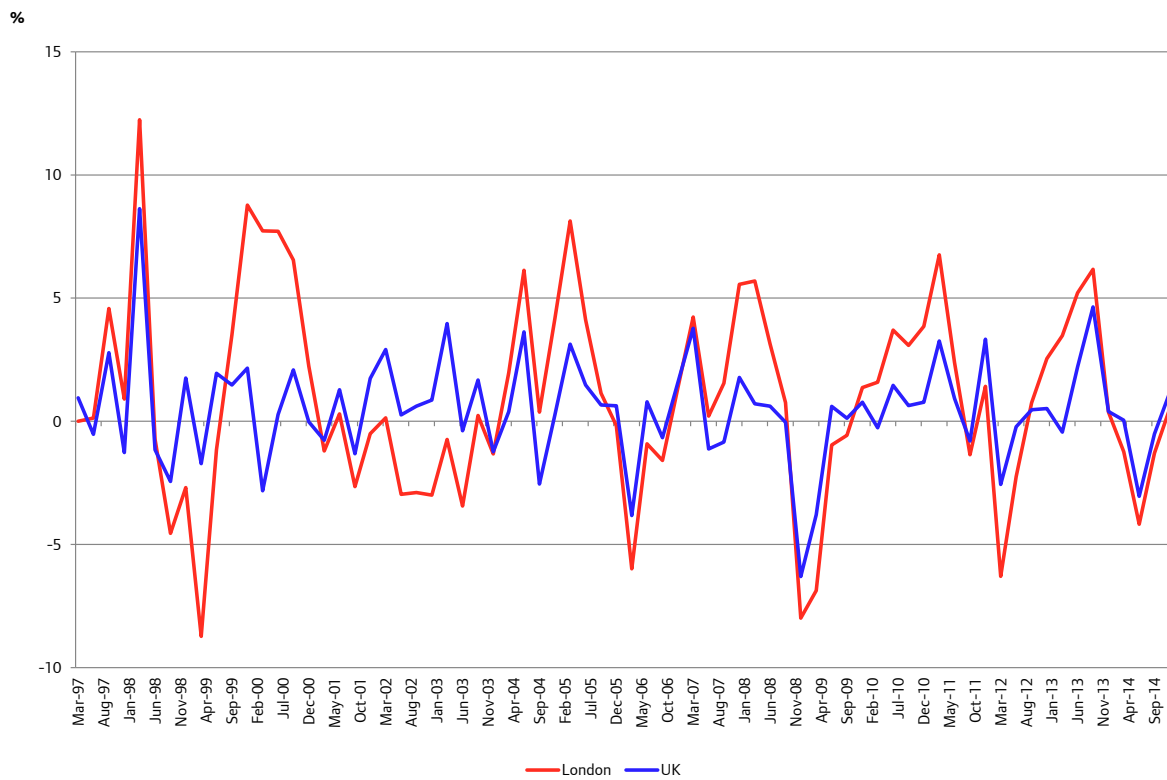
Source: ONS and GLA Economics

Figure C4: Electricity, gas, steam and air-conditioning supply



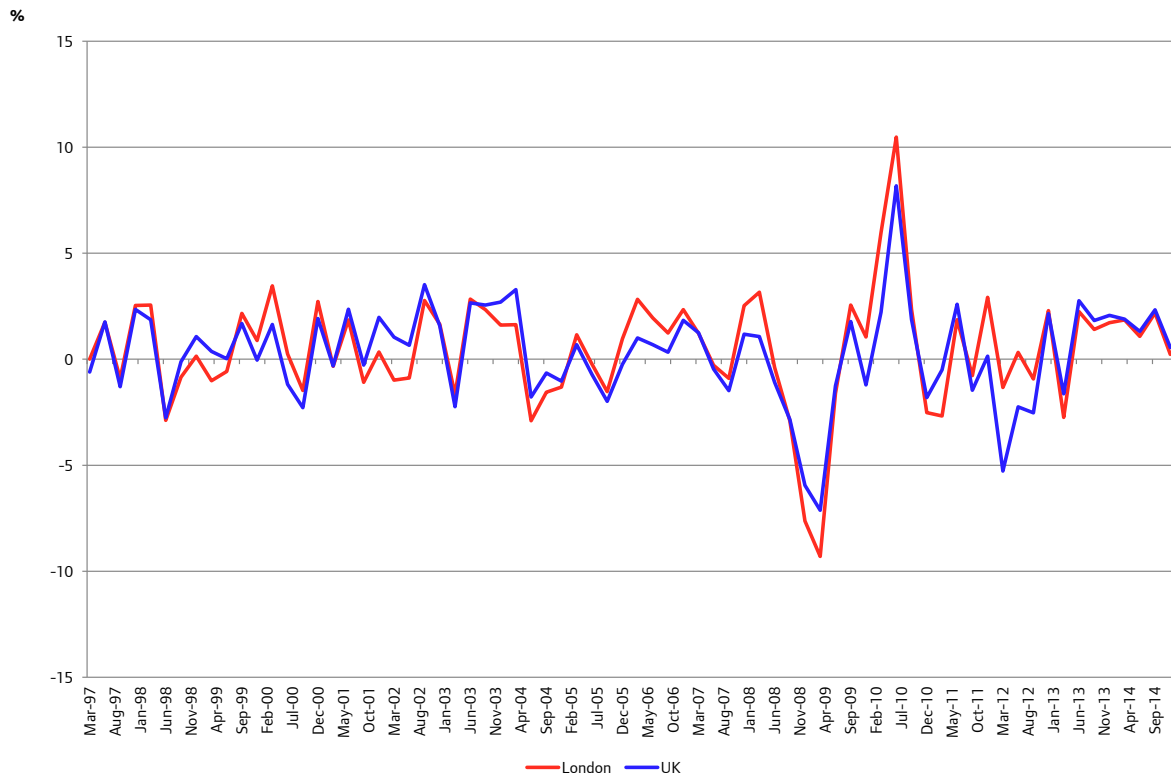
Source: ONS and GLA Economics

Figure C5: Water supply; sewerage and waste management



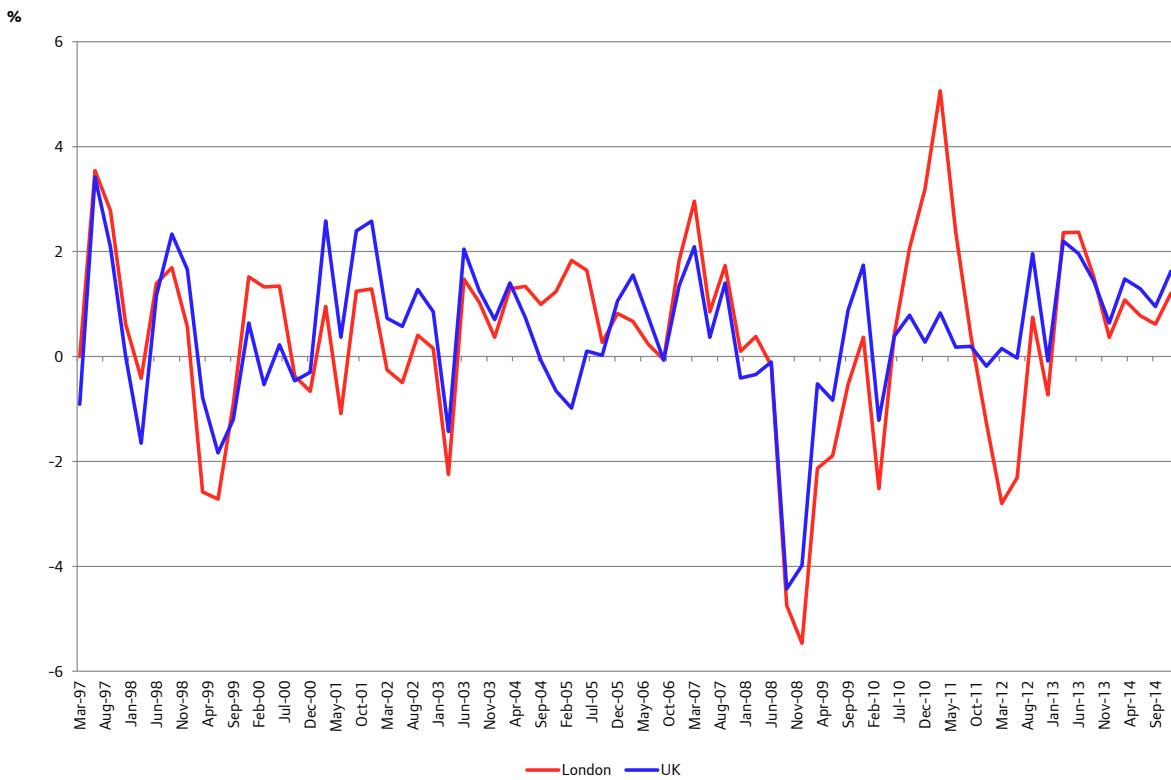
Source: ONS and GLA Economics

Figure C6: Construction



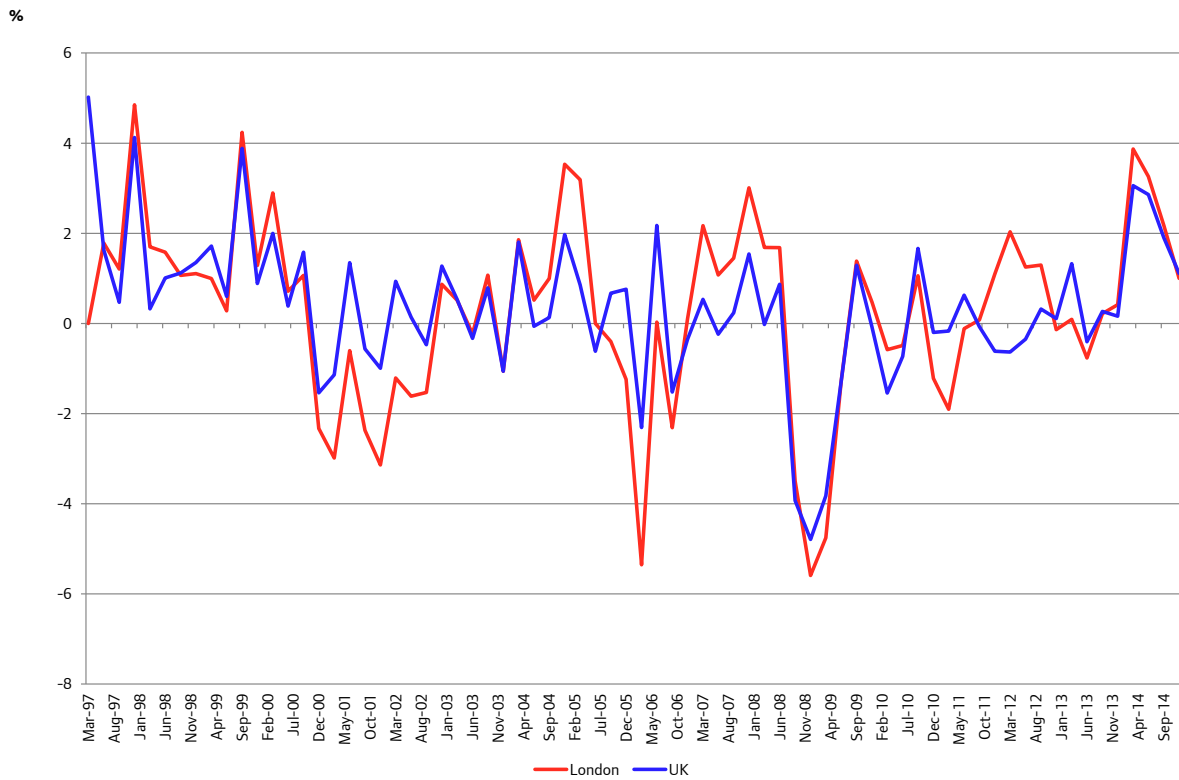
Source: ONS and GLA Economics

Figure C7: Wholesale and retail trade; repair of motor vehicles



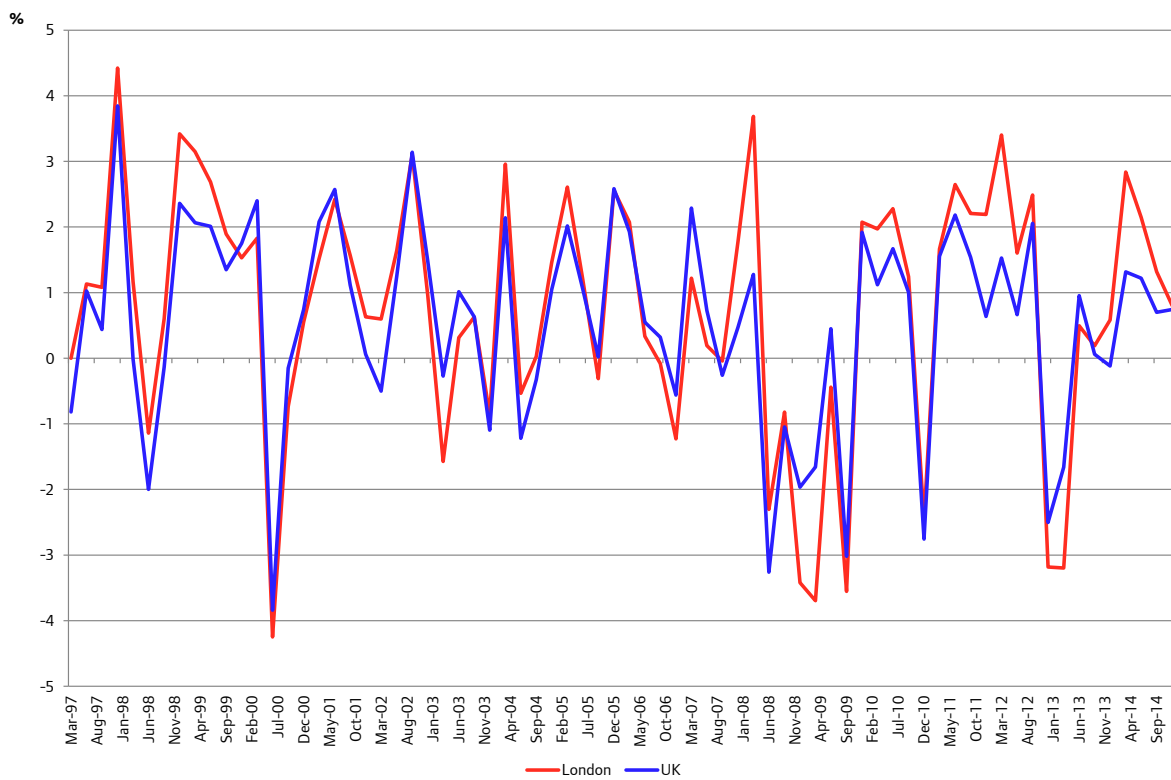
Source: ONS and GLA Economics

Figure C8: Transportation and storage



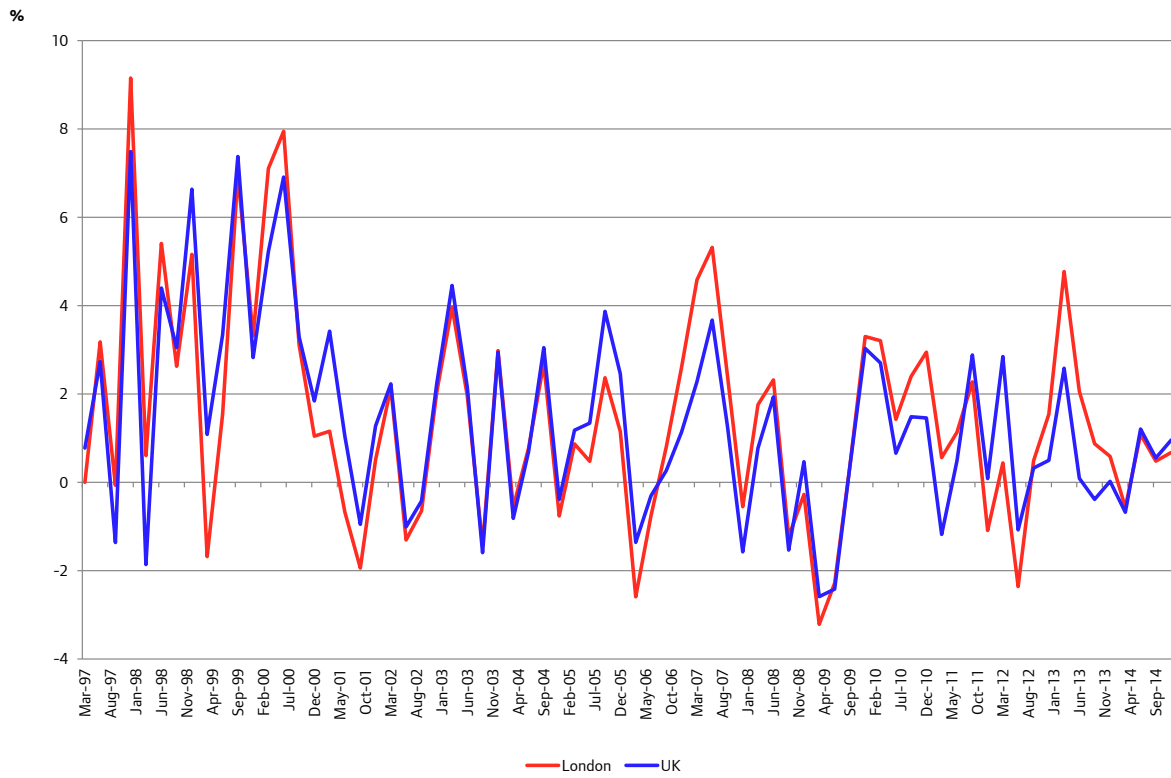
Source: ONS and GLA Economics

Figure C9: Accommodation and food service activities



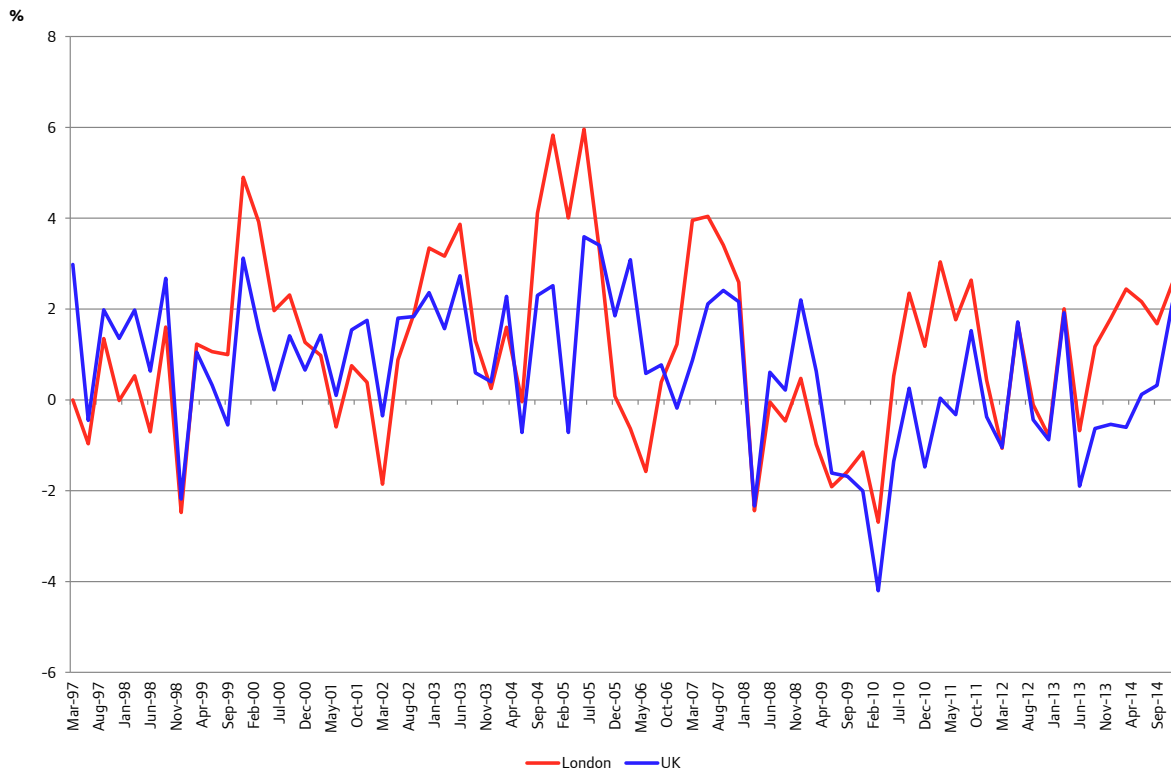
Source: ONS and GLA Economics

Figure C10: Information and communication



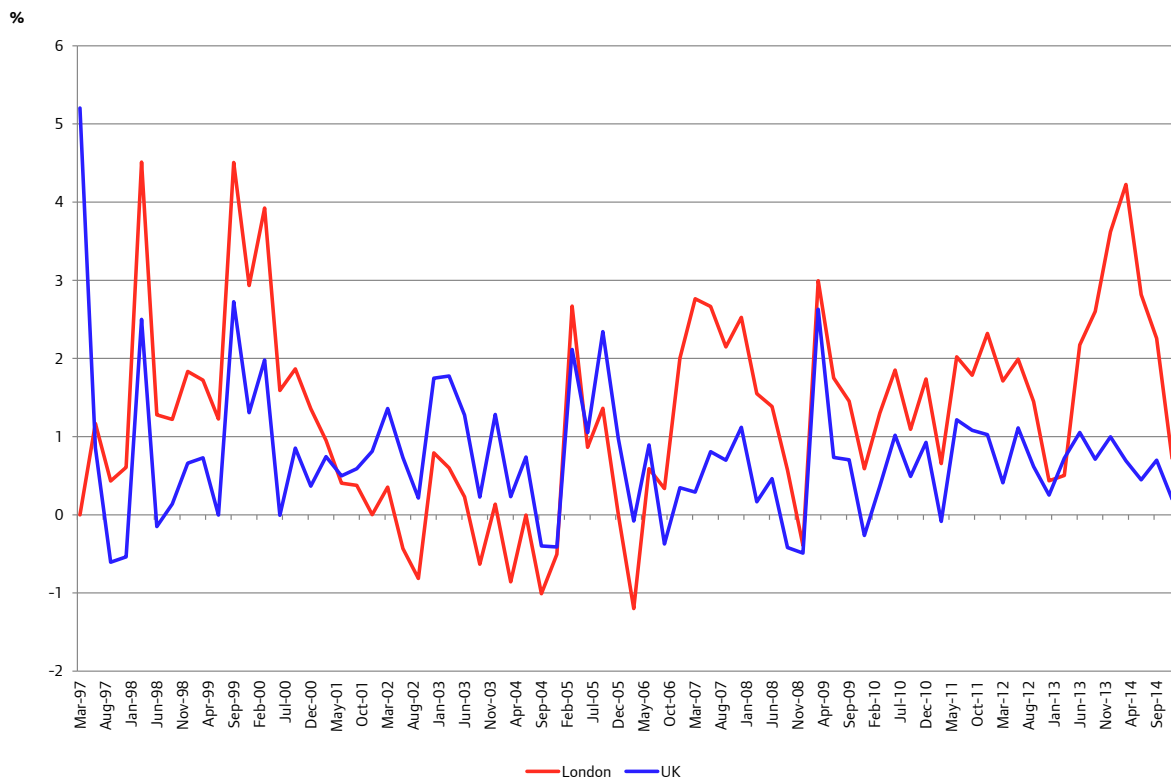
Source: ONS and GLA Economics

Figure C11: Financial and insurance activities



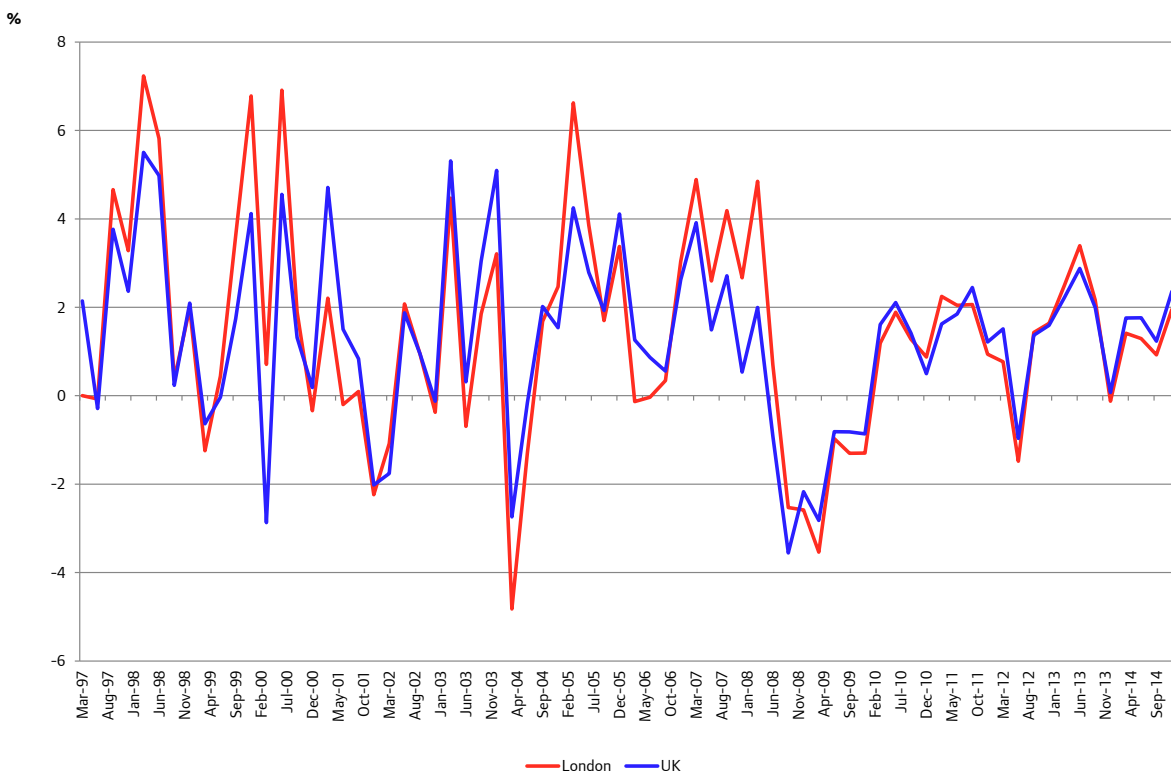
Source: ONS and GLA Economics

Figure C12: Real estate activities



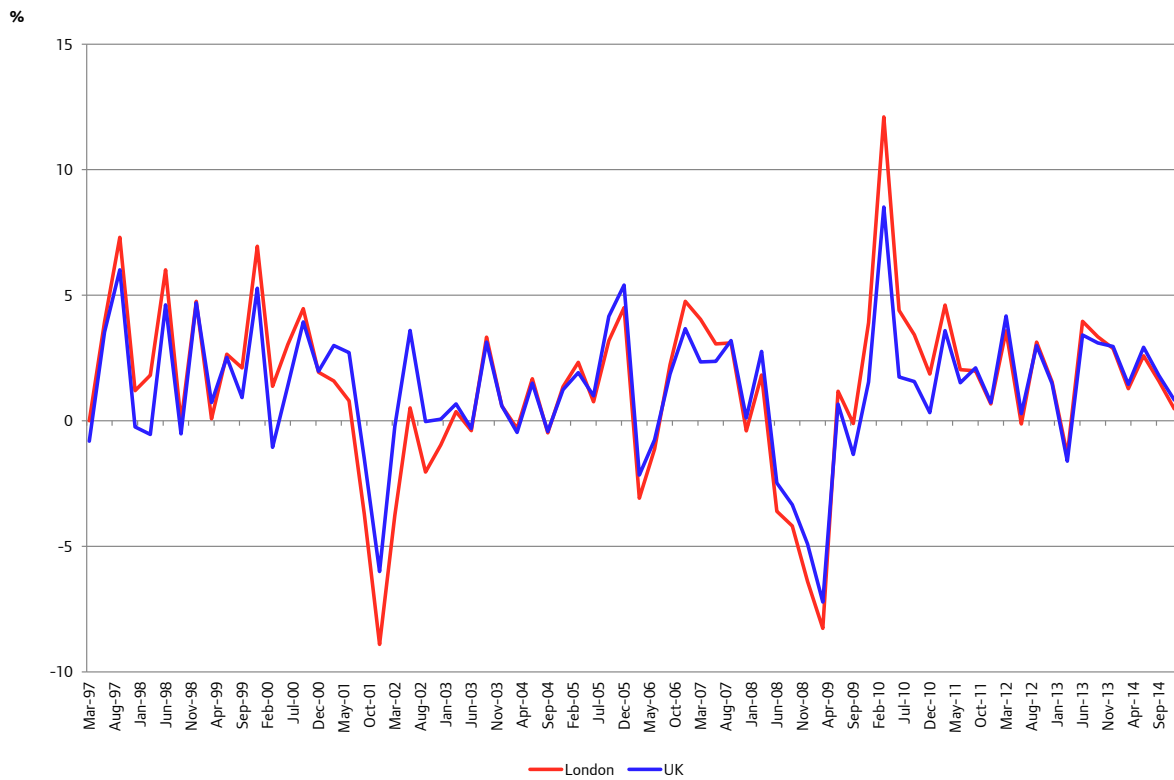
Source: ONS and GLA Economics

Figure C13: Professional, scientific and technical activities



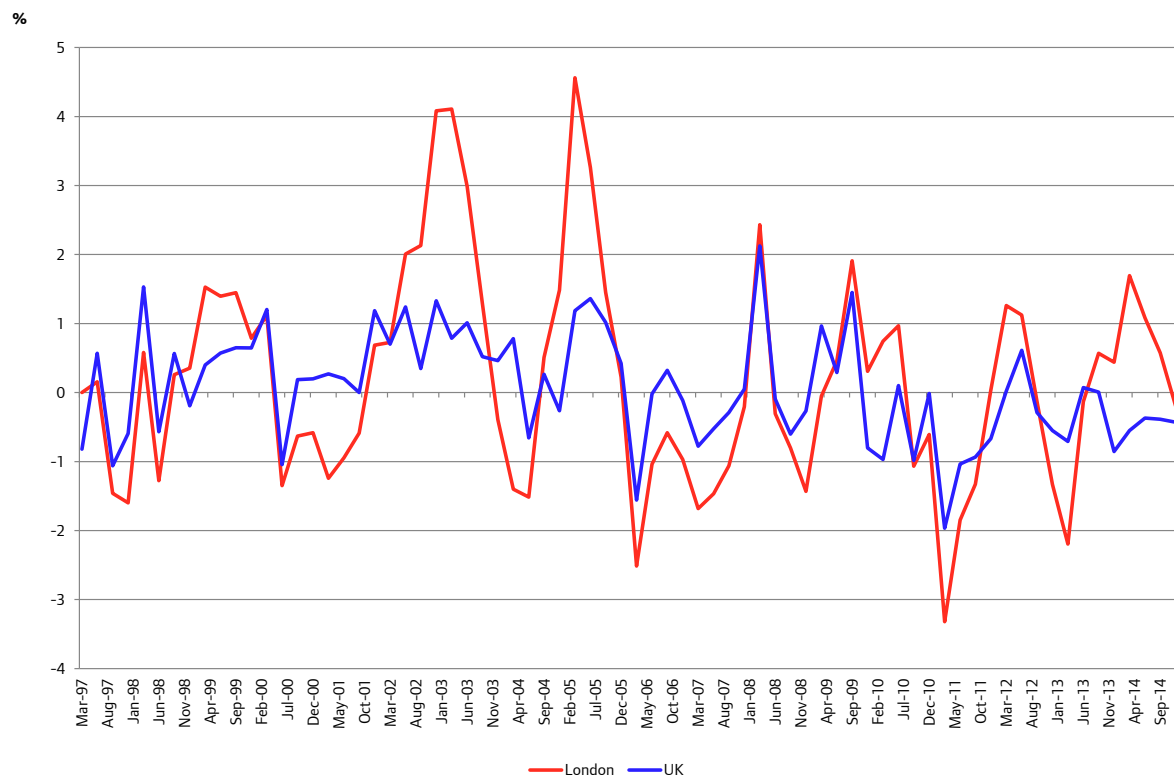
Source: ONS and GLA Economics

Figure C14: Administrative and support service activities



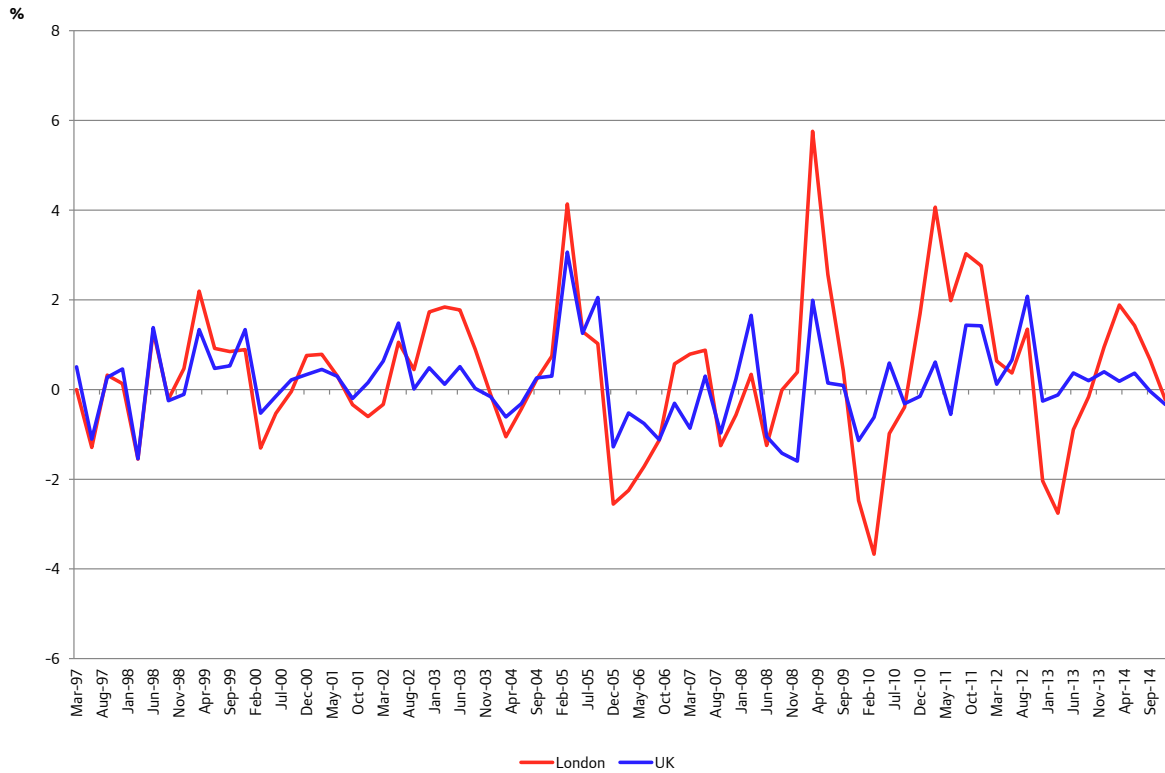
Source: ONS and GLA Economics

Figure C15: Public administration and defence; compulsory social security



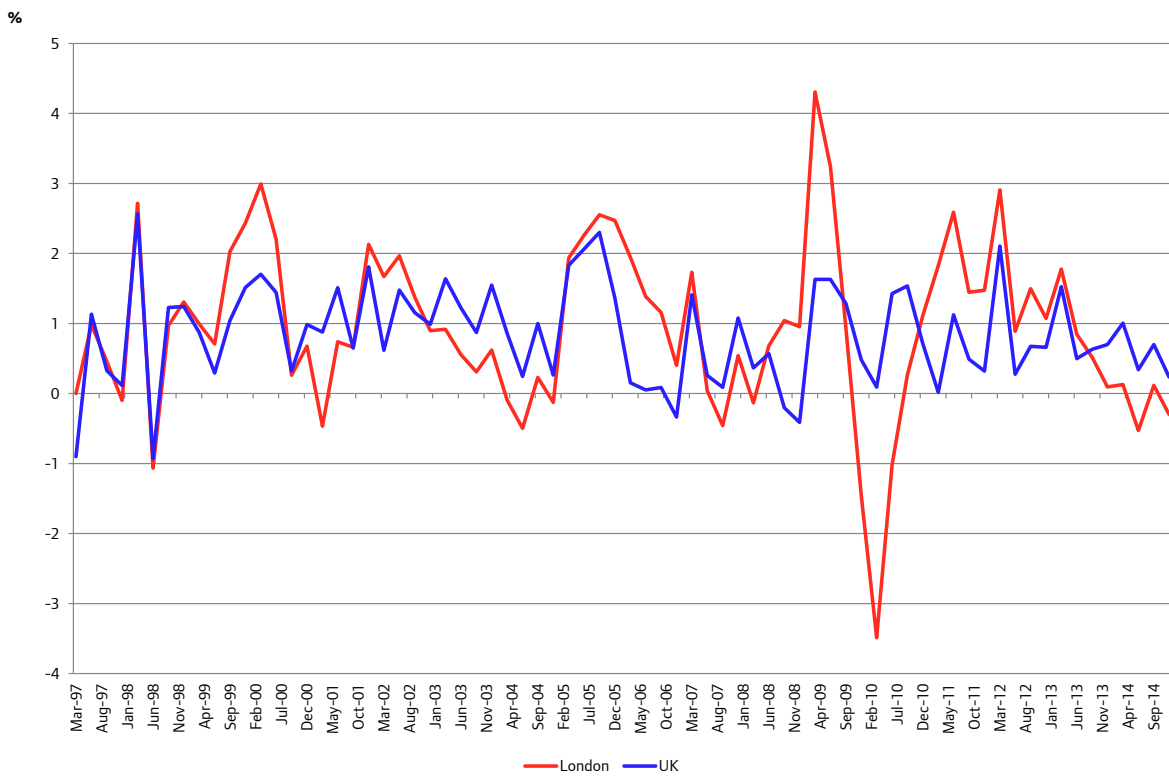
Source: ONS and GLA Economics

Figure C16: Education



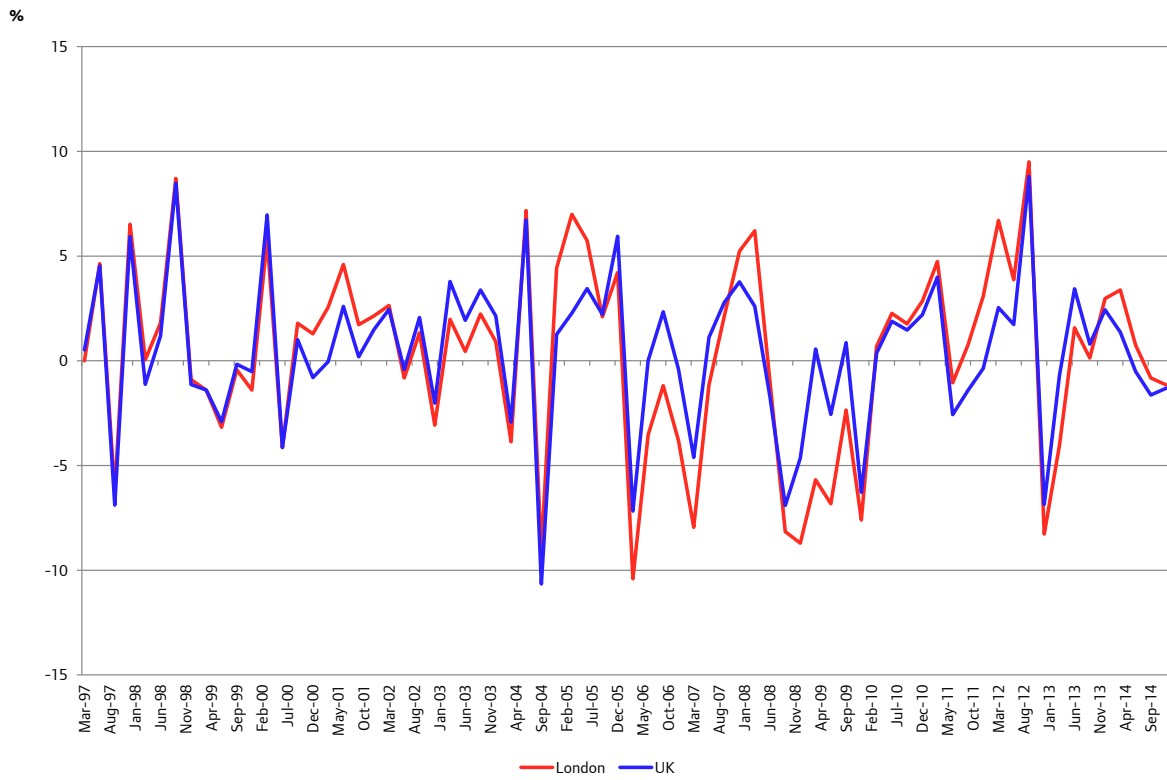
Source: ONS and GLA Economics

Figure C17: Human health and social work activities



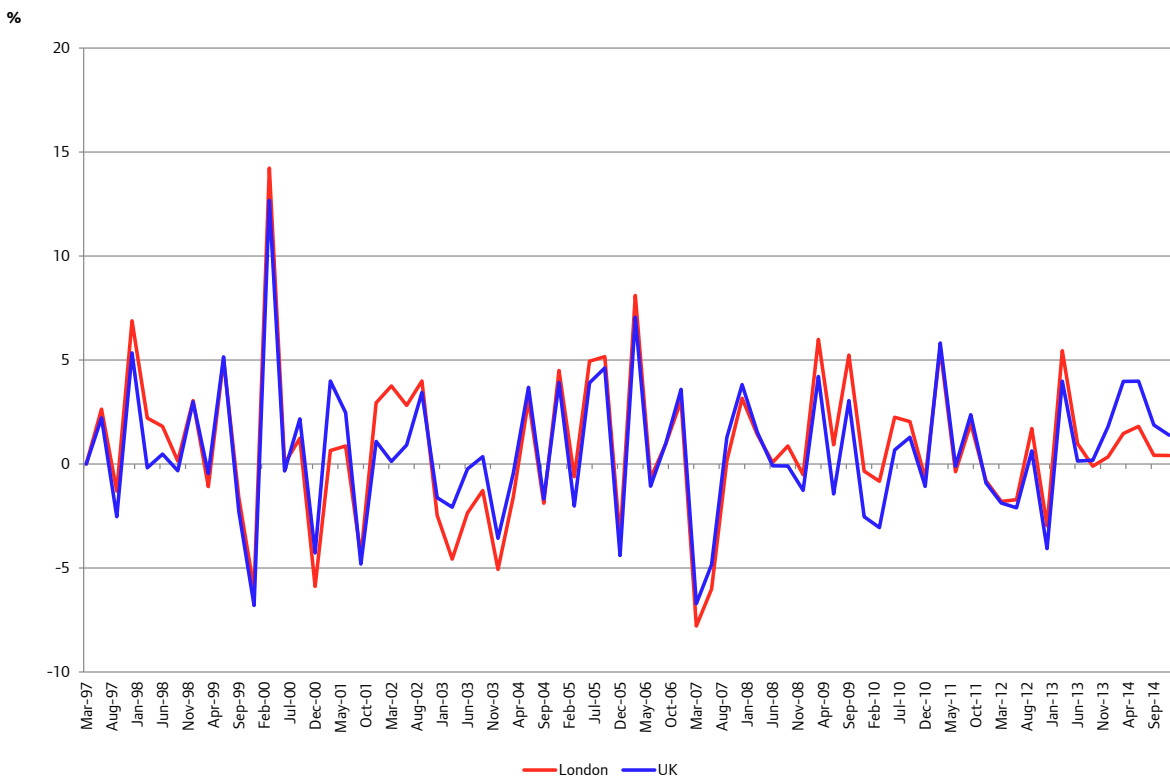
Source: ONS and GLA Economics

Figure C18: Arts, entertainment and recreation



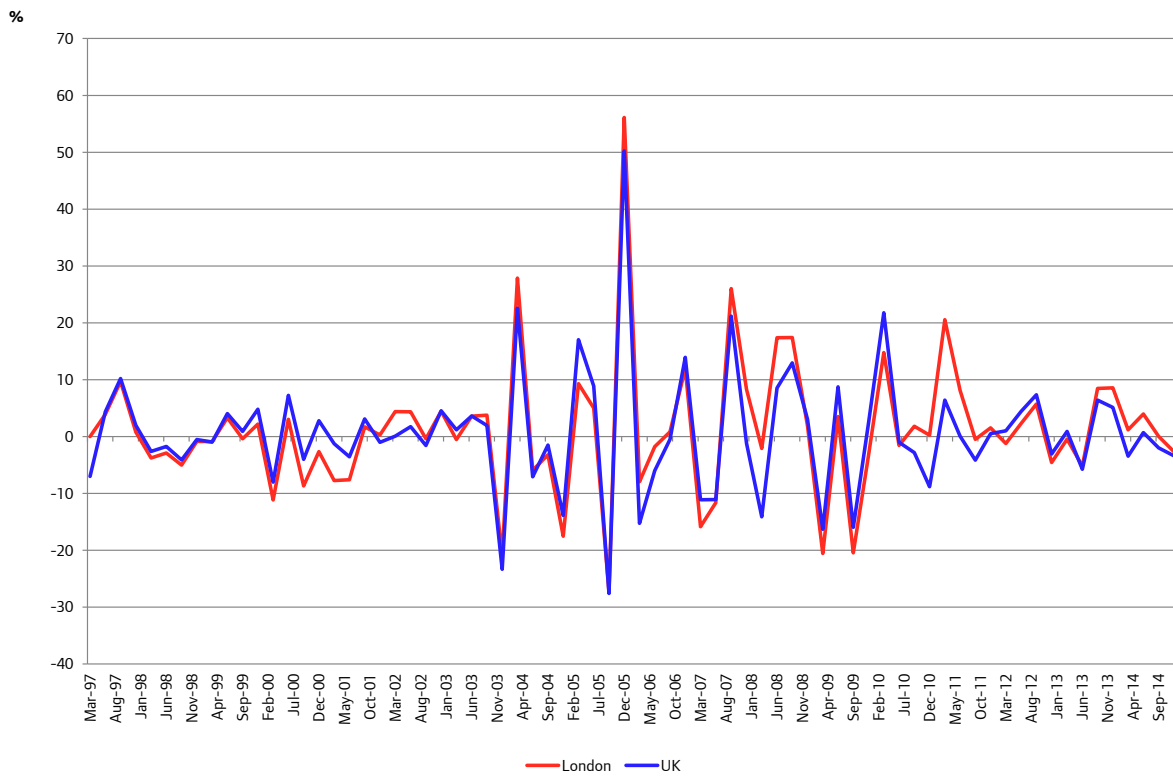
Source: ONS and GLA Economics

Figure C19: Other service activities



Source: ONS and GLA Economics

Figure C20: Activities of households



Source: ONS and GLA Economics

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