

## Article

# Public service productivity: total, UK, 2017

Updated measures of output, inputs and productivity for public services in the UK between 1997 and 2017. Includes service area breakdown, as well as impact of quality adjustment and latest revisions.



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# 1 . Main points

- Total public service productivity grew for the seventh consecutive year in 2017, but growth of 0.3% was the joint slowest annual rate since 2010
- Healthcare remains the service area with the strongest contribution to overall public service productivity in 2017, owing to its large share of total expenditure and positive growth of 0.9% compared with 2016
- Total inputs grew by 0.7% and total output grew by 1.0% in 2017; this was principally driven by changes in inputs and output growth from healthcare
- Three out of the four services areas with a quality adjustment saw an improvement in quality in 2017 (healthcare, education and adult social care), whereas public order and safety quality declined
- Because of methodological improvements, productivity is estimated to have grown at a slightly slower rate over the time series compared with previous estimates

## 2 . Total public service productivity

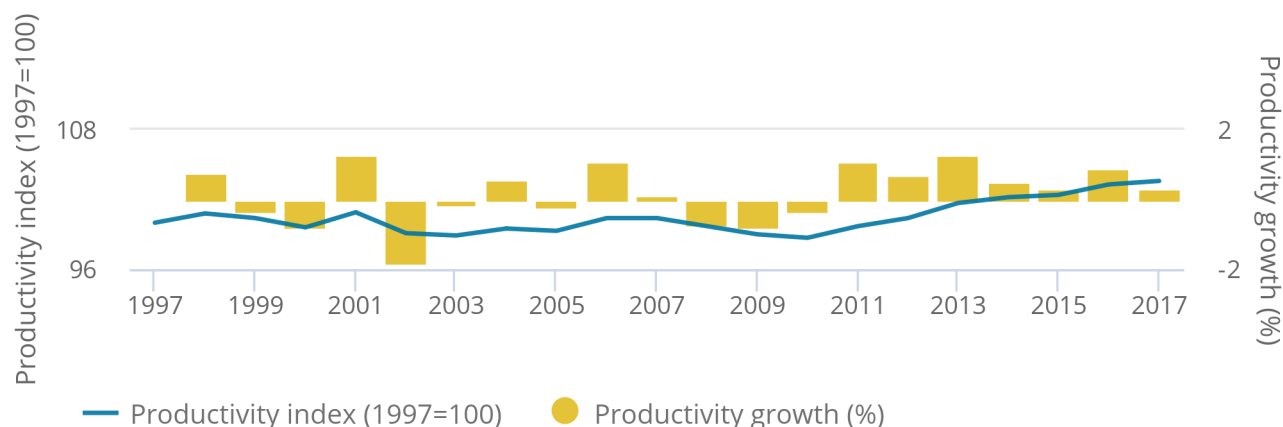
Productivity is the measure of how many units of output are produced from one unit of inputs, and is calculated by dividing total output by total inputs. Public service productivity grew for the seventh consecutive year in 2017, increasing by 0.3% from 2016. The index for productivity and the year-on-year growth rates are shown in Figure 1.

**Figure 1: Public service productivity continues an upwards trend that began in 2011**

Total public service productivity growth rates and index, UK, 1997 to 2017

**Figure 1: Public service productivity continues an upwards trend that began in 2011**

Total public service productivity growth rates and index, UK, 1997 to 2017



**Source:** Office for National Statistics

**Notes:**

1. The bars, showing year-on-year growth, are referenced to the right-hand side axis and the line, showing the productivity index, is referenced to the left-hand side axis.

From 1997 up to and including 2009, average annual growth in total public service productivity was negative 0.1%. This period included years of both positive and negative growth in productivity. From 2010 to 2017, the average annual growth rate was 0.7%, reflecting more stable and positive growth. However, growth of 0.3% in 2017 was the weakest in the post-downturn period with the exception of 2015.

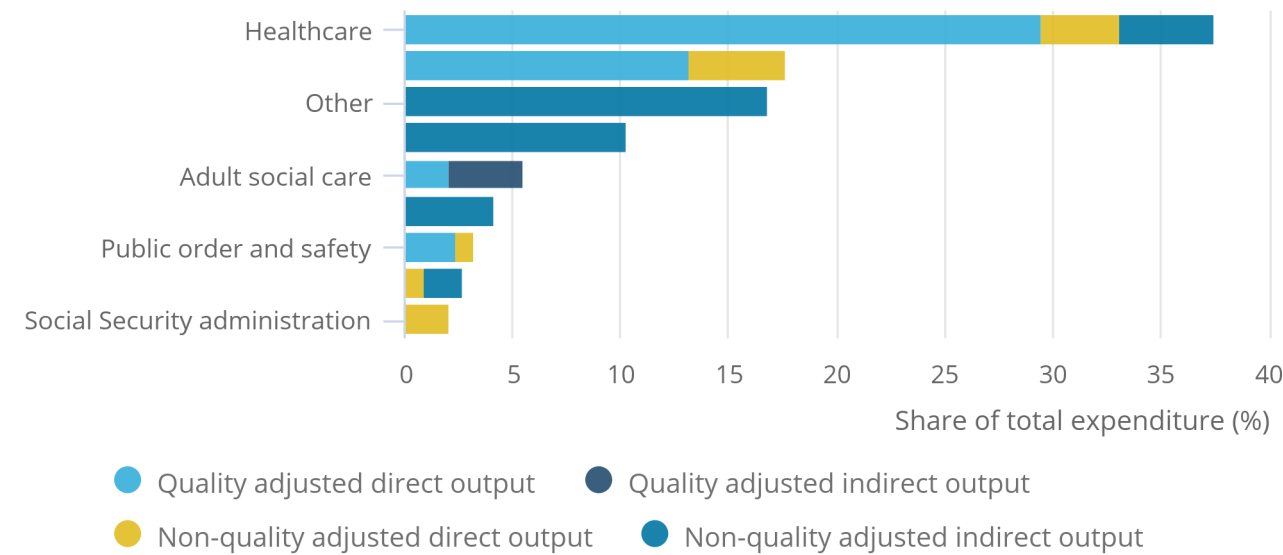
Nine different service areas are included in these estimates of productivity growth. Figure 2 shows the areas, listed in order of their share of total government expenditure in 2017. Healthcare is the largest, followed by education and then other government services (which comprises the variety of smaller services delivered such as recreation and housing). The different colours within each bar show the proportions of that service area that are directly or indirectly measured, and whether each of these are adjusted for quality – more detail can be found in Section 15. The preferred method is to use direct measures and quality adjustments.

**Figure 2: Healthcare is the largest service in the UK by expenditure, followed by education**

Expenditure shares and output types by service area, UK, 2017

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Expenditure shares and output types by service area, UK, 2017



Source: Office for National Statistics

Notes:

1. Police is measured separately to public order and safety, which includes courts, prisons, and the fire services.
2. Adult social care (ASC) includes some quality adjusted indirectly measured output and is the only service area to do so – for more information on the ASC adjustment, see [Public service productivity: adult social care, sources and methods, 2019 update](#).
3. Details on what is included in each service area is included in the service area specific sections of this article.
4. The contributions may not fully sum to the total because of rounding.

Overall, 50.6% of total public services are adjusted for quality (the sum of the light blue and the dark blue bars in Figure 2). A further 11.9% of output is non-quality adjusted and directly measured (the yellow bars in Figure 2), and the remaining 37.5% is non-quality adjusted and indirectly measured (the mid-blue bars in Figure 2).

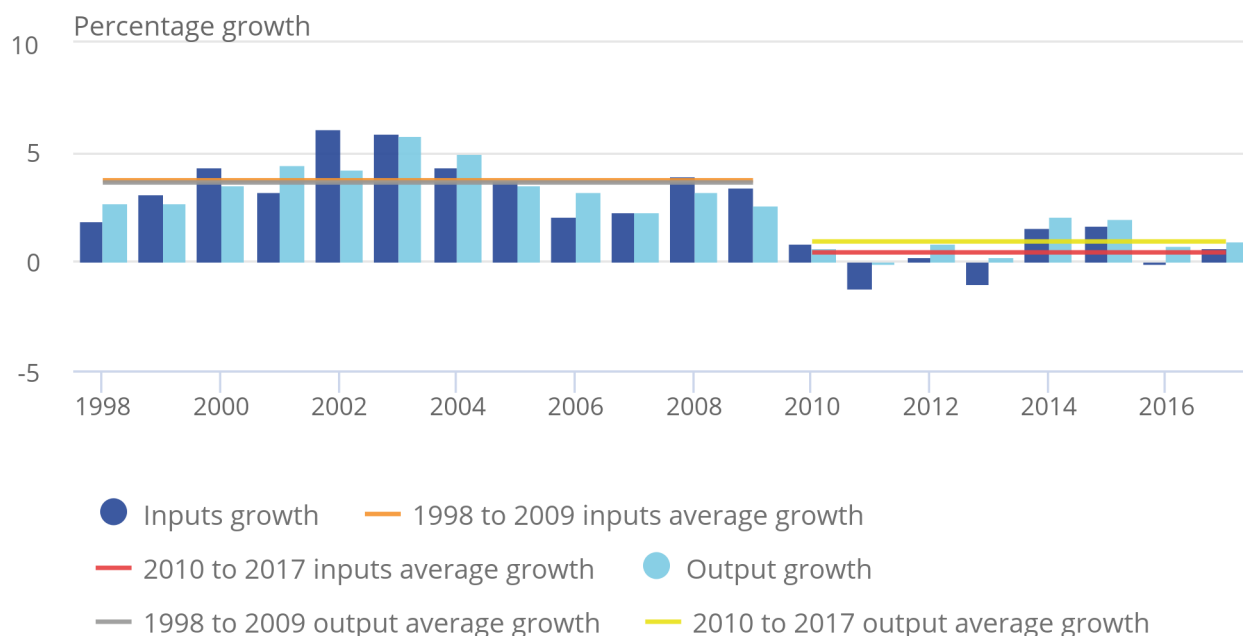
To further explore the increase in productivity from 2010 onwards, Figure 3 shows growth rates of inputs and output each year. It demonstrates that since 2010 there was a clear shift, with both inputs and outputs growth falling, but output now growing more rapidly than inputs, which was not the case prior to that point. This reflects a period of constrained government spending from 2010, in the wake of the economic downturn in 2008.

**Figure 3: From 2010 onwards, growth rates of both inputs and output fall compared with the earlier period, but output grows at a faster pace than inputs**

Inputs and output growth year on year, before and since 2010 with average lines, UK, 1997 to 2017

Figure 3: From 2010 onwards, growth rates of both inputs and output fall compared with the earlier period, but output grows at a faster pace than inputs

Inputs and output growth year on year, before and since 2010 with average lines, UK, 1997 to 2017



Source: Office for National Statistics

Notes:

1. The four average lines use a simple mean of the growth rates of inputs or output (as labelled) across the years in which they are drawn across.

The reduction in government spending since the economic downturn in 2009 is commonly known as “austerity”. Government departments have been encouraged to make efficiency savings, and have also cut services in some cases. During the period of “austerity”, our statistics suggest an improvement in public service productivity, as output growth has exceeded input growth in every year.

Various research by think tanks and research bodies support the idea that productivity gains were made in the delivery of public services in the “austerity” period. In particular, the NHS and local government services have been highlighted as areas where innovative solutions have been found to funding constraints. For instance, the [Police Foundation recognises the need for innovation in policing](#), and [Localis reports the innovative efforts of local council](#). The [Health Foundation provide evidence](#) of innovation early in the “austerity” period.

However, many public services are labour intensive, and opportunities for innovation may be more limited than in the private sector<sup>1</sup>. While also labour intensive<sup>2</sup>, healthcare may be the service area for which innovation and productivity gains are most achievable through the use of specialist machines and drugs. There are also clear market competitors for healthcare, unlike many other service areas, which may drive productivity gains.

Most local government services are currently indirectly measured in our statistics, which means productivity changes cannot be observed. Even in directly measured service areas, there are substantial challenges in output measurement for public services. Increases in output (especially in the quality adjustment) may only be seen in years following increases in inputs, giving a mixed productivity picture. This makes drawing definitive conclusions on the relationship between “austerity” and innovation difficult. It should also be noted that there is necessarily a time lag between public spending and improved outcomes, and there will likely be a limit to public innovation in the interest of delivering core services and reducing risk.

## **Alternative productivity measures**

The headline public service productivity figure uses the quality adjusted output series. It also includes the indirectly measured service areas. If the non-quality adjusted output series are used instead, productivity is estimated to have fallen by an average of 0.2% per year, rather than rising by an average of 0.2% per year if including the quality adjustments. This is shown in Figure 4.

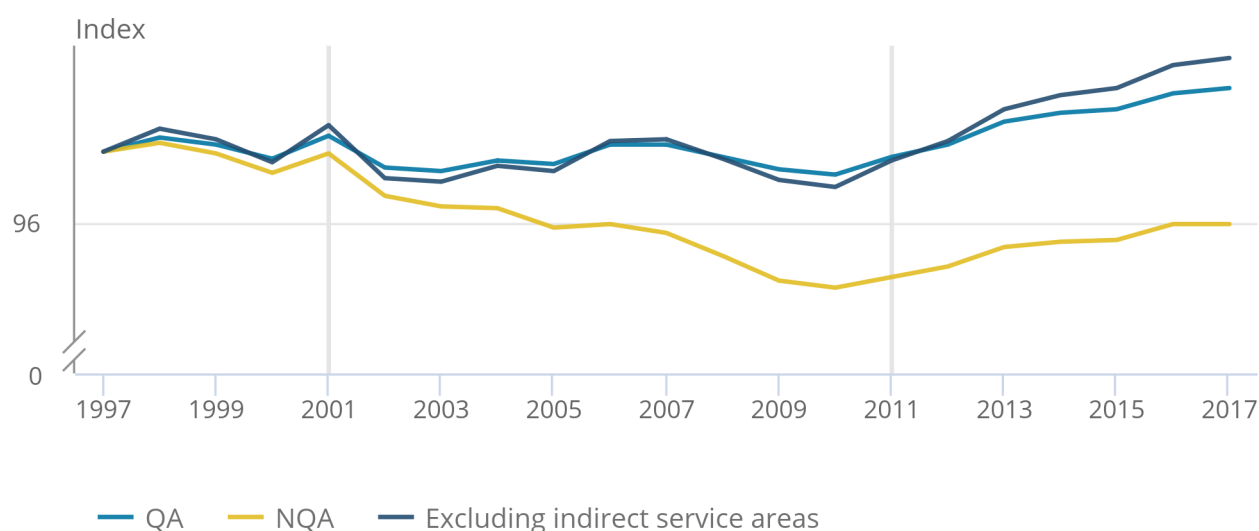
Indirectly measured service areas, which are included in the headline estimate of productivity, have a “dampening” effect – pulling the aggregate towards zero growth. If service areas measured in this way are excluded, this also affects the trend, slightly increasing the average annual growth since 1997. This is also shown in Figure 4. Note that this series is based on the quality adjusted output series.

**Figure 4: The non-quality adjusted series decreases whereas the headline series increases, and the indirectly measured areas have a "dampening" effect in recent years**

Productivity indices over time for headline series, NQA productivity series and when excluding indirectly measured areas, UK, 1997 to 2017

Figure 4: The non-quality adjusted series decreases whereas the headline series increases, and the indirectly measured areas have a "dampening" effect in recent years

Productivity indices over time for headline series, NQA productivity series and when excluding indirectly measured areas, UK, 1997 to 2017



Source: Office for National Statistics

**Notes:**

1. The total productivity line is the headline measure as presented in Figure 1.
2. The non-quality adjusted series excludes any growth from quality adjustments, assuming all output is not adjusted for quality, and includes all nine service areas.
3. The series excluding indirectly measured service areas includes only six services areas, and includes quality adjustment where possible.
4. Vertical lines indicate the introduction of new quality adjustments: healthcare in 2001 and adult social care in 2011. Education and POS are adjusted for quality from 1997, although the scope of these quality adjustment varies somewhat over time.

The non-quality adjusted output series generally follows the quality adjusted series but its growth rates are always lower, whether the growth is positive or negative (although in some years it is close, such as 2016). This divergence is particularly noticeable from 2002. The difference between the non-quality adjusted output series and the quality adjusted output series is because of the positive growth of the quality adjustment during this period.

**Notes for: Total public service productivity**

1. The [labour share of income](#) in the whole economy is typically taken to be around two-thirds, with the remaining third because of capital (ignoring intermediate inputs). For public services, if ignoring intermediate inputs, labour accounts for over 80% and capital less than 20%, as currently measured. This may be partially because of the accounting conventions with regard to non-market sector capital, which prevent a return on capital being recorded – this makes capital measurement inconsistent between the market and non-market sectors. If the capital contribution to inputs in public services were in reality twice as large as currently measured, this would make the labour share in public services around 75% – still considerably higher than in the rest of the economy. If including intermediate inputs, public services still appear more labour intensive than the rest of the economy. While intermediate consumption makes up nearly half of the value of gross output in the economy as a whole, it accounts for only 42% of total inputs for public services in 2017. On this basis, labour inputs account for around half of total public service inputs, but make up only around a third of input costs in the economy as a whole.
2. The only public service areas with labour shares comparable to the market sector are defence (which relies heavily on military equipment which is classified as capital in the national accounts), and other government services (which includes the value of public infrastructure, as well as a large amount of office-related capital equipment). Healthcare is labour intensive, but also uses large amounts of intermediate goods and services such as drugs and medical supplies.

### **3 . Contributions to total public service productivity**

Four of the service areas (healthcare, education, adult social care, and public order and safety) are adjusted for quality, the preferred method, and consequently the productivity estimates for these service areas are more reflective of their respective outcomes than the other five areas. The productivity indices for the four quality adjusted areas are shown in Figure 5.

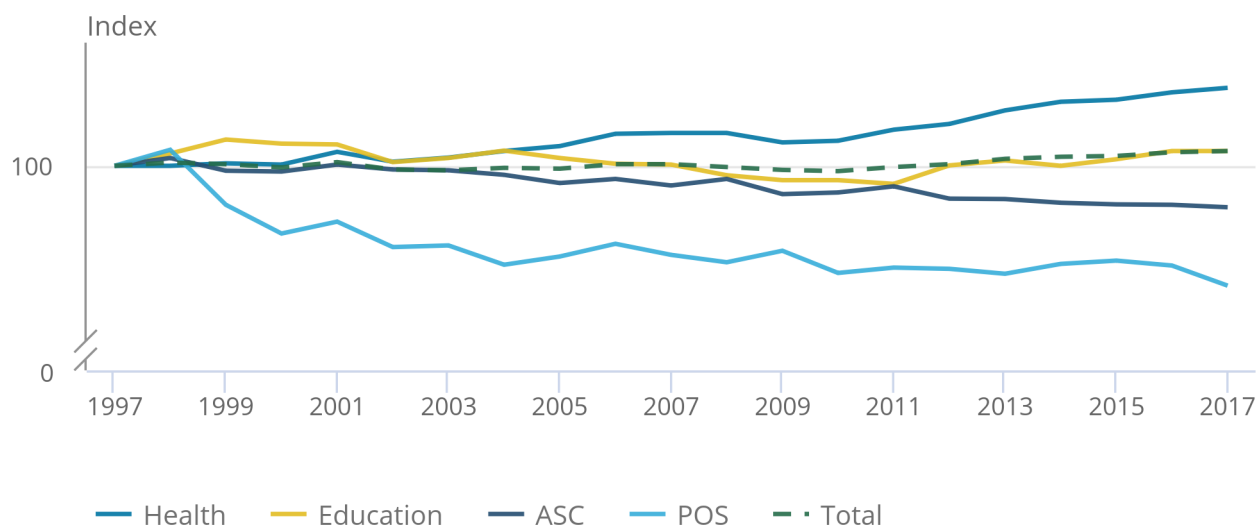


**Figure 5: Healthcare productivity pulls total productivity upwards, while POS productivity pulls it downwards**

Productivity indices over time for four service areas and the total estimate, UK, 1997 to 2017

## Figure 5: Healthcare productivity pulls total productivity upwards, while POS productivity pulls it downwards

Productivity indices over time for four service areas and the total estimate, UK, 1997 to 2017



Source: Office for National Statistics

Notes:

1. The total productivity line is the headline measure as presented in Figure 1.

Since 2004, healthcare is the only service area that has consistently outperformed total public service productivity, and is the primary reason for the increases in the aggregate since 2010 (due also to its large weight). Education productivity tends to be comparatively flat, and tracks the aggregate reasonably consistently. Adult social care (ASC) and public order and safety (POS) have consistently drawn total public service productivity downwards.

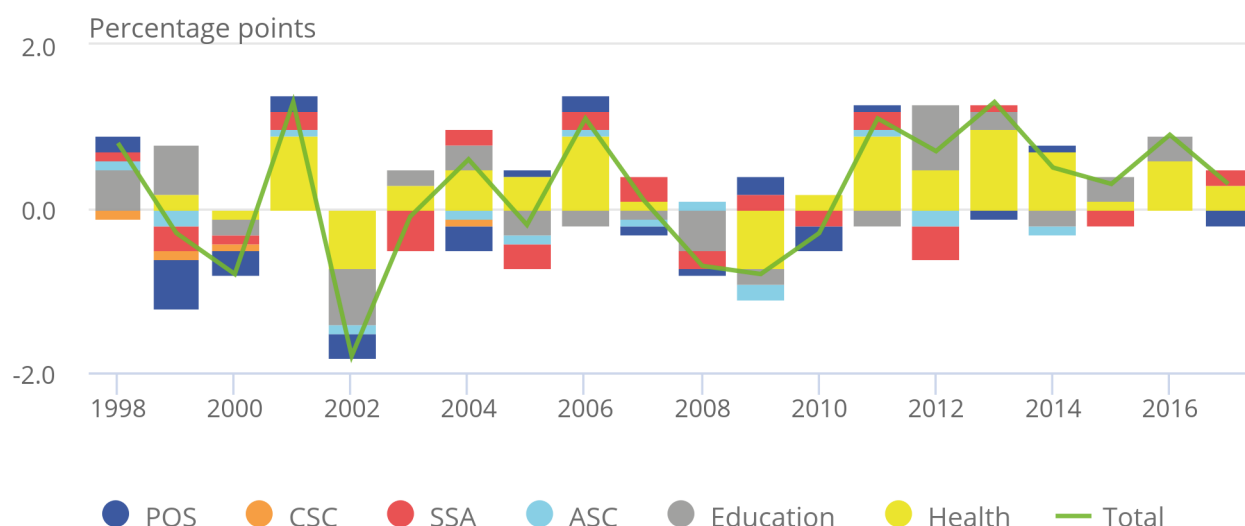
Another way to illustrate the concept of service area trends and how they affect the total is using contributions to growth (Figure 6). This takes the productivity growth for each service area and weights it by its expenditure share each year. For example, in Figure 5 POS appears to significantly drag total productivity downwards. However, POS has a small expenditure share (3.3% in 2017) and as such contributes less to the total productivity estimate than Figure 5 may initially suggest. Three service areas (police, defence and other government services) have been excluded from Figure 6 as they are measured using the inputs-equals-output convention and consequently they have no impact on estimates of productivity growth.

**Figure 6: Healthcare is the largest contributor to total public service productivity growth**

Contributions to total public service productivity by service area, UK, 1997 to 2017

## Figure 6: Healthcare is the largest contributor to total public service productivity growth

Contributions to total public service productivity by service area, UK, 1997 to 2017



Source: Office for National Statistics

Notes:

1. The contributions may not fully sum to the total because of rounding.

Despite POS' smaller expenditure share, it still does noticeably affect the total productivity estimate. Over the time series, its average contribution is negative 0.1 percentage points. Healthcare's average contribution is 0.3 percentage points. Education, despite its large expenditure share, has a flatter productivity trend and as such its average contribution is only marginally positive, although there are clear larger movements in some years.

## 4 . Total public service inputs

Unlike other measures of productivity produced by the Office for National Statistics (ONS), public service productivity includes goods and services, as well as labour and capital, as inputs. This is necessitated by the fact that public service output measures are gross output (total output) measures, rather than value added measures as used in [labour productivity](#) and [multi-factor productivity](#).

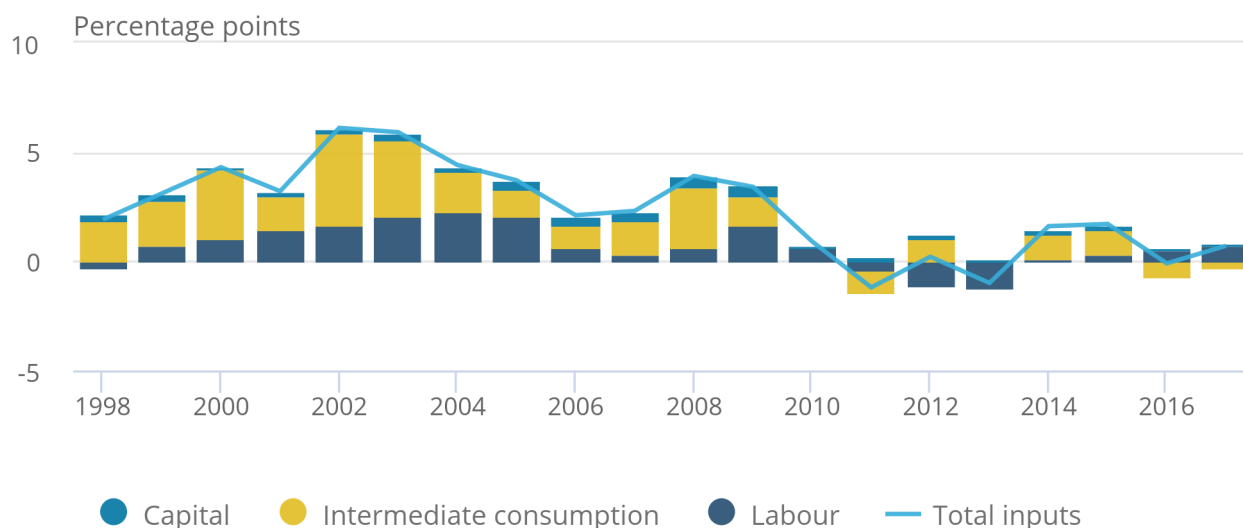
Figure 7 shows the growth for total public service inputs, broken down by the type of input. Total inputs grew 0.7% in 2017, after falling by 0.1% in 2016. This is in line with the average annual growth rate of inputs since 2010, and therefore continues the period of historically weak growth in inputs as a result of constrained government spending in the post-downturn period.

**Figure 7: Intermediate consumption tends to contribute the most to total inputs growth, although labour dominates in some years**

Contributions to total inputs growth by input component, UK, 1997 to 2017

Figure 7: Intermediate consumption tends to contribute the most to total inputs growth, although labour dominates in some years

Contributions to total inputs growth by input component, UK, 1997 to 2017



Source: Office for National Statistics

## Labour

Labour inputs are the volume of labour used to provide public services, covering all workers that contribute to producing public services, such as teachers, doctors, and administrative staff. We previously published analysis of the types of workers who [work in the public sector](#).

Most public services are labour intensive, and labour is the largest input to public services by weight, at around 48% in recent years. Labour inputs have grown relatively slowly over time, at an average rate of 1.3% per year. Growth since 2010 has been more modest, but growth in 2017 of 1.8% is the fastest since 2009.

## Intermediate inputs

Intermediate inputs cover all goods and services purchased in the course of delivering public services, except fixed capital assets (which last for more than a year). This includes utilities, energy, professional services and medical supplies, among others. The volume of this input is calculated by removing price growth from expenditure growth using appropriate price indices (known as deflators).

Unlike labour, these inputs have grown rapidly over time, and accounted for 41% of total inputs in 2017, up from 34% in 1997. This partially reflects changing methods of delivering public services: more public services have been delivered by the private sector over time, and the costs of this are recorded as intermediate inputs. In the case of healthcare, this trend has reversed somewhat in recent years, with NHS “bank” staff (recorded as labour inputs) replacing agency staff (recorded as intermediate inputs) – see the [separate healthcare publication](#) for details. Total intermediate inputs fell by 0.7% in 2017, after falling by 1.4% in 2016, but was offset by the stronger than usual growth in labour inputs.

## Capital

Capital inputs reflect the use of fixed capital assets which last more than a year, such as buildings, equipment, computers and software. Most public services are not very capital intensive, and capital has a small weight over of around 10%. However, this masks considerable variation by service area: in defence, it accounts for over 20%, but in adult social care and children’s social care only around 1%.

Improvements in the measurement of capital consumption in the National Accounts (described in Section 13) have changed this significantly in this release. Capital is now estimated to have grown in every year between 1997 and 2017, at an average rate of 2.9%. This has slowed to 2.0% in years since 2010, as a result of weaker capital investment. The growth of 1.4% in 2017 continues this weaker trend.

A driver of productivity growth is the amount of capital inputs available per unit of labour input, as workers that have more capital at their disposal can be expected to be more productive. Figure 8 shows the ratio of capital to labour inputs in total public services, healthcare, and the market sector (taken from the ONS multi-factor productivity<sup>1</sup> release) as indices relative to 1997.

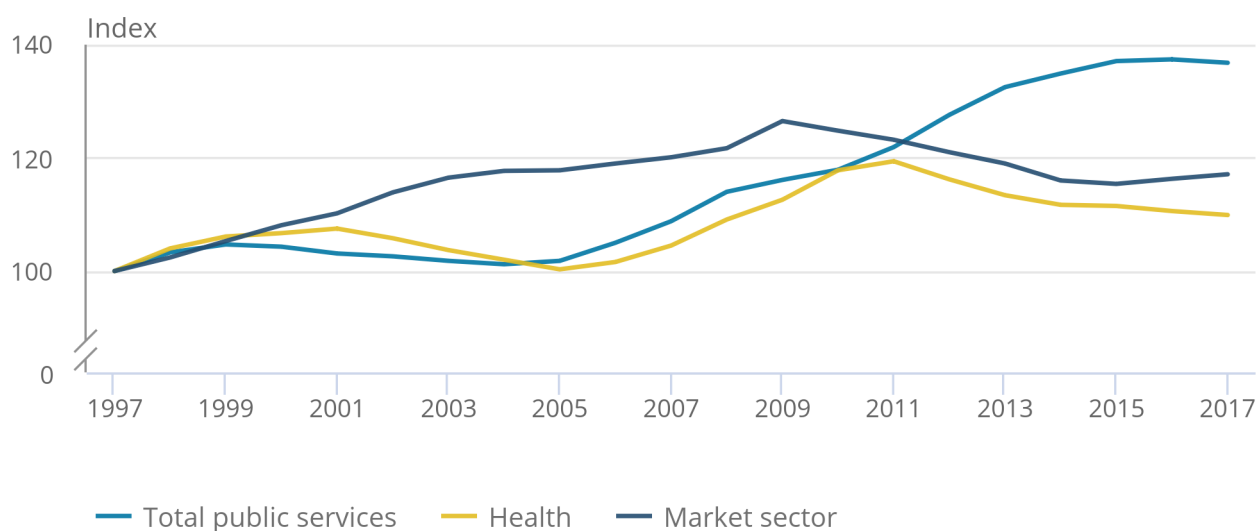
Capital per worker fell (known as capital shallowing) in public services between 1997 and 2005, and by 2010 was barely above the level in 1997. However, since then it has increased substantially (known as capital deepening), mainly as a result of a decline in labour inputs rather than a faster growth in capital. For the market sector the trend is the reverse; capital deepening (more capital per worker) until 2009, shortly after the economic downturn in 2008, and capital shallowing (less capital per worker) since. This may help to explain the relatively stronger productivity performance seen in public services since 2010 as compared to the weak productivity growth (known as the “[productivity puzzle](#)”) in the rest of the economy.

## Figure 8: Capital per worker stronger in public services in recent years than in market sector

Trends in capital per worker for total public services, healthcare, and the market sector, UK, 1997 to 2017

### Figure 8: Capital per worker stronger in public services in recent years than in market sector

Trends in capital per worker for total public services, healthcare, and the market sector, UK, 1997 to 2017



Source: Office for National Statistics

The trend in capital to labour input for healthcare is similar to the rest of the market sector in recent years. In spite of this, healthcare productivity has been the strongest performing of public service areas, as shown in Figure 5. The Health Foundation also [identified this and similar trends for healthcare](#) – the UK lags international comparators on capital investment, capital stocks and capital per worker in healthcare.

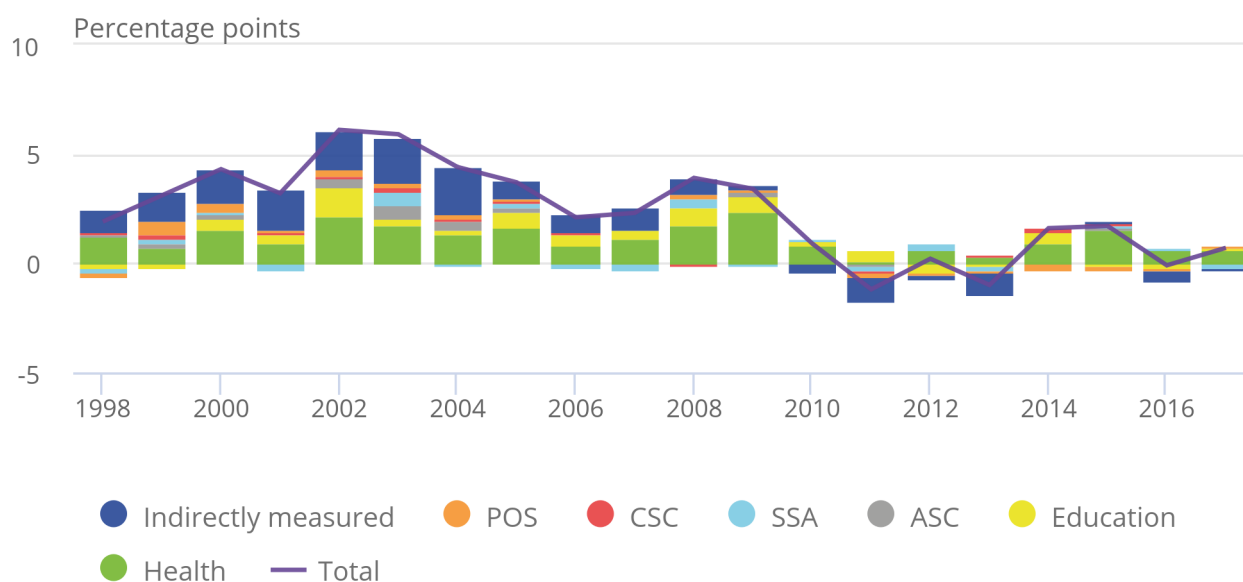
Inputs growth can also be decomposed by service area, as shown in Figure 9. The growth in 2017 has been mainly driven by healthcare, in line with recent years.

**Figure 9: Healthcare drives inputs increases in recent years**

Contributions to total inputs growth by service areas, UK, 1997 to 2017

**Figure 9: Healthcare drives inputs increases in recent years**

Contributions to total inputs growth by service areas, UK, 1997 to 2017



Source: Office for National Statistics

Notes:

1. The contributions may not fully sum to the total because of rounding.

## Notes for: Total public service inputs

1. The measures in public services and market sector differ slightly, but are a reasonable approximation.

## 5 . Total public service output and quality change

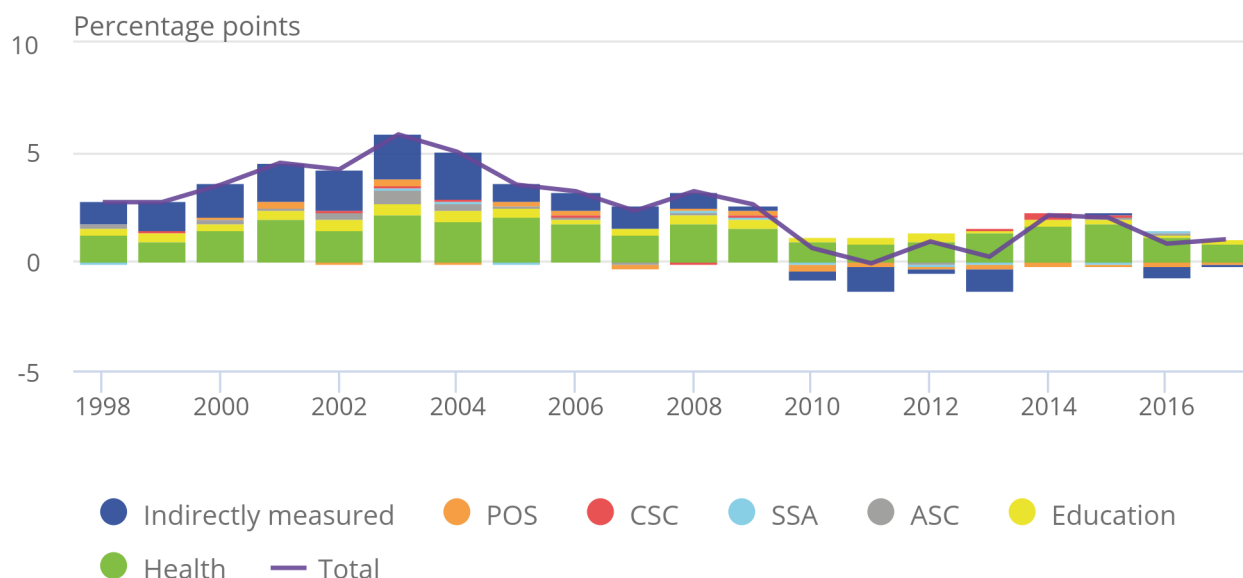
Figure 10 shows the contributions from the nine service areas (with police, defence and other government services combined into the indirectly measured category) to total output growth. From 2016 to 2017, total public service output grew by 1.0%.

**Figure 10: Healthcare is the largest positive contributor to total output growth**

Contributions to total output growth by service areas, UK, 1997 to 2017

## Figure 10: Healthcare is the largest positive contributor to total output growth

Contributions to total output growth by service areas, UK, 1997 to 2017



Source: Office for National Statistics

### Notes:

1. The contributions may not fully sum to the total because of rounding.

Healthcare is a noticeable positive contributor to output growth throughout the time series, even in later years where total output grows more slowly. Public order and safety (POS) has contributed negatively in every year since 2010, and the indirectly measured areas have also contributed negatively in five of the years since 2010. Education contributes positively through most of the series, but on a small scale considering its relatively large expenditure share.

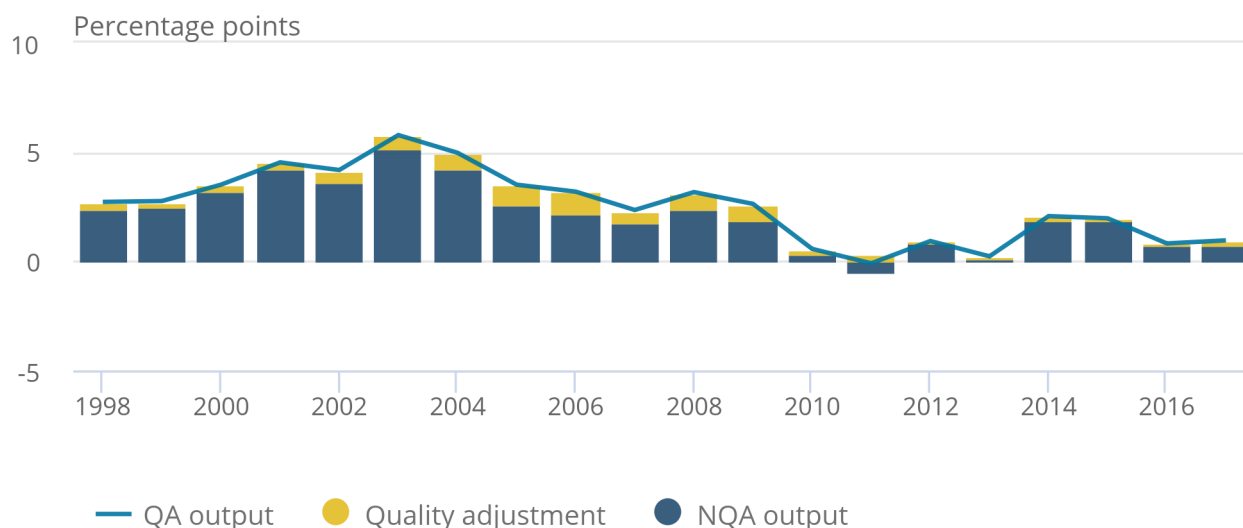
The growth of quality adjusted (QA) output can be split into contributions from non-quality adjusted (NQA) output and the quality adjustment. This is illustrated in Figure 11.

**Figure 11: Most output growth is from quantity output growth as opposed to quality adjustment**

Contributions to total quality adjusted output growth by changes in non-quality adjusted output and quality adjustment, UK, 1997 to 2017

## Figure 11: Most output growth is from quantity output growth as opposed to quality adjustment

Contributions to total quality adjusted output growth by changes in non-quality adjusted output and quality adjustment, UK, 1997 to 2017



Source: Office for National Statistics

### Notes:

1. The contributions may not fully sum to the total because of rounding.

Most of the growth in quality adjusted output is because of growth in non-quality adjusted output, particularly after the economic downturn. However, since quality improvements are cumulative, small increases over a long period help to explain the large divergence between the quality adjusted and non-quality adjusted productivity series in Figure 4.

Figure 12 shows the contribution to the growth of the quality adjustment by service area.

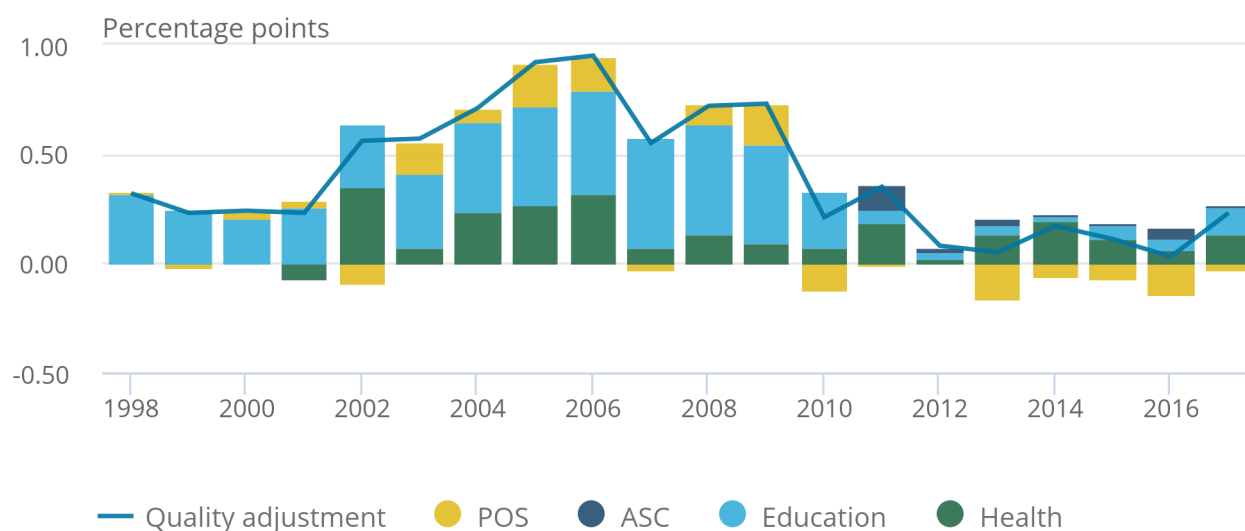


**Figure 12: Healthcare contributes most to quality adjustment in 2017, closely followed by education**

Contributions to quality adjustment growth by service area, UK, 1997 to 2017

**Figure 12: Healthcare contributes most to quality adjustment in 2017, closely followed by education**

Contributions to quality adjustment growth by service area, UK, 1997 to 2017



Source: Office for National Statistics

Notes:

1. The contributions may not fully sum to the total because of rounding.

From 1998 to 2010, the education adjustment contributes positively to the total adjustment, before continuing a positive contribution on a smaller scale in more recent years. More details on this are in Section 7. The POS adjustment has contributed negatively for the past eight years whereas ASC has contributed positively every year since it was implemented in 2011.

## 6 . Healthcare

Healthcare is the largest service area included in these statistics. Output is estimated for four sectors, which are then weighted together to form the overall output index. These four sectors are Hospital and Community Health Services, Family Health Services, GP prescribing, and non-NHS provision. This last sector illustrates the importance of the definition of these estimates as “public services”, not “public sector” – non-NHS provision includes services that may not be delivered by the public sector, but they are paid for by Government. Of all healthcare output, around 79% is adjusted for quality. More information is available in [Public service productivity estimates: healthcare QMI](#).

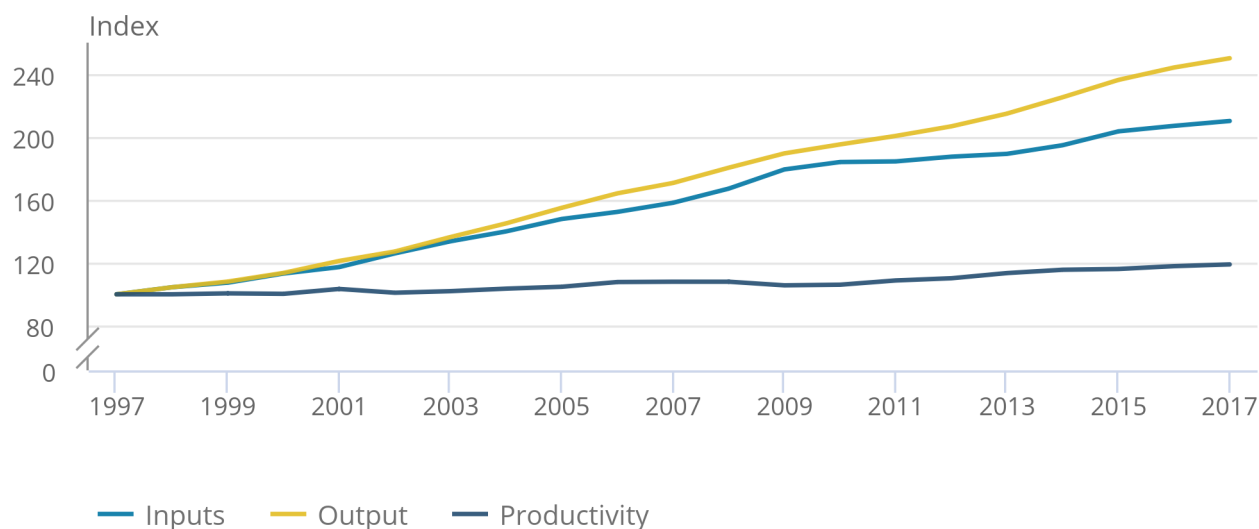
Healthcare contributes positively to total public service productivity growth consistently over the time series, although it does make notable negative contributions in 2002 and 2009. In healthcare, inputs and output have both grown rapidly over the past twenty years, reflecting increased demands on the healthcare system.

**Figure 13: Healthcare productivity rises again in 2017 for the eighth consecutive year, by 0.9%**

Indices for healthcare inputs, output and productivity over time, UK, 1997 to 2017

## Figure 13: Healthcare productivity rises again in 2017 for the eighth consecutive year, by 0.9%

Indices for healthcare inputs, output and productivity over time, UK, 1997 to 2017



Source: Office for National Statistics

Productivity growth has fluctuated over the period, but has been more consistently positive since the economic downturn. Output has consistently grown at a faster pace than inputs, however the growth rates of both have slowed since 2010. In 2017, output grew by 2.4% and inputs by 1.5%.

More details are available in the accompanying [healthcare productivity article](#). Some important improvements have been made to the methodology for this year's set of estimates, which are explained in [Methodological developments to public service productivity: healthcare, 2020 update](#).

## 7. Education

The education service area is the second largest by expenditure share in 2017. Output is measured by the number of students in the educational system, at various stages, and is adjusted for quality using attainment measures. It includes some nursery places (if funded by the government), schools, further education, Initial Teacher Training and some health courses at university (again, only those funded by the government). Schools includes students at primary, secondary and special schools, including academies in England, the number of which have greatly increased over the past decade as local authority-maintained schools transition to become academies.

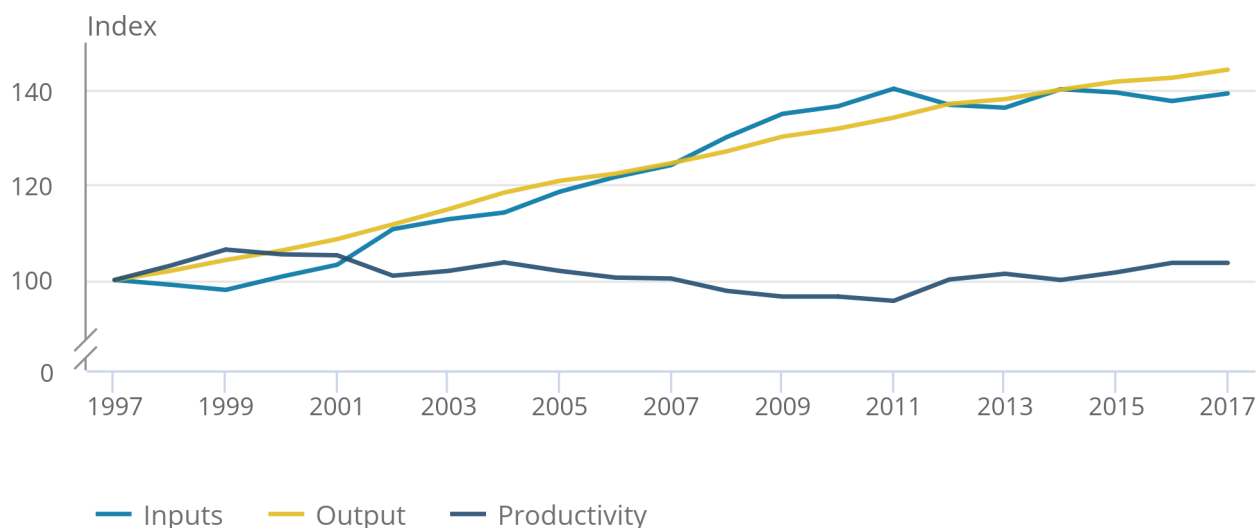
Inputs and output indices tend to increase over time, as shown in Figure 14. However, output growth fluctuates less year to year than inputs growth.

**Figure 14: Education inputs and output trend upwards, with almost no growth in education productivity in 2017**

Indices for education inputs, output and productivity over time, UK, 1997 to 2017

**Figure 14: Education inputs and output trend upwards, with almost no growth in education productivity in 2017**

Indices for education inputs, output and productivity over time, UK, 1997 to 2017



Source: Office for National Statistics

In 2017, productivity was unchanged compared with 2016, because inputs and output both grew by 1.1%.

The methodology for education productivity has been updated, with more detail available in [Improved methods for total public service productivity: total, UK, 2017](#). These improvements concern the quality adjustment. Attainment at GCSE level or equivalent is used as an indicator of the quality of the education system. New data sources to improve consistency and coverage over all four countries of the UK and a new “cohort split” method have been developed and used for the first time in these annual estimates.

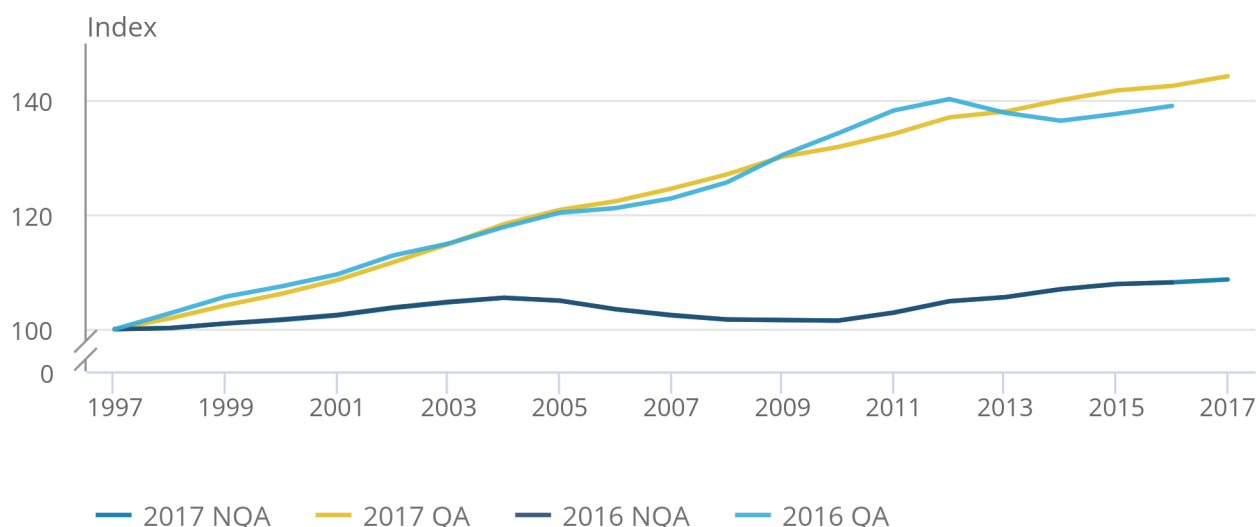
The effect of these changes is demonstrated in Figure 15, which shows the non-quality adjusted and the quality adjusted series as published in last year's article and as published in this article.

**Figure 15: This year's quality adjusted series is smoother and higher in 2016 than last year's series, whereas the non-quality adjusted series are largely unrevised**

Comparing quality adjusted and non-quality adjusted productivity growth in education for last year's estimates and this year's estimates, UK, 1997 to 2017

Figure 15: This year's quality adjusted series is smoother and higher in 2016 than last year's series, whereas the non-quality adjusted series are largely unrevised

Comparing quality adjusted and non-quality adjusted productivity growth in education for last year's estimates and this year's estimates, UK, 1997 to 2017



Source: Office for National Statistics

**Notes:**

1. Data from last year's estimates was published in Public service productivity: total, UK, 2016.
2. NQA stands for non-quality adjusted and QA stands for quality adjusted.

The "cohort split" method has applied attainment data to the five years of secondary school, rather than solely the last year. This better reflects the accumulation of knowledge and skills for learning as pupils progress through the education system. As a result, the quality adjusted series is smoother than previously, and improvements in exam results show as gains in quality earlier in the series, attributable to improved teaching in earlier years. New data sources have also improved the series.

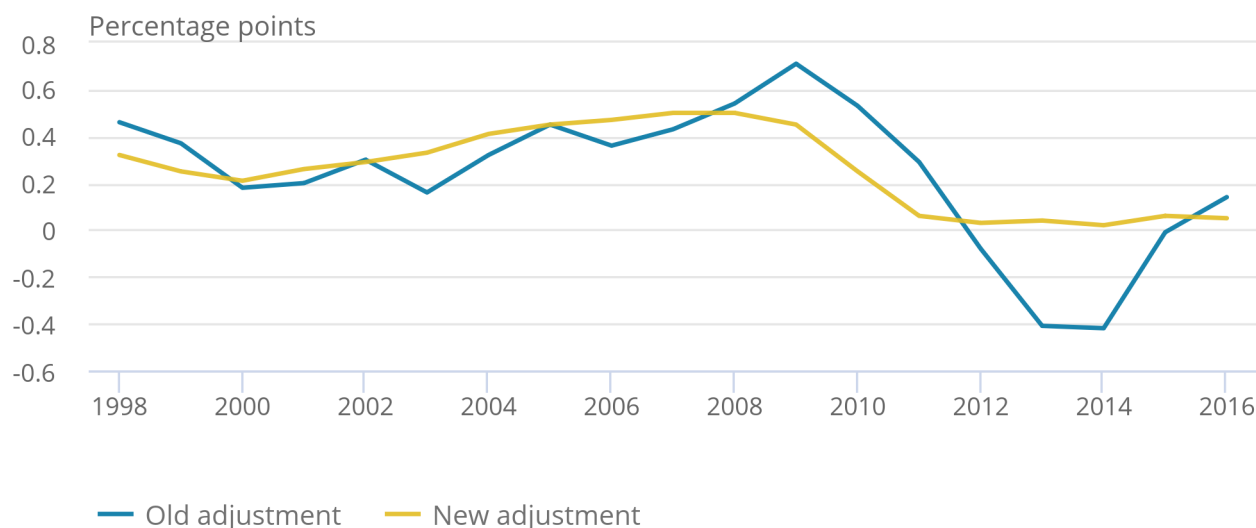
The effect of these changes can also be seen in Figure 16, which shows the growth rate of the education quality adjustment. The steeper peak in 2009 and trough in 2013 and 2014 are significantly reduced.

**Figure 16: The new education quality adjustment is smoother than the old adjustment, but broadly follows the same trend over time**

Comparing the old and new quality adjustments for education, UK, 1997 to 2016

Figure 16: The new education quality adjustment is smoother than the old adjustment, but broadly follows the same trend over time

Comparing the old and new quality adjustments for education, UK, 1997 to 2016



Source: Office for National Statistics

Education output is measured as the number of students in the education system, adjusted for attendance rates. For schools, this is closely related to the birth rate in the UK. An increase in births tends to increase the number of children starting school some four or five years later, and as these children move through the school system, output increases. Accordingly, the non-quality adjusted output trend tracks the birth rate with a time lag. There are differences between the two, though, because of factors such as private education, children migrating in and out of the UK, and home schooling. The birth rate is a factor that schools cannot easily control, whereas the quality of education is likely more responsive to school actions. However, it could be that at times of rising pupil numbers, especially when this translates to rising class sizes (a decreased pupil to teacher ratio), schools are less able to improve the quality of education.

## 8 . Adult social care

Adult social care (ASC) output is partially directly measured, and both indirect and direct measures of output have a quality adjustment applied. Activities that contribute to ASC output include residential and nursing care and home care. The quality adjustment covers the time series from 2011 onwards and considers the improvements to the quality of life for the recipients of the service, accounting for external factors that affect this. More information is available in [Public service productivity: adult social care, sources and methods, 2019 update](#).

ASC productivity has been decreasing over the time series, although in some years it does show positive growth. In 2017, inputs grew by 0.6% while output was unchanged compared with 2016. Accordingly, productivity fell by 0.6%. Over the entire time series, the average annual growth rate of productivity is negative 0.5%.

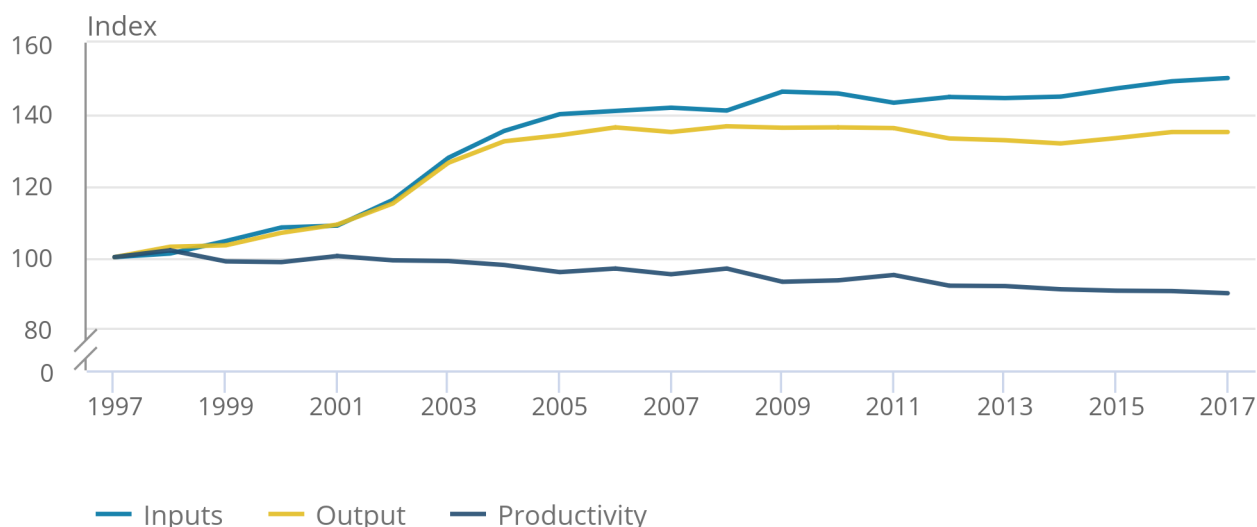
Figure 12 shows that quality in ASC has grown every year since 2011, the year in which the quality adjustment begins. This contributes positively to the growth of quality adjusted output. However, as shown in Figure 17, inputs have increased at a faster pace than output, causing productivity to fall (albeit at a slower rate than pre-2011).

**Figure 17: Adult social care productivity falls in 2017 for the sixth consecutive year, by 0.6%**

Indices for adult social care inputs, output and productivity over time, UK, 1997 to 2017

Figure 17: Adult social care productivity falls in 2017 for the sixth consecutive year, by 0.6%

Indices for adult social care inputs, output and productivity over time, UK, 1997 to 2017



Source: Office for National Statistics

This release incorporates methodological improvements first used in the adult social care article in February 2019. Figures for England up to financial year ending 2019 will be published in a separate [ASC productivity article](#), to be published on [5 February 2020](#). The previous version, for England up to financial year ending 2018, is [also available](#).

## 9 . Public order and safety

Public order and safety (POS) includes courts, probation services, the prison service and the fire and rescue services. The police service is treated as a separate service area within this publication.

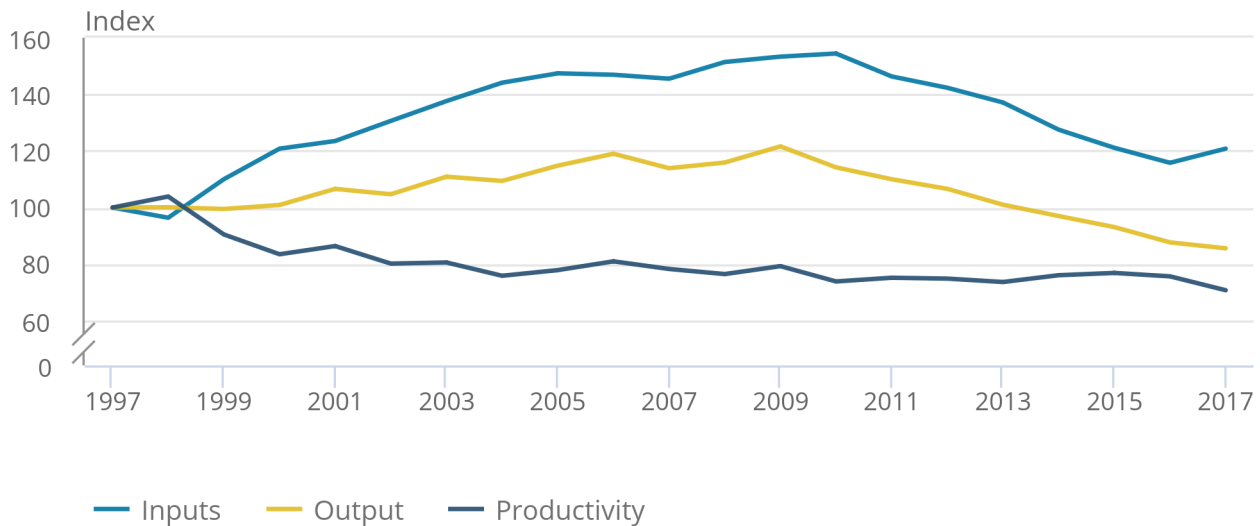
Output is measured on an activity basis using data on fire service incidents, fire prevention work, the volume of work in the courts system and the prison population. Output is also, where appropriate, quality adjusted using data on recidivism, prison safety, custody escapes and courts timeliness<sup>1</sup>. More details on the quality adjustment are in [Quality adjustment of public service public order and safety output: current method](#).

**Figure 18: Inputs and output growth has been decreasing since 2010, until inputs saw an increase in 2017**

Public order and safety inputs, output and productivity indices, 1997 to 2017, UK

## Figure 18: Inputs and output growth has been decreasing since 2010, until inputs saw an increase in 2017

Public order and safety inputs, output and productivity indices, 1997 to 2017, UK



Source: Office for National Statistics

POS saw productivity decrease by 6.4% in 2017. Inputs increased in 2017 for the first time since 2010 while output continued to fall. The increase in inputs was primarily driven by increases in intermediate consumption for courts and prisons. The fall in output was mostly driven by falling quantity output for courts, and some worsening quality in courts and prisons because of higher re-offending rates. Analysis by the Institute for Government on prisons and criminal courts support these findings of falling inputs in recent years and reduced quantity of output, with service quality also falling according to their measures – see their 2019 Performance Tracker for [criminal courts](#) and [prisons](#).

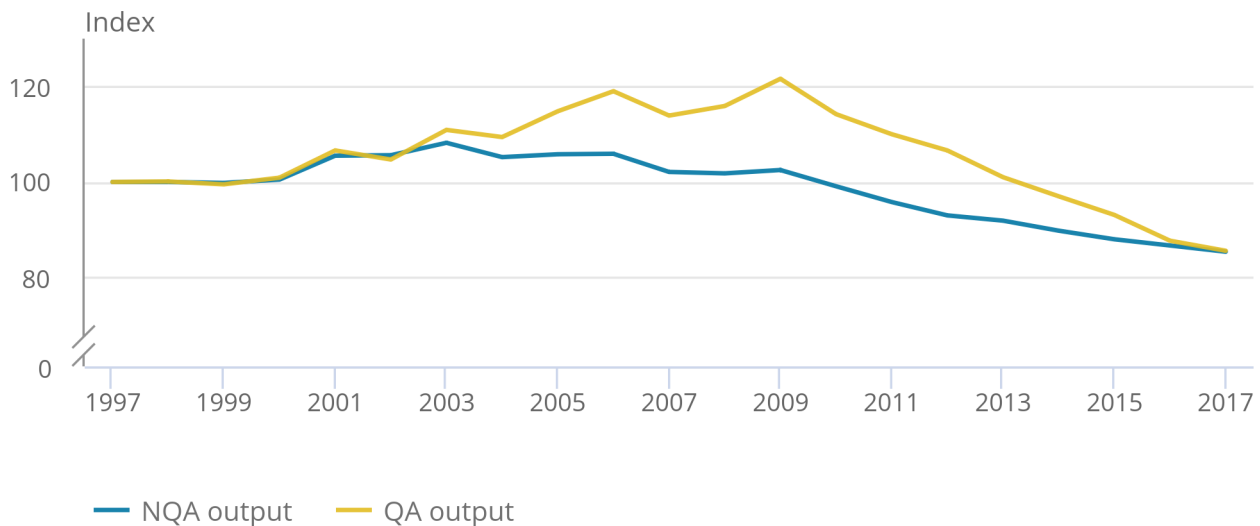
The increase in inputs in 2017 may reflect government policies to improve prison safety, as a result of rises in prison violence in the preceding few years. Public service productivity estimates may be viewed as a long-run indicator of change, and increases in inputs in 2017 may lead to increases in quality adjusted output in subsequent years, which are not yet visible in our statistics.

**Figure 19: The quality adjusted output series reached a higher peak than the non-adjusted output series, but after 2009 has declined more quickly**

Public order and safety non-quality adjusted output and quality adjusted output indices, 1997 to 2017, UK

Figure 19: The quality adjusted output series reached a higher peak than the non-adjusted output series, but after 2009 has declined more quickly

Public order and safety non-quality adjusted output and quality adjusted output indices, 1997 to 2017, UK



Source: Office for National Statistics

Overall quality continued to decline within POS, however the fall in quality was less pronounced than the general trend since 2009. While re-offending rates have worsened, prison safety and timeliness in Crown and Magistrates Courts have improved. Quality adjusted productivity and non-quality adjusted productivity have also returned to broadly comparable levels, with quality improvements within POS before 2009 offset by declining quality since 2009.

## Notes for: Public order and safety

1. Note, the fire service and county courts are not quality adjusted.

## 10 . Children's social care

Children's social care includes, in its output measures, looked after children, children in need, Sure Start schemes, adoption and other activities.



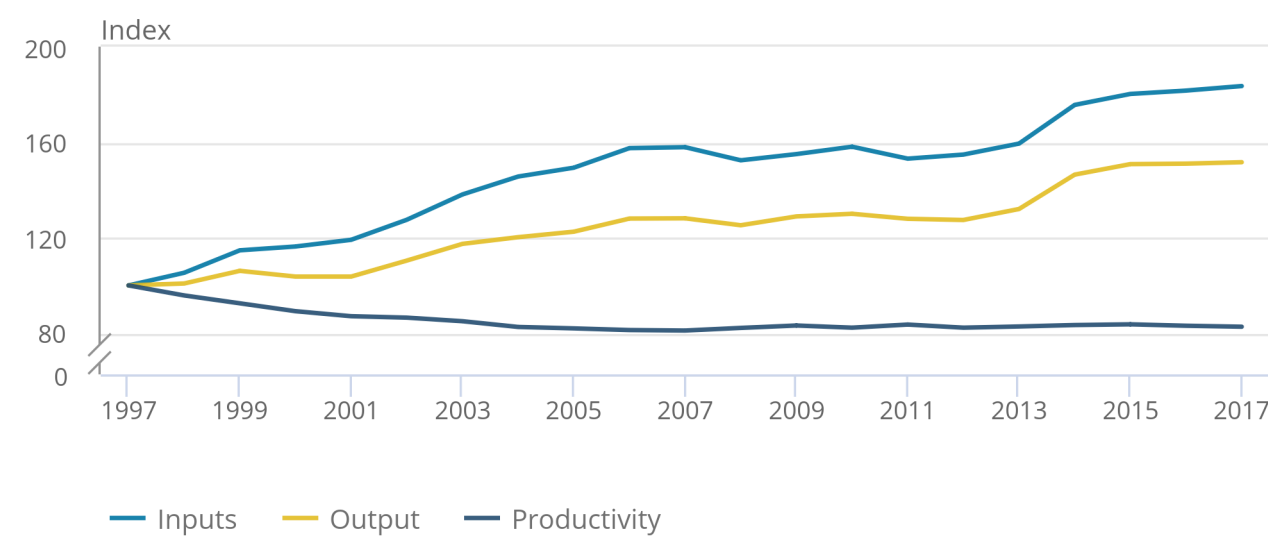
Currently around two-thirds of children’s social care is indirectly measured – that is, the “output-equals-inputs” convention is used. The remaining third of output is directly measured, although no quality adjustment is applied <sup>1</sup>. This direct measurement is of looked after children only. Therefore, inputs and output growth follow the same general trend over the time series. The directly measured proportion of output shows more subdued growth than inputs, so total output grew at a slower pace. The similarity of the inputs and output growth rates leads to a fairly flat trend in long-term productivity growth, especially from 2005 onwards.

**Figure 20: Children’s social care productivity fell in 2017 for the second consecutive year, by 0.6%**

Indices for children’s social care inputs, output and productivity over time, UK, 1997 to 2017

Figure 20: Children’s social care productivity fell in 2017 for the second consecutive year, by 0.6%

Indices for children’s social care inputs, output and productivity over time, UK, 1997 to 2017



Source: Office for National Statistics

The fall in productivity from 2016 to 2017 was driven by inputs increasing at a faster rate than output, with growth rates of 1.0% and 0.5% respectively. The service area is a negative contributor to total public service productivity growth, but its small share of total expenditure (2.8% in 2017) means that it has little effect compared with healthcare and education.

**Notes for: Children’s social care**

1. We intend to develop our measures of children’s social care in the coming year to provide improved insights for this service area in future releases.

## 11 . Social security administration

Social security administration (SSA) covers activities related to the administration of social security, such as unemployment benefits. This estimate of productivity covers the work of various departments, including the Department of Work and Pensions (DWP), HM Revenue and Customs (HMRC) and others.

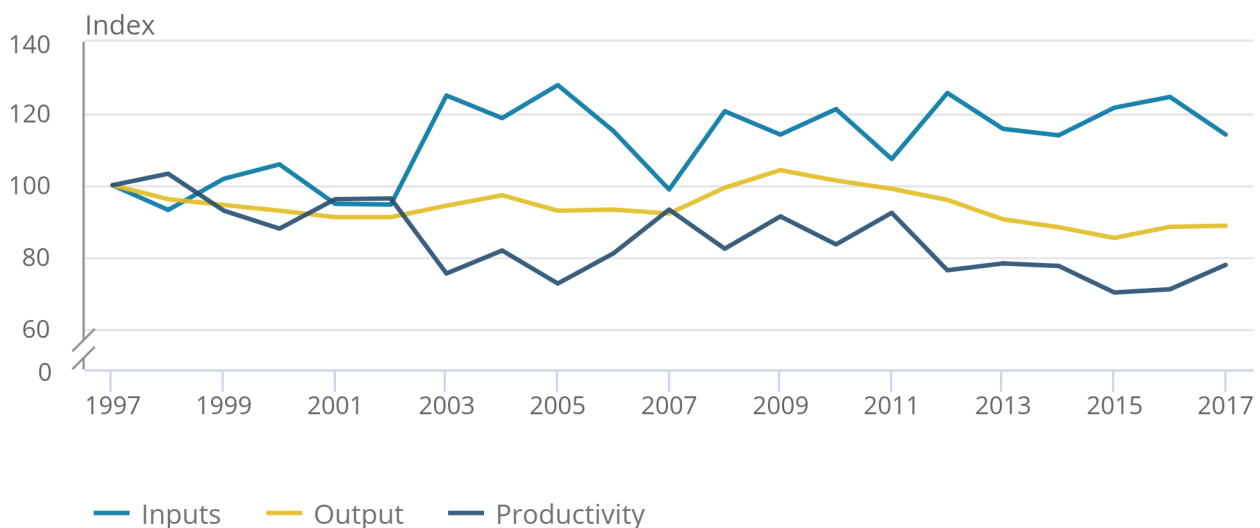
As demonstrated in Figure 21, productivity over time for SSA fluctuates, more so because of changes in inputs than changes in output. From 2016 to 2017, productivity increased by 9.6%. Output rose by a comparatively small 0.3%, so the productivity growth was primarily driven by a fall in inputs of 8.5%.

**Figure 21: Social security administration productivity grew in 2017 for the second consecutive year**

Indices for social security administration inputs, output and productivity over time, UK, 1997 to 2017

Figure 21: Social security administration productivity grew in 2017 for the second consecutive year

Indices for social security administration inputs, output and productivity over time, UK, 1997 to 2017



Source: Office for National Statistics

From 1997 to 2017, the average annual growth rate for SSA productivity is negative 2.5%. This is the lowest of the services areas with the exception of public order and safety, which is negative 3.4%.

SSA can be significantly affected by events in the wider economy. For example, output grew in 2008 and 2009, coinciding with the economic downturn. In 2007, the [UK's unemployment rate](#) was 5.3%, whereas in 2009 it had grown to 7.6% (although it would not reach its peak of 8.1% in this century until 2011). The greater number of unemployed people likely necessitated more social security claims.

## 12 . Indirectly measured service areas

The three indirectly measured service areas are those where output is assumed equal to inputs, and therefore productivity growth will always be equal to zero. Inputs (and thus output) for all three areas – police, defence, and other government services – are shown in Figure 22.

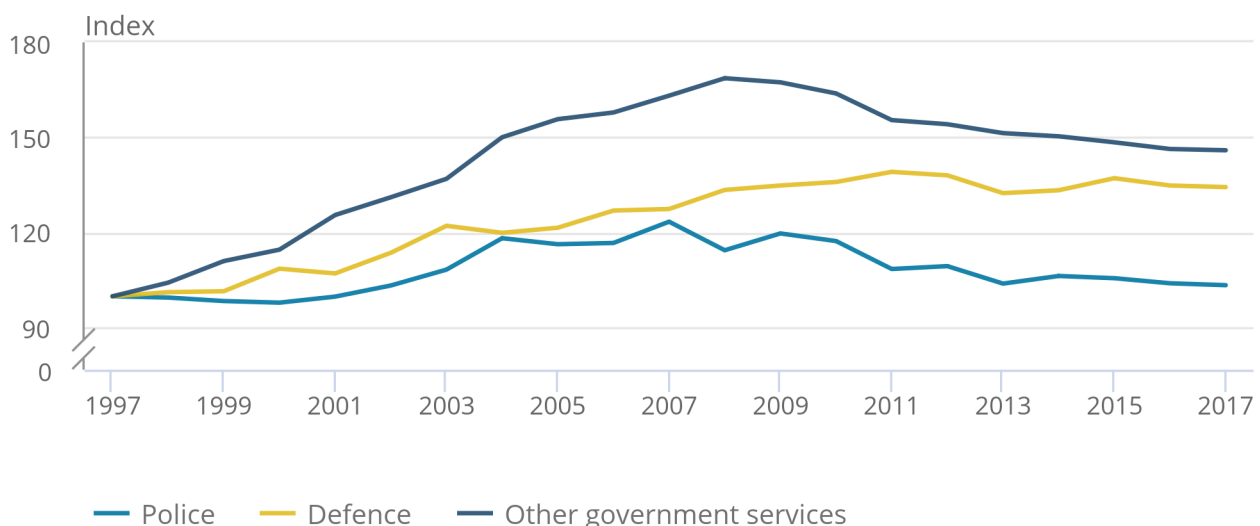
Police includes such activities as incident response, crime investigation and neighbourhood policing. Defence is the administration, supervision and operation of military affairs and land, sea, air and space defence forces. Other government services covers spending in many different areas, including general government administration, environmental protection, housing, and recreation.

**Figure 22: Inputs and output for police, defence and other government services declined in 2017**

Indices for indirectly measured service areas (police, defence and other government services) inputs over time, UK, 1997 to 2017

### Figure 22: Inputs and output for police, defence and other government services declined in 2017

Indices for indirectly measured service areas (police, defence and other government services) inputs over time, UK, 1997 to 2017



Source: Office for National Statistics

From 2017 to 2016, inputs and output fell in all three services areas: by 0.6% in police, 0.4% in defence and 0.3% in other government services. Since the economic downturn, negative growth has been particularly noticeable in other government services.

Defence inputs have been revised upwards from the 2016 estimates of public service productivity primarily as a result of the changes to capital. Police inputs have been revised this year as we now estimate the volume of local government labour directly from data on full-time equivalent employees (FTEs) and relative salaries for different groups (as explained in [Improved methods for total public service productivity: total, UK, 2017](#)). The effect of this has been to increase police inputs growth in the mid-2000s, shifting the overall police inputs series upwards.

## 13 . Methodology changes in this release

The updates to the methodology used for the first time to estimate total public service productivity in this article were pre-announced, as set out in the [Code of Practice](#) for Statistics, in [Improved methods for total public service productivity: total, UK, 2017](#) in November 2019.

The methodological improvements to Education were discussed in Section 7 and the impacts of the changes illustrated in Figures 15 and 16. Other methods improvements were considerably smaller.

Some significant data source changes have been introduced this year. To reflect the latest improvements in the UK National Accounts, particularly on the measurement of capital consumption, we have used government expenditure data consistent with [Blue Book 2019](#). Previously, we had used a Public Sector Finances dataset known as [European System of Accounts Table 11 \(General government annual expenditure\)](#), which was consistent with Blue Book 2017 for the [2016 publication](#). As a result, our data in this release take on improvements in two Blue Books, and in some places are significantly revised compared to [last year's estimates](#).

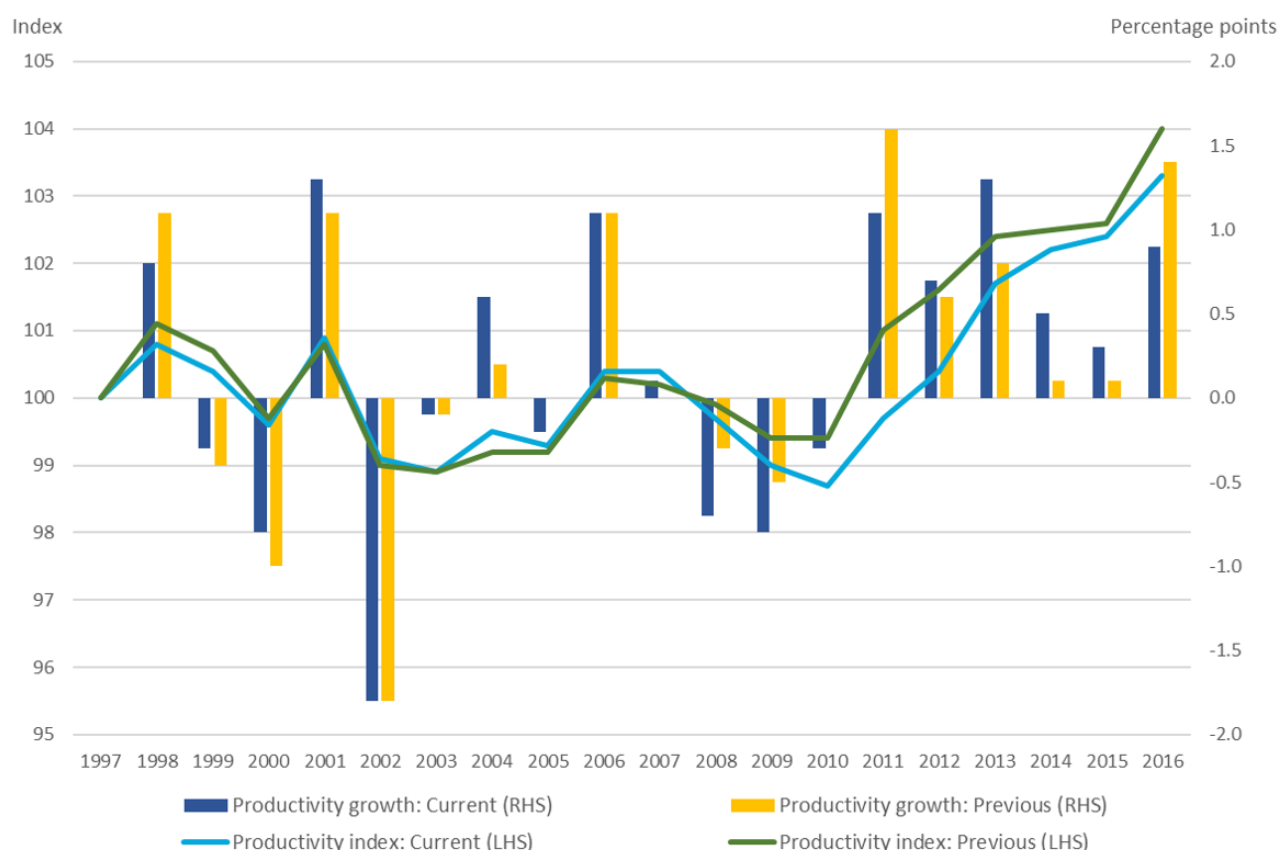
One of the largest data changes was as a result of the improvements to measures of capital consumption in Blue Book 2019. A [review](#) was undertaken of asset lives for capital consumption, which in the majority of cases found them to be shorter. This necessitates the faster replacement of these assets, which in turn increases estimates of capital consumption. The Office for National Statistics (ONS) has also improved its method for estimating government purchases of goods and services, for which the Government does not pay Value Added Tax. However, to maintain consistency with private sector purchases in the UK National Accounts, the cost of paying the tax is estimated. The ONS has widened the scope of this method.

These updates have increased the consistency and accuracy of inputs data. These and other methodological changes to Blue Book 2019 are detailed in an [impact article](#).

The effect of these changes was in part explained in Section 5 in relation to capital inputs. For an overarching view, Figure 23 shows the impact of the revisions on the total public service productivity index. The two indices (the headline estimates from this article and last year's article) track fairly closely until 2009. From there, the new estimate is lower, although stronger year on year growth from 2012 to 2015 means that the gap between the two indices narrows.

**Figure 23: The total productivity growth index has been revised downwards overall, although growth rates have been revised upwards in numerous years**

Total productivity indices and growth rates, for last year's estimates and this year's estimates, UK, 1997 to 2017



Source: Office for National Statistics

**Notes:**

1. Data from last year's estimates was published in [Public service productivity: total, UK, 2016](#).
2. The bars, showing year-on-year growth, are referenced to the right hand side axis and the lines, showing the productivity index, are referenced to the left hand side axis.

The contributions to the revisions by service area are shown in Figure 24. Education makes some significant contributions to revisions, negatively in 2009 to 2011 and then positively in 2012 to 2014. This mirrors the new quality adjustment in relation to the previous adjustment for education. Healthcare also makes some notable downwards contributions, including 2016 which was due partly to the introduction of NHS bank staff into inputs, a staff group that grew quickly in 2016. There have also been numerous changes to year-on-year growth rates for healthcare because of the introduction of a "days adjustment" to account for the effect of leap years and changes in the annual number of working days on output. For more details see [Methodological developments to public service productivity: healthcare, 2020 update](#).

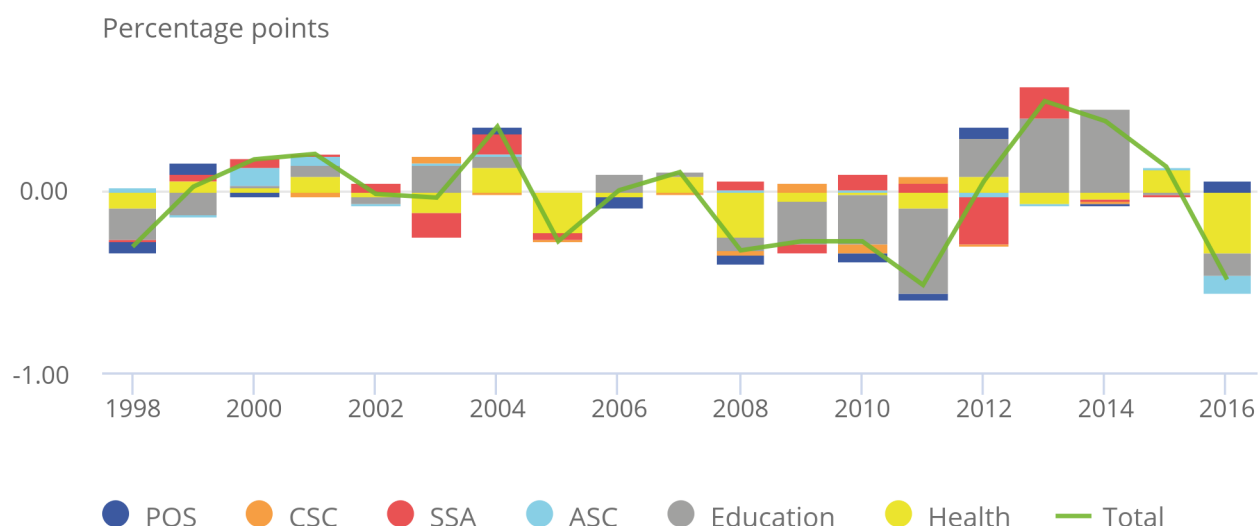
In public order and safety, we now use separate deflators for the prison service and the fire service that better reflect the composition of staff and associated wage inflation within these areas. Police inputs measurement has also been improved, with local government labour inputs now measured directly, using FTE data, instead of indirectly.

**Figure 24: Education significantly contributes to public service productivity revisions from 2009 to 2014**

Contributions to total productivity revisions by service area, UK, 1997 to 2017

**Figure 24: Education significantly contributes to public service productivity revisions from 2009 to 2014**

Contributions to total productivity revisions by service area, UK, 1997 to 2017



Source: Office for National Statistics

Notes:

1. The contributions may not fully sum to the total because of rounding.

## 14 . Glossary

### Public services

These are services delivered by or paid for by government (central or local). If paid for by the government, they may be delivered by a private body – for example, the provision of nursery places by the private sector, where these places were funded by the government.

### Direct output measurement

Using a cost-weighted activity index to estimate the quantity of a service provided, such as the number of students in state schools, adjusted for attendance to produce an estimate of total hours of schooling delivered each year. Differs from indirect output measurement, where output is assumed equal to inputs.

## Quality adjustment

A statistical estimate of the change in the quality of a public service, using an appropriate metric, such as safety in prisons as part of the public order and safety adjustment.

## COFOG

The [Classification of the Functions of Government \(COFOG\)](#), which is the structure used to classify government activities. It is defined by the United Nations Statistics Division.

## Service area

The way we refer to the breakdown of public services into nine areas, closely following COFOG.

## Intermediate inputs

Also referred to as “goods and services”, or “intermediate consumption” (the UK National Accounts term). Intermediate inputs include goods and services used up in the provision of a public service, such as utilities, energy, professional services and medical supplies, among others.

## Deflator

A price index used to remove inflation effects from estimates of expenditure to provide a volume estimate. Tailored wherever possible to maximise relevance and accuracy for the expenditure being measured.

# 15 . Data sources and methodology

Productivity is the measure of how many units of output are produced from one unit of inputs, and is calculated by dividing total output by total inputs.

Inputs can be broken down into three components. They are labour (which can either be measured directly through means such as number of staff or indirectly by measuring service area expenditure on staff), intermediate consumption (expenditure on goods and services) and consumption of fixed capital. These inputs, as appropriate, are adjusted for inflation using a suitable deflator.

We measure output either directly or indirectly. If output is measured directly, this means that we have some measurable indicator for the amount of service provided. For example, direct output measurement for schools uses data on the number of students, adjusted for attendance. If output is measured indirectly, as it is for other government services (a service area that includes various smaller activities such as spending on housing and recreation), police and defence, then output is assumed to equal inputs. Therefore, there is no productivity change in these areas as the ratio of inputs to output is always one.

To account for changes in the quality of the service provided, we also use adjustments for quality in some service areas. More information on quality adjustment is available in [A guide to quality adjustment in public service productivity measures](#). It is preferable to use direct measures of output and incorporate an adjustment for quality. Work to develop these methods for different service areas is ongoing and follows the principles of the [Atkinson Review](#) (PDF, 1.08MB).

The range of possible output measures are summarised in Table 1.

Table 1: Types of output measurement in public service productivity

	Direct output measure	Indirect output measure
<b>Non-quality adjusted (NQA)</b>	NQA direct output measure	NQA indirect output measure
<b>Quality adjusted (QA)</b>	QA indirect output measure	QA indirect output measure

Source: Office for National Statistics

Growth rates of output and inputs for individual service areas are aggregated by their relative share of total government expenditure (expenditure weight) to produce estimates of total public service output, inputs and productivity. Service areas are defined by [Classification of the Functions of Government \(COFOG\)](#) rather than administrative departments or devolved administrations. As a result, estimates presented cannot be taken as direct estimates of departmental productivity. For example, estimates of social security administration productivity are not the same as an estimate of Department for Work and Pensions productivity. Lastly, it should be noted that these estimates do not measure, for example, the value for money in public services, or the true effectiveness of the services (quality adjustment includes some measurement of this but coverage is limited).

As well as estimates of public service productivity, the Office for National Statistics (ONS) also produces estimates of [labour productivity](#) and [multi-factor productivity](#). Estimates of public service productivity cannot be compared to these other measures, because of differences in how we measure output and the scope of inputs. As explained in our [blog post](#), public services are provided free at the point of use and often have no market price. Different approaches are therefore needed to measure public service output than those used to measure output in the private sector. We also measure inputs differently to labour productivity where the only input is labour, whereas we also include capital and intermediate inputs.

Estimates of public service productivity are published each year, and on a calendar year basis for consistency with the UK National Accounts. There is a two-year time lag associated with the estimates, because of the timeliness of our data, which come from administrative sources. A timelier estimate is available in the [Public service productivity: quarterly, UK statistics](#), which have a two-quarter time lag. However, the quarterly estimates are [experimental](#), whereas the annual estimates are badged as National Statistics. This means that they meet certain quality criteria, listed in the [Code of Practice](#) from the UK Statistics Authority.

Estimates in this bulletin cover the UK and, where possible, are based on data for England, Scotland, Wales and Northern Ireland. Where data are not available for all four countries, the assumption is made that the available data are representative of the UK.

More detail on methodology for these statistics is provided in [Public service productivity: total, UK QMI](#) (where QMI is Quality and Methodology Information) and [Sources and Methods for Public Service Productivity Estimates: Total Public Services](#) (PDF, 111KB).

The data used in this article is [available to download](#). Data used in the construction for each chart is listed as a download under each one, alongside an option to download the chart as an image.

## 16 . Authors and acknowledgements

Josh Martin, Leah Harris, Sophie Barrand and Jon Gardner, Office for National Statistics

We are grateful to colleagues in various government departments for making their data available for the compilation of these statistics, and providing helpful comments.



## 17 . Related links

### [Public service productivity, healthcare, UK: 2017](#)

Article | Released on 8 January 2020

Analyses public service healthcare productivity for UK on a calendar year basis consistent with the basis traditionally used for public service productivity measures.

### [Public service productivity, healthcare, England: financial year ending 2018](#)

Article | Released on 8 January 2020

Analyses public service healthcare productivity for England only on a financial year basis for improved comparability with other data available for the health service in England.

### [Public service productivity: quarterly, UK, July to September 2019 \(Experimental Statistics\)](#)

Article | Released on 8 January 2020

Analyses quarterly inputs, output and productivity growth for the UK.

### [Improved methods for total public service productivity: total, UK, 2017](#)

Methodology | Released on 20 November 2020

Describes recent developments to public service productivity in various service areas.

### [Methodological developments to public service productivity: healthcare, 2020 update](#)

Methodology | Released on 16 December 2020

Describes recent developments to public service healthcare productivity.