

Article

# Productivity in the construction industry, UK: 2021

An investigation into productivity growth and its drivers for the UK construction industry.

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# 1 . Main points

- Average productivity levels in the construction industry have remained consistently below the UK average and have grown more slowly until recently.
- Civil engineering has consistently been the most productive sub-industry within construction; specialised construction activities has been the least productive.
- The construction industry's workforce has become older and better educated since 1997.
- There has been strong investment growth relative to the number of workers in the industry, outpacing investment per hour worked in the rest of the market sector.
- A greater proportion of the construction industry's expenditure on goods and services has moved towards purchasing services and away from purchasing materials.

## 2 . Productivity industry spotlight articles

Understanding the level and growth of productivity in an industry is necessary to understand its competitiveness, growth potential and contribution to the economy. This is especially true for construction, which has long been thought to have a lower level of productivity than comparable industries, and slower growth in productivity relative to the rest of the economy.

Those views are supported by considerable research and official data. Official estimates of the productivity of the construction industry are produced by the Office for National Statistics (ONS). Like other official economic statistics, the definition of the industry is governed by the [Standard Industrial Classification \(SIC\) 2007](#), and the measurement of the industry's output follows international guidance ([see Section 12](#)).

This article is the first in a new series of productivity industry spotlight articles, which aim to examine productivity and related data for an industry, in order to tell the productivity story of the industry and identify opportunities to improve our statistics.

### 3 . Productivity

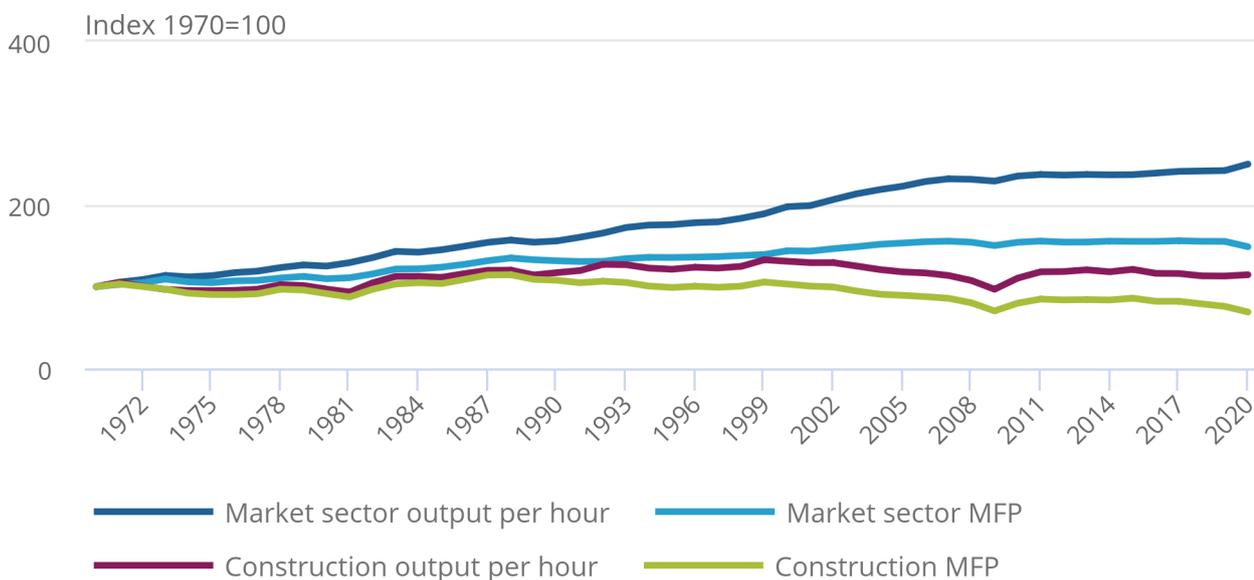
Productivity in the construction industry dragged down both the level and growth of UK productivity for many years prior to the 2008 financial crisis (Figure 1). Since then, labour productivity has grown slightly faster in the construction industry than in the economy as a whole. However, the level of productivity in construction remains below the UK average.

**Figure 1: Productivity has changed little in the construction industry in the past 50 years**

Output per hour worked and multi-factor productivity, construction industry and market sector, UK, 1970 to 2020

Figure 1: Productivity has changed little in the construction industry in the past 50 years

Output per hour worked and multi-factor productivity, construction industry and market sector, UK, 1970 to 2020



Source: Office for National Statistics – Labour productivity and multi-factor productivity

Notes:

1. Multi-Factor Productivity is the unexplained growth in output after accounting for growth in capital and labour inputs.

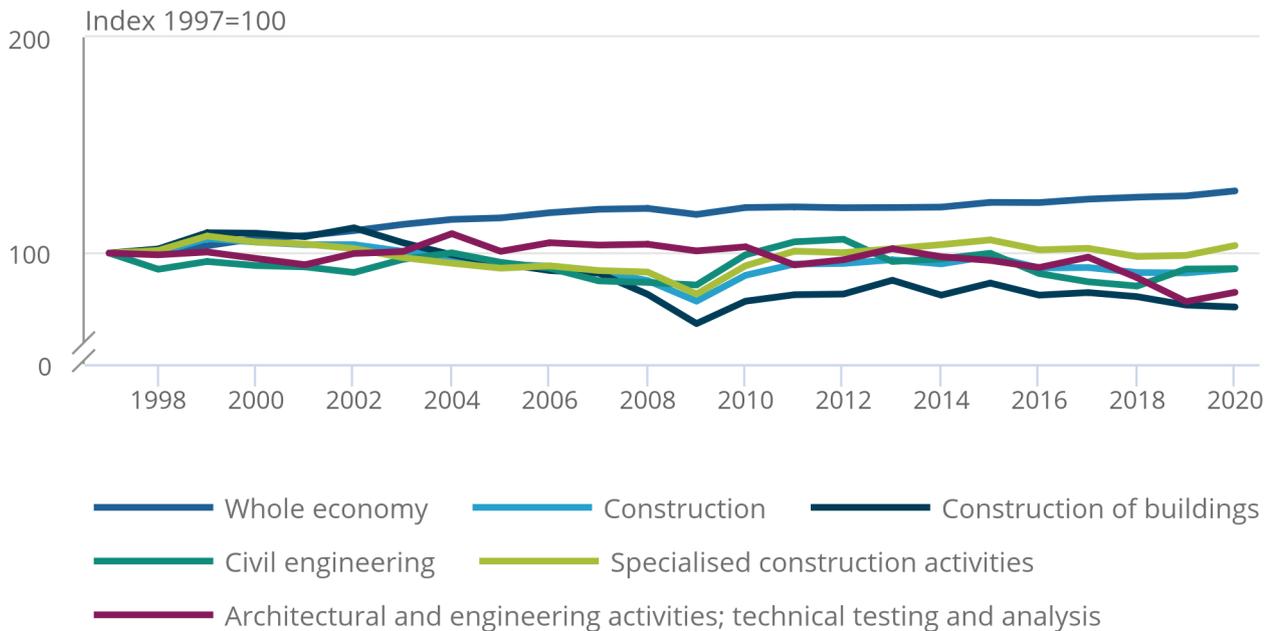
The growth of productivity has differed little across parts of the construction industry since 1997. Figure 2 shows that all the construction sub-industries saw little or negative growth in output per hour worked between 1997 and 2020, with productivity in the construction of buildings industry falling most. Architectural and engineering services, a related sub-industry (part of the professional services industry), saw a similar fall over the period.

## Figure 2: Productivity growth has been slow in construction industries compared with the whole economy

Output per hour worked, construction industry and sub-industries and whole economy, UK, 1997 to 2020, index 1997 = 100

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Output per hour worked, construction industry and sub-industries and whole economy, UK, 1997 to 2020, index 1997 = 100



Source: Office for National Statistics – Labour productivity

#### Notes:

1. Industry division 71 (architectural and engineering services) is included, although it is not part of industry section F (construction) in the Standard Industrial Classification (SIC) 2007. This reflects its close relationship with activity in the construction industry.

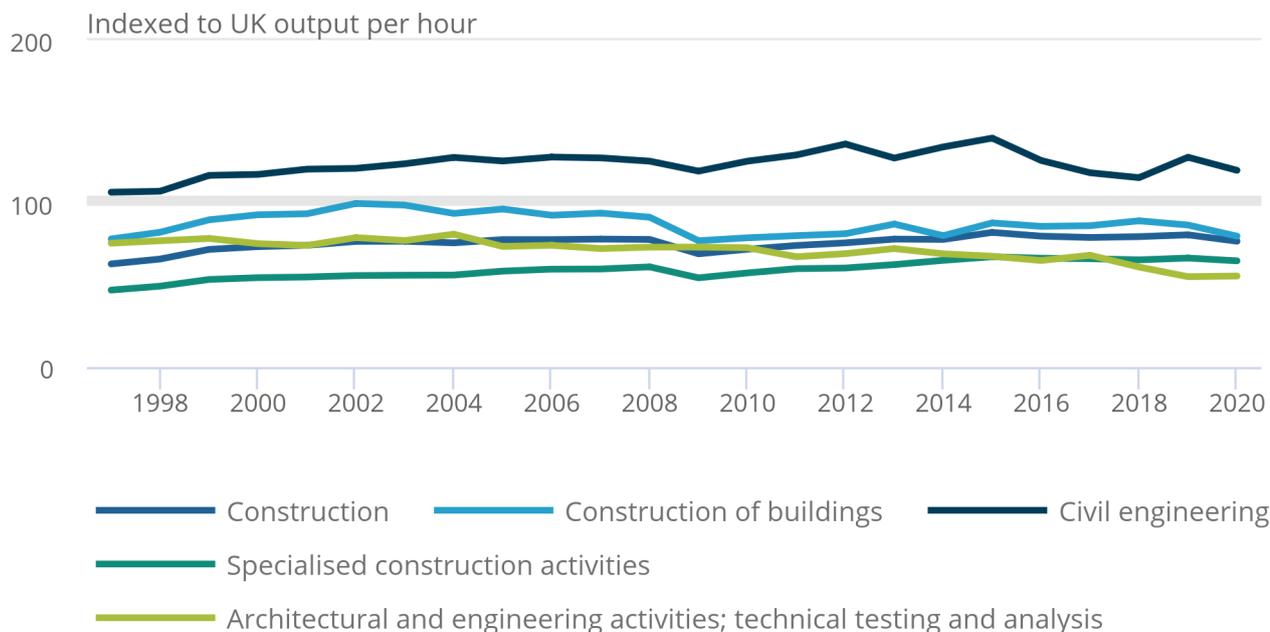
There is considerable variation in productivity levels [between firms](#) and across sub-industries of the construction industry. Figure 3 shows that the highest level of productivity in construction is in civil engineering, which is above the UK average, and has generally been around twice as high as specialised construction.

**Figure 3: Only the civil engineering industry is above the whole economy in levels of productivity**

Output per hour worked, construction industry and sub-industries, UK, 1997 to 2020, level relative to whole economy, index UK = 100

Figure 3: Only the civil engineering industry is above the whole economy in levels of productivity

Output per hour worked, construction industry and sub-industries, UK, 1997 to 2020, level relative to whole economy, index UK = 100



Source: Office for National Statistics – Labour productivity

Notes:

1. Industry division 71 (architectural and engineering services) is included, although it is not part of industry section F (construction) in the Standard Industrial Classification (SIC) 2007. This reflects its close relationship with activity in the construction industry.

Productivity in the construction industry was volatile during 2020, as the industry was greatly affected by the coronavirus (COVID-19) restrictions in response to the pandemic. Taking the year as a whole, output per hour was 2% higher in 2020 than in 2019, as output fell less than hours worked. This was particularly notable in the specialised construction activities sub-industry, where output fell by 16% and hours fell by 20%.

The increase in output per hour worked in construction in 2020 could also reflect a composition effect, with higher productivity activity continuing while lower productivity activities paused. For example, a relative shift towards civil engineering activity, or towards large construction firms and away from sole traders.

[The Construction statistics, Great Britain](#) bulletin, published alongside this article, provides an overview of recent changes to the industry.

## 4 . Pay

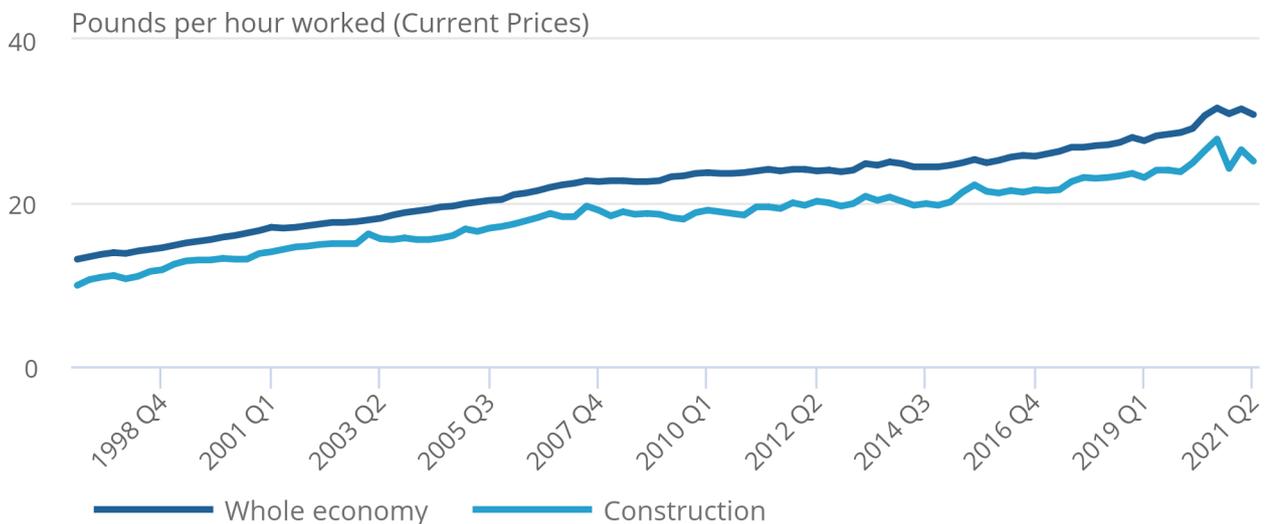
Average labour income per hour worked is lower in construction than the rest of the economy, in line with economic theory since productivity is also lower. This relationship is shown in Figure 4, where total employee compensation (including wages and other costs of employment, such as employee taxes and pension payments) per hour worked is consistently higher for the whole economy than it is for the construction industry.

### Figure 4: Labour income per hour worked is persistently lower in the construction industry than the rest of the economy

Total labour costs per hour worked, construction industry and whole economy, UK, Quarter 1 (Jan to Mar) 1997 to Quarter 2 (Apr to June) 2021

#### Figure 4: Labour income per hour worked is persistently lower in the construction industry than the rest of the economy

Total labour costs per hour worked, construction industry and whole economy, UK, Quarter 1 (Jan to Mar) 1997 to Quarter 2 (Apr to June) 2021



Source: Office for National Statistics – Supply and use tables, and labour productivity hours worked

#### Notes:

1. This measure is preferred over Average Weekly Earnings (AWE) which only includes wages and salaries, and does not include self-employed workers. This measure will be introduced in the Unit Labour Costs release on 3 Nov 2021.

## 5 . Output

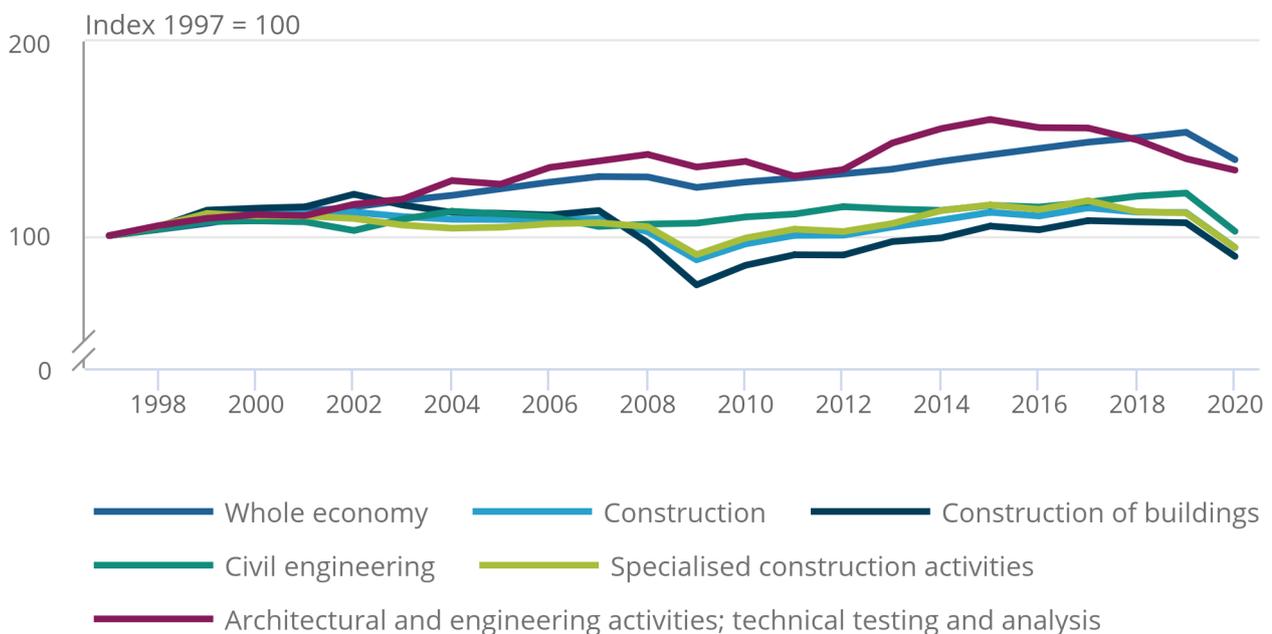
The volume of output in the construction industry is estimated to have risen more slowly than the whole economy since 1997 (Figure 5). In real terms, gross value added in the construction industry increased just 12% in the 22 years to 2019 (0.5% per year on average), compared with the whole economy which saw a 53% increase (2.0% per year on average). This in part reflects the larger fall in construction output during the 2008 to 2009 recession than for the economy overall.

### Figure 5: Real output has increased slowly in construction compared with the rest of the economy

Gross value added, chain volume measures (CVM), construction industry and sub-industries and whole economy, UK, 1997 to 2020

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Gross value added, chain volume measures (CVM), construction industry and sub-industries and whole economy, UK, 1997 to 2020



Source: Office for National Statistics -- GDP(O) low level aggregates table

The growth in the volume of output has been broadly consistent across all construction sub-industries.

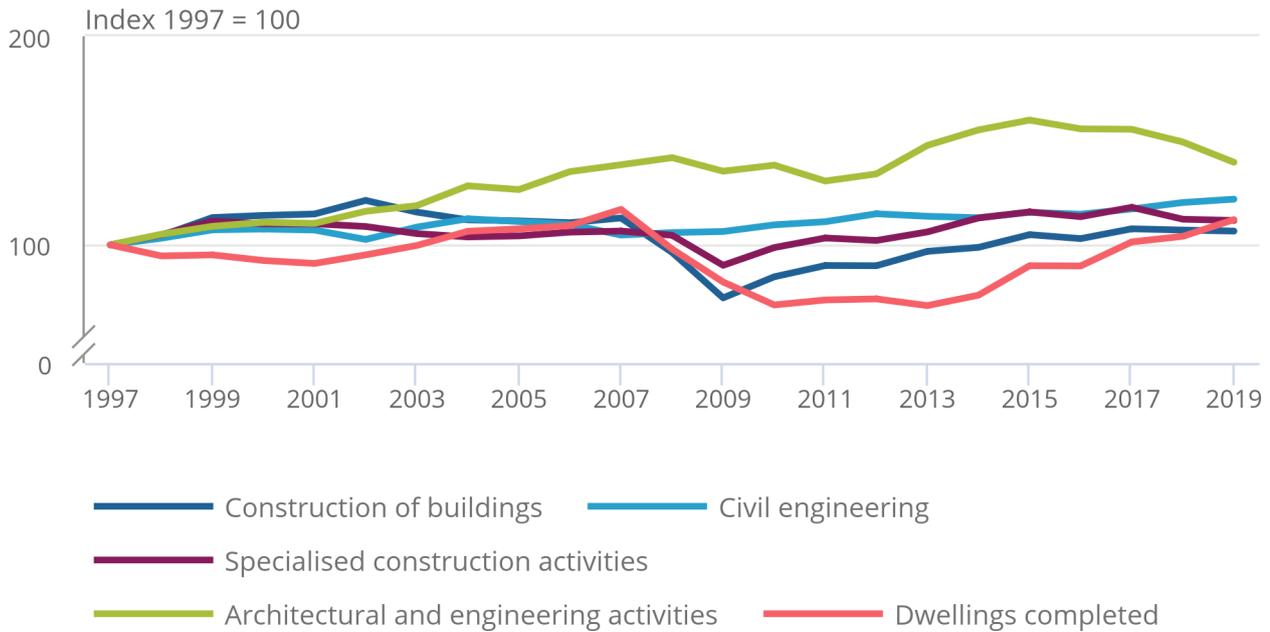
The volume of output for specialised construction activities and construction of buildings follows a similar trend to the number of dwellings built each year. Figure 6 shows that the pattern of growth before, during and after the financial crisis for specialised construction activities and construction of buildings is similar to that of the number of dwellings built. By contrast, the volume of output for civil engineering steadily increases.

**Figure 6: Real output is cyclical in construction industries related to housebuilding, and more steady for civil engineering**

Gross value added (CVM) and number of dwellings built, UK, 1997 to 2019, index 1997= 100

Figure 6: Real output is cyclical in construction industries related to housebuilding, and more steady for civil engineering

Gross value added (CVM) and number of dwellings built, UK, 1997 to 2019, index 1997= 100



Source: Office for National Statistics – UK housing statistics

Notes:

1. Construction sub-industry 41 is not just related to housebuilding; for dwellings completed information see [House building, UK: permanent dwellings started and completed](#).

## 6 . Goods and services

Raw materials, goods and services (intermediate consumption) are inputs into production, like labour and capital. This expenditure is deducted from output to calculate gross value added, the numerator in our productivity calculations.

Intermediate consumption includes sub-contracting expenses, which is common in the construction industry. Over 50% of intermediate consumption is sub-contracting expenses, by far the highest of any industry in the UK economy. The figure rose in the late 1990s to the level it is today. A high degree of subcontracting could be good or bad for productivity in the industry: it could lead to increased specialisation of tasks and competition, but also increase fragmentation and higher communication costs.

To look at trends in purchases of other products, we have deducted sub-contracting expenses from total intermediate consumption.

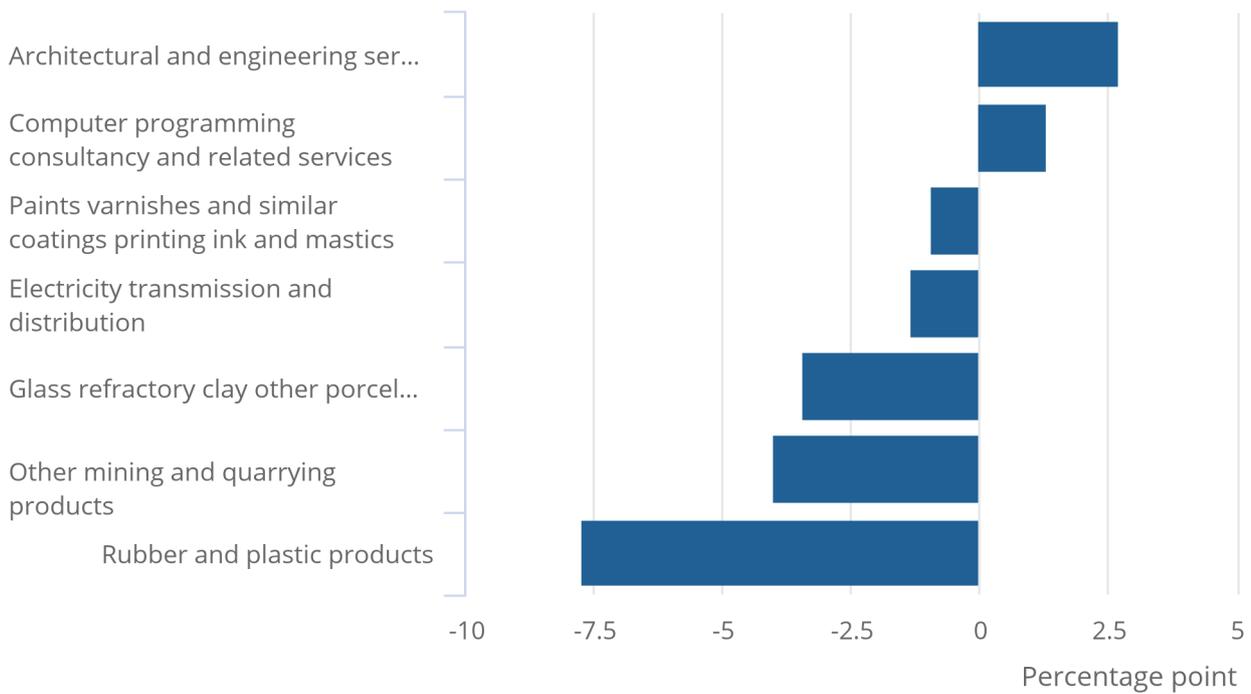
The construction industry is spending proportionally more on services and less on materials than it used to. For example, the proportion of the industry's total intermediate spending on rubber and plastic products has decreased from 10.6% to 2.9% between 1997 and 2018. Other materials like glass and paint have also decreased as a proportion of total intermediate consumption (Figure 7). Over the same period, the share spent on architectural and engineering services has increased, along with computer programming and consultancy-related services.

**Figure 7: Construction industry is spending proportionally more on business services, and proportionally less on materials**

Percentage point difference in intermediate consumption shares for selected products between 1997 and 2018

**Figure 7: Construction industry is spending proportionally more on business services, and proportionally less on materials**

Percentage point difference in intermediate consumption shares for selected products between 1997 and 2018



Source: Office for National Statistics – Supply and use tables

The shift in purchases towards services and away from materials might suggest increased efficiency in using materials, or less wastage of raw materials. The increased proportion spent on services could reflect increased planning or pre-construction design work and could also reflect increased complexity of building projects. This trend mirrors the changes in the industry's labour composition; see [Section 7](#).

## 7 . Labour input

In 1997, almost 1.9 million people worked in the construction industry, 700,000 being self-employed. By 2019 that had risen to 2.3 million with 900,000 self-employed people, maintaining a steady share of UK employment.

Total hours worked in the construction industry increased by 23% between 1997 and 2019, compared with 20% in the economy as a whole over the same period. During this time, the composition of hours worked in construction shifted towards older and more educated workers.

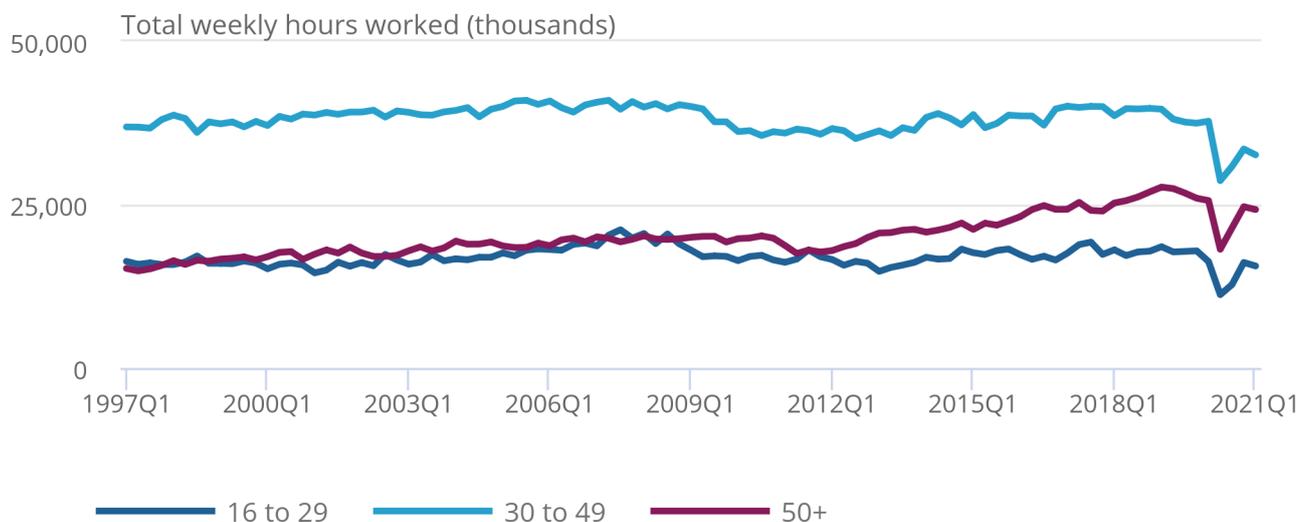
An increasing share of total hours worked in the construction industry are by older people (50 years and over). Figure 8 shows that until the financial crisis, hours worked increased steadily for all age groups. During the financial crisis hours worked fell for those under 50 years, before marginally increasing thereafter. In contrast, the number of hours worked by those aged 50 years and above stayed broadly flat during the financial crisis before rising again in the post-financial crisis period.

**Figure 8: The number of hours worked by workers 50 years and over has increase substantially, while for younger workers there is little growth**

Total weekly hours worked per quarter by age group, construction industry, UK, Quarter 1 (Jan to Mar) 1997 to Quarter 2 (Apr to June) 2021

Figure 8: The number of hours worked by workers 50 years and over has increase substantially, while for younger workers there is little growth

Total weekly hours worked per quarter by age group, construction industry, UK, Quarter 1 (Jan to Mar) 1997 to Quarter 2 (Apr to June) 2021



Source: Office for National Statistics – Quality-adjusted labour input

Despite growth in the industry and labour market, there are about the same number of hours worked by 16- to 29-year old's in the construction industry today as in 1997. This could suggest difficulties attracting younger workers to the industry. The share of hours worked by females in the construction industry has approximately doubled since 1997 but remains relatively low at about 20%.

There has also been a general rise in the amount of work undertaken by those who are more educated, with trends in construction broadly matching the whole economy. Figure 9 shows that while highly educated workers account for a smaller share of hours worked in the construction industry than the rest of the economy, the share of hours worked by this group has increased dramatically over the past two decades.

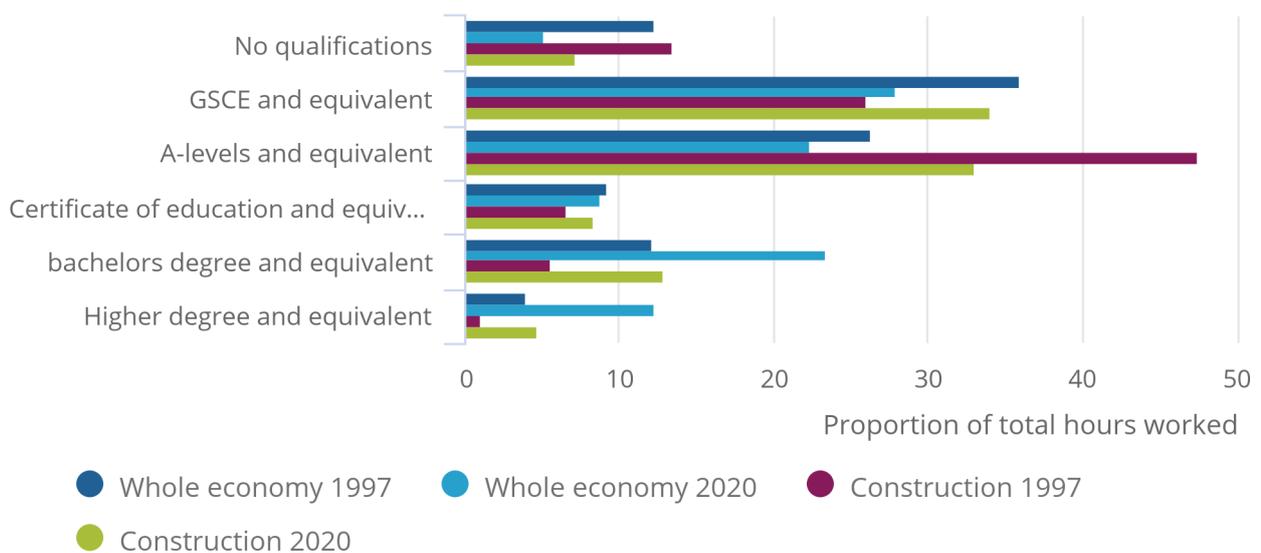
Middle and lower-educated workers account for a larger share of hours worked in the construction industry than the rest of the economy, both in 2019 and in 1997. The share of hours worked by those with no qualifications has fallen by about half in construction between 1997 and 2019, although remains a little higher than the rest of the economy.

**Figure 9: Construction employs proportionally fewer higher-educated workers than the rest of the economy, although this has increased**

Proportion of total hours worked by highest education qualification, construction and the whole economy, UK, 1997 and 2019

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Proportion of total hours worked by highest education qualification, construction and the whole economy, UK, 1997 and 2019



Source: Office for National Statistics – Quality-adjusted labour input

The relative increase in education levels of the construction workforce could be expected to have a positive effect on productivity as people develop their skills before entering the workforce. However, education might not be a good measure of worker skill in construction, where on-the-job training and tacit knowledge are important. Experience in the industry might therefore be more important, which can be approximated by age.

Driving the increase in higher-education levels in construction over the past two decades are workers 30 years and over. Figure 10 shows that the largest increase in hours worked in construction came from less-educated workers aged 50 years and over, and highly educated workers aged 30 years and over. This might reflect a big increase in people attending university in the early 2000s, entering the industry, and becoming 30-years-old by 2019.

**Figure 10: Construction employs proportionally fewer higher-educated workers than the rest of the economy, although this has increased**

Change in hours worked in construction industry between 1997 and 2019, by highest education level and age group, UK

## Download the data

[.xlsx](#)

In contrast, the number of hours worked by workers aged 30 to 49 years, with A-levels, technical qualifications and other certificates of education, has fallen substantially. However, this remains the largest group in absolute terms, and the fall might reflect changing education norms over the generations, as well as aging of the existing construction workforce.

## 8 . Capital

To understand capital in productivity analysis, we use a measure called capital services, which reflects the rate of use of the capital stock, which is in turn accumulated from capital investment.

Capital investment has increased more rapidly in the construction industry than the market sector, especially since the 2008 to 2009 recession (Figure 11).

### Figure 11: Capital investment in the construction industry has outpaced the market sector, especially since 2009

Real capital investment, construction (excluding buildings, structures and land improvements) and the market sector, UK, 1997 to 2019

#### Figure 11: Capital investment in the construction industry has outpaced the market sector, especially since 2009

Real capital investment, construction (excluding buildings, structures and land improvements) and the market sector, UK, 1997 to 2019



Source: Office for National Statistics – Capital services estimates

#### Notes:

1. Building, structures and land improvements have been removed from the capital stock in the construction industry. These assets often reflect the output, rather than the input, of the construction industry, so for productivity analysis it is preferable to remove them.

The type of assets the construction industry invests in has changed over this period, moving towards intangible and technology assets. The productive capital stocks of computer hardware, research and development, and software (both developed in house and purchased) have all increased faster in recent years than more traditional assets like machinery (Figure 12). These assets accounted for just 6% of the value of the capital stock in 1997, rising to 14% in 2020. These assets tend to require more skilled and educated workers to be employed to use them, in line with the trends in the education of the workforce in [Section 7](#).

**Figure 12: The proportion of the capital stock accounted for by intangible and technology assets has risen in the construction industry**

Proportion of the value of the productive capital stock when excluding buildings, structures and land improvements, construction industry, UK, 1997 and 2020

Figure 12: The proportion of the capital stock accounted for by intangible and technology assets has risen in the construction industry

Proportion of the value of the productive capital stock when excluding buildings, structures and land improvements, construction industry, UK, 1997 and 2020



Source: Office for National Statistics – Capital services estimates

Notes:

1. Building, structures and land improvements have been removed from the capital stock in the construction industry. These assets often reflect the output, rather than the input, of the construction industry, so for productivity analysis it is preferable to remove them.

The increase in investment, and changing composition of that investment, have led to sharp increases in capital services in recent years. Coupled with more modest growth in hours worked, this means that each worker has more capital available to them, known as “capital deepening”. Capital deepening should have a positive effect on labour productivity, as workers have more or better-quality capital available to them.

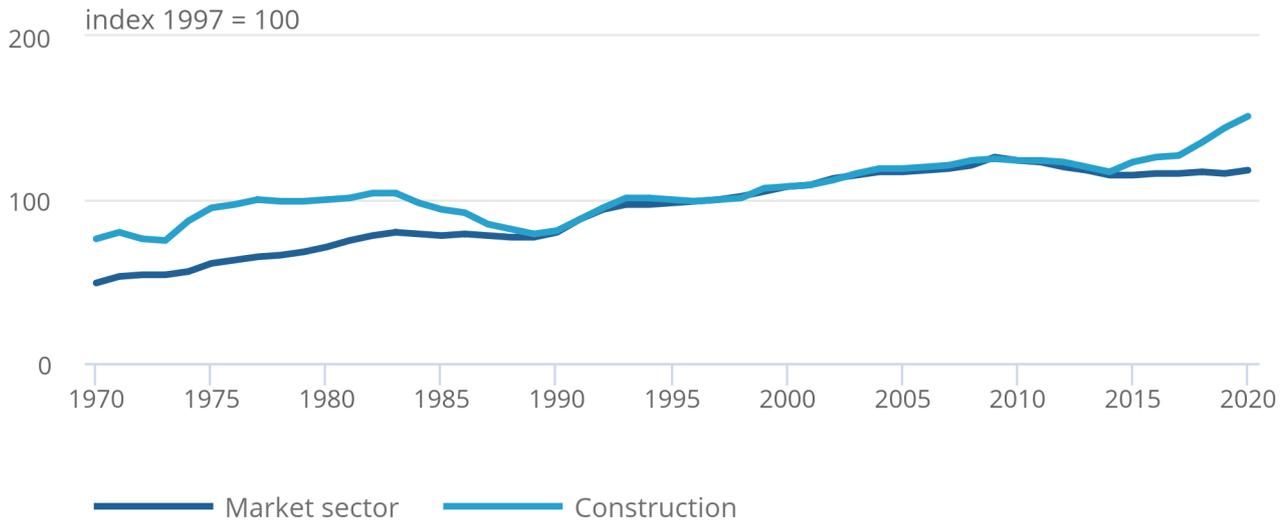
Between 1990 and 2014 the amount of capital available to workers in the construction industry grew at a similar rate as the market sector (Figure 13). Since 2014 however, the construction industry has had far faster capital-deepening growth than the rest of the market sector.

**Figure 13: Capital deepening has increased in the market sector and construction industry between 1997 and 2020**

Capital deepening, construction industry and market sector, UK, 1970 to 2020, index 1997 = 100

**Figure 13: Capital deepening has increased in the market sector and construction industry between 1997 and 2020**

Capital deepening, construction industry and market sector, UK, 1970 to 2020, index 1997 = 100



Source: Office for National Statistics – Multi-factor productivity estimates

Notes:

1. Building, structures and land improvements have been removed from the capital stock in the construction industry. These assets often reflect the output, rather than the input, of the construction industry, so for productivity analysis it is preferable to remove them.
2. Value for 2020 is adjusted for a fall in utilisation, see [dataset](#).

## 9 . Understanding construction productivity

Data on the expenditure, skills and capital of the construction industry are all suggestive of productivity growth in recent years. Yet our productivity estimates show little if any productivity growth in construction in recent decades.

The growth in hours worked, jobs and nominal output between 1997 and 2019 are similar in the construction industry as the rest of the economy; in fact, construction grows a little faster in each. However, the growth in real output (adjusted for price changes) is substantially less in construction than the rest of the economy, especially prior to the 2008 downturn. This is because estimated price increases are much faster in construction than the rest of the economy.

Since official productivity statistics follow the [Standard Industrial Classification \(SIC\) 2007](#), they may miss important changes in the structure of the construction industry in practice. For instance, industry experts often consider architectural and engineering businesses part of the construction industry, although that activity is in a different part of the SIC 2007 classification. Businesses specialising in modern methods of construction, such as modular and offsite construction, may also be allocated to other SIC 2007 industries based on their principal activity.

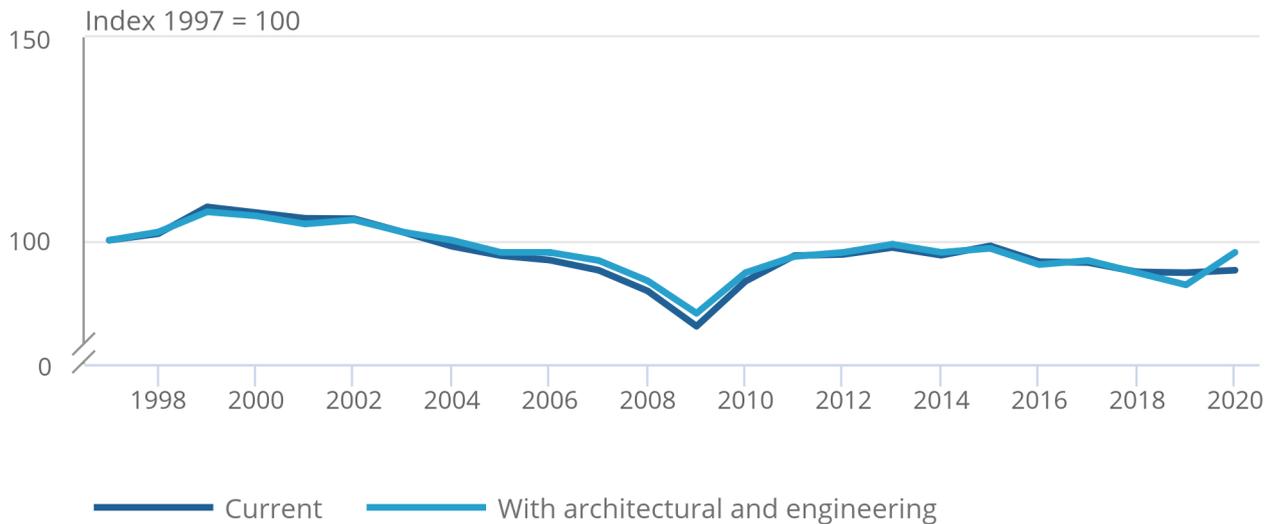
However, expanding the scope of construction to include these activities would likely have little impact on current measures of productivity. Figure 14 shows productivity for the aggregate of construction (section F of SIC 2007) and architectural and engineering services (division 71 of SIC 2007), which follows a very similar trend to the series for the construction industry, This is because both industries have similar productivity trends (see Figure 2), and architectural and engineering services is relatively small compared with construction.

## Figure 14: Expanding the scope of the construction industry changes the trend in productivity little

Output per hour worked, with various definition adjustments to the construction industry, 1997 to 2020

### Figure 14: Expanding the scope of the construction industry changes the trend in productivity little

Output per hour worked, with various definition adjustments to the construction industry, 1997 to 2020



Source: Office for National Statistics – Multi-factor productivity estimates

#### Notes:

1. GVA of architectural and engineering industry (division 71) added using chained volume measures, and uses total hours worked across construction and division 71.

ONS has a programme of development work on deflators in progress, building on successful implementation of 'double deflation' in Blue Book 2021. For instance, ONS is exploring the role of 3D Business Information Modelling (BIM) in architectural and engineering and construction services. The use of BIM techniques tends to reduce the potential of costly errors and reduce lifetime cost, which can be seen as a quality improvement. Any improvements to output price deflators would have commensurate impacts on real output and productivity estimates.

## 10 . Glossary

### Output

Output refers to the total production of goods and services produced by an industry, sector or an economy. It can refer to current price production (such as the value of all goods and services without accounting for inflation) or a volume measure of production.

### Gross value added (GVA)

GVA is an estimate of the volume of goods and services produced by an industry, and in aggregate for the UK.

## Intermediate consumption

Output refers to GVA, which is an estimate of the volume of goods and services produced by an industry, and in aggregate for the UK.

## Deflator

Deflators measure changes in prices over time, so the effects of price changes (inflation) can be removed from data. This allows data to be expressed in "real" or "volume" terms, so that the underlying growth rate can be identified.

## Multi-factor productivity

For any given change in output, multi-factor productivity (MFP) measures the amount that cannot be accounted for by changes in inputs of quality-adjusted labour and capital.

## Capital services

Capital services refer to the flow of productive services provided by an asset that is employed in production. Capital services are the appropriate measure of capital input in production analysis.

## Capital deepening

Capital deepening refers to the change in the amount of capital workers have at their disposal for each hour worked. It is calculated as the level of capital services divided by total hours worked.

# 11 . Data sources and quality

## About productivity measures

Productivity measures how much output can be generated per unit of input. This article uses official measures of productivity, which use gross value added (GVA) as their measure of output. Inputs are either hours worked or a composite measure of labour and capital inputs.

Multi-factor productivity (MFP) estimates are compiled using the growth accounting framework. This decomposes changes in economic output, in this case GVA of the UK market sector, into contributions from changes in measured inputs: labour, capital and a residual element known as MFP. For more information, see our [simple guide to multi-factor productivity](#) and our [Multi-factor productivity \(MFP\) quality and methodology information \(QMI\)](#).

## Measuring the output of the construction industry

Construction output for Great Britain is sourced from the Monthly Business Survey, which covers businesses classified to construction according to the UK Standard Industrial Classification (SIC) 2007. Data for Northern Ireland comes from the Northern Ireland Quarterly Construction Enquiry.

Additional information on construction data contributing to gross domestic product (GDP) can be found in the [Construction statistics: sources and outputs](#) article. Details on the capital services measures used in this article can be found in the [Capital services QMI](#).

## Definition of the construction industry in official statistics

SIC 2007 has a section-level industry for construction (section F), which is divided into three industry divisions: civil engineering, construction of buildings (including development of building projects), and specialised construction activities. This last group of companies includes electrical and plumbing activities, demolition and site preparation, and building finishing, which includes plastering, painting and glazing.

Other related activities, such as architectural and engineering activities and off-site manufacturing of buildings, are not included in this industry.

## 12 . Future developments

This is the first in a series of productivity “industry spotlight” articles, highlighting productivity trends and their drivers in different industries of the UK economy. We welcome feedback on this article and any suggestions for industries of focus in future articles. Please contact [productivity@ons.gov.uk](mailto:productivity@ons.gov.uk).

## 13 . Related links

### [Productivity overview, UK](#)

Article | Released 7 October 2021

The main findings from official statistics and analysis of UK productivity, presenting a summary of recent developments.

### [Construction statistics, Great Britain](#)

Article | Released 19 October 2021

A range of statistics that are currently available on the construction industry including value of output, new orders by sector, number of firms and total employment.

### [Capital stocks and fixed capital consumption, UK](#)

Bulletin | Released 1 December 2020

Annual estimates of the value and types of non-financial assets used in the production of goods or services within the UK economy and their loss in value over time.