

Article

# An international comparison of gross fixed capital formation

A comparison of the gross fixed capital formation of the UK with other countries' estimates from around the world.

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# 1 . Main points

- The UK saw the largest proportional fall in the level of gross fixed capital formation (GFCF) of any G7 nation after the pre-financial crisis peak of Quarter 1 (Jan to Mar) 2008, falling by 18.0% from peak-to-trough; it has since recovered to a similar level seen before the financial crisis.
- Between Quarter 1 1997 and Quarter 2 (Apr to June) 2017, the UK had the lowest average value of GFCF as a percentage of gross domestic product (GDP) of any Organisation for Economic Co-operation and Development (OECD) nation.
- The UK has the lowest average non-government sector investment of any G7 nation as a percentage of GDP, along with the second lowest average government sector investment as a percentage of GDP.

## 2 . Introduction

Gross fixed capital formation (GFCF) is a net investment concept used within national accounts, which measures expenditure on non-financial assets from both the public and non-government sectors. More specifically, it measures the acquisitions less disposals of assets such as land, buildings, software, transport equipment and machinery used in the production process for more than one year. GFCF is a component of the expenditure measure of gross domestic product (GDP) and currently represents approximately 17% of GDP in the UK. GFCF is an important factor within an economy as it highlights an aspect of long-term productive capacity.

Business investment is a component of GFCF and measures investment by private and public corporations but excludes investment by central or local government, investment in dwellings, or the costs associated with the transfer of non-produced assets (such as land). For more detailed information on gross fixed capital formation and business investment, we have produced [a short guide to GFCF and business investment](#).

Business investment is not an internationally recognised concept and therefore, it cannot be used to make international comparisons. GFCF, however, is an internationally recognised concept in the [European System of Accounts](#) (ESA) and the [System of National Accounts](#) (SNA) and is therefore internationally comparable. This article will focus on GFCF comparisons between nations in the Organisation for Economic Co-operation and Development (OECD) using available statistics from the [OECD website](#) (as at the time of this article's publication), and will analyse the different GFCF trends in various OECD nations.

Comparisons made in this article will be based upon a combination of chained volume measures, seasonally adjusted and current prices, seasonally adjusted.

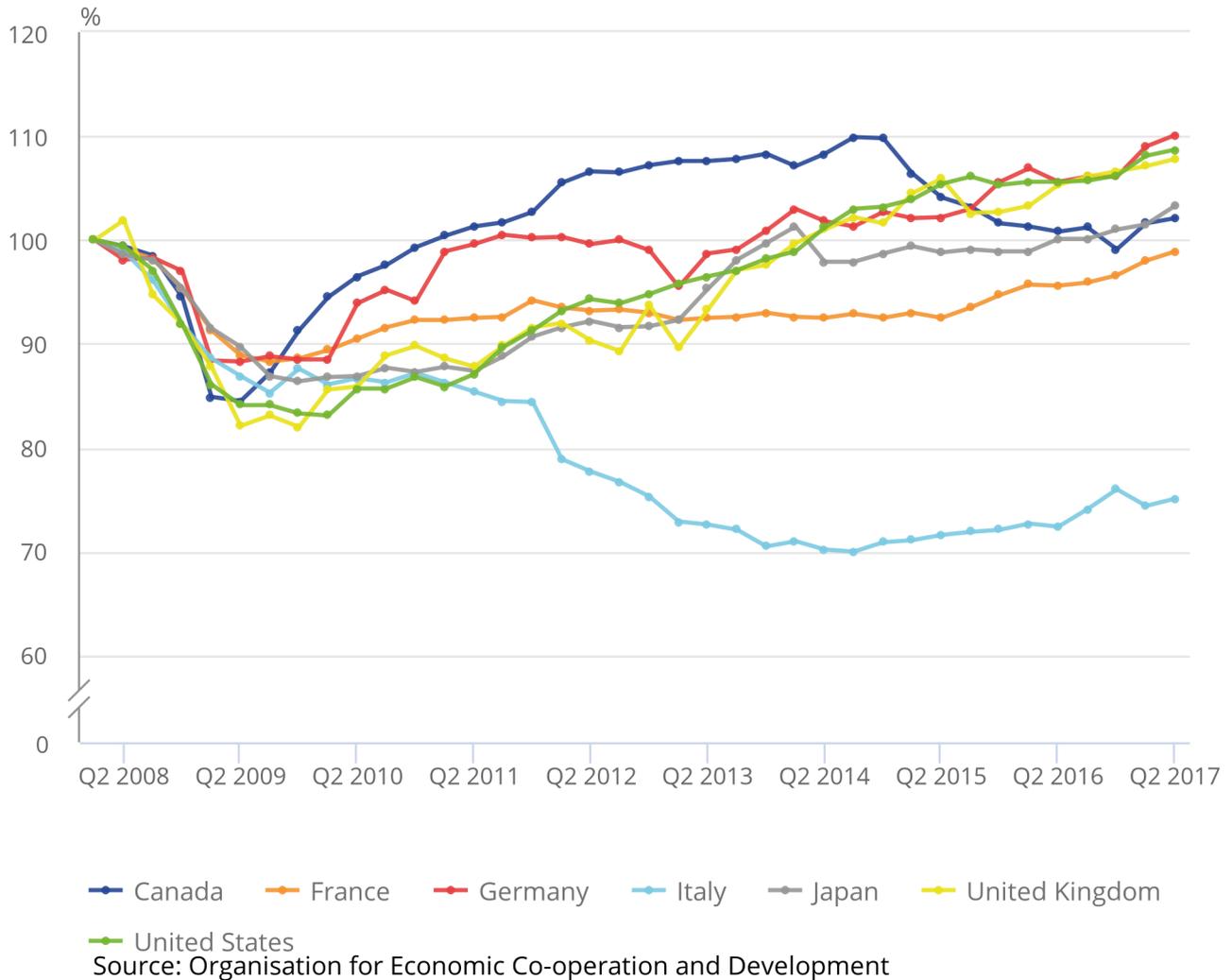
## 3 . Comparison of the UK with the G7

Between Quarter 1 (Jan to Mar) 2008 and Quarter 2 (Apr to June) 2009, gross fixed capital formation (GFCF) in the UK decreased by 18.0%, in chained volume measures, which represented the sharpest peak-to-trough decline of any G7 nation between 2008 and 2009 (Figure 1). The global financial crisis in 2008 impacted upon lending to the real economy, as the cost of raising finance increased and credit was less available to business. This tightening of financial conditions made it harder for firms to finance their capital expenditure.

The UK experienced the largest fall in output on record, as gross domestic product (GDP) fell by 6.1% between Quarter 1 2008 and Quarter 2 2009. This fall in demand led to a large increase in spare capacity in firms, reducing the incentives for businesses to invest. Investment in fixed capital is often costly and irreversible, so the increase in uncertainty around the economic outlook is likely to have been another factor as to why many firms would have been unlikely to invest, leading to a sharp fall in GFCF.

**Figure 1: Indexed gross fixed capital formation level, Quarter 1 (Jan to Mar) 2008 to Quarter 2 (Apr to June) 2017**

Figure 1: Indexed gross fixed capital formation level, Quarter 1 (Jan to Mar) 2008 to Quarter 2 (Apr to June) 2017



Source: Organisation for Economic Co-operation and Development

**Notes:**

1. Q1 equals Quarter 1 (January to March), Q2 equals Quarter 2 (April to June), Q3 equals Quarter 3 (July to September), Q4 equals Quarter 4 (October to December).
2. Q1 2008=100

The other G7 countries experienced an average peak-to-trough fall in GFCF of 14.0%, compared with the 18.0% decline in the UK. The US experienced the second largest decline in GFCF after the UK, with a fall of 16.9%. Conversely, the countries that experienced the smallest decline were France and Germany, which both saw an 11.7% decrease in GFCF. The largest persistent decline overall was experienced by Italy, where the Quarter 2 2017 GFCF level was 24.9% lower than that of Quarter 1 2008. Italy's GFCF level fell by 30% between Quarter 1 2008 and Quarter 3 (July to Sept) 2014 and it is the only G7 nation not to have increased its level of investment since Quarter 2 2009.

The first country to recover to its Quarter 1 2008 level was Canada, 12 quarters after the GFCF first began to fall. In contrast, it took the UK more than six years (25 quarters) to recover to its pre-recession level of GFCF. Quarter 2 2017 represents a 7.8% increase in the level of GFCF since Quarter 1 2008.

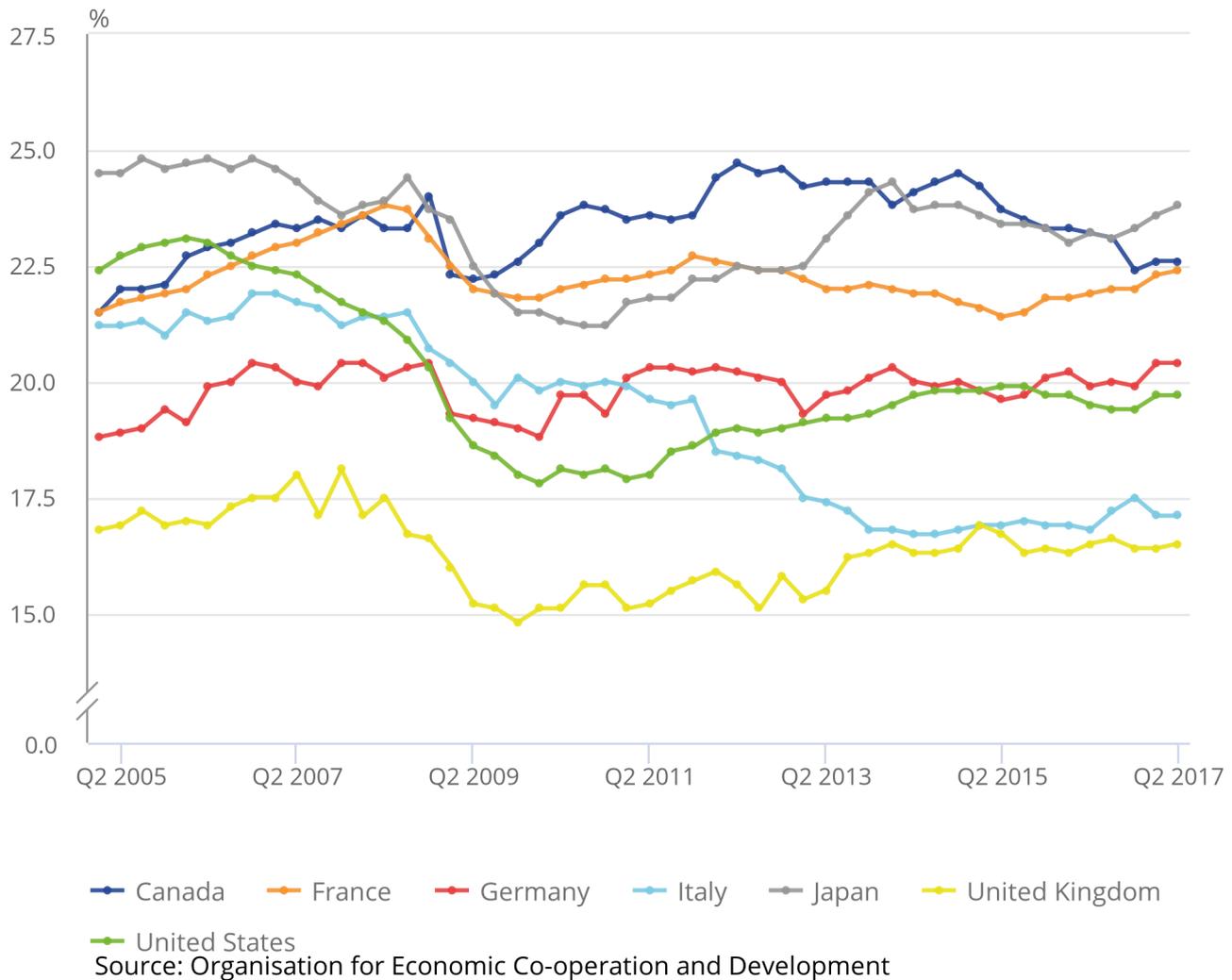
## **4 . Gross fixed capital formation as a percentage of gross domestic product**

As a percentage of gross domestic product (GDP) in Quarter 2 (Apr to June) 2017, gross fixed capital formation (GFCF) represented 16.5% of total expenditure within the economy. Comparing this with other G7 nations, the UK and Italy have the lowest relative levels of GFCF as a percentage of GDP (Figure 2). Pre-financial crisis levels show GFCF as a percentage of GDP in the UK was around 18%, which fell to a low of 14.8% in Quarter 4 (Oct to Dec) 2009.

Figure 2 shows that all advanced economies experienced a fall in GFCF that was relatively much larger than the fall in GDP over the 2008 to 2009 period. The ratios for many countries then began to pick up as the factors that weighed on capital expenditure during the financial crisis started to unwind. The increases in investment levels have been enough to keep GFCF at a similar percentage of GDP to its pre-crisis levels, but investment has not increased its overall share in the economy.

**Figure 2: Gross fixed capital formation as a percentage of gross domestic product between G7 nations, Quarter 1 (Jan to Mar) 2005 to Quarter 1 2017**

Figure 2: Gross fixed capital formation as a percentage of gross domestic product between G7 nations, Quarter 1 (Jan to Mar) 2005 to Quarter 1 2017



Source: Organisation for Economic Co-operation and Development

**Notes:**

1. Q1 equals Quarter 1 (January to March), Q2 equals Quarter 2 (April to June), Q3 equals Quarter 3 (July to September), Q4 equals Quarter 4 (October to December).

This is in contrast to Italy, a country that has experienced two recessions in the last decade. Italy's GFCF as a percentage of GDP has experienced a downward trend over the past 10 years that has culminated in GFCF representing approximately five percentage points less of GDP than it did in Quarter 1 (Jan to Mar) 2007.



**Table 1: Average gross fixed capital formation as a percentage of gross domestic product, by country, Quarter 1 (Jan to Mar) 1997 to Quarter 2 (Apr to June) 2017**

<b>Country</b>	<b>1997 to 2017</b>
South Korea	30.8
Estonia	28.3
Czech Republic	28.0
Australia	26.5
Slovak Republic	25.9
Latvia	25.0
Japan	24.6
Spain	24.6
Switzerland	24.1
Slovenia	24.0
Ireland	23.7
Austria	23.5
Sweden	22.4
Belgium	22.3
Finland	22.3
Canada	22.2
Norway	22.1
New Zealand	22.1
Iceland	21.8
Portugal	21.7
France	21.7
Colombia	21.5
Lithuania	21.0
Netherlands	20.9
United States	20.8
Denmark	20.6
Germany	20.5
Israel	20.2
Costa Rica	20.2
South Africa	19.8
Greece	19.7
Luxembourg	19.6
Italy	19.6
United Kingdom	16.7

Source: Organisation for Economic Co-operation and Development

The UK is a highly advanced economy mainly based upon the services sector and as such, it would be expected for the percentage of GFCF to be lower in the UK than in countries whose economies are based more upon manufacturing. This is because manufacturing activity tends to be more reliant on capital-intensive production than services activity.

Table 1 shows that over the 20-year period from 1997 to 2017, the UK has had an average value of 16.7% of GDP being accounted for by GFCF. This is 2.9 percentage points lower than Italy, the next lowest investor over the same period. Table 1 demonstrates that the UK has, historically, been a low investor in non-financial assets compared with its GDP as a whole.

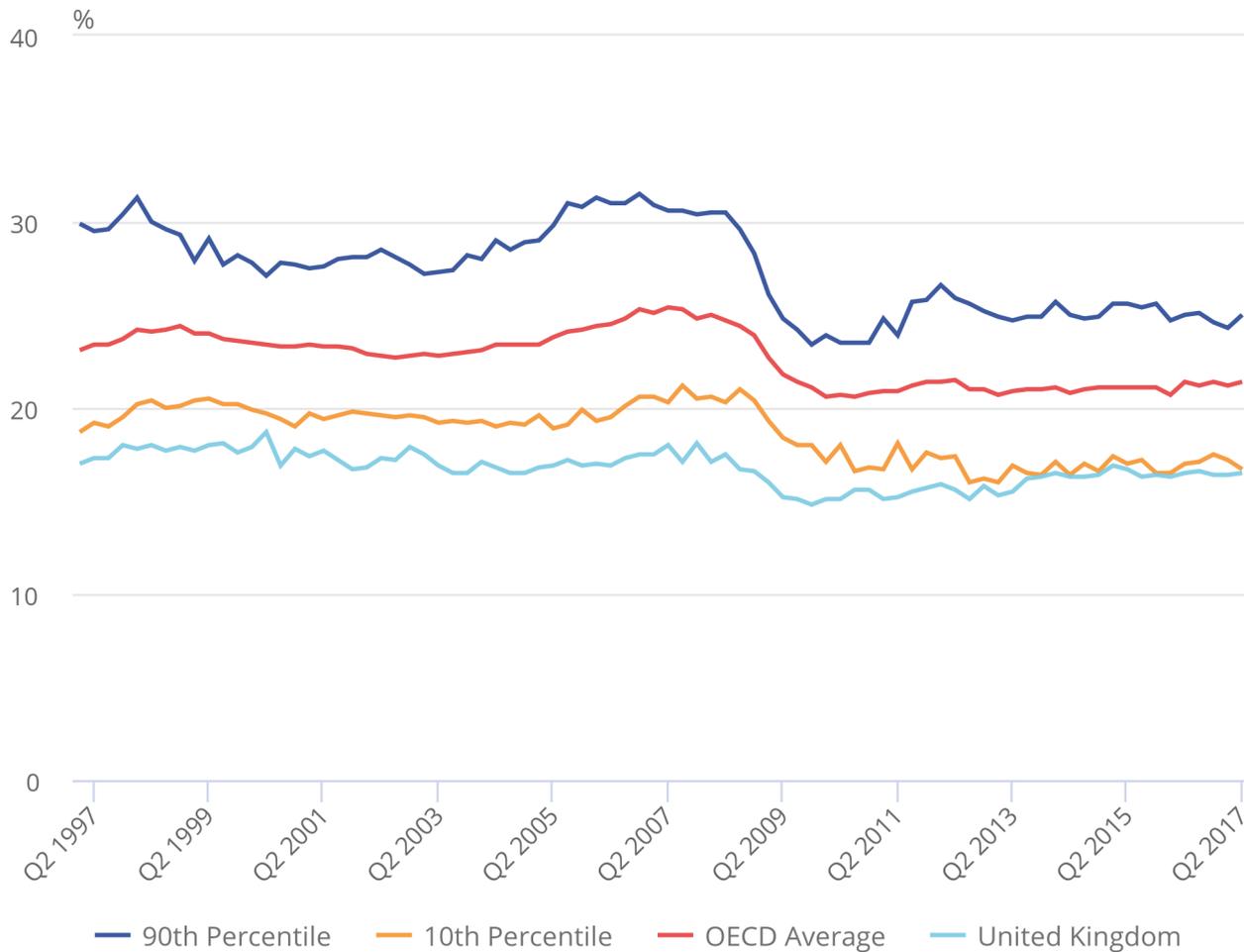
The largest investor of the G7 is Japan, with 24.6% of GDP being accounted for by GFCF. Canada is the only other G7 nation to appear in the top half of all Organisation for Economic Co-operation and Development (OECD) countries.

Scandinavian countries have a remarkably similar level of GFCF as a percentage of GDP. Sweden, Norway and Finland have values of 22.4%, 22.3% and 22.1% respectively. Australia has the fourth highest value of GFCF as a percentage of GDP, despite having a very similar economy to that of the UK, US and other economically advanced nations.

Figure 3 shows the low level of GFCF as a percentage of GDP that the UK has had for many years. Table 1 shows the UK at the bottom of the table, and this is outlined in Figure 3, with the UK being in the lowest decile in each of the last 20 years. The UK is an average of six percentage points lower than the OECD average across the same time frame.

**Figure 3: Gross fixed capital formation as a percentage of gross domestic product, UK compared with Organisation for Economic Co-operation and Development nations, 1997 to 2017**

Figure 3: Gross fixed capital formation as a percentage of gross domestic product, UK compared with Organisation for Economic Co-operation and Development nations, 1997 to 2017



Source: Organisation for Economic Co-operation and Development

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**Notes:**

1. Q1 equals Quarter 1 (January to March), Q2 equals Quarter 2 (April to June), Q3 equals Quarter 3 (July to September), Q4 equals Quarter 4 (October to December).

Table 2 shows the average share of the government and non-government sectors to overall GFCF within the economy along with the average spend on GFCF as a percentage of GDP. The UK has the third lowest average contribution from the government of any G7 nation, with Germany showing the lowest value, where just 10.6% of GFCF comes from government expenditure on non-financial assets. Conversely, Japan has the highest ratio, at 24.1%.

**Table 2: Average percentage contribution of government and non-government sectors to gross fixed capital formation and gross domestic product, 1997 to 2017, G7 nations**

Country	Average government share of GFCF	Average non government share of GFCF	Average government spend on GFCF as a % of GDP	Average non-government spend on GFCF as a % of GDP
Canada	16.3	83.7	3.6	18.5
France	17.8	82.2	3.9	17.8
Germany	10.6	89.4	2.2	18.3
Italy	13.9	86.1	2.9	16.8
Japan	24.1	75.9	6.0	18.6
United Kingdom	14.4	85.6	2.4	14.3
United States	18.7	81.3	3.9	17.0
G7 Average	16.6	83.4	3.5	17.3

Source: Organisation for Economic Co-operation and Development

Table 2 also shows the average percentage share of both the government and non-government sectors to overall GDP in the G7 economies. The UK has a low average government spend on GFCF as a percentage of GDP, with a value of 2.4%. This is 1.1 percentage points below the G7 average of 3.5%. Germany has the lowest average government spend on GFCF as a percentage of GDP at 2.2%.

It is also worth noting the comparatively high shares of GFCF to GDP of the French, Canadian and American governments, which all contribute more than 3.6% of GDP via their spending on GFCF. Japan, however, is the clear leader in this category, with 6.0% of GDP being accounted for by government expenditure on GFCF. This is 2.7 times greater than that of Germany.

The average non-government spend on GFCF as a percentage of GDP for the UK is 14.3%. This is 2.5% lower than the next lowest G7 nation, Italy. Japan, Germany and Canada all have an average non-government spend on GFCF as a percentage of GDP of more than 18%. Comparing the UK directly with Germany, both countries have a similar level of government spend as a percentage of GDP, however, the average non-government spend on GFCF as a percentage of GDP is 4% larger in Germany than it is in the UK.

## 5 . Comparison of gross fixed capital formation by asset

On an international level, gross fixed capital formation (GFCF) can be broken down into four main assets that are comparable:

- dwellings
- other buildings and structures
- other machinery and equipment
- intellectual property products

For a detailed guide of products contained within each of these assets, please see [a short guide to GFCF and business investment](#).

Table 3 shows the total spend on each of the assets as a percentage of GFCF. It has been calculated by taking an average contribution across a 20-year period for each asset, from Quarter 1 (Jan to Mar) 1997 to Quarter 2 (Apr to June) 2017.

**Table 3: Percentage of gross fixed capital formation spend by asset**

	<b>Dwellings</b>	<b>Other Buildings and Structures</b>	<b>Other Machinery and Equipment</b>	<b>Intellectual Property Products</b>
Austria	19.8	29.6	33.9	16.5
Canada	28.0	32.7	25.8	13.4
Colombia	16.5	46.5	23.9	1.3
Czech Republic	12.6	31.0	44.8	11.1
Denmark	22.5	23.8	32.9	20.8
Estonia	12.8	40.3	40.6	6.0
Finland	26.2	28.0	24.9	20.7
France	27.3	26.8	24.1	21.5
Germany	28.3	20.4	34.9	16.4
Greece	29.5	25.9	35.5	8.9
Ireland	26.7	23.3	28.7	21.3
Israel	28.9	19.8	30.8	20.5
Italy	25.8	25.6	35.2	13.2
Japan	14.8	30.6	28.4	20.8
Korea	15.2	38.6	30.7	15.5
Latvia	10.4	39.1	43.3	6.8
Luxembourg	16.3	40.3	36.7	6.5
Netherlands	23.9	27.6	28.4	19.8
New Zealand	25.6	26.4	34.8	13.2
Norway	19.0	43.6	24.9	12.5
Portugal	22.7	35.1	30.2	10.7
Slovak Republic	11.1	33.6	44.8	7.7
Slovenia	13.4	35.6	38.3	12.2
Spain	30.9	30.2	28.6	9.9
Sweden	15.1	22.2	34.7	27.7
United Kingdom	20.1	33.2	25.9	20.4
United States	20.1	22.5	25.7	23.8

Source: Organisation for Economic Co-operation and Development

Notes:

1. Series may not sum due to rounding and/or the omission of non comparable assets such as cultivated biological resources and residual item

Table 3 shows the total spend on each of the assets as a percentage of GFCF. It has been calculated by taking an average contribution across a 10-year period for each asset, from Quarter 1 (Jan to Mar) 1997 to Quarter 2 (Apr to June) 2017.

## Dwellings

Dwellings are buildings or designated parts of buildings that are used entirely or primarily as residences, including any associated structures, such as garages, and all permanent fixtures customarily installed in residences. Typically, the data suggest that smaller countries tend to spend a smaller proportion of GFCF on dwellings. The country with the smallest average spend on dwellings is Latvia with 10.4%. Similarly, Slovakia, the Czech Republic, Estonia and Slovenia make up the next four lowest spenders on dwellings in the Organisation for Economic Co-operation and Development (OECD). Japan, however, also has a low percentage spend on dwellings, with just 14.8% of total GFCF being spent on dwellings.

Conversely, larger economies appear to spend a greater proportion of GFCF on dwellings. Spain tops the list with 30.9%, with Canada, France and Germany all spending greater than 27% of GFCF on dwellings. The UK spends 20.1% of dwellings compared with other OECD nations, comparable to the level spent by the US.

## Other buildings and structures

Other buildings and structures includes spending on buildings such as schools, hospitals and commercial buildings, among other things, while structural spending typically includes spending on roads, railways and bridges, among other things. Spending on these assets tends to be more volatile, and no particular trend is visible from the data, as is the case for other assets.

Israel spends the least proportion of GFCF (of the countries in this comparison) on other buildings and structures at just 19.8% of total GFCF. Colombia, Norway, Luxembourg and Estonia top the list with over 40% of total GFCF being spent on buildings such as schools, workplaces and hospitals in each of these nations. The UK spends 33.2% of all GFCF on other buildings and structures.

## Other machinery and equipment

Other machinery and equipment revolves around information communication technology (ICT) hardware and machinery for special use, typically associated with the production of goods and services within an economy. It follows logically that economies with a larger manufacturing sector should spend a higher proportion of GFCF on other machinery and equipment. The UK, an economy based primarily on the service sector, has a comparatively low spend on this asset, ranking in the bottom 10 of the countries in the comparison with just 25.9% of total GFCF. It is joined in the bottom 10 by Canada, France, the US and Japan.

At the other end of the scale, smaller economies that manufacture goods on a larger scale are seen to have a higher proportion of GFCF spending on other machinery and equipment. Slovakia and the Czech Republic are the highest proportional spenders in this category, with 44.8% of total GFCF being dedicated to this asset in each country. Germany has a much larger manufacturing sector than the UK and other G7 nations, and ranks ninth in this asset at 34.9%.

## Intellectual property products

The final asset to be compared is intellectual property products (IPP). Theoretically, more advanced economies should spend a larger amount on IPP than less advanced economies and by looking at the data, this generally seems to be the case. Sweden tops the list with 27.7% of GFCF being spent on IPP and three of the G7 nations (US, Japan, France) are in the top five in terms of the percentage spent on IPP. Canada and Italy, however, spend comparatively little on IPP, at just 13.4% and 13.2% respectively. Colombia has the lowest percentage of any country, with just 1.3% of GFCF being spent on IPP. The UK spent an average of 20.4% of GFCF on IPP over the period, which ranks ninth of all OECD nations.

IPP is important for a nation's economy as a large proportion of IPP is research and development. Development of new software and new products can lead to patents, which reward entrepreneurs for time and effort. Spending on patents is included in IPP. When a country has a lower percentage spend on IPP within its economy, it may be a sign that little to no work is being done in terms of research and development, which may be an indication of future economic performance. Other assets included within IPP are mineral exploration and entertainment products such as film, TV or radio.

IPP, however, can be difficult to measure accurately as it is often hard to quantify how much a particular patent or piece of film (for example) is worth. It is dependent on the specific methodologies used by different nations, which may lead to some unexpected disparities within the data.

## 6 . Conclusion

This article has been an international comparison of gross fixed capital formation (GFCF) between the UK and other Organisation for Economic Co-operation and Development (OECD) nations. The UK was found to have experienced the sharpest decline in GFCF of any G7 nation in relative terms, with a peak-to-trough fall of 18.0%.

The UK has had historically low investment as a percentage of gross domestic product (GDP) and has the lowest proportions of any nation examined in this comparison between 1997 and 2017. This was found to be as a result of weaker non-government sector investment which, on average, has a 14.3% share of GDP.

Analysing assets specifically, more advanced economies tended to invest more in intellectual property products and dwellings rather than machinery, equipment and buildings. However, stronger manufacturing economies in the G7 still invest a relatively large proportion in these assets, whereas the UK does not.

## 7 . Sources and methodology of UK estimates of gross fixed capital formation

The UK's gross fixed capital formation (GFCF) estimates are based primarily on business data from our Quarterly Acquisitions and Disposals of Capital Assets Survey (QCAS), which collects data from across the UK. The QCAS survey has a sample size of approximately 24,500 UK businesses and is a stratified random sample based on employment size (20 to 49, 50 to 99, 100 to 299 and 300 plus). It uses the Inter-Departmental Business Register (IDBR) as its sampling frame.

In the QCAS, businesses are classified by industry and stratified by employment. Businesses with an employment size of at least 300 are permanently included in the sample. Those with between 20 and 299 employment are sampled on a rotating basis and those with employment under 20 are not sampled to reduce survey costs and burden upon small businesses. In addition to the sampled survey, businesses with fewer than 20 employees who undertake large (more than £5 million) capital spending have their capital expenditure included in the estimates.

Results of the QCAS are weighted using combined ratio estimation, and then aggregated at industry level. Current price and chained volume measures are derived from the results, and both unadjusted and seasonally adjusted series are available.

Non-survey sources are also used in the production of GFCF estimates. These include data compiled from other areas of Office for National Statistics (ONS) such as data for government investment. Data are also received from other sources such as construction output, Her Majesty's Treasury and prices indices.

A new system for the estimation of GFCF was launched in February 2017 in which a detailed article regarding the methodology changes was also published. For more details regarding these changes, please refer to [Changes to the gross fixed capital formation methodology and processing \(McLaren and Murphy, January 2017\)](#). For more general information around the methodology of how GFCF statistics are produced in the UK, the [Business Investment Quality and Methodology Information](#) report provides a comprehensive overview of the production of both business investment and GFCF estimates.