Article

Experimental regional gross fixed capital formation (GFCF) estimates by asset type: 1997 to 2020

Experimental regional gross fixed capital formation (GFCF) split by industry and asset type, 1997 to 2020

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1 . Overview

This methodology note accompanies new experimental statistics on regional capital investment. It is intended to provide a high-level overview of methods used to produce these experimental statistics.

An interim report was circulated to key stakeholders in October 2021, which set out the scope and purpose of a project to develop these new statistics. It also included the results of a user survey, a summary of international guidance and current practice, and data source options. This note can be forwarded to those interested, on request.

The main purpose of this project is to improve existing annual regional gross fixed capital formation (GFCF) estimates. These are intended to support delivery of the Government Statistical Service (GSS) subnational data strategy and support locally targeted policy making, such as the Levelling Up agenda. It also aims to pave the way for future improvements in measuring regional capital stock and regional productivity. A Next steps section is included at the end of this note, which details ongoing work that will contribute to improving GFCF estimates and makes recommendations for future improvements.

Estimates have been produced using new and experimental methods or data sources with a focus on assets rather than industries. For the purposes of this project, data sources are limited to those we already have available at the ONS, or are publicly available, and guided by research and user feedback. The estimates produced have the following characteristics:

- annual – covering the period 1997 to 2020

- UK International Territorial Level 3 (ITL3) regions

- Standard Industrial Classification 2007 (SIC07) section level industry groups

- high-level asset groups (buildings and structures, transport equipment, information and communications technology (ICT) equipment, other tangible assets, intangible assets)

- constrained to national GFCF totals consistent with The Blue Book 2021.

This represents a change from the currently published regional GFCF data, which estimate investment by industry at ITL2, and which do not have an asset breakdown.

2 . Methods

We follow international guidelines including the Eurostat manual on regional accounts methods (PDF, 1.3MB). These stipulate that assets should be allocated on the basis of economic ownership, location or use. We use a variety of data sources and methods in order to follow these principles:

- tangible immovable assets (for example, buildings) are allocated to the region where they are constructed using commercial data on construction new orders

- tangible movable assets (for example, laptops) are allocated to the region where they are used; we estimate this using information on employee locations

- transport equipment is allocated to the region where they are registered (not where they are located or used, as that will be many locations) – this assumes that where they are registered is where their economic owner is based; we estimate this using information on the registered location of the asset (where available) or the location of the economic owner; where these are not available, we use employee locations.

- intangible assets are also known as intellectual property products; computer software and databases are allocated to the region where they are used and are estimated using employee location; research and development is allocated according to where the investment takes place using survey data.

The following section shows more detail on the data sources and methods used for individual assets. For some assets we use the existing or "as-is" methods and data sources used to produce currently published regional gross fixed capital formation (GFCF).

Data source and methods by asset or product (ESA 2010)

Buildings and structures – dwellings

- Data source: commercial data from Barbour ABI and the Office for National Statistics (ONS) construction statistics (dwellings values); Northern Ireland Statistics and Research Agency (NISRA) construction statistics; Counts of dwellings completions and stocks from: Department for Levelling up, Housing and Communities (DLUHC), Welsh, Scottish and Northern Ireland government data

- Regional method: regional values of dwellings used where available

- Industry method: allocated to Standard Industrial Classification (SIC) 2007 section L – Real Estate

Other buildings and structures – general (includes land improvements)

- Data source: commercial data from Barbour ABI and ONS construction statistics and NISRA construction statistics (2008 onwards); Annual Business Survey (ABS) (before 2008)

- Regional method: commercial data from Barbour ABI microdata and ONS construction statistics (2008 onwards); Northern Ireland – ITL3 shares of regional gross value added (GVA) in SIC2007 section F (2008 onwards); regional ABS apportionment (before 2008)

- Industry method: modelled from published UK industry by product data

Other buildings and structures – roads

- Data source: commercial data from Barbour ABI and ONS construction statistics (2008 onwards); Annual Business Survey (before 2008); Road length statistics for Northern Ireland from NISRA/Department for Infrastructure for Northern Ireland

- Regional method: Great Britain – commercial data from Barbour ABI microdata and ONS construction statistics (2008 onwards); Northern Ireland – roads lengths of local and national roads at ITL3 areas (2008 onwards); regional ABS apportionment (before 2008)

- Industry method: all allocated to SIC2007 section F in line with allocation in national estimates

Other buildings and structures – costs of ownership transfer on non-produced assets

- Data source: estimated dwellings data

- Regional method: "as-is" allocated to regions using estimated dwellings data

- Industry method: allocated to SIC industry section L – Real Estate

Transport machinery and equipment – ships

- Data source: commercial data on trade of ships from VesselsValue Ltd.; commercial data on registration of ships from IHS-Markit Ltd.

- Regional method: port of registration (where this is in the UK) and economic owner address where ships are registered to overseas ports

- Industry method: Companies House data on economic owner industry

Transport machinery and equipment – road transport vehicles

- Data source: new registrations of vehicles – Driver and Vehicle Licencing Agency (DVLA); Employment data – Labour Market Statistics

- Regional method: location of registration (ITL1); Location of relevant workers (ITL3 - constrained to ITL1 figures)

- Industry method: proportional to national totals

Machinery and equipment – other transport (includes aircraft)

- Data source: ABS

- Regional method: regional ABS apportionment

- Industry method: modelled from published UK industry by product data

Machinery and equipment – Information and Communications Technology (ICT) hardware and telecoms

- Data source: ABS

- Regional method: regional ABS apportionment

- Industry method: modelled from published UK industry by product data

Machinery and equipment – other (included in other tangible assets in data tables)

- Data source: ABS

- Regional method: regional ABS apportionment

- Industry method: modelled from published UK industry by product data

Other tangible assets – weapons systems

- Data source: Ministry of Defence (MoD) – regional armed forces personnel data

- Regional method: "as-is" data provided at local authority level and mapped to ITL3

- Industry method: allocated to SIC industry section O – Public Administration and Defence

Other tangible assets – cultivated assets

- Data source: Department for the Environment, Farming and Rural Affairs (Defra)

- Regional method: ITL2 - As-is; ITL3 England – Defra "regional income from farming data"; ITL3 – Scotland, Wales, NI – modelled

- Industry method: allocated to SIC industry section A – Agriculture, forestry and fishing

Intangible assets/intellectual property products – research and development

- Data source: Business Enterprise Research and Development survey (BERD)

- Regional method: as-is; BERD local authority data were mapped to ITL3

- Industry method: aggregated from microdata

Intangible assets/intellectual property products – mineral exploration and evaluation

- Data source: UK gross fixed capital formation (GFCF) totals

- Regional method: allocated to Extra Regio

- Industry method: allocated to SIC2007 section B

Intangible assets/intellectual property products – computer software and databases – purchased software

- Data source: ABS

- Regional method: regional ABS apportionment

- Industry method: modelled from published UK industry by product data

Intangible assets/intellectual property products – computer software and databases – own account software

- Data source: Annual Survey of Hours and Earnings (ASHE)

- Regional method: based on workplace location of relevant workers and follows the 2008 System of National Accounts (SNA) guidelines on sum of costs

- Industry method: based on industry of relevant workers

Intangible assets/intellectual property products – entertainment, literary or artistic originals

- Data source: employment data – Labour Market Statistics

- Regional method: employment data mapped to ITL3 region

- Industry method: employment data for SIC 59, 60, 90

Our aim has been to produce a full picture of UK GFCF for all assets. This allows users to see total investment for a region and allows the data to be compared with published data, which are compiled by industry. In some instances, the data used to fill gaps are sub-optimal – for example, using total net capital expenditure data from the ABS survey, rather than asset-specific data. These issues are addressed in the Next steps section.

Data allocated to Extra Regio represent investments in assets used in the offshore oil and gas extraction industry that are not allocated to any specific UK region. In these experimental estimates, these include investments in mineral exploration and evaluation, as well as some transport equipment. Additionally, and in line with published estimates, we have incorporated an adjustment in 2005 for the decommissioning of nuclear reactors. Further work is needed to more accurately identify the assets that should be allocated to Extra Regio – see the Next steps section for more information.

3 . Data availability and disclosure

Estimating regional gross fixed capital formation (GFCF) is challenging and becomes more so with increased granularity at the region and industry level. Two main challenges are data availability and disclosure.

Data availability

Data available for use in this project have enabled us to estimate regional GFCF at a more detailed level than previously. The use of detailed asset-specific commercial, administrative and survey data, would help improve these data. Unfortunately, data of the necessary detail were not available for all years or all assets. This has left gaps which have been filled either by modelling or using data that are insufficiently detailed.

Disclosure

The use of detailed information to produce UK International Territorial Level 3 (ITL3) estimates by industry section leads to the risk of disclosing individual firm level data. This occurs when aggregates comprise data from only a small number of firms or where a few firms are dominant. These risks have been mitigated by aggregating the microdata to a higher level – such as removing the industry dimension, grouping industries and grouping ITL3 regions – and subsequently modelling the industry and ITL3 data. Because of the way these data have been compiled, disclosure checking and prevention has been done by data source, rather than at the final stage of aggregation. This has meant suppressing data that might have been non-disclosive.

4 . Next steps

These data are experimental, and we anticipate that there will be further user engagement, quality assurance and development of these statistics.

As indicated above, improvements could be made if we were able to use more detailed data for some assets at the industry and regional level. The removal of detailed industry data to avoid disclosure and the subsequent use of industry weightings has likely led to some potential data anomalies for some assets. For instance, estimates of investment in some assets by organisations in industry A (agriculture) appear to be overstated in urban areas and understated in rural areas. In the absence of relevant micro-data, we recommend further investigation into region specific industry weightings.

Other improvements could be made if there were more detail on the true economic owners of certain assets, for example, transport vehicles. We recommend further conversations with data suppliers to obtain more detail on the economic owners and discussions around disclosure processes. This would avoid the use of aggregation and then subsequent modelling to obtain the detail required and should provide more accurate region by industry data.

Another area for further work is on the allocation of GFCF investment to Extra Regio. Ideally these allocations would be based on detailed analysis of the economic ownership of individual assets and their specific use for offshore oil and gas exploration.

In time, the intention is that improved regional capital investment methods will be incorporated into official GFCF statistics, and work will begin to improve regional capital stocks.

5 . Related links

Regional accounts methodology guide: June 2019
Methodology article | Last revised 13 June 2019
What comprises the UK regional accounts, how various regional estimates are compiled, the different data used in compilation and concepts underpinning the process.

Manual on Regional accounts methods - 2013 edition
Chapter 7, General principles for allocating Gross Fixed Capital Formation (GFCF) to regions
Publication | Released 24 January 2014
An update of the two methodological booklets of 1996. In addition, it includes the modifications introduced by the ESA 2010.

UK National Accounts, The Blue Book: 2021
Compendium | Released 29 October 2021
National accounts statistics including national and sector accounts, industrial analyses and environmental accounts.

Annual gross fixed capital formation by industry and asset
Dataset | Released on 28 October 2021
Annual estimates of gross fixed capital formation (investment) by industry and asset, in current prices and chained volume measures, consistent with the UK National Accounts.