

Information paper

Summary Quality Report for Quarterly Capital Expenditure Inquiry

1 Introduction

This report is part of a rolling programme of quality reports being introduced by the Office for National Statistics (ONS). The full programme of work being carried out on [Statistical Quality](#)¹ is available on the National Statistics website. Summary Quality Reports are overview notes which pull together key qualitative information on the various dimensions of quality as well as providing a summary of methods used to compile the output.

This report relates to the estimates of capital expenditure collected by the Quarterly Capital Expenditure Inquiry (Capex Survey) and aims to provide users with information on usability and fitness for purpose of these estimates. The Capex Survey collects information on the acquisition and disposal of capital assets.

Capital expenditure is more difficult to measure than many other variables in sample surveys. This stems from two main reasons. First, capital expenditure can be sporadic, being quite large in one period and zero in others. This makes validation more difficult as well as imputation for non responders. Second, significant capital expenditure can be undertaken by new businesses before they start normal trading. Important examples of this would include new plants set up in the UK by overseas businesses as well as new special project vehicles established to run [Private Finance Initiatives \(PFIs\)](#)².

Terminology, concepts and methods used in capital expenditure can be found in the [UK National Accounts: Concepts, Sources and Methods](#)³.

2 Summary of Quality

2.1 Relevance

The degree to which the statistical product meets user needs for both coverage and content.

Capital assets (or Fixed assets) are tangible or intangible assets produced as outputs from processes of production that are themselves used repeatedly, or continuously, in processes of production for more than one year.

	Quarterly Capital Expenditure Inquiry
What it measures	The value of capital assets bought and sold. Acquisitions and disposals of vehicles, other capital equipment, and computer hardware. Acquisitions only of new building work (excluding dwellings), or other (construction) work of a capital nature, and computer software. Exploration expenditure is also collected for Standard Industrial Classification (SIC) 1110 level.
Frequency	Quarterly.
Sample size	Approximately 27,000 (UK).
Sampling frame	Inter-Departmental Business Register (IDBR).
Sample design	Stratified random sample where the strata are defined by SIC 2003 and

	employment size of the business (20-49, 50-99,100-299 and 300+). See section 3.2 for an exception to this.
Weighting	Each business represents a number of similar businesses, based on number of employees and SIC 2003. Weights are automatically calculated each quarter.
Estimation	Combined ratio estimation.
Imputation	There is no imputation in the sampled bands. Automatic imputation using period on period movements is carried out for all non-responding businesses in the top size band. Also, system constructions are created for non-responding businesses, in the top size bands, the first time they are selected, based on average capex by employment. Manual constructions are used in exceptional circumstances such as company restructures.
Outliers	Businesses with extreme or atypical key variable returns for their business size are treated as outliers. Outliers are detected and treated using one sided Winsorisation. Some manual outliering is done where there is further information available.

The main data user is Capital Branch of National Accounts Group (NAG), who use the data to provide estimates of Gross Domestic Product (GDP) as the total of all expenditures made either in consuming finished goods and services or adding wealth less the cost of imports (GDP(E)). Data supplied from this survey make up around 95 per cent of the value of data presented in the [Business Investment Statistical Bulletin](#)⁴ and around 55 to 60 per cent of the total value of Gross Fixed Capital Formation (GFCF). The availability of quarterly data means that meaningful aggregates can be created which then go on to be used by policy makers within government and the Bank of England.

The data are also used in the compilation of annual current price Input-Output Supply and Use tables, which determine the level of current price GDP.

The survey covers manufacturing, other production, construction, distribution and services expenditure for the private sector. It does not cover: agriculture, fishing and forestry (except for agricultural contractors), banking and various financial institutions, higher education establishments, new building work related to dwellings, and land and existing buildings. These data are obtained by National Accounts from other sources.

The survey is reviewed every three years as part of the government's guidelines for controlling statistical surveys. The review aims to ensure surveys are conducted in such a way as to obtain the information needed while imposing the minimum burden on respondents.

Capital expenditure and the [UK National Accounts](#)⁵ are compiled in accordance with the [European System of Accounts 1995 \(ESA 95\)](#)⁶, under EU law. ESA 95 is itself consistent with the standards set out in the [United Nations, System of National Accounts 1993 \(SNA 93\)](#)⁷. At the industry level results are classified by [SIC 2003](#)⁸.

2.2 Accuracy

The closeness between an estimated result and the (unknown) true value.

The survey obtains its samples from the IDBR which is a database of UK businesses that is maintained by ONS. The sample is periodically reviewed and optimised. Achieved samples must be 67per cent at the provisional stage, 80 per cent at the revised stage and 85 per cent at the late stage. Respondents are sent reminder letters to encourage response, and are also contacted by telephone to achieve the response targets.

Estimates from this survey are subject to various sources of error. Total error consists of two elements, the sampling error and the non-sampling error.

Sampling error

This occurs because estimates are based on a sample rather than a census. Sampling error is minimised for the Capex Survey through the use of a scientifically chosen sample which is reviewed and refined periodically. Sampling error is continually monitored with standard errors and coefficients of variation calculated for all survey outputs.

Non-sampling error

Non-sampling errors can occur due to errors of coverage, measurement, processing and non-response. Response rates give an indication of the presence of non-response error on the estimates (eg bias). Non-sampling error is minimised through comprehensive input and output editing processes.

The Capex Survey uses the IDBR as its sampling frame and uses it to calculate the design and calibration weights used in combined ratio estimation. The IDBR is updated frequently but inevitably suffers from some frame error.

Responses are checked for internal consistency, and compared with those for similar units. Quarter-on-quarter comparisons are made at respondent data and aggregate level. Disparities are investigated to ensure consistent returns.

2.3 Timeliness and Punctuality

Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the time lag between the actual and planned dates of publication.

The Capex Survey is quarterly and produces three sets of results per quarter. Provisional results of the current quarter are delivered to National Accounts five to six weeks after the end of the quarter, revised results of the current quarter and late results of the previous quarter are delivered eight to nine weeks after the end of the quarter.

The provisional data are published in the [Business Investment Statistical Bulletin](#)⁴ about eight weeks after the end of the quarter. This is followed by the publication of the second GDP press notice of the quarter, the [UK Output, Income and Expenditure Statistical Bulletin](#)⁹, which gives GFCF estimates. The revised Business Investment First Release (containing estimates of the previous quarter's late results in addition to the current quarters' revised results) is published roughly 12 weeks after the end of the quarter, one day before the third GDP press notice of the quarter, the [UK Quarterly National Accounts Statistical Bulletin](#)¹⁰.

2.4 Accessibility and Clarity

Accessibility is the ease with which users are able to access the data, also reflecting the format(s) in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the metadata, illustrations and accompanying advice.

Access to data at the individual business level is restricted. The confidentiality of the data is legally enforced by the Statistics of Trade Act 1947 in Great Britain and in Northern Ireland the Statistics of Trade and Employment (NI) Order 1988.

To accompany the dataset, three times each quarter a briefing is compiled which explains the major data movements and supporting information such as response rates achieved, outliers set, standard errors and coefficients of variation. This is sent to Capital Branch in National Accounts Group.

Data are published twice each quarter on the ONS website via the [Business Investment Statistical Bulletin](#)⁴. The data are also used in the compilation of GDP(E) and published in the [UK Quarterly National Accounts Statistical Bulletin](#)¹⁰ by National Accounts Group.

Tables showing Capex Survey figures are also published in Economic and Labour Market Reviews, with a longer run of series in the Annual Supplement, Annual Abstract and Monthly Digest of Statistics, Current Price Input-Output and the [UK National Accounts \(Blue Book\)](#)¹¹.

2.5 Comparability

The degree to which data can be compared over time and domain.

The Quarterly Survey into Capital Expenditure (Capex Survey) began in 1955. It became a statutory survey in 1991 following the Pickford Review of Government Economic Statistics (November 1988). Since the Pickford review, a number of changes have been made to the Capex Survey, namely a new sample design; the reorganisation of the work area responsible for conducting the survey; the introduction of new technology for data collection and analysis; and the publication of results at 2-digit Standard Industrial Classification (SIC 03) level.

A review of the methods used in the survey was carried out by ONS' Methodology Group and the University of Southampton in 1998, this resulted in increasing the sample size from 16,000 to around 32,000 each quarter.

Since the third quarter of 1994, sample selection has been from IDBR.

During 2006, due to ONS pressures on efficiencies, the sample size was reduced to approximately 27,000 with effect from the second quarter of 2006. The sample was also optimised and reallocated resulting in minimal impact on quality.

The questionnaire has been changed a number of times in the past few years. In 2001, computer software and computer hardware data were collected separately for the first time.

As of the second quarter of 2004, the oil and gas industry (SIC 1110) was included in the sample for the first time following the cessation of the survey by the Department of Trade and Industry (DTI), now the Department for Business, Innovation & Skills (BIS). A separate questionnaire type was created for SIC 1110 and a new question added requesting Exploration Expenditure.

As of the second quarter of 2006, the land and existing buildings question was removed from the questionnaire.

Capital expenditure and the [UK National Accounts](#)⁵ are compiled in accordance with the [ESA 95](#)⁶, itself consistent with [SNA 93](#)⁷ which has been adopted by statistical offices throughout the world.

2.6 Coherence

The degree to which data that are derived from different sources or methods, but which refer to the same phenomenon, are similar.

To ensure that the Capex Survey results are coherent, they are checked for consistency against the [Annual Business Inquiry \(ABI\)](#)¹². The ABI covers production, construction and distribution and has a much larger sample of approximately 63,000 businesses. It collects total capital expenditure (with some but not all asset detail). The Capex Survey results are also checked against the [Business Spending on Capital Items Survey \(BSCIS\)](#)¹³.

During the ABI data take-on process, individual comparisons of the larger businesses are made to ensure that returns to the annual and quarterly surveys are comparable. This is an automatic process and is a part of the annual survey's data validation system. Investigation of these errors has been suspended, at present, due to ONS' efficiency programme. A similar process occurs with BSCIS data take-on, with errors being rectified where possible.

Once a year, to coincide with the publication of the [Blue Book](#)¹¹, the annualised figures obtained from the previous four quarterly Capex Surveys are benchmarked against the latest results from the ABI survey to ensure coherence at sector and industry level.

3 Summary of Methods Used to Compile the Output

Data Collection

Two different questionnaires are sent out reflecting different SICs:

	Questionnaire types	Capex breakdown requested
1	SIC 1110 only	New construction work Vehicles Other capital equipment Computer software Computer hardware Exploration expenditure
2	All other SICs	New construction work Vehicles Other capital equipment Computer software Computer hardware

If respondents have no capital expenditure during the quarter they are given the option of replying using Telephone Data Entry (TDE). Questionnaires sent to Northern Ireland respondents are the same but with the Telephone Data Entry option removed.

From Q1 2010 the Capital Expenditure Survey will use a prototype internet based data collection service for a subsample of data. Initially this service will be offered in three different ways as follows:

1. 80 per cent of the sample (approx 20,000) will receive the paper questionnaire as usual, with an additional question asking if they would be interested in responding by internet in the future.
2. 16 per cent of the sample (approx 4000) will receive the paper questionnaire and a letter inviting them to use the internet based system
3. 4 per cent of the sample (approx 1000) will receive a letter asking them to use the internet based system

All respondents will have the option of providing a nil response by TDE.
Businesses over 300 or based in Northern Ireland will be excluded

The purpose of the prototype is to provide information about likely response patterns in the use of a fully developed internet based data collection service. This information will assist in the development of a business case for a strategic internet based solution. The arrangements have been agreed with Methodology Directorate to balance the requirement that there is sufficient information from which to develop a robust business case, with the risk that testing a new data collection instrument presents to the quality of the data.

Depending on the outcome of this pilot changes may be made to the arrangements either to provide better information for the development of internet based data collection, or to enhance the quality of responses.

Questionnaires ask for the amount of acquisitions and disposals by asset type incurred during the quarter. All respondents in the same sector, regardless of their employment size, receive the same questionnaire. They are asked to provide figures for a calendar quarter, although some provide data for slightly different periods if this is more convenient. If actual figures are not available by the return date, company estimates are acceptable.

Sample and Design

The Capex Survey sample is approximately 27,000 businesses with the IDBR used as the sampling frame. Stratification of the survey is by industrial classification (a single SIC code or groups of SIC codes), employment size band and region.

The selected size bands are (see below for exclusions):

- 20-49, 50-99, 100-299, and 300+

All businesses in the 300+ employment size band are permanently included in the sample. The smallest businesses in terms of employment (ie, 0-19 employment), are not sampled.

To reduce the burden on “employment agency” type businesses, companies classified in SICs 55520, 74130, 74500, 74602 and 74701 have a different sample design. From the second quarter of 2007, all businesses with 1000+ employment are selected continuously, with a rotating sample of those between 20-999 employment.

Using optimal Neyman allocation the sample is allocated in these cells to minimise the variance of the total capital expenditure estimator. A minimum cell size is imposed and small alterations are made based on other evidence.

Combined ratio estimation is used (cells are combined in the same industry across sampled employment size bands) with IDBR employment being the auxiliary variable. The weights are adjusted to account for the smallest unsampled businesses. Generally, each quarter, one fifth of the random sample is rotated out of the sample and a new fifth is rotated in.

Businesses not yet in production or in the process of being developed with less than 20 employees and, who account for a significant amount of capital expenditure, are selected in addition to the

above sample. The returns from these respondents are not weighted in the results. Two main sources are used to identify businesses that fall into this category: the Annual Register Survey, and Construction News. These sources identify businesses which expect to spend capital expenditure of more than £5 million on any new development project. PFIs are sourced from a number of areas and are included in the sample in the same way as businesses not yet in production.

Coverage

The Capex Survey estimates cover UK businesses registered for Value Added Tax (VAT) and/or Pay As You Earn (PAYE) and are classified using SIC 2003.

Industries covered are:

Industry	SIC
Other Production	0141,10,11,14, 40, 41
Manufacturing	15-37
Construction	45
Distribution Services	50 – 52
Other Services (for exclusions see below)	55 – 93

The survey aims to cover capital expenditure for the above. It does not cover: agriculture, fishing and forestry (except for agricultural contractors), banking and various financial institutions, higher education establishments, new building work related to dwellings, and land and existing buildings. These data are obtained by National Accounts from other sources.

Statutory Status

The statutory basis of the Capex Survey in Great Britain is the Statistics of Trade Act 1947 and in Northern Ireland, it is the Statistics of Trade and Employment (NI) Order 1988. Returns for businesses in Northern Ireland are sent out by the [Department of Enterprise, Trade and Investment, Northern Ireland \(DETINI\)](#)¹⁴.

Survey Procedures

Questionnaires are despatched two weeks before the end of the quarter to which they relate requesting a response within roughly three weeks of the despatch date. Questionnaires are addressed to a named contact within the business wherever possible. Two written reminders are sent each quarter, one to coincide with provisional results processing and the other for revised results processing. All businesses that have a significant impact on the survey (known as key responders), who have not replied are also telephoned before the first set of results is produced.

Questionnaires are scanned centrally by ONS' Survey Processing Centre with Optical Character Recognition (OCR) used to create an image. Images are stored on the computer system, reducing paper handling, retrieval and storage. Due to confidentiality issues, the paper version is shredded and then recycled.

Once the data are placed onto the system, a series of credibility checks are applied to aid data validation. Respondents who have zero capital expenditure to report can use the TDE system.

Combined ratio estimation is used (cells are combined in the same industry across sampled employment size bands) with IDBR employment being the auxiliary variable.

Results are processed for four size bands within each industry. The top sample band includes all businesses with 300+ employment. Where possible, returns for non-responding businesses in this size band are imputed by using the previous quarter's capital expenditure values for that business. The other three bands contain all businesses in the rotational sample. Weighting is used to compile population aggregates for this sample, including the population below the lowest cut-off. This is calculated by using capital expenditure per head from the returned data in this size group. Figures for businesses producing significant capital expenditure that are not covered in the normal sample design, including data for businesses not yet in production or being developed, are included in the top sample band and are not subject to weighting.

Businesses that have capital expenditure which is atypical or extreme are treated as outliers. An automatic method called one sided Winsorisation is used. An outlier weight is used to give the

business a more appropriate weighting. In some circumstances if more evidence is known outlying may be done manually.

Statistical Disclosure

Statistical disclosure control methodology is also applied to data. This ensures that information attributable to an individual organisation is not disclosed in any publication. The [Code of Practice for Official Statistics](#)¹⁵, and specifically Principle 5: Confidentiality, set out practices for how we protect data from being disclosed. The Principle includes a guarantee to survey respondents to "ensure that official statistics do not reveal the identity of an individual or organisation, or any private information relating to them". More information can be found on the [Statistical Disclosure Control Methodology](#)¹⁶ page of the ONS website and in [National Statistician's Guidance: Confidentiality of Official Statistics](#)¹⁷ page of the United Kingdom Statistics Authority website.

4 References

	Title of Reference	Website location
1	Statistical Quality	http://www.ons.gov.uk/about-statistics/methodology-and-quality/quality/index.html
2	Private Finance Initiatives (PFIs)	http://www.statistics.gov.uk/CCI/article.asp?ID=1638&Pos=&ColRank=2&Rank=224
3	UK National Accounts: Concepts, Sources and Methods	http://www.statistics.gov.uk/StatBase/product.asp?vlnk=1144
4	Business Investment Statistical Bulletin	http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=171
5	Guide to the National Accounts	http://www.statistics.gov.uk/CCI/nugget.asp?ID=55
6	European System of Accounts 1995	http://circa.europa.eu/irc/dsis/nfaccount/info/data/esa95/en/esa95en.htm
7	UN System of National Accounts 1993 (SNA93)	http://unstats.un.org/unsd/sna1993/introduction.asp
8	Standard Industrial Classification 2003 (SIC 2003)	http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=14012
9	UK Output, Income and Expenditure Statistical Bulletin	http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=1129&Pos=&ColRank=1&Rank=128
10	UK Quarterly National Accounts Statistical Bulletin	http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=818
11	Blue Book	http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=1143
12	Annual Business Inquiry	http://www.statistics.gov.uk/abi/
13	Business Spending on Capital Items Survey	http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=8167&Pos=&ColRank=1&Rank=422
14	Department of Enterprise, Trade and Investment, Northern Ireland (DETINI)	http://www.detini.gov.uk/cgi-bin/gethome
15	Code of Practice for Official Statistics	http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html
16	Statistical Disclosure Control Methodology	http://www.statistics.gov.uk/about/data/methodology/general_methodology/sdc.asp
17	National Statistician's Guidance: Confidentiality of Official Statistics	http://www.statisticsauthority.gov.uk/national-statistician/guidance/index.html

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