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Central
Statistics
Office

Standard Report on Methods and Quality for Quarterly Survey of Construction (QSC)

Standard documentation Metainformation

(Definitions, Explanations, Methods, Quality)

On

Quarterly Survey of Construction (QSC)

This documentation applies to the reporting period:
Quarterly

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Table of Contents

| | | |
|----------|---|-----------|
| 1 | Overview | 3 |
| 2 | General Information | 4 |
| | 2.1 Statistical Category | 4 |
| | 2.2 Area of Activity | 4 |
| | 2.3 Organisational Unit Responsible, Persons to Contact | 4 |
| | 2.4 Objectives and Purpose; History | 4 |
| | 2.5 Periodicity | 4 |
| | 2.6 Client | 4 |
| | 2.7 Users | 4 |
| | 2.8 Legal basis | 4 |
| 3 | Statistical Concepts, Methods | 5 |
| | 3.1 Subject of the Statistics | 5 |
| | 3.2 Units of Observation/Collection Units/Units of Presentation | 5 |
| | 3.3 Data Sources | 5 |
| | 3.4 Reporting Unit/Respondents | 5 |
| | 3.5 Type of Survey/Process | 5 |
| | 3.6 Characteristics of the Sample/Process | 6 |
| | 3.7 Survey Technique/Data Transfer | 6 |
| | 3.8 Questionnaire (including explanations) | 6 |
| | 3.9 Participation in the Survey | 6 |
| | 3.10 Characteristics of the Survey/Process and its Results | 7 |
| | 3.10.1 Seasonal Adjustment | 8 |
| | 3.11 Classifications used | 8 |
| | 3.12 Regional Breakdown of Results | 9 |
| 4 | Production of the Statistics, Data Processing, Quality Assurance | 10 |
| | 4.1 Data Capture | 10 |
| | 4.2 Data Editing | 10 |
| | 4.3 Imputation (for Non-Response or Incomplete Data Sets) | 10 |
| | 4.4 Grossing and Weighting | 10 |
| | 4.5 Computation of Outputs, Estimation Methods Used | 10 |
| | 4.6 Other Quality Assurance Techniques Used | 10 |
| 5 | Quality | 11 |
| | 5.1 Relevance | 11 |
| | 5.2 Accuracy and Reliability | 11 |
| | 5.2.1 Sampling Effects, Representativity | 11 |
| | 5.2.2 Non-Sampling Effects | 11 |
| | 5.2.2.1 Quality of the Data Sources used | 11 |
| | 5.2.2.2 Register Coverage | 11 |
| | 5.2.2.3 Non-response (Unit and Item) | 11 |
| | 5.2.2.4 Measurement Errors | 11 |
| | 5.2.2.5 Processing Errors | 12 |
| | 5.2.2.6 Model-related Effects | 12 |
| | 5.3 Timeliness and Punctuality | 12 |
| | 5.3.1 Provisional Results | 12 |
| | 5.3.2 Final Results | 12 |
| | 5.4 Coherence | 12 |
| | 5.5 Comparability | 13 |
| | 5.6 Accessibility and Clarity | 13 |
| | 5.6.1 Assistance to Users, Special Analyses | 13 |
| | 5.6.2 Revisions | 13 |
| | 5.6.3 Publications | 13 |
| | 5.6.3.1 Releases, Regular Publications | 13 |
| | 5.6.3.2 Statistical Reports | 13 |
| | 5.6.3.3 Internet | 13 |
| | 5.6.4 Confidentiality | 13 |
| 6 | Additional documentation and publications | 14 |

1 Overview

The quarterly Production in Building and Construction Index provides quarterly statistics on output in the construction sector. The index monitors trends in the value and the volume of production in building and construction. The primary purpose of the index is to measure changes in “Value Added” of construction work done at constant prices.

The principal difference between the value and volume indices is that the volume index traces the quantitative volume of production (i.e. effect of price changes excluded) each quarter. The “Capital Goods” price index for Building and Construction materials was used as the price deflator for this series (this is a wholesale price index for capital goods in the construction sector). Data are collected by means of e-forms together with a postal survey with approximately 2,500 firms surveyed each quarter.

2 General Information

2.1 Statistical Category

The quarterly “Production in Building and Construction Index” is a primary statistical survey.

2.2 Area of Activity

Construction Statistics.

2.3 Organisational Unit Responsible, Persons to Contact

Short Term Statistics Division

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2.4 Objectives and purpose; history

The quarterly “Production in Building and Construction Index” provides quarterly statistics on output in the construction sector. The index monitors trends in both the value and volume of production in building and construction.

The primary purpose of the index is to measure changes in value added at constant prices (i.e. where the impact of price inflation over the time period of the index is removed). The Quarterly Survey of Construction (QSC) was established to provide quarterly results on the value and volume of work done in the construction sector.

First results from the survey were published in August 2007.

2.5 Periodicity

The “Production in Building and Construction Index” is a quarterly survey.

2.6 Client

These statistics are required for EU comparisons under Council Regulation (EC) No 1165/98 and amended by Regulation (EC) No. 1893/2006.

2.7 Users

- European Union/Eurostat
- Government
- Economists
- National Accounts/CSO
- Construction Industry Federation
- The general public

2.8 Legal Basis

This survey is carried out in accordance with the Statistics (Quarterly Survey of Construction) (No. 2) Order 2021 (S.I. No. 314 of 2021), made under the 1993 Statistics Act. The statistics are also required for EU comparisons under Council Regulation (EC) No 1165/98 and amended by Regulation (EC) No.1893/2006.

3 Statistical Concepts, Methods

3.1 Subject of the Statistics

The subject of the statistics is the value of construction work done. The quarterly Production in Building and Construction Index provides quarterly statistics on output in the sector. The index monitors trends in the value and the volume of production in building and construction. The primary purpose of the index is to measure changes in value added at constant prices. The Quarterly Survey of Construction (QSC) was established to provide quarterly results on the value and volume of work done in the construction sector.

3.2 Units of Observation/Collection Units/Units of Presentation

The survey is designed to cover the entire construction sector as defined by NACE Rev. 2 (Industrial Classification of Economic Activity in the European Communities) Sector F (41-43). The NACE Rev. 2 classification defines the construction sector (i.e. Sector F) as:

“General construction and specialized construction activities for buildings and civil engineering works. It includes new work, repair, additions and alterations, the erection of prefabricated buildings or structures on the site and also construction of a temporary nature.”

The volume of work done is derived from the value. The CSO collects absolute values and publishes an index, which is derived by comparing results for the current quarter, and the same quarter in the previous year.

The sampling register used for the QSC includes all enterprises classified to Sector F of NACE Rev. 2. The EU requirement is for three indicators of production in the sector:

- Building
- Civil Engineering
- Total Building and Construction

The following value and volume indices are produced as part of the national publication:

- Seasonally Adjusted Production in All Building and Construction
- Seasonally Adjusted Production in All Building and Construction (excl. Civil Engineering)
- Seasonally Adjusted Production in Residential Building
- Seasonally Adjusted Production in Non-Residential Building
- Seasonally Adjusted Production in Civil Engineering

3.3 Data Sources

Primary Survey i.e. – The Quarterly Survey of Construction (QSC)

3.4 Reporting Unit/Respondents

Data is collected for 3 categories of Building and Construction output, Residential, Non-Residential and Civil Engineering. Respondents are asked to supply data for these categories on the value of work done in the quarter. The reporting unit is any enterprise classified to Sector F of NACE Rev. 2.

3.5 Type of Survey/Process

The QSC is a sample survey. Approximately 2,500 companies are surveyed each quarter. The STS Register provides the sampling frame from which the companies are drawn.

3.6 Characteristics of the Sample/Process

3.6.1 Population and Sampling Frame

The Central Business Register in the CSO provides the basis for the STS Register. It is from this STS Register that samples are chosen. The population comprises all enterprises classified to Sector F of NACE Rev. 2.

3.6.2 Sampling Design

All relevant companies with 20 or more employees are surveyed each quarter. A Neyman allocation method is used to optimally select the remainder of the sample by sizeclass and NACE Rev. 2 group.

The Neyman allocation method is a stratified sampling method, where the sample can often be split up into sub-samples, i.e. the total sample size is given by the sum of the sub-sample sizes. It takes sub-samples from distinct sub-populations or "strata" of the original population, with the aim of decreasing variances of sample estimates.

Each sizeclass by NACE Rev. 2 group can be considered as a sub-sample when choosing samples for the QSC.

3.7 Survey Technique/Data Transfer

Survey forms are issued either by post or by email on a quarterly basis. Returned postal forms are scrutinized and then scanned in batches.

The resulting scanned data is imported in to the CSO Data Management System (DMS). Electronic data is also imported into the DMS.

Edits are run on the imported data and any required changes are made.

Postal reminders, emails and telephone calls are used to seek the return of forms from non-respondents.

Enterprises which respond by eForm are sent an email with a link to the eForms application in future quarters.

3.8 Questionnaire (including Explanations)

The QSC survey collects data on the value of work done, classified according to 3 categories of work, namely:

| | |
|--------------------------|---|
| Residential | (which includes: Local Authority & Voluntary Housing, Affordable Housing and Private Housing) |
| Non-Residential | (Public & Private which includes: Education, Health and other public or semi state buildings, Commercial, Industry, Agriculture, Tourism, Sport and Recreation and other non-residential construction not elsewhere classified) |
| Civil Engineering | (which includes, Roads, Public Transport, Seaports/Airports, Water, Sanitary, Energy, Telecommunications and other civil engineering activities not elsewhere classified) |

The following is a link to the current questionnaire:

<https://www.cso.ie/en/methods/surveyforms/productioninbuildingandconstructionindex/>

3.9 Participation in the Survey

This is a statutory inquiry in accordance with the Statistics (Quarterly Survey of Construction) (No. 2) Order 2021 (S.I. No. 314 of 2021) made under the 1993 Statistics Act.

3.10 Characteristics of the Survey/Process and its Results

The survey is used to obtain information on the value of construction work done.

The quarterly Production in Building and Construction Index provides quarterly statistics on output in the construction sector. The index monitors trends in the value and the volume of production in building and construction.

The primary purpose of the index is to measure changes in value added at constant prices. The principal difference between the value and volume indices is that the volume index traces the quantitative volume of production (i.e. effect of price changes excluded) each quarter.

Volume indices are derived from value figures using the Wholesale Prices Index (WPI) “Capital goods for Building and Construction materials” index as a deflator (a deflator is defined as a statistical tool used to convert current prices into inflation-adjusted prices, in order to compare prices over time after factoring out the overall effects of inflation).

The QSC Index is calculated using Laspeyre’s index: (a Laspeyre’s index number is a form of index number where prices, quantities or other units of measure over time are weighted according to their values in a specified base period.)

A general form of the Laspeyre’s index is shown below.

$$\left[\left(\frac{\sum W_{q-1} \left(\frac{CT_q}{CT_{q-1}} \right)}{\sum W_0} \right) \right] \times 100$$

Where:

W_0 and W_{q-1} are the base weights and updated values respectively.

CT_q and CT_{q-1} are the category values of production (or output) for the current and previous quarter respectively.

The current QSC Index compilation uses a matched sample, i.e. survey returns from enterprises that have responded both in the current and previous survey. The values from these survey returns are added to get the total value of production for these enterprises in the current quarter in a single category and size class. The same calculation gives the corresponding value for the previous quarter. Then the “relative” or the ratio of these two values, for size class S in category C, between quarter 2 and quarter 1 is given by:

$$\hat{R}_{CS}^{Q_2, Q_1} = \frac{\hat{t}^{Q_2}}{\hat{t}^{Q_1}}$$

Here \hat{t}^{Q_1} is the sum of the value of construction output as supplied on survey returns in Q1, and \hat{t}^{Q_2} is the corresponding sum from Q2, for enterprises in size class S in category C that returned in both time periods.

Having calculated the relative for a single category of construction for each of the 4 size classes, a total relative for the whole category is calculated. In this calculation, the relative for each size class is multiplied by a weight

taken from the base year.

The base weight for the first quarter in the current series (base year 2015) is taken from the DKM Economic Consultants Review of the Construction Industry. This provides the total value of construction output in current prices for 2010. From this, a value for the total output for the first quarter of 2015 is estimated.

Once the relative of Q2/Q1 has been calculated as outlined in subsections 4.1-4.3, the updated value for the second quarter of 2010 is then calculated as:

$$W_{Q_2} = \hat{R}_C^{Q_2, Q_1} * W_0$$

where W_0 is the base weight, and $\hat{R}_C^{Q_2, Q_1}$ is the relative for category C, between quarter 2 and quarter 1. Note that the values W_{Q_2}, W_{Q_3} etc. can be referred to as weights, but here will be called updated values to distinguish them from the weights used in estimating totals from samples. Similarly, the updated value for Q3 is calculated as:

$$W_{Q_3} = \hat{R}_C^{Q_3, Q_2} * W_{Q_2}$$

And so on. Then the index for any quarter, for a given category is found by summing the updated weights for each size class, multiply by 100 and finally scaling to base year 2015. The index for construction is found by the (category) weighted sum of the residential, non-residential and civil indices.

3.10.1 Seasonal Adjustment

Seasonal Adjustment is conducted using the direct seasonal adjustment approach. Under this approach, each individual series is independently adjusted. Each individual seasonally adjusted series is calculated based on working day adjusted data.

The seasonal adjustments are implemented using the X-13-ARIMA methodology. This is applied using the Win X-13 software package, developed by the U.S. Census Bureau. This methodology estimates seasonal factors while also taking into consideration factors that impact on the quality of the seasonal adjustment such as outliers and level shifts in the series.

For additional information on the use of X-13-Arima see Monsell B. C., Lytras, D., and Findley, D. 'Getting Started with X-13 ARIMA SEATS Input Files', March 2016 available at www.census.gov/srd/www/x13as/.

3.11 Classifications Used

The QSC survey collects data on the value of work done for construction work done, classified according to 3 categories of work, namely:

- | | |
|------------------------|---|
| Residential | (which includes: Local Authority & Voluntary Housing, Affordable Housing and Private Housing) |
| Non-Residential | (Public & Private which includes: Education, Health and other public or semi state buildings, Commercial, Industry, Agriculture, Tourism, Sport and Recreation and other non-residential construction not elsewhere classified) |

Civil Engineering (which includes, Roads, Public Transport, Seaports/Airports, Water, Sanitary, Energy, Telecommunications and other civil engineering activities not elsewhere classified)

Nace Rev 2. This is defined at the following URL link :-

http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NACE_REV2&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=&CFID=2444489&CFTOKEN=75149b0be3d84200-64FEEACC-D737-1D93-E83CD4A3DA020AB3&jsessionId=1e51ae5a11ab60b93d7754a5eb6441151b40TR

3.12 Regional breakdown of Results

No regional breakdown of results is provided.

4. Production of the Statistics, Data Processing, Quality Assurance

4.1 Data Capture

Firstly, the returned survey forms are scrutinised. Following this the data is scanned and imported into the CSO Data Management System (DMS) and a copy of the scanned image is stored on the network.

4.2 Data Editing

A number of edit procedures are in place. Comparison checks are run for each category of work done against previous returns and data values exceeding certain thresholds are queried. Range checks are also performed as part of the edits.

4.3 Imputation (for Non-Response or Incomplete Data Sets)

None.

4.4 Grossing and Weighting

A two-stage weighting scheme has been used for the QSC, the first stage is at the company level.

The second stage weights the survey relatives at the type of construction work done (i.e. residential, non-residential and civil engineering).

See Section 3.10 for more details.

4.5 Computation of Outputs, Estimation Methods Used

Approximately 2,500 companies from the STS Register are surveyed.

All relevant companies with 20 or more employees are surveyed each quarter.

A Neyman Allocation is used to optimally select the remainder of the sample by sizeclass and NACE Rev. 2 group.

Data is collected at firm level. Outputs are compiled at category level. Seasonally Adjusted value and volume indices are produced for: All Building and Construction, Building (excluding civil engineering), Civil Engineering, Residential Building and Non-Residential Building using Arima X-13, please see section 3.10.1 for more information.

The inquiry is used to obtain information on the value of construction work done. Volume indices are derived from absolute value figures using the Wholesale Prices Index (WPI) "Capital goods for Building and Construction materials" index as a deflator (a deflator is defined as a statistical tool used to convert current prices into inflation-adjusted prices, in order to compare prices over time after factoring out the overall effects of inflation.)

4.6 Other Quality Assurance Techniques Used

Questionnaire reviews, staff training including telephone skills

5. Quality

5.1 Relevance

The QSC is designed as a short-term indicator, so while it provides good estimates of quarter-on-quarter change, it is not designed to be used to examine long term or structural changes in the construction sector. It is of relevance to the following user groups: -

1. Eurostat
2. Government
3. Economists
4. Other CSO sections
5. The general public
6. Professional Bodies
7. University students and other interest groups for research purposes

5.2 Accuracy and Reliability

5.2.1 Sampling Effects, Representativity

Samples are chosen each quarter, stratified by NACE code and sizeclass, so as to be representative of the population as far as possible. The sample is chosen from the STS Register which is populated from the Business Register. Some NACE categories have few enterprises and in such cases, staff contact these enterprises in order to boost response.

5.2.2 Non-Sampling Effects

5.2.2.1 Quality of the Data Sources Used

Not relevant as external sources are not used in order to produce results for this inquiry.

5.2.2.2 Register Coverage

Sample Selection is taken from the STS Register. Coverage is dependent on the quality of the Register used. The STS register is updated annually from the CSO Business Register and updates to both Registers are made continually throughout the year, to improve quality.

All enterprises classified under NACE Rev. 2, Sector F are available for sample selection.

5.2.2.3 Non-Response (Unit and Item)

Extensive follow up of non-responding companies is carried out by telephone, e-mail, and by issuing eForm and postal reminders.

In the case of item non-response, contact is made with the company to retrieve any missing data. The matched unit response rate is approximately 50% per quarter. Some companies find it difficult to supply data each quarter.

5.2.2.4 Measurement Errors

Measurement errors are not formally calculated, however hereunder are some sources of measurement errors and the measures which are employed by the section to guard against them:-

Only those enterprises who are engaged in activities defined in NACE Rev. 2, Sector F are requested to complete the form as outlined in the instructions.

Explanatory notes are provided on the questionnaire, in order to provide some assistance in filling in the survey form. These provide a definition of terms as well as describing how the questionnaire should be completed, in terms of what to include and what to exclude from the figures.

The reference period and units of response are clearly outlined on the questionnaire itself.

Respondent forms are scanned.

Data is compared at local level. Data for the current quarter is compared with data for the previous quarter.

Staff are trained so that they have a good knowledge of the local units they are responsible for.

The design of the questionnaire is monitored and any changes which can be made to improve the questionnaire are incorporated into the questionnaire.

5.2.2.5 Processing Errors

Data Capture

Forms are sent by post or by email to construction firms. The returned postal forms are scrutinised and then scanned and verified. Due to the use of scanning rather than keying data manually, the risk of data capture error is greatly reduced. Any character which may be rejected by the scanner is manually keyed. The use of eForms also reduces the risk of data capture error.

Data Editing

Edits have been developed to compare values for variables in each category of work done against previous returns. If differences exceed specified thresholds, an edit is raised. The system produces lists of errors for each type of edit each quarter. These are then analysed and records are corrected as appropriate.

5.2.2.6 Model-related Effects

It is assumed that non-respondents have the same characteristics as respondents. Grossing or imputation is not used when generating results for the QSC, however, weighting is used. Weights have been derived for each category of construction by sizeclass. Each firm is size coded at the beginning of each year. It is assumed that each firm remains in the same sizeclass throughout the year.

5.3 Timeliness and Punctuality

5.3.1 Provisional Results

Provisional Results are produced for the current quarter within 75 days of the reference date. The release contains value and volume indices together with annual percentage change for production in Building and Construction and also for subsectors such as Civil Engineering, Residential and Non-Residential, together with EU comparative data.

5.3.2 Final Results

Final results are provided for the last published quarter - e.g. if the current quarter published is Q1 2020 then final results for Q4 2019 will be produced within 145 days of the reference date. The release table details are the same as those outlined in section 5.3.1 for provisional results.

5.4 Coherence

Data from the QSC is checked for consistency with other data sources such as:

- Labour Force Survey (LFS) - numbers employed in construction
- Earnings and Labour Costs Survey (EHECS) - average hourly and weekly rate, hours worked
- Planning Permissions - number of units granted planning permission
- New Dwelling Completions Series
- Commencement Notices
- House Registrations

The QSC compares reasonably with these indicators in value and volume of construction output in Ireland.

5.5 Comparability

Comparisons are made between quarters going back to Q1 2000 and there is no break in the time series.

Data for the QSC is comparable with that for other EU states as can be seen in tables 3(a) and 3(b) of the release. Data is also available from the Eurostat website. First results from the survey were published in August 2007. There are differences (due to timing, definitions and other factors) between the quarterly and annual trends measured by this survey and by other national data sources. In particular the quarterly series from the Quarterly Survey of Construction shows considerable volatility. Comparability is improving as this survey matures. The methodology is continually under review in order to make any further improvements if required.

5.6 Accessibility and Clarity

5.6.1 Assistance to Users, Special Analyses

The publications, background notes and methodology documents are available on the CSO website, see section 5.6.3.3

Historical data is also available on the CSO's databank, see section 5.6.3.3.

Specific user requests are acceded to where possible, and where confidentiality issues do not arise.

5.6.2 Revisions

Revisions are made to provisional data due to late returns or amendments being required to existing returns. Revised data becomes final data.

5.6.3 Publications

5.6.3.1 Releases, Regular Publications

Quarterly Production in Building and Construction Index

5.6.3.2 Statistical Reports

Statistical Yearbook

5.6.3.3 Internet

The most recent release is made available at the following link:

<https://www.cso.ie/en/statistics/construction/productioninbuildingandconstructionindex/>

All previous releases are made available from the Releases and Publications archive:

<http://www.cso.ie/en/statistics/construction/archive/>

Data from the paper publication is also available on Database Direct:

<https://data.cso.ie/product/pbci>

5.6.4 Confidentiality

The data provided by respondents is treated as strictly confidential in accordance with Part V of the Statistics Act, 1993. Data on respondent companies are not disclosed by the CSO to any other Government Department or outside body.

6 Additional Documentation and Publications

The Quarterly National Accounts: Gross Fixed Capital Formation in tables 2, 3 and 5

<https://www.cso.ie/en/statistics/nationalaccounts/quarterlynationalaccounts/>

The National Income and Expenditure: Gross Fixed Capital Formation in tables 5, 5.1, 6, 6.1, 15 - 18

<https://www.cso.ie/en/statistics/nationalaccounts/nationalincomeandexpenditureannualresults/>

Relevant EU data can be found at:

<http://ec.europa.eu/eurostat/web/national-accounts/data/database>