THE REGISTER CENSUS: OBJECTIVES, REQUIREMENTS AND IMPLEMENTATION

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↘ ***Keywords:*** *census – population statistics – buildings and dwellings – register use – intercensal population updates*

ABSTRACT

The requirements on the census of population and housing as well as on population statistics are changing considerably. Users now require more frequent and more timely results as well as results that provide a detailed geographical breakdown. In the foreseeable future, the current census model and the intercensal population updates based on it will not be able to meet these requirements. Therefore, the plan is to switch step-by-step to a modern, purely register-based method, the register census, until 2031. This article describes the objectives and backgrounds, presents the thematic modules of the new system and the requirements to be met by the future census model. It also outlines selected methodological aspects and explains the current implementation status of the future register census.

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1

Introduction

The register census is one of the main projects for the future of official statistics. As part of the work necessary to modernise the registers, it constitutes an important source of new ideas for digital, modern administration in Germany. The register census changes the census data collection process over to register-based procedures without the need for supplementary surveys. This relieves citizens of the burden of completing the survey and significantly reduces the amount of work required by the respective administrations. In addition, the register census lays the groundwork for fulfilling the future data requirements of the European Union (EU) in the areas of population, labour market, education, buildings, dwellings, as well as households and families.

A census provides an indispensable data basis for numerous political and administration-related decisions. Examples include the fiscal equalisation system for the Länder or the delimitation of constituency boundaries for Bundestag elections. As the Federal Constitutional Court made clear in its 2018 ruling (BVerfGE 150, 1 - 163), the importance of these tasks makes it imperative to ensure that realistic population figures are available and that the latest accepted statistical methods are used. Reliable census results on the stock of buildings and dwellings, the housing situation, cohabitation in households and families, and socio-demographic characteristics such as labour market participation and educational qualifications are of fundamental importance in order for politicians and administrators to plan for the future.

This article provides an overview of the background and objectives of the register census (Chapter 2) as well as the considerations regarding implementation in the individual thematic modules (Chapter 3). The concluding chapter (4) describes the current status of the work on the register census.

2

Objectives and background

2.1 From the traditional counting of the population to Census 2022 to the register census

The last traditional counting of the population took place in Germany in 1987. Both the 2011 and the 2022 censuses were based on a register-assisted procedure with additional surveys. Register data form the basis, supplemented by information from primary statistical surveys. These serve to correct register data errors in the statistics but are also used to collect data in thematic areas for which no registers or register links are currently available (Dittrich, 2019).

The register-assisted census model used so far collects and processes the data every ten years, and has done so since 2011. The data are processed exclusively by the statistical offices. As data must not be fed back, it is not possible to inform the administrative bodies which have supplied the data about any possible errors identified in the registers they are keeping. The population register data are used to determine the demographic characteristics of the “population” thematic area. A household survey of a sample of 12 % of the population (Census 2022) is used to identify and adjust data entries during the statistical processing that are outdated or missing (of people who have not deregistered or registered). The household survey is also used to obtain data on labour market participation and education (as well as other individual characteristics that are not available in registers). The data on buildings and dwellings are provided by the census on buildings and housing, a complete enumeration of all the approximately 23 million building and dwelling owners. Households are generated by a statistical procedure in order to determine the results for households, families and their housing situation. The information from the population registers on the relationships between the persons registered at a particular address (including additional persons) flows into this. The results of the household sample and the census of buildings and housing (including the names of up to two residents in each dwelling) are also taken into account.

2.2 New European Union requirements

The requirements surrounding the census and population statistics are currently undergoing major changes. Users are demanding results that are more up-to-date, delivered more frequently and in geocoded form. Accordingly, Eurostat, the Statistical Office of the European Union, together with the Member States, has presented a strategy for the further development of the population and housing census after the 2021 census round (Eurostat, 2018). The characteristics required for census and population statistics have also changed in some areas. For example, in the Budapest Memorandum on Migration Statistics, the heads of the National Statistical Institutes agreed to move towards providing census-type results regarding the demographic, social and economic characteristics of the population on an annual basis in future. They also agreed to provide geocoded results in these areas (ESSC, 2017). In the wake of the Covid-19 pandemic, the UK's exit from the European Union and the European Green Deal in recent years, further data needs have emerged, particularly with regard to migration and the energy efficiency of the building stock. This was revealed by the evaluation of the current legal regulations. It also identified significant need for improvement with regard to the completeness, coherence and comparability of the statistics, which is also leading to the inclusion of some new topic areas. Finally, the evaluation concluded that greater flexibility is needed in adapting to future data needs.

The European Commission is thus currently working on a new framework regulation for population and housing statistics under the working title European Statistics on Population and Housing (ESOP). This is intended to consolidate and harmonise the current regulations on the census and on population statistics.[1] The core requirement of the new regulation is mandatory annual delivery of population figures from the 2025 reference year at the level of geographical grid cells, as currently obtained for the decennial census. It is also planned to significantly shorten the periodicity and delivery times. In the future, the census will be conducted annually in all thematic modules, supplemented by the monthly transmission of population statistics results. It has been proposed to create population statistics registers in the Member States in order to improve data harmonisation. The voluntary and data protection-compliant exchange of individual and slightly aggregated data between Member States is intended to complement them and avoid double counting.

The European Commission is currently drafting the planned framework regulation (for adoption by the end of 2023). The foreseeable new EU requirements – although possibly not all binding – cannot be met with the current system of register-assisted census and intercensal population updates. They assume that a new system which meets the data needs will be operational by 2024.

Not least, the binding enforcement of a harmonised definition of population is of decisive importance for the Commission. At present, when a census is conducted in the Member States, it cannot be ruled out that individual persons are recorded as residents in multiple Member States and others in none of their places of residence. Therefore, the aim is to implement consistently the standard of defining the population by the usual place of residence, as agreed by the United Nations. Under this definition, the population of a Member State includes all persons whose usual place of residence is in that Member State. The usual place of residence is determined on the basis of a twelve month duration of residence criterion (for details see Carow and others, 2019; UNECE, 2015; Lanzieri, 2019).

2.3 Further Requirements

Reduction of financial burden

As examples from other European countries show, the changeover to a register-based census model offers considerable potential for financial savings (UNECE, 2014, here: page 64 ff.). Based on the cost information provided by the UNECE (2014), it can be assumed that combined models (such as the register-assisted 2011 and 2021 censuses) cost about half as much as traditional censuses. Exclusively register-based censuses yield further savings of over 90 % compared to combined census models. Accordingly, the National Regulatory Control Council also points out in its report on the Census Act

1 These are the Census 2021 Regulation (No. 763/2008), the Demography Regulation (No. 1260/2013) and Article 3 of Regulation No. 862/2007 (migration statistics).

2021 that census surveys can be designed at a fraction of the current cost if register-based evaluation is used (Nationaler Normenkontrollrat, 2019).

Burden reduction for citizens

The register-assisted census model which was used in Census 2022 imposes a considerable burden on the population. The survey (with obligation to provide information) of more than 11 million inhabitants and around 23 million building and dwelling owners is a time-consuming and bureaucratic undertaking for those affected. This burden could be completely eliminated by switching to a purely register-based procedure. In view of the administrative data already available in many cases, critical questions are repeatedly asked regarding the justifiability of conducting surveys specifically for census purposes (for example, Nationaler Normenkontrollrat, 2016; Nationaler Normenkontrollrat, 2019).

Realistic population figures

In its ruling on 19 September 2018, the Federal Constitutional Court set out the framework for the further, long-term development of a census from a constitutional perspective (BVerfGE 150, 1 - 163; Leischner/Bierschenk, 2019). Essentially, the Federal Constitutional Court stated that the legislator must ensure that realistic population figures are determined. Accordingly, the legislator must also create the necessary conditions for doing so. As key basic principles, the Federal Constitutional Court stipulated the use of all exhaustible sources of knowledge as well as a data collection method that protects fundamental rights and is in line with state-of-the-art statistical methods. The method must be able to achieve the required degree of accuracy for fulfilling the constitutional purposes.

In order to obtain census results, the Federal Constitutional Court expressly favoured data transfers from administrative registers over primary collection on account of the lower level of encroachment on fundamental rights (Leischner/Bierschenk, 2019, here: page 13).

Provision of small-area data

More and more municipal, regional, national and European-level issues and decisions rely upon the provision of population figures, dwelling and building data and household characteristics at small-area breakdown levels (such as sides of blocks) or at the level of geographical grid cells.

Increased timeliness and coherence

For political decision-making and administrative tasks, census-based results now need to be more up-to-date than before and delivered more frequently. In fact, the register-assisted procedure used for Census 2022 can only be carried out at longer intervals due to the considerable effort involved. Providing the results is a very time-consuming process, with timeliness suffering as a result.

The population register corrections determined in the household sample for the census may not be fed back to the population registers because of the prohibition on feeding back data. This results in turn in discrepancies between the counts of the population registers and the results of the census and the ongoing intercensal updates on the number of inhabitants. The longer the time period since the last census, the greater these deviations are. This generates considerable potential for conflict, as shown not least by the numerous court disputes which arose in connection with the determination of the official number of inhabitants after Census 2011. Furthermore, the current procedure results in the number of inhabitants being redetermined in each decennial census round, which leads in turn to breaks in the time series of population figures.

Register modernisation and digitalisation of the administration

The register census is one of the main projects for the future of official statistics and an important element of modern, digital administration in Germany. The switch to the register census means that the required data will in future be obtained in fully digitalised form from registers and other existing sources. The objective of the register census therefore adheres to the Once-Only Principle of register modernisation in Germany. The Once-Only Principle states that citizens should not be asked to provide information they have already given to the administration.

Implementation of the register census provides clear impetus for the further development of the register landscape in Germany. In some areas, new data bases need

to be created that will allow existing data gaps in statistics and administration to be closed. This applies in particular to the creation of a register of buildings and dwellings (Krause and others, 2022). In addition, the new developments arising from register modernisation and the synergies they offer can be exploited from a very early stage. This includes the use of cross-register identification as permitted by the Identification Number Act, which will in future enable reliable and data protection-compliant merging of data records from different registers.

3

Implementation and current progress

3.1 Thematic modules

The register census is divided into five thematic modules based on the characteristics to be provided; these will be implemented step by step. The main focus in the first step is on the provision of geocoded figures in the population module. This is being investigated in a large-scale method test. Meanwhile, work is also starting on the other modules and must be continued quickly to ensure a timely changeover. The five thematic modules are complemented by the address register, which is used for geocoding, among other things. It thus performs a cross-sectional function in the register census. ↘ Overview 1

Overview 1
Thematic modules and important data bases of the register census

Thematic modules	Data basis
1 Population	Regular data transmission from municipal population registers
2 Labour market	Various data sources, including the Federal Employment Agency and the tax authorities
3 Education	Education register of statistics, supplemented by other data sources
4 Buildings and dwellings	Register of buildings and dwellings
5 Households and families	Population registers and register of buildings and dwellings
Address register	Data from the land surveying authorities and data from official statistics

Population module

The primary data basis for determining the monthly and annual population levels is personal data supplied by the municipal population registers. These are used to build up a population statistics database and are continuously updated through occasion-related data transmissions (in the case of a move to a different address, for example).

Quality assurance comparisons are made with data from so-called comparative data stocks (see Section 3.2) in order to detect potential over- and undercoverage in the population registers.

Labour market module

The observation units of the labour market module are also persons. “Current employment status” is a fundamental characteristic for the labour market. This is based on the categories of the International Labour Organisation (ILO) and divides the total population into three non-overlapping groups: the employed, unemployed and inactive population. For the employed population, further information needs to be provided on the main occupation, in particular the occupational status, the economic sector and the place of work.

It is planned to link numerous statistical and administrative registers to create a data basis for the labour market participation characteristics. Data from the Federal Employment Agency, public employers, the financial administration and social insurance institutions must be linked together in order to be able to cover the relevant groups of people and derive the required survey characteristics. In addition, an interface is required between the education and labour market modules in order to be able to identify students and school pupils as inactive persons.

Education module

The educational attainment and participation characteristics for the population resident in Germany are to be determined in the education module of the register census in future (Grimm and others, 2022). A combination of different data sources will serve as the basis for determining educational attainment. Prominent among these will be the individual data from the school statistics, the higher education statistics and the vocational training

statistics. It will also be necessary to use supplementary data from existing registers and surveys (from Census 2022, the microcensus and, if necessary, the data stocks of the Federal Employment Agency, for example). The statistical offices of the Federation and the Länder are currently preparing an educational pathway register. Once introduced, it will be possible to obtain a large part of the information required by the education module from this.

Buildings and dwellings module

In future, this module will yield the required building and dwelling characteristics (for example, type of building, year of construction, number of dwellings, type of heating, number of rooms and also living space) of a register census. The survey units are buildings intended for habitation and all dwellings therein as well as other housing units (including inhabited hunting cabins, summerhouses or portacabins). At present, there is no uniform and comprehensive database from which all the required register-based information on buildings and dwellings can be determined.

There are plans to introduce a register of buildings and dwellings as an administrative register to close this gap. In addition to being used as a data basis for the register census, the register of buildings and dwellings is also needed for a large number of administrative purposes at federal, Land and municipality level (for example, as a planning tool for public building administration, for climate protection target monitoring, and for disaster prevention). For these and other reasons, the register of buildings and dwellings is to be set up as an administrative register.[2] As such, it is available for various administrative purposes and can also be used to provide results for statistical purposes. If, on the other hand, the register was designed as a statistical register, this would rule out its use for administrative purposes because of the prohibition of data (re)transfer.

Households and families module

The households and families module provides the required information on household size, nuclear family size, household and family type, housing situation and available living space. In order to allocate persons to dwellings and thus enable the generation of households, it is necessary to allocate building and dwelling numbers to the individuals in the population registers. No information on households is available in existing registers and data stocks; the introduction of building and dwelling numbers to the population registers is therefore the only way to obtain the necessary data. Each person is given the number of the building and the dwelling in which they live. This number is recorded in the register of buildings and dwellings.

A data base must also be established which stores information on collective living quarters and residential establishments (accommodation facilities register). This is necessary in order to identify persons who do not live in a private household, for example. The accommodation facilities register will provide information on residential establishments and collective living quarters such as correctional facilities, nursing homes, monasteries and convents. It will contain data on the type of facility, addresses and funding bodies. No information is collected on the people living in these facilities. In addition to the register census, it should also be possible to use the accommodation facilities register for other federal and Land statistics, if required.

Address register

In future, the results of the register census will have to be provided in geocoded form at the level of geographical grid cells. In accordance with Section 13 (2) of the Federal Statistics Act, further development work will be conducted on the address register for this purpose. The address register is the first central, continuously maintained collection of all addresses in Germany to be set up for official statistics. In addition to the addresses and their geographical coordinates, the address register contains further information such as whether residential space is available at a particular address and whether it belongs to different territorial classification systems. In addition to geocoding, the address register will also be available for the cross-module processing of address data in the register census as well as for other federal and Land statistics.

The register census will be introduced incrementally until it is fully implemented in the 2031 census round. The current working draft of the future EU Framework Regula-

2 For considerations regarding the structure of the register of buildings and dwellings, see Krause and others (2022).

tion provides for mandatory annual transmission of geocoded population figures from the 2025 reference year. The further development of the census methodology in the population module towards a register-based procedure will not be fully complete by then; accordingly, the Register Census Testing Act provides for the geocoded population figures to be obtained from a combination of the intercensal population update with annual population register extracts as an auxiliary and transitional measure (Stage 2). Here, the population figures updated on the basis of Census 2022 are used as benchmarks for adjusting the population register data using estimation and rounding procedures. The combination model must be replaced by 2028 at the latest, as the legal basis will expire in that year. From then on, the population register information will be quality controlled using the signs of life method described in Section 3.2 (Stage 3). The changeover to a purely register-based procedure is to be completed from the 2031 reference year. In addition to the population figures, the results of the other modules will then also be obtained from registers. ↘ Figure 1

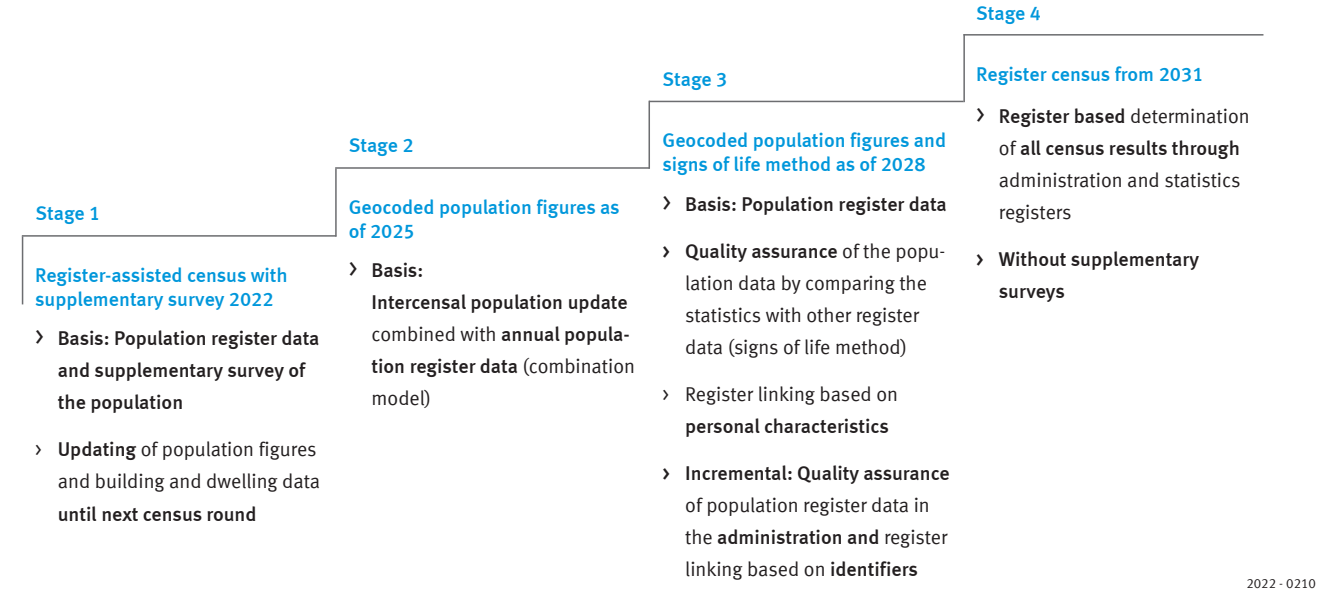
3.2 Selected new methodological aspects of the register census

Signs of life method

One of the principal tasks of a census is to obtain realistic population figures. The main data sources used in the register census to determine the population figures are the decentralised population registers, as was already the case in the 2011 and 2022 censuses. Experience from previous census rounds has shown that the population registers suffer from overcoverage (outdated entries) and undercoverage (missing data entries), mainly due to the fact that the population does not always behave as required by law. Therefore, obtaining realistic population figures requires statistical adjustment for over- and undercoverage, which in turn requires quality assurance of the population register data. In the previous register-assisted censuses of 2011 and 2022, a primary household survey was carried out for quality assurance purposes. In this process, over- and undercoverage in the population registers was recorded in a sample of around 12 % of the population and then extrapolated.

Since no household survey is carried out in the register census, the main way to conduct quality assurance is to apply the signs of life method. This checks for persons

Figure 1
Thematic modules of the register census and time frame for their introduction



recorded in the population register for whom administrative signs of life exist in other data stocks. These are therefore also known as comparative data stocks. Examples of comparative data stocks include the data of the pension insurance institutions, the Central Register of Foreigners, data of the Federal Employment Agency and data of public employers at the federal, Land and municipal level. In this context, an administrative sign of life is when an activity can be found for a person in a comparative register, for example because he or she paid taxes or social security contributions during the previous calendar year. The nature of the activity is not stored, only the existence of the sign of life. This is then taken as an indication that the person is actually resident in Germany. Persons listed in the population registers for whom no corresponding sign of life is found are treated as potential examples of overcoverage (suspected outdated entries). In such cases, further checks must be conducted to determine whether they are (still) resident in Germany (and in a particular municipality). Conversely, if signs of life are found for persons in comparative data stocks who are not registered in the population registers, this may be a potential case of undercoverage (suspected missing data entries) in the population registers. Based on this information, the final number of inhabitants can be calculated using a subsequent correction procedure.

Use of remote sensing data to process the building and dwellings data

"New Digital Data" will be used for the register census, too. One example of this is the supplementary use of remote sensing data to process data on buildings and dwellings. The main source of data on buildings and dwellings will initially be the register of buildings and dwellings, although this has yet to be established (Krause and others, 2022). Experience in other countries shows that supplementary quality assurance measures can support the determination of up-to-date and complete building and dwellings data. Temporary accommodation, for example, might not be included, and can thus be added.

The "Sat4GWR_IF-Bund - Remote Sensing & AI for the Register Census" innovation project is therefore being carried out as part of the "Innovative Remote Sensing for the Federal Administration (IF-Bund)" programme. The aim of the project is to develop algorithms based on neural networks which are used to recognise buildings on satellite or aerial images. A further aim is to examine the extent to which certain characteristics such as the use or size of a building can be deduced from remote sensing data. Remote sensing data should thus support quality assurance in checking and processing building data from the register of buildings and dwellings. In the Sat4GWR project, the Federal Statistical Office is working closely with the German Aerospace Center (DLR) and the Federal Agency for Cartography and Geodesy (BKG). The project started in October 2021 and is scheduled to run until December 2024. The results will subsequently be transferred to the register census and tested.

4

Current status and next steps

Numerous preconditions must be met for the changeover to a register-based census. New procedures need to be developed and tested to ensure the required quality. New data sources have to be tapped into and, in some areas, newly established. Together with the IT operating service provider, a highly performant IT infrastructure must also be set up that allows large amounts of data to be processed efficiently and in compliance with high security and data protection standards.

In order to achieve this, the Federal Statistical Office and the statistical offices of the Länder began laying the groundwork for the register census even before the 2022 census was carried out. The experts in the statistical offices are working intensively on setting up the systems and procedures in the population, buildings and dwellings, labour market, education, and households and families modules.

The Register Census Testing Act came into force in June 2021. In it, the legislature put important prerequisites into place for setting up the register census. Firstly, the act regulates the implementation of an extensive method test to check the procedures for determining population figures based on registers. Among other things, the test assesses how data records can be reliably linked even before the introduction of the cross-register identification number. A further focus of the

method test is on assessing the signs of life method for the detection of outdated and missing data entries. For this purpose, the population register data obtained for Census 2022 are checked against comparative signs of life data stocks from administrative sources to identify any indications of over- and undercoverage. Any such information is validated in the method test based on the results of the household sample from Census 2022, and then used to shape the signs of life method. The procedure for resolving place of residence discrepancies is also being subjected to a large-scale test. The Register Census Testing Act stipulates that in order to clarify such cases, the statistical offices of the Länder may use a method test to ask up to 100,000 persons whether they lived at a certain address on a reference date. The conceptual and technical preparations for the method test are already well advanced and the first data have already been delivered.

In addition, work has begun on the software for the further development of the address register in accordance with Section 13 (2) of the Federal Statistics Act. In the register census, the address register processes the address data and creates the basis for geocoding all results. In addition, preparations have started for setting up the statistical accommodation facilities register, which provides the basis for collecting results on the population in households and in collective living quarters. The Register Census Testing Act also regulates the use of a sample of the 2022 census of buildings and dwellings data for investigations into whether remote sensing data can be used for the collection and quality assurance of data on buildings and dwellings in the register census. These investigations are being carried out in the Sat4GWR project. Another focus of the current work is on implementing the combination model for the transitional collection of geocoded population figures. At the same time, the Federal Statistical Office and the statistical offices of the Länder are working intensively on the technical and methodological concept for the collection of labour market and education data.

Finally, evaluation of the methodology and procedures is necessary to ensure confidence in the results of the register census. It is planned to commission an independent group of scientific experts to evaluate the methodology during the project, thus ensuring that the methods and procedures used meet state-of-the-art statistical science standards.

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Extract from the journal WISTA Wirtschaft und Statistik

Published by:
Statistisches Bundesamt (Federal Statistical Office)

www.destatis.de

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Abbreviations

WISTA	=	Wirtschaft und Statistik
JD	=	annual average
D	=	average (for values which cannot be added up)
Vj	=	quarter of a year
Hj	=	half-year
a. n. g.	=	not elsewhere classified
o. a. S.	=	no main economic activity
St	=	piece
Mill.	=	million
Mrd.	=	billion

Explanation of symbols

–	=	no figures or magnitude zero
0	=	less than half of 1 in the last digit occupied, but more than zero
.	=	numerical value unknown or not to be disclosed
. . .	=	data will be available later
X	=	cell blocked for logical reasons
I or —	=	fundamental change within a series affecting comparisons over time
/	=	no data because the numerical value is not sufficiently reliable
( )	=	limited informational value because numerical value is of limited statistical reliability

Figures have in general been rounded without taking account of the totals, so that there may be an apparent slight discrepancy between the sum of the constituent items and the total as shown.