

# The Relevance of Census Results for a Modern Society

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## Summary

Population censuses have been conducted for thousands of years and they are one of the bases of any official statistics. By giving a detailed overview of the structure of a country's population at a specific point in time, they provide one of the most important parameters for political action.

In addition, in modern statistical systems, population censuses are the data basis for a variety of further statistical information, such as intercensal updates of the number of inhabitants. They provide the basis for the statistical fields which either describe the population or in which population data are integrated. Furthermore they allow drawing reliable population samples and performing qualified extrapolation of sample results.

This article focuses on the relevance of censuses in general and, more specifically, of the current 2011 Census in Germany. Following a historical overview in the first part of the article, the second part describes the various definitions of "population", the relevance and issues of defining the survey unit and of operationalising concepts of variables. In the third part, some examples illustrate various areas that are relevant for statistics and social policy and for which the 2011 Census will provide information, while the fourth part provides an outlook on how the census can be developed further, both in terms of methodology and contents.

## 1 Census: yesterday and today

Ascertaining the number of inhabitants or population data by population censuses has a long tradition. As early as in 2255 BC, a population census was held in China – the oldest census known today (Michel 1985: 79). Counts of the population are also documented for the ancient world<sup>1</sup> (Michel 1985: 79). However, the motivation underlying those censuses was much more specific than it is today. From demographic aspects, the surveys

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<sup>1</sup> E. g. Persia, Egypt and Greece.

conducted at the time were incomplete because they were not systematically designed and often covered only part of the population; censuses in antiquity were conducted specifically for purposes of military planning and taxation (Daszynska 1896: 486 ff.), e.g. the count in the gospel according to Luke (Luke 2, verses 1–5) was conducted for taxation purposes in contrast to the scope today. Today's censuses count all people living in a defined regional area for general political, administrative and scientific purposes, while data are made fully anonymous and are subject to statistical confidentiality.

Modern population statistics as a separate science emerged in the 19<sup>th</sup> century (Michel 1985: 79). At the time, the first censuses were conducted in nearly all European countries. One of the main factors here was technological progress. For example, punch card technology was applied in data processing for the first time in the late 19<sup>th</sup> century and remained common practice in Germany until the 1970 population census (Grohmann 2008: 79). Since 1816, there have been population censuses at more or less regular intervals in the German states. When the German *Reich* was founded in 1871, they were largely standardised – at first based on the provisions of the *Deutscher Zollverein*<sup>2</sup> – and were held at five-year intervals. In the 20<sup>th</sup> century, population censuses in Germany were conducted only irregularly, which in the first half of the century was due to the two world wars.<sup>3</sup> In the second half of that century the period between two censuses increased from just five or six years to almost a quarter of a century in the old *Länder* and to 30 years in the new *Länder*.<sup>4</sup>

The official population figures were based on intercensal updates. These were performed since the 1987 population census for the territory of the old *Länder* and Berlin-West. Intercensal updates for the new *Länder* and Berlin-East were based on the counts of the central population register of the former GDR. The years between the latest population censuses and the 2011 Census were however characterised by serious political change – German unification, civil wars in the Balkan countries and ensuing flows of refugees, and the EU enlargement involving freedom of movement. These are just a few keywords in this context. All those events led to considerable population flows, which were represented by intercensal population updates.

However, the method of continuously updating the current population of every single municipality by means of intercensal population updates requires regular adjustments. Experience shows that occasional errors occur in processing the monthly reports on natural population change and migration which the statistical offices receive from the residents' registration offices. Over the years, these errors may add up to considerable inaccuracies.<sup>5</sup> It is therefore standard practice at the international level to conduct a census every ten years in order to put intercensal population updates on a new basis and, consequently, to assure the quality of population data in the long term.

<sup>2</sup> *Deutscher Zollverein*: Federation of German states for customs and trade purposes.

<sup>3</sup> In the Federal Republic of Germany, four population censuses were conducted until 2010, that is, in 1950, 1961, 1970 and 1987, see *Statistisches Bundesamt* (1990: 41).

<sup>4</sup> In the German Democratic Republic, a total of four population censuses were conducted at quite irregular intervals: 1950, 1964, 1971 and 1981, see *Staatliche Zentralverwaltung für Statistik* (1955: 8); *Staatliche Zentralverwaltung für Statistik* (1968: 3); *Staatliche Zentralverwaltung für Statistik* (1975: 1); *Staatliche Zentralverwaltung für Statistik* (1982: 41).

<sup>5</sup> Errors may already occur in the original data, for example, in the population register data as a result of the registration behaviour of the population, e.g. when people do not de-register after moving away, or during processing in the administration. They may also arise from the specific conditions of intercensal population updates, for example, in the course of eliminating negative cases.

A characteristic feature of a census is that, while the number of variables covered for the survey units is very limited, they are covered in a detailed regional breakdown. The main criteria applied to select the survey variables are relevance, effectiveness, and efficiency (*Zensuskommission* 2009: 3). As regards relevance, the variables to be covered in a census must be defined by way of legislation. The decisive question here is whether they are directly required for government action by the central, regional or local authorities or whether they are part of the statistical infrastructure, which is crucial for the tasks of other institutions. The criterion of effectiveness serves to check whether a variable classified as relevant should really be covered in a census – that is, in a detailed regional breakdown – or whether it would be more appropriate to use a different tool. Finally, it has to be verified for every variable whether coverage in a census is efficient, that is, whether there is a reasonable relation between the benefit of the information content of the census variable and the costs. The German legislative bodies have decided that the 2011 Census should go just slightly beyond the European Union data requirements (OJ L 218, 14). The variables additionally included in the list of variables defined by the EU are “legal affiliation with a religious society under public law” and “adherence to religions, persuasions or beliefs”, and the coverage of the variable “migrant background” is based on a definition that is broader than required by EU provisions.

For the 2011 Census – following a methodological test (*Statistische Ämter des Bundes und der Länder* 2004: 813 ff.) – a new, register-based method for the population census is applied for the first time in Germany: existing register data are used in combination with results of various primary surveys (*Statistisches Bundesamt* 2011: 4). While the housing census has also been modified but conducted as a full enumeration, the census of non-agricultural local units, which had generally been a component of previous population censuses in Germany, is nowadays conducted within the scope of business statistics. To be able to implement the complex mixed-mode method of the 2011 Census, a register of addresses and buildings was set up as a first step. It contains all addresses in Germany at which residential space is available. It is used, first, as the statistical population underlying the census of buildings and housing and, second, as a sampling frame from which the sample for the household survey was drawn. In addition, the register of addresses and buildings is used as a central basis for organising all survey components of the 2011 Census. As described, the data of the 2011 Census are obtained from the following components (cf. Chart 1):

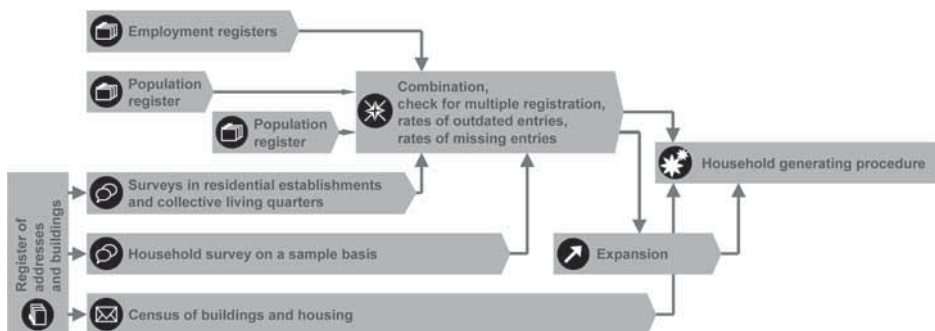


Chart 1 The census model

1. Register data of the residents' registration offices are the core data used to ascertain both the number of inhabitants and the data on the demographic structure of the population living in private households. They are combined into a data set for the whole of Germany and are checked for any incorrect duplicate cases<sup>6</sup>. To meet the requirements, the residents' registration offices had to deliver their data three times. It is important to mention that the checked data are only used for statistical purposes – they will not be retransmitted to any public authority.
2. For residents of collective living quarters, institutions, residential establishments and similar facilities, population register data involve too many errors, so that data on these people are ascertained through a complete enumeration.
3. At the level of individuals, register data of the Federal Employment Agency and register data on public service personnel complement the demographic variables obtained from the population registers and from the survey conducted at special facilities. For most of the people covered by the register data from the residents' registration offices, data are available on the place of work, employment status, economic branch and occupation; however, information on self-employment cannot be derived from the registers used. This information was collected in the sample survey described in the following.
4. A sample survey conducted among just under 10 percent of the population assures the quality of the population register data by ascertaining, for every municipality, the rates of outdated entries and missing entries and by taking them into account when determining the number of inhabitants of the municipalities.<sup>7</sup> The survey also collects additional data on the population that cannot be obtained from register data.<sup>8</sup> This includes information on employment, education, migrant background and religious affiliation. The data are collected directly by interview.
5. Data on the number and structure of residential buildings and dwellings are collected by conducting a postal survey among all owners because the exact number of residential buildings is not known in Germany. To reduce the burden on the population, only the owners, managers or other parties entitled to use or dispose of a building or dwelling are questioned.
6. Finally, the household generating procedure allows combining personal data into residential households by linking the population register data, which include information on family relationships, to dwellings data from the census of buildings and housing.

This census method ensures complete coverage of the target population<sup>9</sup>.

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<sup>6</sup> Incorrect duplicate cases may refer to persons registered with their sole residence in several municipalities.

<sup>7</sup> That method of assuring the quality of population register data is applied for municipalities with 10,000 inhabitants and over. In municipalities with fewer than 10,000 inhabitants, quality assurance is achieved by conducting a survey to clarify discrepancies and a survey to clarify the residence.

<sup>8</sup> The sample design and the extrapolation model for the household survey were developed in a specific project by Trier University and GESIS – Leibniz Institute for the Social Sciences in Mannheim. Münnich et al. (2012).

<sup>9</sup> Covered are inhabitants at their main or second residence; however, the official number of inhabitants is calculated only on the basis of the population at the main or sole residence.

## 2 Problems of adequation and operationalisation in a census

In German, the term adequation refers to a number of different issues dealing with the correct delimitation of the survey population and the statistical variables describing it as well as with the determination of suitable concepts of measurement. It also refers to the challenges (faced by a data producer) regarding the planning and conduct of statistics and the comparability of the data, that is, the exact definition and the correct collection of the data.

*Adequation* and *operationalisation* are terms which have had a lasting impact on German official statistics. The challenges involved are illustrated in the following, taking as examples the term “population” and the employment concept.<sup>10</sup>

### 2.1 The term “population”

Population data for today’s Germany (as a whole) – based on an all-German census and subsequent updates – were not available until the 2011 Census. However, the boundaries of constituencies, the number of seats of any *Land* in the *Bundesrat*, the horizontal, vertical and municipal equalisation of revenue<sup>11</sup> – this list mentions just a few major examples – are strongly affected by reliable data on the population and its spatial distribution. The mission of official statistics is to provide and disseminate statistical information which is used e.g. for decision-making regarding political and economic problems. But what is *the* population?

The question of who should be counted as part of the population of a country or of another regional unit cannot necessarily be answered through the term “population” or “inhabitant”. The term “population” has a functional meaning and, consequently, depends on the concrete task at hand. When, in the years before the foundation of the German *Reich* in 1871, the *Deutscher Zollverein* attempted to set up a single market among the German states, the customs revenue had to be distributed among these states, which was done on the basis of the number of inhabitants. For the purpose, the *Deutscher Zollverein* created the term *Zollabrechnungsbevölkerung*, thus establishing a first generally accepted definition and initiating the efforts to harmonise the methodology of population censuses (Michel 1985: 82). The *Zollabrechnungsbevölkerung* comprises all persons staying permanently in the country (and, consequently, being relevant for the consumption of goods). To ascertain the *Zollabrechnungsbevölkerung*, a population census was conducted in the German states every three years. In 1863 the term was defined more precisely, specifying that persons who were absent from their place of usual residence for more than a year did not belong to the *Zollabrechnungsbevölkerung*. Later the *Deutscher Zollverein* extended its survey of the population to cover the *ortsanwesende Bevölkerung* (Scheel 1869: 157) on the census reference date because they participate in economic life, too (Michel 1985: 83 ff.). According to the concept of *ortsanwesende Bevölkerung*, the inhabitants are counted at, and allocated to, the place at which they are present on census day.

The question of what population censuses should be used for is decisive for defining the universe of such a survey. This becomes apparent when looking at the early volumes of

<sup>10</sup> For more information on the issue of adequation see also: Flaskämper (1931: 379 ff.); Egeler et al. (2012: 269 ff.); Grohmann (1988: 25 ff.).

<sup>11</sup> Equalisation of tax revenue between the German *Länder* and the Federation. This fiscal strategy is a fundamental contribution to greater fairness in Germany.

the Journal of Economics and Statistics. Two articles have been chosen here to illustrate the issue when talking about the population of a country. In the sixth volume of the Journal of Economics and Statistics published in 1866, Meyer<sup>12</sup> and Fabricius<sup>13</sup> explain what definition of the term “population” is best suited for what type of evaluation. In his paper on *Das Princip der rechtlichen und der factischen Bevölkerung*, Meyer advocates ascertaining the population according to three definitions:

- de jure population – people having the right of residence (*Indigenat*);
- de facto population – people present at the relevant place at the time of the census;
- population with permanent residence – people spending most of the time at the relevant place (Meyer 1866: 97 ff.)

The decision as to which definition is taken as a basis of a population census has an impact on the analytical potential of the survey. The intention behind a definition of population was – and still is – to provide a solid basis for decision-making, which means it is necessary to count the population staying at a specific place at a given point in time, irrespective of the duration of stay (Meyer 1866: 98 ff.). When opting for that definition, however, the question arises who should be included. Especially where that term does not include a time dimension regarding the people’s presence, the question arises how “present” is defined: permanent and regular or simple presence at the time of a census?

Meyer, and also Fabricius, summarise that, depending on the statistical issue to be examined, one of the three definitions of population is to be preferred. However, to cover the population and its structure and to derive political decisions, as is allowed by a population census, the definition of the population with permanent residence is to be used. This definition covers persons with residence according to a fixed criterion such as at least six months at the relevant place: It is the only basis allowing planning and calculation (Meyer 1866: 106 ff.). Nowadays this criterion is met by the use of the administrative register, which is based on the German Basic Registration Law (*Melderrechtsrahmengesetz*). Here some aspects are taken as examples to illustrate that the argumentation used at the time is still topical and consistent today.

The application of the definition of the permanently present population is reflected also today in the 2011 Census. In its requirements for the 2011 Census and the coming census rounds, the EU has agreed on the definition of the “population at its usual residence at the reference date” (OJ L 218, 14 [15]). Even today, agreeing on this definition of the population is not a matter of course. Even the Conference of European Statisticians, at its meeting organised by the United Nations Economic Commission for Europe (UN ECE) in 2006, and in the recommendations subsequently adopted for the census round 2010/11, did not succeed in agreeing on one concept of “usual residence” (United Nations 2006: 35). The “usual residence” has been defined by the EU to be the “place where a person normally spends the daily period of rest, regardless of temporary absences for purposes of recreation, holidays, visits to friends and relatives, business, medical treatment or religious pilgrimage.” (OJ L 218, 14 [15]). In short, the place of usual residence for the EU population is where a person’s own bed is.<sup>14</sup>

<sup>12</sup> Georg Meyer (1841-1900), lawyer and politician, public official at the statistical office in Jena.

<sup>13</sup> Karl (Carl) August Fabricius (1825-1890), member of the founding body of the *Hessische Zentralstelle für Landesstatistik* in Darmstadt in 1861.

<sup>14</sup> For further information on statistical innovations especially information for a better understanding of the development in economic statistics and in this context the relevance of the definition of the term “population” in Germany in the first half of the 20<sup>th</sup> century, see also: Tooze, J. A. (2001), *Statistics and the German State, 1900-1945*, Cambridge.

The requirements regarding the operationalisation of the definition specify that those persons have to be counted as inhabitants of the relevant place or the relevant member state who have permanently lived at that “usual residence” for at least twelve months prior to the survey date or who arrive there with the intention of staying there for at least twelve months. Due to the difficulties of operationalising<sup>15</sup> that definition, Germany has made use of the derogation mentioned in Regulation (EC) No 763/2008, Article 2 (d). It specifies that the legal or registered residence can be considered as “usual residence”. For the 2011 Census, the information on the housing status has been used as shown in the population register – sole residence, main residence or second residence.<sup>16</sup> Applying that variable ensures that all persons participating in the economic, social and political life of the society are taken into account, similar to the definition of permanent residence.

Apart from defining the term “population”, other issues of adequation and operationalisation have to be settled for every census. What definitions should be taken as a basis to describe the population in terms of employment statistics or education statistics? What concepts are used to show the migrant background and the religious affiliation, which have been covered in the 2011 Census in Germany? As an example of the questions to be answered to solve such problems, the employment concept underlying the 2011 Census will be explained here.

## 2.2 Employment concept

In the 2011 Census, the employment data had to be collected according to the concept of the International Labour Organization (ILO). This means that all persons aged 15 or over are considered as employed if they worked for remuneration or as self-employed or family workers for at least one hour in the reference week (*Statistisches Bundesamt* 2008: 110).

Employment data are obtained from three different sources in the 2011 Census: As mentioned above, the employment status of employees subject to social insurance contributions and of all people registered as unemployed or as seeking a job is obtained from register data of the Federal Employment Agency. As regards public officials, judges and soldiers, register data of the public employers are used in addition. For the remaining persons employed, employment status data have to be collected in the household survey on a sample basis, and extrapolated subsequently. For that specific purpose, a decision had to be taken on the concept of questions to cover the employment status according to the ILO concept.

Generally, the questions are designed in line with the microcensus to ensure that the census results are comparable with that set of statistics (Gauckler 2011). However, experience has shown that covering smaller and marginal activities performed for

<sup>15</sup> Operationalisation problems consist, first, in the fact that quality losses have to be expected when covering “intentions of planned duration of stay”. Second, it is difficult to ascertain the place of usual residence of a person living for less than twelve months at the place. This is due to the registers used and their structure.

<sup>16</sup> In section 12 (2) of the German Basic Registration Law, to ascertain the main residence, a distinction is made between married persons / persons living in a registered same-sex partnership who do not permanently live separated from the family or the partner, and any other persons. For the first group of persons, the main residence is the dwelling mainly used by the family or the partners. For the second group of persons, the main residence is the dwelling mainly used by the relevant person.

remuneration is difficult in household surveys.<sup>17</sup> Based on a methodological study<sup>18</sup> carried out in 2008 on the quality of employment data obtained from the microcensus<sup>19</sup>, the microcensus concept of questions was revised in 2011 to achieve better coverage of smaller jobs (Gauckler 2011: 720 ff.). After adjustment to the specific framework conditions, the new concept of questions was applied also in the 2011 Census.<sup>20</sup>

The problem of covering smaller jobs consists mainly in the difference between the respondents' common understanding of specific terms and the definitions of the ILO concept. Tests have shown that in particular the above-mentioned limit of one working hour per week does not coincide with the respondents' common understanding of "employment". The methodological microcensus studies have clearly shown that many respondents take their main social status as a basis for orientation. This means that, for example, students consider especially their main status and, consequently, they do not realise that a small part-time job they may have is also to be regarded as employment (Köhne-Finster/Körner 2008: 2; Gauckler/Körner 2011: 197 ff.).

Consequently, the 2011 Census asked first of all for the main employment status, while smaller activities and side jobs were then covered through specific follow-up questions. A quantitative pretest of the household survey questionnaire demonstrated that this allowed better representation of the number of persons in employment than the concept of microcensus questions applied until 2010. However, even with the new concept of questions, there is still a difference compared with the employment registers of the Federal Employment Agency (Gauckler/Körner 2011: 196 ff.; Körner et al. 2011: 1072 ff.).

### 3 Current relevance of the census – Knowing what will count tomorrow

Since the times of the *Deutscher Zollverein*, the methodology, the relevance and the content of population censuses in Germany have changed. The usability of the results has become much more varied. It ranges from policy issues and economic aspects to social themes. In the statistical field, too, census results are used in manifold ways.

#### 3.1 Providing neutral and robust data

- Intercensal population updates

Between two censuses, the official numbers of inhabitants in Germany are updated on the basis of the official number of inhabitants ascertained in the latest census. Such intercensal population updates are compiled for every single municipality and based mainly on the numbers reported on births and deaths as well as on arrivals and departures across municipal borders. Over the longer term, this leads to increasing discrepancies, especially on the local level, so that it is very important to regularly

<sup>17</sup> See the overview in Körner et al. (2011: 1065–1085).

<sup>18</sup> For a systematic study of the problems of covering the ILO employment concept in the microcensus see also Köhne-Finster/Körner (2008: 3 ff.).

<sup>19</sup> The microcensus provides official representative statistics of the population and the labour market in Germany, thereby bridging the data gap between two population censuses. The microcensus is based on a sampling fraction of 1 % of the population and is designed as a multi-topic survey.

<sup>20</sup> For example, laptop interviews – which are common in the microcensus – were not carried out. Therefore, due to the different framework conditions, it was not possible to implement the microcensus questions on a one-to-one basis.



put the existing population figures on an up-to-date basis by conducting a census. This becomes obvious when looking at the cohorts of people aged 90 years or over, which have been updated on an intercensal basis since the 1987 population census. In official statistics, those cohorts are strongly overestimated where only intercensal updates are used. This is because, over a longer period, the inaccuracies in the population registers accumulate, especially those regarding arrivals and departures. People who moved away without de-registering with their registration office continue to be covered by intercensal updates. Such inaccuracies become obvious especially for older cohorts with smaller numbers of people. Using pension insurance data can yield higher accuracy (Scholz/Jdanov 2006). When new results of the 2011 Census are available, it will be possible again to show age groups of over 90 years without having to apply estimation methods and to compile a general life table (Eisenmenger/Emmerling 2011: 226).

In the 1987 population census, a difference of “just” 75,000<sup>21</sup> people between census results and intercensal updates was ascertained for the whole Federal Republic of Germany. A look at the regional distribution of the result shows, however, that the population in five of the eleven *Länder* was higher, and in six *Länder* lower than the figures of intercensal updates. The differences ranged between -2.3 % and +6.5 % (*Statistisches Bundesamt* 1995: 23). Adding up those differences separately at the municipality level shows that the intercensal updates overestimated the number of inhabitants by some 900,000 and underestimated them by about 830,000 people. This is a total difference of some 1.7 million people.

The census test carried out in 2001/2002 indicated that intercensal population updates overestimated the number of inhabitants in Germany at the time by some 1.3 million, with the extent of the error differing considerably between regions (*Statistische Ämter des Bundes und der Länder* 2004: 813 ff.). The question of how the assumed overestimation of the number of inhabitants developed until 2011 – for example, whether the tax identification number introduced since 2007 has led to adjustments in the population registers, which would then have improved intercensal population updates – can be answered only when the 2011 Census results have become available.

#### • Basic data for sample surveys

For all kinds of statistics, census results are used as a frame for both sampling and extrapolation in sample surveys. Only updated census results make it possible to extrapolate results of sample surveys and to obtain data on the universe (Wagner 2010: 4). This applies to all sample surveys based on the population distribution and structure, irrespective of whether they are conducted by statistical offices, scientific or commercial institutions.

When examined from a statistical-methodological aspect, census results play a major role in two respects. First, the updated figures lead to an adjustment of the sample systems. For example, sample designs have to be revised to adapt them to changes regarding the regional distribution, the age and sex structure as well as further demographic or other variables. Second, future extrapolations and weightings will then have to be based on the new data. Such adjustments ensure the representativeness and reliability of future sample surveys.

One of the central sample surveys for official statistics on the population and the labour market is the microcensus. It both bridges the data gap between two population censuses

<sup>21</sup> Values rounded.

and provides a wealth of information that goes beyond census results.<sup>22</sup> As in any sample survey, the quality of the microcensus results is mainly determined by the quality of the sampling frame. The results of the 2011 Census in Germany will provide new sampling frames not only for population samples but also for samples of buildings and housing.

- **Monitoring the economic development**

The national accounting system of the Federal Statistical Office, which describes in quantitative terms the economic development in Germany for a past period, generally uses the entire range of official statistical data as a basis. Economic statistics are used most often, but population statistics play a major part, too. However, national accounts apply some specific definitions, for example, of the term “population”. According to the international concept of national accounts, the population comprises all persons – citizens or foreigners – who are resident in a country’s economic territory, in this case the Federal Republic of Germany. People are considered as resident in the country if they have had their permanent residence in Germany for at least a year. This includes people who are resident in the country but are staying abroad temporarily, i.e. for a period of less than a year. Not included are persons staying temporarily in the country such as non-residents working in the country or tourists and foreign students.<sup>23</sup> The stock of the population defined in this way is shown in national accounts as an annual and quarterly average. Correct “per inhabitant” or “per capita” reference values can be calculated. The quarterly and annual averages of the population in national accounts are based on continuous intercensal population updates, which cover the population in Germany according to the concept of the population at the place of sole or main residence.<sup>24</sup> Consequently, readjusting the population figures by current data obtained from a census has a considerable impact on the quarterly and annual averages of national accounts. This applies in particular to the per capita GDP, which is one of the most important indicators and often directly used for international comparisons of economic performance. A reliable per capita GDP is also of major importance for compiling composite indicators such as the Human Development Index of the United Nations (United Nation 2011) as part of the international discussion on measuring well-being.

If the number of inhabitants is considered a central criterion for measuring differences in size between regions, per capita GDP data are generally well suited as a structural indicator. The Statistical Office of the European Communities (Eurostat) includes that indicator<sup>25</sup> when evaluating to what extent the Lisbon objectives adopted by the European Council in 2000 have been achieved (Eurostat 2011). However, a methodo-

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<sup>22</sup> The microcensus results are used for government reports, the annual reports of the Council of Economic Experts and the annual pension insurance report of the Federal Government, and they are the basis for continuous employment research, etc.

<sup>23</sup> In his definition published in 1866, Meyer subsumes that group of persons under the term “population with permanent residence”, defining it as the group of persons suitable for deriving the country’s production capacity and the people’s wealth (Meyer 1866: 107). In addition, according to Meyer, that definition is the only one suitable for the statistical calculations regarding the production capacity and wealth of a society. This is due to the fact that the work of persons not staying permanently in Germany is not taken into account when calculating production figures.

<sup>24</sup> However, the population concept applied in German national accounts differs from the provisions of the European System of National and Regional Accounts (ESA) 1995, especially as regards the inclusion of persons staying temporarily in the country and of “residents” staying temporarily abroad (short-time migrants, students, etc.).

<sup>25</sup> It is measured in purchasing power standards to compensate for price differences between countries.

logical shortcoming should be taken into account especially for small-area comparisons: the calculation of the GDP is based on the domestic concept, while the resident population is based on the national concept. Allocation to the place of work or the place of residence is done accordingly. Due to the surplus of people commuting to conurbations, the per capita GDP tends to be too high in such areas, whereas it tends to be too low in regions where those people live.<sup>26</sup> A regional indicator taking account of the “bias” caused by commuter flows is the GDP per capita of the *Wirtschaftsbevölkerung*<sup>27, 28</sup>. Up to the late 1980s, the *Wirtschaftsbevölkerung* was used quite frequently in the Federal Republic of Germany to standardise GDP results by *Kreis* (administrative district).

Changes in the description of the economic development that are caused by updated population figures will also have an impact on political action based on that description. To what extent that may happen is shown by the reactions in various political fields to the 1987 population census.

### 3.2 Impact of data changes on individual political fields

#### • Fiscal policy and equalisation of revenue

Changes in population data will change the financial flows of the equalisation-of-revenue system. For the compensation in 2010, the equalisation of revenue between the *Länder* led to equalisation payments made/received of Euro 7.0 billion (Section 2 of the 2nd Ordinance implementing the Financial Equalisation Act in 2010). The extent to which that can change as a result of updated figures is shown by the adjustments made after the 1987 population census. At the time, the total of equalisation payments was corrected by about DM 908 million<sup>29</sup> (*Deutscher Bundestag* 1990). For example, after the correction Schleswig-Holstein received DM 159 million less, while Nordrhein-Westfalen was granted DM 100 million more.

At the EU level, too, the number of inhabitants of the member states has an influence on economic and fiscal policies. The European Union pursues the goal of reducing differences in development between the member states in order to strengthen the social coherence and economic competitiveness of the EU and to balance the living conditions in the individual states. Between 2007 and 2013 the EU made an amount of Euro 347 billion available to the regions of the so-called NUTS-2 level<sup>30</sup> (*Europäische Gemeinschaft* 2007: 24). Distribution of the funds for “eligibility under the Convergence objective” is based on the gross domestic product (GDP) per capita of that regional

<sup>26</sup> Apart from the commuter problem, an issue to be taken into account at the regional level when comparing intercensal population updates over time is the changes that occur due to territorial changes. For example, the comparability between results by municipality or *Kreis* (administrative district) in a *Land* and data of previous years is limited where smaller municipalities were incorporated into bigger ones or where a territorial reform was performed in the reference year. As changes generally are rare for larger regional units (e.g. *Länder*), comparability over time is good at that level.

<sup>27</sup> *Wirtschaftsbevölkerung*: resident population adjusted for two-way commuting.

<sup>28</sup> In contrast to the resident population according to intercensal updates in a region, the statistical artefact of *Wirtschaftsbevölkerung* allocates the persons in employment (including family members) to the region of their place of work, irrespective of their actual place of residence.

<sup>29</sup> About Euro 464 million.

<sup>30</sup> NUTS = nomenclature des unités territoriales statistiques; in Germany, this corresponds to *Regierungsbezirke* (administrative regions).

classification. The number of inhabitants in a detailed regional breakdown is highly important also in this context (*Europäische Gemeinschaft* 2007: 6 ff.).

- **Labour market policy**

As described in section 2.2, the 2011 Census collects data on the people's labour force participation according to the international labour force concept. The census results thus allow representing the labour market in Germany, including structures of persons in employment. What corrections may consequently become necessary after the 2011 Census is illustrated by the decisions taken on the basis of the 1987 population census results.

In 1987, in national accounts, the population census results led to an upward correction of the number of persons in employment by about one million and, consequently, to a revision of the assessment of the labour market trends in the 1970s and 1980s (*Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung* 1990: 104). Based on the corrected figures, the reference data required for unemployment rates were recalculated. Especially the regional unemployment rates changed considerably. In about a third of the labour office districts of the former territory of the Federal Republic, they were corrected downwards by 20 percent and more (*Statistisches Bundesamt* 1995: 24 ff.).

An analysis of the numbers of persons in employment by economic sector for 1989 illustrated the ongoing structural change. The sectors of industry, trade and transport, service enterprises, general government, households, etc. recorded an increase in the number of persons in employment, with the increase in industry remaining below the average for the overall economy. The service enterprises sector accounted for almost half of the volume of corrections required. In agriculture and forestry, the number of persons in employment had decreased (Schoer/Hanefeld 1990: 251 ff.).

- **Housing policy**

Other information to be collected by the 2011 Census in Germany, apart from the official number of inhabitants and the population structure, is data on the stock and structure of dwellings and residential buildings. This is done in a special census component, the census of buildings and housing, which is designed as a traditional census, with one important difference: the questionnaire was only sent to the owners of buildings, instead of the usual approach of directly questioning every household. As in the past, the results of the census of buildings and housing will provide current information on the distribution and structure of residential space and vacant dwellings as well as on the supplier structure. In addition, they will be an important basis for decision-making in terms of housing policy and regional planning. The results of the 1987 census of buildings and housing showed that there were no reserves in terms of housing supply in the Federal Republic of Germany at the time because the number of dwellings had been overestimated by about 1 million through the intercensal dwelling updates. Due to the results of the 1987 census of buildings and housing, the situation had to be reassessed by politicians and the construction industry.

As results of the census of buildings and housing are linked to other census variables on persons and households, municipalities are able to compile solid forecasts of housing demand – based on the specific demographic structure of each municipality. So the results of the census of buildings and housing provide both important information for highly specific market monitoring and an updated basis for small-area urban monitoring.

- **Shaping legislative structures**

The Federal Elections Act requires that the number of inhabitants<sup>31</sup> of a constituency should not differ by more than 15 % upwards or downwards from the average number of inhabitants of all constituencies. Where the difference exceeds 25 %, the constituency has to be reshaped (Section 3 (1) no. 3 of the Federal Elections Act).

Up to now, the delimitation of constituency boundaries has been based on intercensal updates of the 1987 population census and on the data of the central population register of the GDR, whose basis was the population census of 1981. Readjusting the official number of inhabitants by the 2011 Census will provide the basis for the activities of the Constituency Commission. At the beginning of any electoral period, the commission has to report on how the population in the electoral territory has changed, and it explains whether and, if so, what changes in the delimitation of constituency boundaries are required. The information obtained from the 2011 Census will be used in the delimitation of constituencies at the federal level for the first time for the election to the 19<sup>th</sup> German *Bundestag* in 2017.

The number of inhabitants also has an impact on the distribution of seats in the *Bundesrat*. Each *Land* is represented there and has a specific number of votes according to its number of inhabitants. When the official number of inhabitants has been ascertained by the 2011 Census, it will reveal whether a *Land* will lose in importance in the *Bundesrat*. Only for *Hessen*, the number of inhabitants as obtained by intercensal updates is currently close to one of the thresholds defined in Article 51 (2) of the Basic Law<sup>32</sup> (the German constitution), which are decisive for the number of votes in the *Bundesrat*.

For the distribution of seats in the European Parliament, too, the number of inhabitants is relevant. Here, the “degressive proportionality” principle applies, meaning that more populous countries have more seats, although the number of seats granted is relatively smaller than the number of inhabitants. Smaller countries benefit from the provision that every member state must have at least six members in the European Parliament (*Europäische Gemeinschaft* 2007a). A German member of the European Parliament currently represents a good 825,000 citizens, but one from Malta only just under 70,000.

The 2011 Census will provide updated numbers of inhabitants for all European member states. Due to the new voting rules of the European Council applying from 2014 onwards, they will be particularly relevant. As from 2014, European Council decisions will require a qualified majority, that is, *both* the majority of member states *and* the majority of European Union citizens. The double majority is considered to be achieved if a decision is supported by 55 percent of the member states and if, at the same time, that majority represents at least 65 percent of the EU population. Every member state will then have one vote as a state and, at the same time, its number of inhabitants will be taken into account as a weight (*Europäische Union* 2011). This example shows not only how

<sup>31</sup> Foreigners are not included when the number of inhabitants is ascertained for the delimitation of constituency boundaries according to section 3 (1), seventh sentence of the Federal Elections Act. According to the decision of the Federal Constitutional Court of 31 January 2012, legislation will in the future have to take account also of the proportion of minor Germans in the German population when delimiting the constituencies.

<sup>32</sup> “Each Land shall have at least three votes; Länder with more than two million inhabitants shall have four, Länder with more than six million inhabitants five, and Länder with more than seven million inhabitants six votes.”

important an up-to-date and exact number of inhabitants is but also that it is necessary in the overall European system to apply technical terms – such as the official number of inhabitants – that are based on standard definitions.

#### **4 Challenges for future censuses**

The methodological reorientation of the 2011 Census in Germany, abandoning the traditional population census as a primary complete enumeration and introducing the large-scale use of administrative data, was a challenge for all parties involved. Although major issues had been settled in advance through a census test, actual implementation was done in large part without any tests. Experience has now shown what will have to be discussed before the next census in order to obtain the data more efficiently and to make wider use of the information contained in the census results.

A major finding is that setting up a permanent register of buildings and dwellings, combined with information from the population register, has to be the choice of the future. Also, a decision has to be taken on whether such a register should be designed as an administrative register instead of just a statistical register. The register of addresses and buildings of the 2011 Census is only used to organise the 2011 Census and will have to be deleted when those activities are finished. That approach had been planned under the assumption that permanently maintaining a register of addresses and buildings until it is used for the next census would be much more costly and time-consuming than setting up a new register immediately before the census. Judging by the experience now available, that assumption cannot be maintained. The administrative data used to set up the register of addresses and buildings were not very well suited for the purpose. The administrative data are available in exactly the way they are needed by the relevant administrative authority. Operationalising the data for statistical purposes requires enormous efforts in terms of technology, manpower and especially time. In contrast, a permanent register maintained centrally could support many standardisation processes – especially if it were maintained as an administrative register outside the secure area of the statistical offices, so that it could be used by the administrative authorities, too. This would also support other e-government projects. For the statistical system itself, such a register would allow the flexible provision of current population and housing data and be available as an up-to-date sampling frame.

The use of administrative data, which will further intensify in the future, in combination with collected data leads to highly demanding problems of adequation and methodologically very complex estimation models which create new challenges not only for the sample designs. Using such data sets is more demanding, too, because choosing suitable methods of analysis requires detailed knowledge of the sampling methodology underlying the data sets. For the societal acceptance of the results of official statistics – and this applies particularly to official numbers of inhabitants ascertained by a census – the paradigm shift from traditional population census results to census results whose accuracy depends on their sampling error poses a major difficulty. The basic principle of a traditional population census is easy to understand even for statistical laypersons, whereas a complex survey design that is demanding in terms of sampling methodology and consists of various data sources means that most users of official numbers of inhabitants are no longer able to understand how the results have been produced. The basic situation for the use of administrative registers could considerably be improved by standardisation processes. This would not only improve efficiency and create savings in the production

of statistical results from such registers but it would also reduce the complexity of surveys and, consequently, enhance their societal acceptance. In 1983, the Federal Constitutional Court demanded that this should be a permanent goal for official statistics (*BVerfGE 65, 1 [55]*).

A second major finding is that the methodological and technological possibilities available today to evaluate census data on a geo-referenced basis and, consequently, to make use of the information potential of those data according to the state of the art have not been exploited for the 2011 Census. The data of the 2011 Census will have the same spatial reference as those of the 1987 population census. Although many of the results will be available down to municipality level, it will not be possible to show all variables at the same detailed regional level, which is due to the methodology.<sup>33</sup> For all municipalities with safe statistical units, many results can be disaggregated down to block sides. Comprehensive use of geo-coordinates (geographical longitude and latitude) for spatial data analysis, which is legally regulated in other countries, is currently not legally allowed for census data in Germany. Pilot projects and checks for data usability and provision have been carried out for a few years already by the statistical offices of the Federation and the *Länder* and they have been supported by the Statistical Advisory Committee, a body giving advice in matters of federal statistics. Flexible data processing based on coordinates, however, requires either a specific legal basis for every set of statistics or the inclusion of a general provision in the Federal Statistics Law. Preparatory work is currently done here, with the future users of such data being involved. There is still an urgent need felt in this context that legal provisions be found which can still be applied to the data of the 2011 Census.

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<sup>33</sup> The variables covered only in the household survey on a sample basis, such as education and employment variables, can be shown at municipality level only for municipalities with 10,000 or more inhabitants. For those variables, results for municipalities with fewer than 10,000 inhabitants and results below municipality level will not be available, except for cities with 400,000 or more inhabitants.

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