

Which Countries Will Follow the Scandinavian Lead in Taking a Register-Based Census of Population?

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Abstract: During the past twenty years Scandinavian countries have made changes in the methods of taking population and housing censuses that are more fundamental than any seen since modern census methods were first introduced two hundred years ago. These countries extract their census data in part or in whole from administrative registers. If other countries in Western Europe were to adopt this approach, most of them would have to make major improvements to their adminis-

trative records. But the primary reasons for making such improvements are concerned with administration and policy rather than statistics, namely, the need to secure a more effective and fairer system of public administration and to enable governments to exercise a wider range of policy options.

Key words: Census of population; administrative registers; registers of population; administrative record census (ARC).

1. Introduction

This paper is based on a study commissioned by the Statistical Office of the European Communities (Eurostat) and reported in Redfern (1983–1986). The study examined the experience of censuses of population and housing in 14 countries, the directions in which the census was being developed and alternatives to the conventional census methodology. The fourteen consisted of eleven countries in the European Economic Community (Belgium, Denmark, France, the Federal Republic of Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and the United Kingdom) and three countries outside the EEC (Canada, Sweden and the United States).

2. The Experience of the 1980 Round of Conventional Censuses

Of the 14 countries in the study, all but one (Denmark) approached the 1980 round of censuses with the intention of taking a conventional census – conventional, that is, in the sense of undertaking a field operation to distribute and collect a census questionnaire. But in the event, only eleven of them made their planned enumerations. Increasingly sophisticated technologies were employed. Examples are: the pre-printing of names, addresses and other personal data from the registers of population (as in Belgium and Sweden); mail-out and mail-back (Sweden and the US); automated input by OMR or OCR (Sweden and the US); computer-assisted coding of a complex group of topics such as address of place of work/industry/occupation

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(France and Sweden); and “hot-deck” editing of responses. In the main these technologies worked well: the difficulties encountered in the 1980 round were not usually of a strictly technical kind. However, on the technical side a criticism that may be directed against the censuses in some countries is that not enough effort was made to measure the quality of the census results and in particular the coverage.

More substantial problems encountered in the 1980 round of censuses were concerned with logistics. Lack of financial resources and manpower was a handicap in some countries. Several countries had difficulties in recruiting enough enumerators with the right skills or in securing the full support of the municipalities in the execution of the fieldwork. For example, Belgium experienced logistical problems of all these kinds with consequential delay in the dissemination of the results.

But the biggest problems of all were concerned with public confidence and public relations. These struck in a seemingly haphazard fashion. Whilst in some countries the 1980 round of the census was better received than that of a decade earlier (as in Portugal and the UK) or had a higher response level (as in the US), severe problems were encountered in two countries, neither of which was able to carry out its planned enumeration – the Netherlands and the Federal Republic of Germany. In the Netherlands plans for a 1981 census were withdrawn following a poor response to a census pretest in 1979 (though response to the test was voluntary) and in the light of the significant level of refusal in the 1971 Census. The prospect of taking a conventional census in the Netherlands in the future is seen by Dutch statisticians as very uncertain. In Germany the plans for a 1983 census led to a strident campaign of public protest, and the Constitutional Court ruled that some aspects of the census concerned with the uses of the individual data violated the individual’s rights under the Constitution. A new enumeration

with changed rules on confidentiality is now planned for 1987.

The experiences of the 1980 round have underlined some of the main disadvantages of the conventional method of taking a census. These are:

- i) its cost, and the peaking of effort and cost at census time.
- ii) the burden on the public and the intrusion into privacy (as some see it).
- iii) as a consequence of i) and ii) the interval between censuses is long (ten years in most countries) and fails to meet the needs of many users.
- iv) there is now a risk that the census will be damaged by an unpredictable public protest.
- v) the census is ill-suited to the construction of longitudinal statistics, except perhaps by retrospective questioning.

3. The Scandinavian Approach to the Census of Population

The Scandinavian countries have met these problems by redirecting the census of population and housing along a radically different road. The basis of the new approach is the circumstance that reliable and up-to-date records of the principal units with which the census is concerned – persons, housing units and business establishments – are maintained for administrative reasons. Subject to appropriate safeguards on confidentiality, data about each of the different kinds of units can therefore be extracted from the administrative registers to create a data set similar to the data set which would be assembled from the responses to a conventional census questionnaire. The essence of the scheme is, then, that data already held in the public sector for administrative purposes are being used (or “recycled”) for the statistical purposes of a census. Figure 1 shows schematically the principal units that feature in the census and also some of their interrelationships.

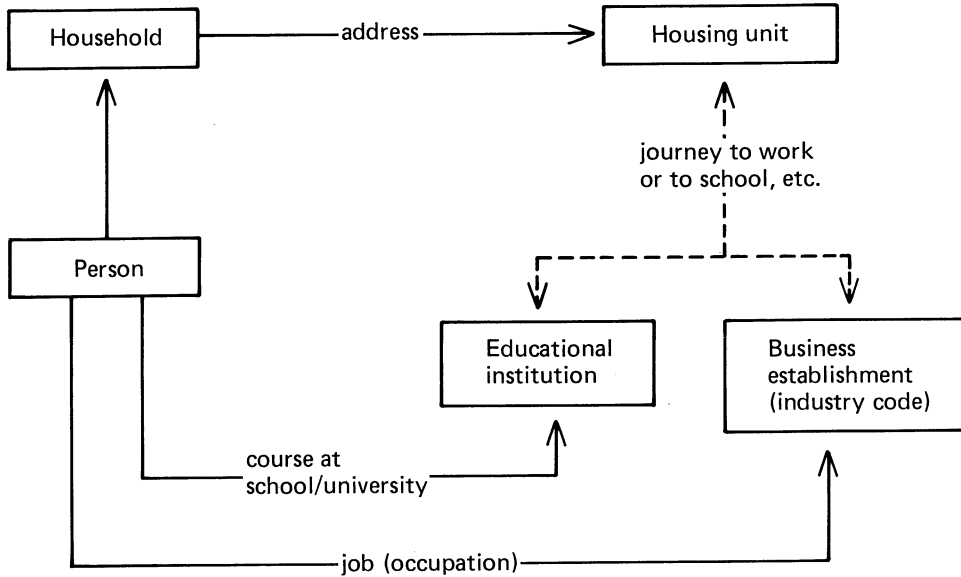


Fig. 1. *Schematic of the Register System for a Census of Population and Housing*

The front runner in the development of this new approach is Denmark which in 1981 replaced a conventional census of population and housing by a register-based census. The methodology has been described by, for example, Thygesen (1983). The main elements of a register-based census – also called an administrative record census (ARC) – constructed on the Danish lines are:

- i) municipal registers of the resident population; there is an obligation on the citizen to notify the authorities of changes, particularly changes of address.
- ii) a central population register which is linked to the municipal registers and carries personal identifiers (usually in the form of personal reference numbers) that are in 1:1 correspondence with the individuals in the population; the register serves several purposes – to make the population data accessible centrally, to eliminate duplication and to act as a reference point against which the personal identifying data in other files can be checked – and the personal reference numbers provide a mechanism for linking files of personal data.
- iii) administrative files containing personal data which must also carry the personal reference numbers; examples are files on social security and on personal taxation.
- iv) a central register of housing that distinguishes the separate housing units within a building; each housing unit has an identifier that also appears in the address part of the population registers, thus enabling a person and his characteristics to be related to the characteristics of the housing unit in which he resides.
- v) registers of business enterprises and establishments.

The register-based census saves the cost of the fieldwork and the burden on the public of a conventional enumeration, and thus offers a remedy for two of the main defects of the conventional census. Moreover, register data can be analyzed frequently – in principle annually – and longitudinally as well as cross-sectionally. The risk that a census will be undermined by a campaign of public protest is much less for a register-based census than for a conventional census. Thus the register-based approach appears to offer a remedy for all the problems listed at the end of Section 2.

However, the register-based approach brings its own problems, as Danish experience shows. Some personal and housing characteristics do not appear in administrative files – for example, the mode of travel one uses to go to work. Some data may have to be added to administrative files. A good example concerns the returns which Danish employers make to the tax authorities showing the wages paid to each employee. In the case of an employer with more than one establishment, the return had to be extended to show the *establishment* where each employee worked. This was done to identify the workplace and the industry in which the employee worked. Data in administrative files may use administrative definitions, which are likely to change arbitrarily, rather than using statistically-desirable definitions. Income is an example of this. Occupation is an important social and economic characteristic about which most conventional censuses seek information, despite the difficulties of collecting and coding data of good quality. But Scandinavian experience shows that this topic presents even greater difficulty in a register-based census because a person's occupation is of little relevance in most schemes of public administration. Another difficulty met with in the 1981 Census in Denmark was the lateness in updating tax registers, leading to delays to the census results.

It has been argued that the data held in registers are increasingly unlikely to reflect the complexities and informalities of present-day life-styles, for example, part-time jobs and part-time education and looser family and household ties. On the other hand, limitations on the topics that can be included in the census are not confined to censuses based on registers. Restrictions on the number of questions and on the character of the questions have always been a feature of conventional census enumerations, particularly perhaps in recent times. Thus the question content of the 1981 Census in the United Kingdom was reduced to its lowest level in many decades in an effort to save costs and limit the burden on the public. So both the register-based census and the conventional census must be complemented by sample enquiries on topics they must omit.

The successful development of the register-based census in Denmark has been greatly helped by the legislative and institutional framework that was created at the time that Danmarks Statistik (DS) was reorganized in 1966 and by the further legislation on data protection in 1978. The main features of the 1966 reorganization were:

- i) Though DS was dependent on the Minister for Economic Affairs for funding and personnel, final decisions on its program of work rested with a board appointed by the Minister. DS was therefore given a degree of independence from the central government which could help to reassure the public on confidentiality.
- ii) DS was given powers to demand, and to use for statistical purposes, data held by administrative agencies and to participate in the work of developing administrative data systems.
- iii) The transmission of identifiable data from DS to outside agencies was restricted.

In Sweden the move towards a register-based census has not as yet proceeded as far as

in Denmark. In Swedish censuses from 1970 onwards, questions on a limited range of topics have been asked in a conventional enumeration, and the responses have been linked to personal data on other topics extracted from administrative files. The linkage mechanism has been the personal reference number, which is entered on the census questionnaire from the central population register before the questionnaire is distributed to the public. This method represents a halfway house between a conventional census and a full register-based census. The Swedish government considered a proposal that the 1985 Census should be wholly register-based, which would have involved the creation of new registers of buildings and housing units and of households. But in the end the government decided that the 1985 Census should follow the lines of previous censuses by retaining a limited questionnaire, mainly because of doubts about the likely quality of register information on occupation, household composition and housing.

4. The Prospects for a Register-Based Census in Other Countries

Outside Scandinavia several of the countries covered by this study have at least some of the elements of data infrastructure that have been used in Denmark and Sweden to move towards a register-based census (see the list in Section 3, above). Some countries maintain local population registers, but rather fewer have in addition the central population register and associated system of personal reference numbers that are needed for an effective register-based census. Table 1 sets out the situation in each of the countries in the study.

But a system of population registration that includes a central population register with personal reference numbers does not, by itself, provide a sufficient base for moving to a

register-based census. For that the registers must be of acceptable quality. In fact, however, quality varies widely from one country to another. In Scandinavia and the Benelux countries the population registers play a part in a wide range of administrative functions, so that the smooth running of the citizen's daily life requires him to cooperate in the timely updating of the information in the registers quite apart from the legal obligation on him to do so. On the other hand, in the countries of Southern Europe the population registers are much less fully integrated into administrative functions that impinge on the citizen's daily life and there are considerable delays in updating the information in the registers. National temperament and willingness to conform to bureaucratic disciplines may also be a factor in the differences between North and South in the quality of the registers.

Among the main kinds of errors in population registers are: delays in notifying changes of addresses, duplications, and failure to notify the departure of emigrants – this is a weakness in all countries but particularly in countries with a relatively high level of international migration like Luxembourg. Duplication in population registers can arise in the same way as in the conventional census: namely, a person is returned as resident at two addresses (for example a person with a second home, a student or worker living away from home for part of the week or year). Duplication can also arise through the failure to delete a person's name from the municipal register when he moves to another municipality. A central population register with associated personal reference numbers provides the best mechanism for eliminating duplication of both kinds.

A different procedure may be employed to deal with errors in population registers that arise from delays in notifying changes of address and from failure to notify the departure of emigrants. These errors can be corrected at the time of a conventional census enumeration

Table 1. Table Showing (With the Symbol x) the Countries that have Population Registers and Personal Numbering Systems

Country	Local popula- tion registers (1)	Central population register		Personal reference numbers	Data from the census (1980 round) used to update population registers
		With current addresses	Without current addresses		
Countries in the EEC					
Belgium	x	x	.	x	x
Denmark	x	x	.	x	.
France	.	.	x	x	.
Federal Rep. of Germany	x(2)
Ireland
Italy	x	.	.	.	x
Luxembourg	x	x	.	x	x(3)
Netherlands	x	.(4)	.	.(4)	.(5)
Portugal	.	x(6)	.	x(6)	.
Spain	x	x(7)	.	.(8)	x
United Kingdom	.	.	x	x(9)	.
Other countries					
Canada	.	.	.	x(10)	.
Sweden	x	x	.	x	x
USA	.	.	.	x(11)	.

- 1) This column takes no account of electoral registers that depend on a person applying for voting rights.
- 2) The practice was adopted in previous censuses but in 1983 was ruled to be unconstitutional.
- 3) The practice was followed in some places.
- 4) A proposal for interlinking local population registers is before Parliament. Personal reference numbers have been assigned to about 70 per cent of the population and are held in the municipal population registers; numbers will be assigned to the remainder later.
- 5) The practice was followed in 1971.
- 6) Refers to the register maintained in connection with the central issue of identity cards and personal numbers to those aged 10 and over.
- 7) Refers to the register of those aged 16 and over who have, or will have, the right to vote.
- 8) Personal numbers appear on identity cards issued centrally at age 16, but are not carried into some of the local population registers or, at present, into the central register referred to in note 7. The numbers are being revised.
- 9) The personal numbers used in the National Health Service Central Register have only limited use outside the National Health Service.
- 10) The Social Insurance Number is recorded in a number of major administrative files (for example, tax files).
- 11) The Social Security Number issued by the Social Security Administration is recorded in several major administrative files, both federal and State.

adopted in several countries (as shown in the by using the census data to check and as necessary update the registers, a practice final column of Table 1). This procedure will also correct duplications that arise from failure to delete from a municipal register the name of a person who has moved to another municipality. Three comments may be made. First, the procedure can be applied only infrequently, that is at census time (though in Spain an additional canvass for the population

registers occurs midway between the decennial censuses). Second, the use of census data to update population registers can be controversial, as indeed it was in Germany in 1983, because, however carefully this use is explained to the public, it destroys the notion that the census serves purely statistical ends. Third, a clear distinction must be made between countries like Belgium and Sweden, where census data are used for the "fine tuning" of a population register that is already maintained

at a high level of accuracy, and countries like Italy and Spain, where the census enumeration is seen as a main method of updating the registers. In this latter case there is clearly no imminent possibility of replacing the conventional census by a register-based census.

Outside Scandinavia the countries that seem best placed to develop the register-based approach to censuses – if they choose to do so – are the Benelux countries. Belgium and Luxembourg already have the first three of the elements of a register-based system listed in Section 3; and the Netherlands is likely to reach a similar position before long, though the functions normally performed by a central population register may be carried out there by interlinking the municipal registers. What is equally essential, the quality of the data in the population registers in the Benelux countries is generally high. But in order to switch to a full register-based census of population and housing these countries, like Sweden, would have to develop registers of housing of the kind described in item (iv) of the list in Section 3. The case for moving to a register-based census would seem to be particularly strong in the Netherlands if there is little future prospect of taking a conventional census.

Other countries in Western Europe would face a much bigger task in improving their data infrastructure to the point that would make a register-based census possible. Those countries that already maintain population registers recording each person's place of residence would need to act in four main ways. First, the quality of the data in the population registers needs to be enhanced, particularly by ensuring that changes of address are promptly reported. Second, where it does not already exist, a central version of the population register must be set up together with an associated system of personal reference numbers. Third, the personal numbers need to be entered in administrative files to permit

linkage. Fourth, a register of housing units must be constructed. But if countries like Italy and the Federal Republic of Germany would face not only substantial costs in carrying out such a programme but also possible opposition from politicians or lack of cooperation from the public, what chance is there of creating the necessary data infrastructure in a country that lacks a system of population registration to record each person's address? This question is discussed in the next section by taking the United Kingdom as an example.

5. The Situation in the United Kingdom Taken as an Example

As in every developed country, registers of personal data and of housing data are held in the United Kingdom for a variety of administrative purposes. Important examples concern vital registration (births, deaths, marriages and divorces), immigration and naturalization (the acquisition of UK citizenship), the national health service, social security (registers of contributors and of beneficiaries such as the unemployed, pensioners and children), personal taxation, the issue of passports, electoral registration, the ownership of cars and licences to drive cars. Records of land and buildings are kept for purposes of local planning and building control, registration of ownership and property taxation. Registers of enterprises and establishments are held in connection with business registration, value-added tax (VAT) and health and safety regulations as well as for statistical purposes.

Though this data infrastructure is extensive, its quality is unsatisfactory. In particular, the data identifying a person, usually name and date of birth, are not reported consistently, with the result that a person's record may be fragmented within a single file and linking between files would be uncertain and costly. Separate personal numbering systems exist in different administrative areas. Information on

a person's address is recorded in many of the registers of personal data, but again there is no consistency between files in the details reported or in the timing of updates. There is no procedure by which important changes in a person's situation – such as a change of address, a change of name due to marriage or a death – can be carried simultaneously into all the relevant administrative files. To do these things would require a central register of the population, together with a set of personal reference numbers (or other identifiers) that was in a 1:1 correspondence with the individuals in the population and was recorded not only in the central register but also in the various files of personal data. In fact a central register covering virtually everyone does exist – the National Health Service Central Register (NHSCR) – but it lacks many of the qualities that an effective central register should have: it is inflated by duplicates and emigrants; it does not record current addresses; it does not serve as a reference point against which the personal identifying data in other files can be checked; though it contains personal reference numbers (the National Health Service numbers) these numbers have little application outside the health service and cannot be used for linking files; and it is still clerically maintained (though computers will be introduced shortly).

In summary, the personal data held in administrative registers in the United Kingdom lack consistency, are out-of-date in many cases (for example in regard to address) and are uncoordinated. There is possibly less coordination in the UK than in other countries that lack population registers with current addresses. France has a computerized central register of the population without current addresses – the *Répertoire National d'Identification des Personnes Physiques* (RNIPP) – and the personal reference numbers that it holds are also carried into a range of administrative files. In the United States virtually all

the adult population as well as a substantial proportion of those under 18 years of age have a Social Security Number (SSN) which is carried into several major administrative files, both Federal and State, though there is some duplication of persons and of numbers in the SSN file. In Canada the Social Insurance Number (SIN) plays a similar role.

From the statistical point of view, the situation in the United Kingdom is made more difficult by the fact that the Government Statistical Service (GSS) is decentralized and therefore compartmentalized, so that there are barriers to the access of individual data even for statistical purposes. Moreover, the GSS is directly responsible to the central government, unlike countries such as Denmark and the Netherlands whose statistical agencies have a degree of autonomy and can therefore command a greater degree of public trust on matters of confidentiality. But on the credit side the UK has enacted a law on the protection of personal data on the lines of the Council of Europe's 1981 Convention.

To improve the quality of the information in the files, its up-to-dateness, its consistency and its accessibility for statistical purposes could be very costly. A much-improved central register of the population would be needed with better means for gathering information from the public on changes of address. A case can be made for doing this in order to have better statistics. Such a case might rest in part on the desirability of introducing a register-based census. But other statistical needs might carry more weight, for example, the need to have better annual statistics of the population of local areas for purposes of resource allocation. However, such a proposition aiming only at better statistics is unlikely to commend itself to the administrative agencies which hold the files. Nor would the public be likely to respond favorably to a call for more or better information just to give the government better statis-

tics – particularly if it involved an obligation to register each change of address. In the present political climate the whole proposition might be “unsaleable.”

There is, however, a different approach which probably has a better prospect of success but is altogether more challenging. The real case for a better data infrastructure concerns administration and policy more than statistics. This point is developed in the next section.

6. Why a Better Data Infrastructure Is Needed for Administration and Policy

When records are out-of-date and inaccurate, the costs of the administrative process are increased, and at the same time the effectiveness of the systems in achieving their objectives is reduced. Hence burdens and duties fall on those who should not have to bear them and benefits and rights are given to those not entitled to them. The system is less fair than it ought to be. In addition, the opportunities for crime and fraud are increased. In purely financial terms the costs of introducing a reliable registration system for persons and housing units are likely to be more than offset by savings in the costs of administration, by reductions in the amount of government revenues missed – whether accidentally or through wilful tax evasion – and by reductions in the amount of benefits paid improperly, sometimes as a result of fraudulent claims.

In addition, the absence of an effective record system can limit the policy options open to government. Three examples in the United Kingdom may be mentioned. First, the basis on which local taxation is raised is now being reviewed as a result of dissatisfaction with the existing tax (which is simply a tax on the occupation of land and buildings). But some of the alternatives, such as a tax dependent on the numbers of persons resident

at an address (a “poll tax”), can be implemented only if registers of local residents are set up. Second, regulation of immigration into the UK at present rests to a much greater extent on controls on entry, that is at airports and seaports, than on any control on residence. If effectiveness were to be improved by reversing the balance between these two forms of control, a reliable population register would have to be instituted. Third, a better system of population records would be needed if the government wished to control duplication in the local electoral registers on the lines followed in France, or to improve the coverage of the electoral registers (which are notably deficient in respect of the younger age-groups).

A coordinated data infrastructure on the lines of the Scandinavian model thus has clear advantages in terms of cost-effectiveness and an increased range of policy options open to the government. To be weighed against this are the likely political reactions. They are certainly not all on one side of the balance. On the credit side is the fact that a better information system will lead to a fairer distribution of burdens such as taxes and of benefits. It will also lead to a reduction in fraud and crime. On the other hand, better organization and handling of personal data by the government, even if the range and amount of data are not increased, involve a shift in power between the state and the individual and can be represented as an erosion of the fundamental freedoms of the individual. But the implication of this line of argument is that individual freedom should extend to the freedom to deceive the state – to evade taxes and to claim benefits fraudulently. This may perhaps be an acceptable attitude if the state is corrupt or tyrannical but would seem hard to justify in a well-run democracy.

The way to reconcile these divergent arguments is to accept the greater effectiveness and fairness that a reliable data system brings

but at the same time to introduce legislative and institutional arrangements that protect individual rights. Foremost amongst these arrangements should be a data protection régime supervised by an independent “watch-dog” body. The Danish institutional structure outlined in Section 3 above deserves to be studied.

7. Conclusions

The way forward – a coordinated and reliable data system serving essentially administrative ends – raises issues concerning administration, policy and the quality of society that we seek. These issues merit wide public discussion on the basis of a factual analysis.

The possibility of providing better statistics and of conducting a register-based census of population and housing would be a secondary benefit or “spin-off” from an improved data system. But statisticians could play a key role in this kind of development because of their knowledge of the data and their ability to see the data infrastructure as a whole rather than from the viewpoint of a single administrative application.

I believe that the moves towards better data systems, with a register-based census as a by-

product, that have been pioneered in the past twenty years in Scandinavia will extend as we enter the 21st century to other countries in Western Europe and North America. The movement will be propelled by a powerful combination of social, economic and technological forces: the quest for a fair and just society whilst respecting individual rights, the search for efficiency which in this case is not in conflict with conservation (the recycling of data), and the revolution in information technology.

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