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Operational aspects of censuses

Why is it more and more difficult to finance a census?¹

Note by the National Institute of Statistics and Economic Studies, France

Summary

Since the late 20th century, some developed countries have decided to change the form of their censuses, reducing, or even eliminating, census surveys. If we compare the map of countries which have implemented alternative methods with the map of GDP per capita in Europe, we find that the richer the countries, the less they accept to finance a traditional census. It therefore appears that, as the standard of living increases, countries are less willing to devote part of their resources to censuses.

This text provides an explanation for this trend, based on the cost disease theory described by W. Baumol and W. Bowen: as the cost of a traditional census consists largely of remuneration of census enumerators, and considering that the productivity gains in this area are very low, the relative cost of a traditional census increases with economic development. When GDP per capita increases, either a country agrees to finance a very expensive census (like the United States) or, like most of Western Europe, it changes its statistical model to reduce the cost of surveys.

¹ Prepared by François Clanché.

I. The number of traditional censuses is decreasing

1. During the first three quarters of the 20th century, almost all developed countries and many developing countries held regular general population census. Since the 1950's, the statistical department of the UN has made regular recommendations on the implementation of censuses. It considers that a census of the population should be performed, if possible, every 10 years, in each country. The very large majority of censuses in the world take place in the shape of a short survey of the general population, and are organized in a short period (in a few weeks) to avoid double counting and omissions. In many developed countries, there is the same tradition dating back to the nineteenth century.

2. Since the late 20th century, some of the developed countries have decided to change the organisation of these censuses, reducing the number of people surveyed, or even eliminating any specific survey. Most often, those who implement alternative methods take advantage of existing administrative sources which already include data collected during surveys. The *Conference of European statisticians recommendations for the 2010 censuses of population and housing*, published by UNECE in 2007, consider the "traditional" census to be only one of the four possible methodological approaches to conduct a census.

3. Instead of gathering information specifically for the census, the alternative methods use data from existing databases, which have the essential characteristics of a census: precise information on the home address at a given date, demographic information on household residents, and consistency of information throughout the country. In the 1980s, some European countries replaced their census surveys with a census based on population registers. But the number of countries was limited by the availability of administrative sources with adequate statistical qualities. Population registers often have demographic data and information on the home address. But a census also requires economic data such as occupation, type of employment, training and qualification information. This information is not always included in the population registers.

4. There are now several methods of producing the results of a census without making the survey on the entire population. It depends on the opportunities offered by sources and on advances in statistical techniques. The countries which have abandoned the traditional census for the 2000 or the 2010 census round use methods combining input from several administrative sources or completing administrative sources with surveys.

5. Thus, according to the recent UNECE Survey on the 2010 census round, among the 49 member countries which conducted a census in the 2008-2013 period, only 29 opted for a "traditional" census, 11 combined administrative sources with surveys, and 9 used only administrative sources.

6. Besides, among these 49 countries, 26 introduced a methodological change in their census (use of administrative sources, sample surveys, rolling surveys) between the 2000s and 2010s, and 25 are considering new developments within their methods for the next census.

7. The argument most often put forward to justify these changes is the cost of the census: questioning the whole population is very expensive and the weight of such an operation on public finances is considered too high. Among the 49 countries of the UNECE, 21 conducted methodological or technical innovations intended to reduce the cost of their censuses (Figure 1).

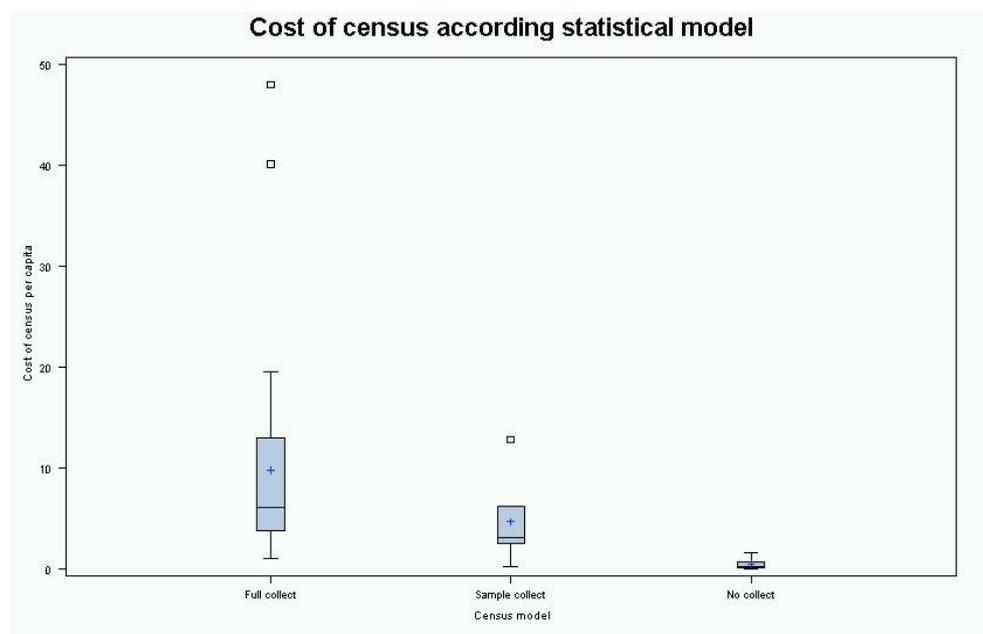
Figure 1
Evolutions and innovations in the census

	<i>Yes</i>	<i>No</i>	
In which aspect did-you innovate on in your last census?			
Methodology (use of registers, sampling, rolling estimates)	26	25	49
Did innovations (internet collection, scanning, outsourcing, using of registers, other technical or methodological improvements) decrease total cost?			
	21	28	49
What challenges did you face in planning or conducting your census?			
Keeping the budget	35	14	49
In which aspect are you considering innovations for your next (round 2020) census?			
Methodology (use of registers, sampling, rolling estimates)	25	24	49
What is driving the potential introduction of innovations for your next census?			
Reduce cost	32	17	49

Source: UNECE Survey on 2010 census round (questions 91, 98, 86, 92, 93)

8. In fact, the per capita cost of a traditional census is much higher than that of a census which uses only administrative data: \$ 8.5 as opposed to \$ 0.5 on average (Figure 2). The cost of combined methods depends largely on the proportion of surveys in the formula: when only a part of the population is surveyed, the average cost is \$ 4.7. When the whole population is surveyed, its cost is approximately the same as that of a traditional census.

Figure 2
Cost of census, per capita, according to the statistical model



UNECE Survey on 2010 census round (questions 6, 94)

Source:

9. At each decennial round of census, the number of countries using alternative and less expensive methods increases. It therefore appears that, as the standard of living improves with time, which is true almost everywhere at least in the long term, countries are less willing to devote part of their resources to censuses.

II. The richer a country, the poorer its census

10. Another paradox: if we compare the map of countries that have implemented alternative methods with that of GDP per capita in Europe, we find that the richer countries are, the less willing they are to finance a "traditional" census. The census with the population registers was first introduced in the countries of northern Europe, which benefited from particularly high per capita income among the ONUECE. They were followed by other fairly wealthy countries of Western Europe (the Netherlands, Belgium, Austria, Switzerland). In contrast, the traditional census still dominates southern Europe, as well as Eastern Europe and Central Asia. The census methods map corresponds quite closely to the hierarchy of GDP per capita (Figure 3.1 and 3.2).

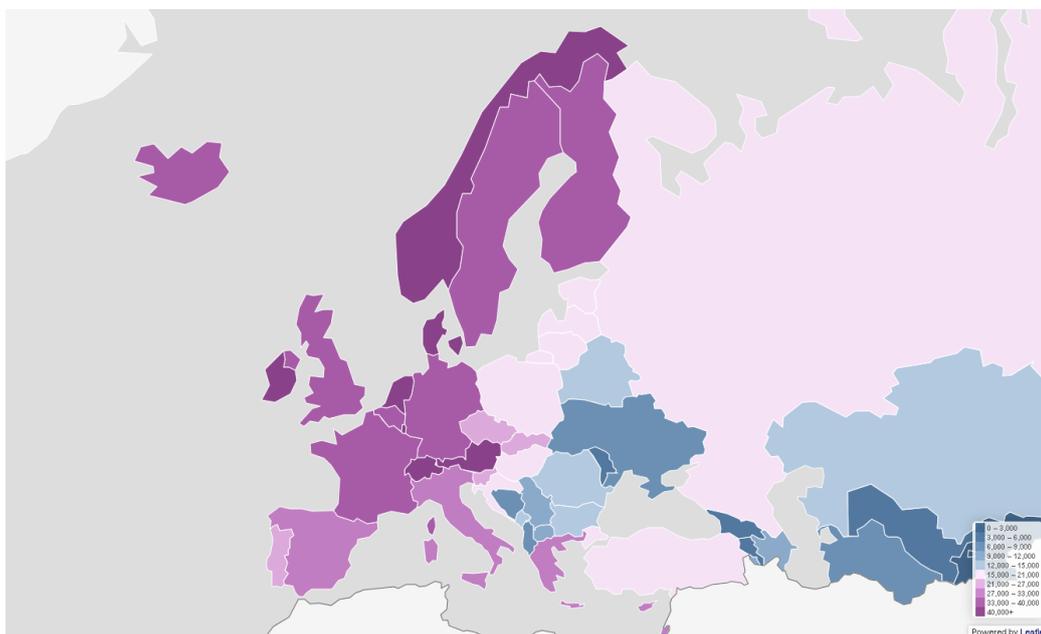
Figure 3.1

Census 2010 statistical models in Europe



Source: UNECE Survey on 2010 census round (question 6)

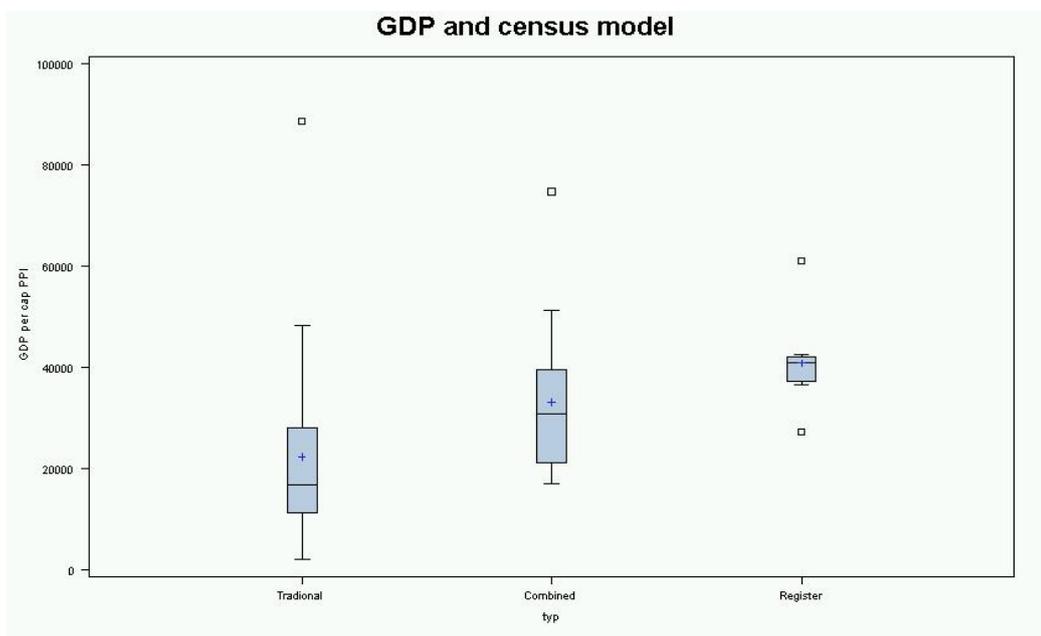
Figure 3.2
GDP per capita in Europe, \$PPI



Source: UNECE Statistical Database

11. The results of the last UNECE surveys confirm this diagnosis: the combined formula and register formula are implemented especially by countries with a high GDP per capita, expressed in dollars and adjusted for purchasing power (Figure 4).

Figure 4
Census statistical model according to GDP per capita



Source: UNECE Survey on 2010 census round (question 6), UNECE Statistical Database

12. The average GDP per capita (PPI) of the countries which implemented a "traditional" census is \$ 22,300. For the countries which have used a combined method, it is \$ 33,000, and finally for those who used only registers the GDP per capita (PPI) is \$ 40,900².

13. While the traditional method is more expensive, it is used by all countries with a GDP per capita lower than \$ 20,000 (with the exception of Turkey, which has developed a combined method). In contrast, the census based on registries is only used by countries with a GDP per capita above \$ 35,000 (with the exception of Slovenia). (Figure 5).

Figure 5

Census statistical model for the 2010 census round in UNECE countries according to GDP per capita

<i>GDP per capita, PPI</i>	<i>Traditional census</i>	<i>Combined method</i>	<i>Registers only</i>
Less than \$ 10,000	6	0	0
10 to 20,000 \$	10	2	0
20 to 30,000 \$	6	3	1
30 to 40,000 \$	3	4	3
More than 40,000 \$	4	2	5
	29	11	9

Source: UNECE Survey on 2010 census round (question 6), UNECE Statistical Database

14. This phenomenon can be partly explained by the availability, in the most developed countries, of alternative sources and methods. We will here focus on another explanation: the relative cost of the census.

15. Nearly half of the countries report, in the UNECE Survey on the 2010 census round, having introduced methodological or technical innovations, in order to reduce costs. But they are much more numerous among the "rich" countries: it seems that the pressure for a lower cost is much stronger above a per capita income of \$ 20,000 (Figure 6).

Figure 6

Innovations and Evolutions according to GDP

<i>GDP per capita, PPI</i>	<i>Innovations in 2010 reducing the cost of the census</i>		<i>Evolution of the statistical model implemented in the 2010 Census</i>	
	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>
Less than \$ 10,000	0	6	1	5
10 to 20,000 \$	2	10	4	8
20 to 30,000 \$	7	3	7	3
30 to 40,000 \$	4	6	7	3
More than 40,000 \$	8	3	7	4
	21	28	26	23

Source: UNECE Survey on 2010 census round, questions 98 and 91, UNECE Statistical Database

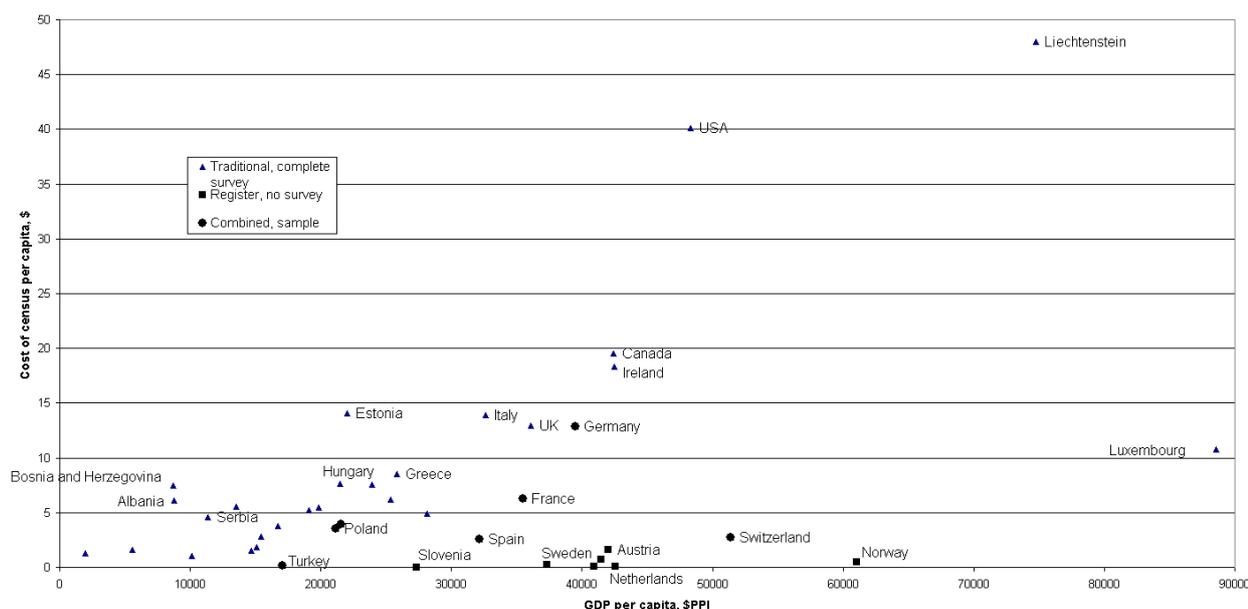
² Source: UNECE Statistical Database, compiled from national and international (CIS, EUROSTAT, IMF, OECD) official sources.

16. Similarly, there were more changes in the statistical model between the censuses of the years 2000 and the census round of the 2010s in the countries with high incomes. "Exceptions" to this trend are, on the one hand, small European countries that have a very high standard of living (Luxemburg and Ireland) and, on the other hand, the United States and Canada.

17. Figure 7 shows that, except in the US, Canada, and some small and rich countries in Europe (Luxemburg, Lichtenstein and Ireland), the budget of a census per inhabitant, rather than going up as could be expected, decreases as the national income increases.

Figure 7

Complete cost of the census, per capita, according to the GDP



Source: UNECE Survey on 2010 census round (question 94), UNECE Statistical Database

III. The explanation through a theoretical approach

18. In 1965, American economists William Baumol and William Bowen were mandated by the Ford Foundation to produce a diagnosis of the health and economic operation of theaters in New York. The authorities wanted to determine why the theaters of Broadway recorded a steady increase in their operating costs, chronic non-profitability and a scarcity of their audience. Their work was summed up in a publication in 1966: *Performing Arts, The Economic Dilemma*. It has resulted in a theory called **Baumol's cost disease** (also known as the **Baumol Effect**), which became famous, beyond the performing arts, in public economy.

19. Baumol and Bowen pointed out that the same number of musicians is needed to play a Mozart symphony today as was needed in the 19th century. The number of musicians required, the duration of the performance and the number of rehearsals, the duration of initial training to achieve the desired qualifications have not changed in 200 years. It is not possible to replace a violin section with a single synthesizer. Some economic activities, called "archaic", are not likely to achieve productivity gains over the long term. In contrast, in most sectors of the economy, the industry, but also agriculture and many services sector,

workers are continually getting more productive due to technological innovations in their tools and equipment.

20. On the other hand, the real wages of musicians (as well as in all other professions) have increased greatly since the 19th century. Although their actual cost (working time) does not increase, they appear, in comparison with the rest of the economy, more and more expensive. Economic development has the paradoxical effect of making it seemingly more "luxurious" while their actual cost of production does not increase. Baumol's cost disease is often used to describe consequences of the lack of growth in productivity in public services such as public hospitals and state colleges. Since many public administration activities are heavily labor-intensive there is little growth in productivity over time because productivity gains come essentially from a better capital technology.

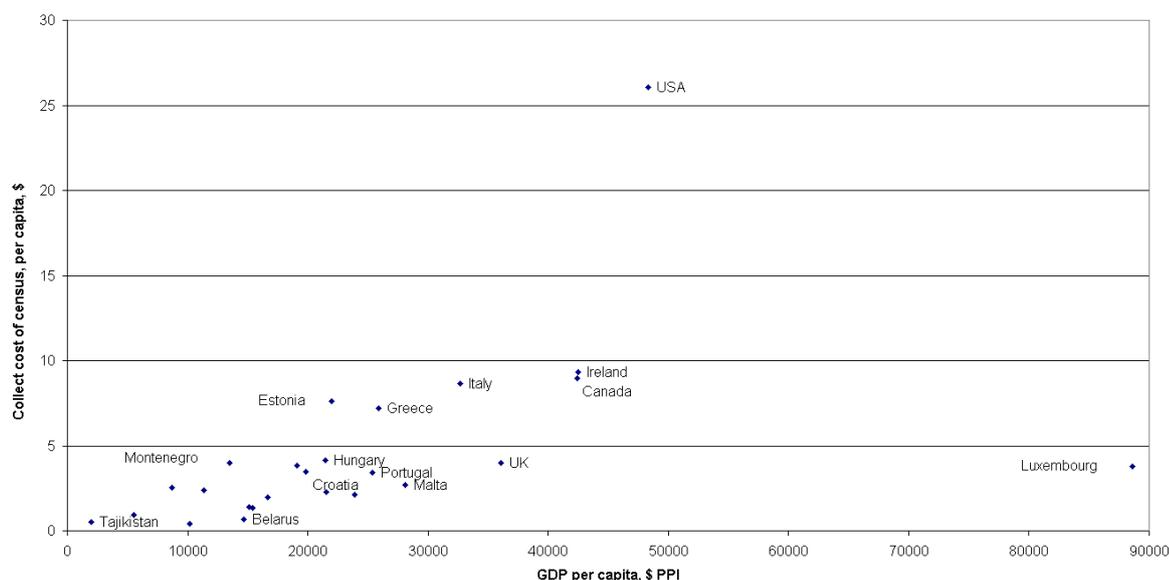
21. Baumol and Bowen's reasoning applies quite well to the census: the time and effort of census enumerators needed to collect information from 1000 people has hardly diminished during the past 100 years, while labor productivity strongly increased in many other sectors of the economy. But supervisors' salaries, even if it is smaller, increase in the long run with the average salaries in the country.

22. In a conventional census, the collection's costs represent the greatest part of the operation's total costs: According to the latest survey by the UNECE, a traditional census, on an average cost of \$ 8 per capita, more than 5 are devoted to the collection itself. It therefore represents two thirds of operation's cost, without the possibility of significant gain: as noted in the latest UN-ECE recommendations on the census³, the use of the Internet to collect data only marginally decreases costs.

23. And in accordance with the theory of Baumol and Bowen, the collection's costs increase with the level of nations' wealth: between \$ 2 and \$ 6 in the country with less than \$ 20,000 per capita, it is more than \$ 10 when the country has a GDP per capita of more than \$ 30,000 (Figure 8).

³ *Conference of european statisticians recommendations for the 2020 Censuses of population and housing*, ONECE, 2006, §120, p.27-28.

Figure 8
Cost of the census collect in countries making complete surveys



Source: UNECE Survey on 2010 census round (question 94 and 97), UNECE Statistical Database

24. It therefore brings us to the conclusion that the more an economy is developed, the more the costs of a complete enumeration appear high.

25. Baumol and Bowen, analysing the situation in the performing arts, found that the cost of concert ticket could only increase: if we don't agree to pay an increasing price (either the audience, or the government), then it disappears. Regarding the census, only governments are likely to pay.

26. At the moment, censuses have not disappeared. But they are increasingly replaced by operations whose nature very strongly decreases costs. Indeed, "the Baumol effect" can only be applied on censuses that intensively use labor, ie which require the systematic use of census enumerators. Alternative methods most often allow this saving, as if the violins were replaced by a synthesizer in a Mozart symphony.

27. Today, among the richest countries, some are ready to pay a very high price for traditional censuses: is the case of the United States, Canada, Luxembourg, Italy, UK and Ireland. But except for Ireland, all these countries are considering to make their statistical model evolve by 2020, by the introduction of samples, by using registers or rolling. Some, like Italy, have already committed their modernization project.

28. Even among the less rich countries of the UNECE, half of them which had led, in 2010, a traditional census, are considering a statistical evolution for 2020: the trend is not as strong as it in Western Europe, but the movement is significant. It is likely that during the next census rounds alternative methods will expend in parallel with the rising standard of living in all regions of the UNECE.