

CONFERENCE OF EUROPEAN STATISTICIANS

Joint ECE-EUROSTAT work session on Demographic Projections  
(Perugia, Italy, 3-7 May 1999)

Working paper No. 9

Point 3. Users and uses of projections

Issues of common concern to the production of all kinds of projections

**AN UNIQUE POPULATION FOR SEVERAL USES AND USERS**

Paper submitted by the National Statistical Institute of Belgium<sup>1</sup>

1. Projections are made for several uses and users. Some examples are mentioned in the terms of reference of the meeting.
2. It is not uncommon that projections are made for a particular purpose, for instance housing needs. In such a case, typically, specific projections are calculated, with a particular attention to the relevant units and correlated assumptions (ex. evolution of households, more than individuals). It is a logical reaction to one need. But on another hand, projections are demanded for other purposes, for example health policy. Here the priority is given to the person, with a special attention to his age. Other axes of segmentation are worth of interest: categories of persons, of households, sub-populations of a country, with respect to internal migrations, etc.
3. Then, an ad hoc approach leads to as many scenarios - and even as many methods - as the number of needs (x users), with two disadvantages:
  - first, redundancy, with a waste of efforts
  - secondly - and it is more serious: a lack of coherence
4. There are the same persons (and households) who will experience dwelling and health policies, and then there are no reasons to produce two figures. The population is "one" and only one; and, in spite of all uncertainties, a fact is sure for the future: this will remain so.
5. A related case of special interest for us is the relation between national projections, expressed by international migration. The balance of world's population must be zero, except with an implicit assumption about migration from or to the moon (or anywhere outside the earth).
6. The first above-mentioned example leads to another thought: it is a fact that some factors to be studied with the projection can play a (kind of feedback) role on the projection. For example health policy can influence life expectancy, and thus the population. Therefore, an iterative way of reasoning can be useful.

---

<sup>1</sup> Prepared by Luc Lebrun.

7. However it is as well the population exposed to housing needs, and housing policy can also have an influence...
8. In any case, a confusion is to be avoided between causes and effects.
9. A statistical bureau is in charge of official population projections, and has by this a responsibility in producing reference figures. So, its main role is not the production of specific responses, and it must adopt a responsible attitude thereon.
10. This does not mean that several scenarios are forbidden - although a stronger (reference) one is recommended -, but they must be done with reference to explicit assumptions regarding the population's behaviour, and not according to the purposes of the results.
11. Coherence in the projections is thus a master word.
12. Knowing the future is surely not an easy enterprise: the economists will not contradict this assertion. A comparison ex post between projections and reality put often the author in a uncomfortable position. Nevertheless it is an useful exercise, not only to give us a (false) feeling of security, but, before all, to help us to manage the future. It is the case in economy. It is also the case in demography (moreover, economy is partially based on the demographic situation!).

Then, we must do it with a maximum of professional reliability.

What does it mean?

### **What is a “perfect” population projection?**

13. It does not exist. But a projection must be
  - as good as possible
  - in any case not impossible.
14. A representation of truth - the question is there - has to verify some criterion. One of them - indisputable - is plausibility. If something - an event; a situation - is impossible, it is not; if a projected situation is impossible, it will not reflect the future reality. This remark is perhaps obvious, but not useless: in our case, for example, it is sure that immigration in Belgium from France will not be different from emigration from France to Belgium. We are nevertheless not sure that in our respective assumptions it is not so. It is a typical problem of consistency. Consistency must thus be a compulsory assumption for population projections.
15. The following aspects are of special interest in the context of the meeting: causes and effects, statistical units, segmentation, spatial units.

### **About causes and effects**

16. Once defined the level for working (ex. mortality by sex, age and region all nationalities together), it is easier to analyse the phenomenon, and to identify the relations between causes and effects.

17. An example of reasoning: life expectancy goes positively (lower and lower mortality); one reason is the evolution of health care policy. On another hand, the growing cost of health policy will have a limit; then life expectancy also; but in such a scenario the financial cul-de-sac of health policy will be broken up, or at least lightened, allowing new progresses in mortality, etc.

18. With one variable, it is possible to define reasonable assumptions. With more it is less easy. Nevertheless, this simplification must be used carefully, to be sure to take into account the specific features (ex. fertility depending on nationality), and the crossed effects (ex fertility depending on migrations).

### **About statistical units**

19. In population projections, persons and households enter both into consideration. Both units are in a hierarchical relationship: each person belongs to one and only one household, and households (broad sense) include all the persons. Projections of households and persons must be consistent.

#### **About households**

20. Up to now, projections are seldom made for persons and households, at least together. It exists some experimental attempts, very interesting, but no guidelines. An urgent job, to be done, preferably by the international community in order to give international consistency, is to define the way households projections will be done, and first of all will be articulated on persons. The question is quite complicated, but the first to do is to define a typology of households, to allow to build a mechanism (a model) where each person finds a place (a household), and is thus in a given “state” (a given position). The positions must be defined with reference to multiple parameters.

21. From there, two approaches are possible. The first one is to make persons projections and then to allocate each person to a household. Here, the households are dependant of the demographic position of everybody (example: if you migrate, it is to join a partner and to compose a couple). A second one is to start from the household, for which transitions between states can be measured (ex. from living alone to living with a partner (or with a child, etc), taking into account the demographic events: births, deceases, ...

22. The classification is a required (and not sufficient) condition to build households projections.

23. It is not so easy, because of the numerous possibilities; in Belgium, for the census, we use about 150 categories, even without taking into account the precise number of children. As it is not possible to derive assumptions for projections with so many classes (<sup>2</sup>), a simplification must occur, with residual category. But, because of its unavoidable heterogeneity, it will be difficult to predict an evolution. The only way we have found up to now is to reduce the residual category to an insignificant volume, in order to limit its incidence on the results. Other ideas are welcome.

### **About segmentation (stratification), to characterise the units, and to build hypotheses**

---

<sup>2</sup> Even with the best statistical observation, due to the random behaviour of small figures

24. For persons, several characteristics are worth of interest. Main are sex, age, nationality and localisation in the country (regional projections). Here again, consistency is a rule: the sum of the population according to age must be equal to the population by sex, etc.

25. This has a inevitable “technical” consequence: the projections must be calculated in all the (cross) details: for example by age, sex, nationality, combined, and not separately, at the margins. The precision of such a projection at the basic level is of course quite poor, but it is not the objective of the segmentation: the results are used at aggregated levels.

26. Reasoning at desegregated level excludes to build the assumptions taking into account each dimension (what could be the evolution of female foreign population of age x in region y?); one must work at the margins (ex. foreign population on one hand, region on another one), according to the problem. In Belgium (1995) for instance, we have first established that mortality did not depend on nationality, then, therefore, we have calculated it all nationalities together, and put the results back in the cells defined by nationality. Techniques exist to recompose the cells from the margins.

27. For international comparability, it is important to agree on a minimal segmentation. One can suggest sex, age, and some kind of aggregation for nationalities. An agreement on the last characteristic is probably harder to reach; an attempt should be a role for international bodies.

### **About spatial coherence**

28. It must be accepted that the building of world projections is not possible, except if disconnected from the national exercises which have probably the advantage of a closer relationship with the reality. This considered, the national exercises have to be (mutually) as coherent as possible. It is the price for comparable, and additive figures.

### **Coherence whereon?**

29. Once defined the observed (= predicted) units - namely the population, = the persons (<sup>3</sup>) -, one has to agree on
- the segmentation (see above)
  - the components of the movement worth of interest for an handling at international level.

For the components, a priority is clearly to be given to migration.

30. Indeed, if mortality and fertility could be influenced from a country to another, it is at a lower level. Furthermore, when we compare fertility even among “close” countries, such as in Europe, it is very difficult to explain the differences. In other words, the explication can hardly be found by the neighbours. Mortality has a more uniform pattern: here one can envisage assumption by groups of countries, but, according to the fact that the incidence is limited, it is not a priority.

### **International migrations**

31. Why to handle migration at international level?

---

<sup>3</sup> Households are worth of interest, but up to now the expertise is too far from an operational stage

32. By definition, international migration is mutually influenced among the countries: a migration is the consequence of the combination of attraction and emission factors.
33. Secondly, specially for the small countries, migration plays an important role in population variation. For Belgium, for instance, international migration explains more or less one third.
34. Third point: according to the fact that assumptions on international migrations are very uneasy to define, specially at a “local” (worldly speaking) level, countries such as Belgium are looking for an expertise of international organisations (UN, Eurostat).
35. Each country does its own projections, with hypotheses on migrations. But, by definition, immigration in one country from another one is the emigration from the second to the first. So, the needs of an international organisation can not be encountered by an addition of national exercises: the balance of world’s population would not be zero, an impossible assumption.
36. The theoretical conclusion of this last statement is that only an unique set of population projections for all countries could ensure coherence. It is nevertheless not affordable, for several reasons: political, technical, but also scientific. Indeed, the “local” approach has at least one (big) advantage: the proximity of the studied problematic, which produce in principal more accurate results.
37. Then, a compromise has to be found between centralisation and decentralisation. In other words, it should be interesting if we could define a procedure allowing an optimal solution.
38. The way to launch an initiative on this topic could be
- first define the level for analyse (ex. Eur-15; Europe as a whole (less Eur-15), OECD,...), and a method of calculation: ex: absolute figures versus probabilities
  - then define a procedure to build the figures: ex.: aggregate and adapt (symmetry) assumptions which can come from the member states (other formulas are possible)

The only objective of this proposal is to try to identify a way to co-operate.

-----