

Risk and Forecasts: Thinking Outside One Box and Inside Another

Rischio e Previsione: Pensando Oltre Uno Schema e Dentro un Altro

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Our disciplines help us see but they also shape - and misshape - our perceptions. We learn conventional ways of looking at the world and interpreting our observations, and sometimes fail to see things that would be clear from another perspective.

Over the years I have come to an ever greater appreciation of the strengths of demography as a discipline. But every now and then, I have noticed gaps and limitations – demographic topics that were slighted or ignored; techniques that had become canonical [that is, ‘correct’] even though not necessarily the only or best; conventions that were retained even though obsolete due to computers or to developments in mathematics and statistics.

A central problem was demography’s schizoid stance toward ‘theory.’ We cultivated great rigour in measurement and formal models. But substantive theory was stated in loose verbal form, used rather casually, and readily dismissed in the face of empirical counter-examples.

These traditional attitudes carried over into demography’s tepid reception of modern computer simulation, especially when used to investigate theoretical ideas, that is, when it got too far from the data. Demographers prefer ‘real data’ not the ‘made-up’ data of simulation – although paradoxically, no numbers are less real than the detailed population forecasts for which demography is well-known, or those in the stable population model.

I see these problems in demography as a special case of what the statistician Adrian Raftery calls the ‘two cultures of quantitative analysis’-- ‘deterministic simulation’ and ‘statistical modeling.’ The former tries to represent underlying mechanisms explicitly, typically with differential or difference equations. The latter tends to ignore underlying mechanisms, modeling relations among observed variables using simple models. In Raftery’s words, ‘simulation modelers take great pains to represent the signal in the system and do so in a sophisticated way, while largely ignoring measurement error and noise, and statisticians model the noise very carefully while often using very simple [often linear] approximations to the signal.’

Demography as a discipline falls mainly in the statistical modeling camp, a fact which has limited its ability to come to terms with the two thematic topics for this meeting – risk and forecasts.

The demographic study of risk is largely confined to the measurement of empirical probabilities of events and to the multivariate statistical analysis of their demographic, economic and social co-variables. Observed risk becomes the basis for assessing future risk by means of strong continuity assumptions. Despite occasional excursions into psychological demography, subjective perceptions of risk and the complex processes whereby actors come to terms with risk in their decision making have not been central to demographic research and teaching. Our work on these matters is empirically and technically solid, but borders on superficiality. John Hobcraft has recently set forth an ambitious agenda to remedy the situation, calling for the study not just of demographic outcomes but of 'pathways, processes, and progressions' towards demographic outcomes, a study that will involve psychology but also genetics and neuroscience. It can be noted in passing that such an approach will require, among other things, more attention to the formulation of rigorous theory, and less reliance on large-scale sample surveys, which are not well-suited to the deep study of psychological processes.

At the macro level, in standard population projections, there is a similar neglect of underlying mechanisms and processes. Inputs for future mortality, fertility and migration are assumed and combined linearly to produce future outcomes. There are limited interactions and feedbacks among the demographic inputs. And, as Joel Cohen has recently noted, the model includes none of the myriad factors that affect the inputs; population dynamics are treated as exogenous.

In short, both macro- and micro-demography have focused on the white box of data analysis while slighting the black box of mechanisms and process.

But enough of problems, in demography and with the 'two cultures' generally. What can be done about it? Raftery suggests that the two camps need to talk to one another more – interdisciplinary dialog. Both he and Hilborn and Mangel [*The Ecological Detective*] suggest that Bayesian statistics is a key to the solution, a proposal I am not competent to assess. Courses and curricula can be re-vamped, and textbooks re-written. New, hybrid disciplines may be invented.

But underlying any solution is the need for a better understanding of what science is and how it works when it works successfully. Most of us absorb the methodological canons of our own disciplines, and seldom re-examine them. Those interested in methodology more likely than not have been schooled in a particular doctrine in the philosophy of science. In demography and other social sciences in the second half of the 20th century, it was logical empiricism [positivism] taught as dogma. In retrospect, logical empiricism now begins to look more like heresy than sound doctrine.

A better understanding of science will be both eclectic and irenic. While admiring the substance and methods of our own fields, we shall not confuse them with 'the true way' of knowing, but recognise the value of other ways, and from time to time adopt them. There will be a premium on 'triangulation' in the study of scientific issues.

Our assessment of the worth of our scientific knowledge will be relative rather than absolute, based on the purpose[s] for which the knowledge is to be used. Our understanding of theory will be more nuanced, recognizing different kinds of theory. Nancy Cartwright speaks of a distinction in physics between *phenomenological* and *fundamental theory*, a distinction in some ways parallel to Raftery's statistical and deterministic modeling. But 'phenomenological' here does not mean 'data-based,' since like any theory, a phenomenological theory goes beyond observation. Contrary to Blalock and the logical empiricists, regression equations are not the 'laws' of a science. But more work is needed to sort out these issues as they apply to demography and social science.

Some of this more flexible and poised view of science will come about through deliberate disciplinary self-examination and reform. Some will come about with the entry of younger and better-trained cohorts. But our disciplines will always have limits; that's the nature of a discipline. We have the paradoxical task of working within but striving beyond the limits, towards constant scientific renewal. Shakespeare's words might be our guide:

...my nature is subdued
To what it works in, like the dyer's hand;
Pity me then, and wish I were renew'd.

[Sonnet CXI]

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