

**COMMUNICATING UNCERTAINTY
IN OFFICIAL ECONOMIC STATISTICS**

Charles F. Manski

Department of Economics and Institute for Policy Research
Northwestern University

Source: article forthcoming in the *Journal of Economic Literature*, 2015.

The news releases of government agencies report official statistics as point estimates and forecasts.

Technical publications may acknowledge that estimates are subject to error, but they do not adequately quantify error magnitudes.

Examples include the employment and household income statistics reported by the Bureau of Labor Statistics and the Census Bureau.

They include the "scores" of pending federal legislation produced by the Congressional Budget Office.

I believe that government agencies should forthrightly communicate uncertainty.

Governments, businesses, and the public use official statistics to make many important decisions.

The quality of decisions may suffer if users of the statistics

(a) incorrectly believe the statistics to be accurate

or (b) incorrectly conjecture error magnitudes.

Agency communication of uncertainty would reduce misinterpretation and promote better understanding of the information actually available regarding key economic variables.

Sampling and Non-Sampling Error

Agencies could use established statistical principles to report sampling error in estimates based on survey data.

It is more challenging to measure nonsampling error, such as arises from nonresponse and misreporting.

Yet good-faith efforts to communicate uncertainty would be more informative than reporting official statistics as if they are truths.

Transitory Uncertainty arises because data collection takes time.

Agencies may release a preliminary statistic with incomplete data and revise it as new data arrives.

Uncertainty diminishes as data accumulates.

Example: Department of Commerce initial measurement of GDP and revision of the estimate as new data arrives.

Permanent Uncertainty arises from lasting incompleteness or inadequacy of data collection.

Sources include survey nonresponse and misreporting.

Example: nonresponse to income questions in the Current Population Survey.

Conceptual Uncertainty arises from lack of clarity in the meaning of statistics.

Example: seasonal adjustment of employment statistics.

Survey Nonresponse and Census Reporting of Income Statistics

The Census Bureau annually reports the household income distribution based on data collected in a supplement to the Current Population Survey.

There is considerable nonresponse to the income questions.

During 2002-2012, 7 to 9 percent of the sampled households yielded no income data due to unit nonresponse.

41 to 47 percent of the interviewed households yielded incomplete income data due to item nonresponse.

Nonresponse Imputations and Weights

To cope with nonresponse, the Census Bureau assumes that nonresponse is random within groups of households who have similar observed attributes.

This assumption is implemented as weights for unit nonresponse and imputations for item nonresponse.

Census documentation offers no evidence that these methods yield a distribution for missing data that is close to the actual distribution.

A Census document describing the American Housing Survey is revealing:

"Some people refuse the interview or do not know the answers. When the entire interview is missing, other similar interviews represent the missing ones For most missing answers, an answer from a similar household is copied. The Census Bureau does not know how close the imputed values are to the actual values."

CBO Scoring of Legislation

The CBO was established in the Congressional Budget Act of 1974.

The Act has been interpreted as mandating the CBO to provide point predictions (*scores*) of the impact of legislation on the federal budget.

CBO scores are conveyed in letters that the Director writes to leaders of Congress.

They are not accompanied by measures of uncertainty.

Illustration: The Patient Protection and Affordable Care Act of 2010

In March 2010 the CBO scored the combined consequences of the Patient Protection and Affordable Care Act and the Reconciliation Act of 2010.

Director Douglas Elmendorf wrote to Nancy Pelosi:

“CBO and JCT estimate that enacting both pieces of legislation would produce a net reduction of changes in federal deficits of \$138 billion over the 2010–2019 period as a result of changes in direct spending and revenue.”

Media reports largely accepted the CBO score as fact.

Interval Scoring

The CBO has established an admirable reputation for impartiality.

Perhaps it is best to leave well enough alone and have the CBO express certitude when it scores legislation.

However, I worry that the willingness of Congress and the public to believe CBO scores will eventually break down.

I think it better for the CBO to act to protect its reputation than to have some disgruntled group in Congress or the media declare that the emperor has no clothes.

A simple approach would be to provide interval forecasts of the budgetary impacts of legislation.

The CBO would produce two scores for a bill, a low score and a high score, and report both.

If the CBO must provide a point prediction for official purposes, it can continue to do so, with some convention used to locate the point within the interval forecast.

Can Congress Cope with Uncertainty?

I have received disparate reactions when I have suggested interval scoring to economists and policy analysts.

Academics react positively, but persons who have worked in the federal government tend to be skeptical.

Some assert that members of Congress are psychologically or cognitively unable to deal with uncertainty.

They argue that expression of uncertainty would yield inferior legislative outcomes.

Conclusion

The National Research Council's *Principles and Practices for a Federal Statistical Agency* recommends adherence to various good practices. Practice 4 states

"A statistical agency should be open about the strengths and limitations of its data, taking as much care to understand and explain how its statistics may fall short of accuracy as it does to produce accurate data. Data releases from a statistical program should be accompanied by a full description of the purpose of the program; the methods and assumptions used for data collection, processing, and reporting; what is known and not known about the quality and relevance of the data; sufficient information for estimating variability in the data; appropriate methods for analysis that take account of variability and other sources of error; and the results of research on the methods and data."

Nevertheless, reporting of official statistics does not adequately face up to error.

Agency technical documentation may caution that estimates are subject to sampling and nonsampling errors.

However, agencies do not measure non-sampling errors. Nor does they justify the assumptions used to produce the point estimates they report.

Agencies would better inform policymakers and the public if they were to measure and communicate the significant uncertainties in official statistics.

Oscar Morgenstern, *On the Accuracy of Economic Observations*, Princeton University Press, 1963, pp. 304-305.

"Perhaps the greatest step forward that can be taken, even at short notice, is to insist that economic statistics be only published together with an estimate of their error. Even if only roughly estimated, this would produce a wholesome effect. Makers and users of economic statistics must both refrain from making claims and demands that cannot be supported scientifically. The publication of error estimates would have a profound influence on the whole situation."

Morgenstern wrote this over fifty years ago. Implementation is long overdue.