SURVEY MEASUREMENT OF HETEROGENEOUS PROBABILISTIC EXPECTATIONS

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Introduction

Micro data are often useful to form and evaluate economic policy.

They are vital when the heterogeneity of actors is a central determinant of policy outcomes.

I consider collection of micro data to measure the heterogeneous expectations that persons may hold for uncertain future events.
Economists suppose that persons conceptualize uncertainty in probabilistic form.

There are good reasons to think that probabilistic expectations vary across persons.

Persons may have different knowledge of the current state of the economy or different beliefs about how the economy functions.

One might anticipate that economists would use surveys to amass data on the expectations that persons hold.

However, research measuring expectations was long rare.
Lacking direct measurements, economists attempted to infer expectations by combining behavioral data with assumptions about expectations formation.

This is a daunting task.

To infer expectations, economists must speculate about what information persons possess and how they use the information to form expectations.

It has been common to use models of rational expectations.
Over the past quarter century, collection of data on expectations has increased.

Household surveys are now performed regularly in many countries.

Subjects include expectations of macroeconomic events (stock market returns), risks (job loss, mortality), future income, and choices (durable purchases).

Expectations data are also collected from macroeconomic forecasters.

Subjects include future GDP growth and inflation.
To illustrate, I summarize my research on two subjects that may be relevant to IMF concerns.

I begin with work measuring the expectations of equity returns held by broad populations of persons.

I then turn to studies of the expectations of macroeconomic forecasters.
Probabilistic Expectations of Equity Returns

Expectations of equity returns are thought to be central determinants of investment in equities and other assets.

In the absence of data, there long was disagreement about the extent and nature of heterogeneity in beliefs about returns.

Much of the finance literature regarded heterogeneity in beliefs as either non-existent or unimportant.

Some researchers argued that heterogeneity in expectations is critical to the functioning of asset markets.
To provide empirical evidence, Dominitz and Manski initiated survey research measuring in probabilistic terms the beliefs that Americans hold about equity returns in the year ahead.


Both surveys asks respondents to state the percent chance that a diversified mutual fund will have a positive nominal return in the year ahead.
"Please think about the type of mutual fund known as a diversified stock fund. This type of mutual fund holds stock in many different companies engaged in a wide variety of business activities.

Suppose that tomorrow someone were to invest one thousand dollars in such a mutual fund. Please think about how much money this investment would be worth one year from now.

What do you think is the percent chance that this one thousand dollar investment will increase in value in the year ahead, so that it is worth more than one thousand dollars one year from now?"
SEE posed this question within a sequence asking for the chance that the mutual fund will increase or decrease in value by specified amounts.

Similar questions have appeared since 2002 in the Health and Retirement Study (HRS).
Dominitz and Manski (2003, 2004, 2077, 2011) described the responses and sought to interpret the measured expectations.

We found that expectations of a positive equity return vary substantially across persons and systematically with sex, age, and schooling.

The patterns of variation are similar within the Michigan, SEE, and HRS samples.

We also reported that individual beliefs exhibit considerable stability over time.
These findings suggest that individuals use interpersonally variable but intrapersonally stable processes to form their expectations.

We proposed that it is reasonable to think of the population as a mixture of expectations types, each forming expectations in a stable but different way.

We performed an exploratory analysis to learn about the prevalence of different types, focusing on three suggested by thinking in orthodox and behavioral finance.
random-walk (RW) type, who believes that equity returns are independent and identically distributed over time and who, given this belief, uses the long-run historical record of returns to predict future returns.

persistence (P) type, who believes that recent stock market performance will persist into the near future.

mean-reversion (MR) type, who believes that recent stock market performance will be reversed in the near future.

We found that persistence was the most prevalent type, but it characterized less than half of all respondents. Thus, heterogeneity is important.
The Probabilistic Expectations of Professional Macroeconomic Forecasters

Macroeconomic forecasters give point predictions of GDP growth and inflation.

The appropriate interpretation depends on what forecasters believe and what they choose to communicate.

Point predictions cannot reveal anything about the uncertainty that forecasters perceive.

They at most convey some notion of the central tendency of beliefs.
Point predictions should somehow be related to the probabilistic expectations that forecasters hold. But how?

Forecasters may report the means of their probability distributions for uncertain events. Or they may report medians or modes.

Forecasters typically are not asked to report means, medians, or modes. They are simply asked to "predict" or "forecast" the outcome.

Without guidance, forecasters may report different distributional features as their point predictions.
To shed light on the reporting practices of professional forecasters, Engelberg, Manski, and Williams (2009) used data from the Survey of Professional Forecasters (SPF) to compare point predictions of GDP growth and inflation with the probability distributions held by forecasters.

We found that the deviations between point predictions and the central tendencies of forecasters’ subjective distributions tend to be asymmetric.

SPF forecasters tend to report point predictions that give a more favorable view of the economy than do their subjective means/medians/modes.

We concluded that organizations commissioning forecasts should not ask for point predictions. They should elicit probabilistic expectations.
Engelberg, Manski, and Williams (2011) showed the value of probabilistic expectations data to characterize the temporal variation of forecasts.

It has been common to aggregate the point predictions reported by SPF panel members at each administration of the survey into a "consensus forecast."

Interpretation of the temporal variation in consensus forecasts can be problematic for several reasons.
1. Consensus forecasts do not reveal the uncertainty that forecasters perceive.

2. They do not reveal possible disagreement across the panel of forecasters.

3. They ignore the fact that the composition of the panel changes over time.
We recommended study of the time series of the probabilistic forecasts made by individual forecasters.

Considering each forecaster separately, one may measure the central tendency and spread of elicited subjective probability distributions; we suggested use of the subjective median and interquartile range.

A plot showing the subjective (median, IQR) of each forecaster clearly portrays the heterogeneity of forecasts at a point in time.

To describe the evolution of expectations over time, we recommended enhancing the plot with arrows to indicate how each forecaster changes his beliefs from one quarter to the next.
GDP: Before/After 911

Inflation: Before/After Bernanke Nomination
Do People Really Think Probabilistically?

There is by now extensive evidence that survey respondents are willing and able to report expectations in probabilistic form.

This does not imply that persons actually think probabilistically and use subjective probability distributions to make decisions.

Survey respondents also respond to questions seeking point predictions of uncertain events or verbal assessments of likelihood.

What the evidence shows is that people are willing and able to report their beliefs in multiple forms.
Alternatives to the hypothesis of probabilistic expectations have been put forward in research on decisions under ambiguity, also known as Knightian uncertainty.

Studies of ambiguity maintain that beliefs have some but not all the structure of a probability distribution.

A common idea has been that a person may hold a set of subjective distributions for an unknown event, not a single distribution.
Suppose that beliefs take the form of sets of subjective distributions.

Then the single distributions that we now elicit from survey respondents are probabilistic summaries of ambiguity, much as point predictions are deterministic summaries of uncertainty.

To enable persons to express ambiguity, survey researchers could elicit ranges of probabilities rather than precise probabilities for events of interest.

This is straightforward in the case of binary events.
Manski and Molinari (2010) report initial findings, asking questions of the form

"What do you think is the percent chance that event A will occur? Please respond with a particular value or a range of values, as you see fit."

This enables respondents to express uncertainty or ambiguity.

A respondent can express

* complete ignorance by reporting “0 to 100 percent”
* bounded ambiguity by reporting “30 to 70 percent”
* uncertainty by reporting “60 percent”
* certainty by reporting “100 percent.”