I start with an anecdote. The President’s Council of Economic Advisers leads the US economic forecast (the “troika”), which feeds into the budget process twice a year. During the years that I was there, 1996-99, GDP consistently ran above 4%, exceeding our estimates of potential output, and yet inflation did not accelerate. As a result, every six months we would underestimate growth by an embarrassingly wide margin. There was a lot of talk about the New Economy, spurred especially by the ICT boom, and there were frequent suggestions that we ought to adapt to new realities by raising our estimate of potential output growth sharply. My “highly scientific” Bayesian approach was the following rule: every year, if we had again underestimated growth and yet saw no sign of inflation rising, we would raise our estimate of potential output by another 0.1 percentage points: 2.2%, 2.3%, 2.4%. I would tell the staff that the year when we threw in the towel and raised the estimate discretely would be the year when we turned out to miss in the opposite direction. The end of the story is that we eventually left CEA, our successors jumped up the estimate of potential output, and soon thereafter came the recession of 2001 and a series of downgraded estimates of potential output.

- By my count, there are five different approaches to estimating potential output, $\bar{Y}$:
  - Pure time series statistics, such as an H-P filter.
  - Measuring the inputs (capital stock, effective labor force, etc.) and then assuming that TFP growth changes slowly. [Conceptually okay, but less useful in practice.]
  - Real Business Cycle Theory, which assumes that $\bar{Y} = Y$, assuming away the output gap by definition.
  - A Phillips Curve approach that estimates the path of $\bar{Y}$ above which wage and price inflation seem to accelerate (perhaps combined with a falling unemployment rate via Okun’s Law).
  - New Keynesian DSGE models, which I take to be hybrids of the RBC and Phillips Curve approaches.

- One basic empirical fact motivates this session of the Bellagio Group meeting: In recessions, $Y$ does not return to the previous trend-estimated $\bar{Y}$ -- not even close, in the case of severe recession. Instead the estimates for $\bar{Y}$ are gradually revised down as more data accumulate. This is especially true of those estimates based on pure time series techniques (but not only those).

- Two major hypotheses to explain this fact:
  - **Hysteresis**: $\bar{Y}$ is endogenous. A severe or long recession has a negative effect on it.
- Low investment reduces capital stock
- Unemployment reduces labor force participation rate
  - Or causes workers actual or perceived skills to deteriorate.

- **Statistics:** $\bar{Y}$ is exogenous, but statistical estimates of path are updated.
  - To me this seems an argument for relying more on other approaches to estimating $\bar{Y}$ than on pure time series estimates,
  - in particular, the Philips Curve approach,
    - so long as the trend is allowed to change only slowly, putting neither too much emphasis on the latest data nor too little.
    - Perhaps by chance, none of the four background papers for this session champions the Philips Curve approach.
- There must be some truth to both hypotheses, even based on common sense alone.
  - We know that in recessions Investment falls, duration of unemployment rises, LFPR falls; so it seems very likely that there is something to the hysteresis phenomenon.
  - We know that the rate of growth of $\bar{Y}$ changes at times, so any statistical technique is going to update the estimate by observing departures of $Y$ from the past trend.
    - One can debate the role of supply versus demand factors in recent slowdowns in Europe or Japan, for example. But:
    - Does anyone doubt that the 10% growth rate that China averaged over the three decades 1980-2010 represented a big acceleration of $\bar{Y}$, or could anybody be surprised if it is slowing down now?
    - On the other hand, can anyone doubt that GDP in the US and other countries fell well below potential in the Great Depression?
    - The point is so obvious that those two examples aren’t really needed. But they do remind us that both $\bar{Y}$ and $Y-\bar{Y}$ is indeed important.

- There are other hypotheses as well to explain the basic empirical fact:
  - **An adverse shock may reduce $\bar{Y}$ but reduce $Y$ by more.** Three slants on that:
    - **Supply shocks:**
      - Example: an increase in oil prices, for an oil-importing country
      - $(Y-\bar{Y})$ can fall due to a (greater) loss of demand at the same time
      - or due to real wage rigidity.
    - **Hard landing:** If economy was too dependent on investment or too highly leveraged, a slowdown in the rate of growth of potential output can cause a hard landing rather than a soft landing (Japan in 1990s, East Asia 1997-98, China now?)
    - Conversely, financial bubbles: Bubbles often form on the back of financial trends that originated in good economic fundamentals (technology booms, commodity booms, tigers both
Asian and Celtic). But the bubble phase can then lead to overheating in goods and labor markets – frequently in the construction industry (as noted by Borio, et al).

- **Significance for policy.** Surely the fact that estimates of $\bar{Y}$ are always subsequently pulled down in recessions has big implications for how policy-makers should react? It is important for them to take this into account? Maybe not.
  - The second hypothesis (it’s an artifact of statistical estimation) implies that they should react less strongly, because if a fall in $Y$ is really a fall in $\bar{Y}$ there is nothing that they can do about it. The Martin, Munyan & Wilson (2015 p.10) paper says “policy-makers should consider revising potential output down more and more quickly following recessions.”
  - But as the Blanchard, Cerutti & Summers (2015) paper points out, the hysteresis hypothesis implies that policy-makers should react more strongly to the early signs of recession (before it has a chance to damage $\bar{Y}$).
  - If both components are substantially present, as seems very likely, then to some extent the two implications cancel out.
  - What if a recession doesn’t produce the fall in inflation that would be implied if $\bar{Y}$ were unchanged? Isn’t this a piece of evidence in support of a downward revision of $\bar{Y}$ (and therefore suggesting less need for a strong rapid stimulus, other things equal)?
    - Blanchard and co-authors (2015) emphatically say “stabilizing inflation is not the optimal policy.” But that is because of their fear of hysteresis. We need to look at inflation in addition to the output and employment indicators (and, of course, central bankers already talk as if inflation is the main thing they target).
      - It is one of the variables that can help in real time distinguish adverse supply or $\bar{Y}$ shocks from other recessions,
      - along with careful attention to labor market variables.
  - Furthermore I buy the argument of Borio and co-authors that it is useful to supplement inflation with asset market price data, when looking for evidence of overheating or excess demand, versus excess supply.

**References for Session 1**

- “Rethinking potential output: embedding information about the financial cycle.”
  Claudio Borio, Piti Disyatat and Mikael Juselius, BIS Working Paper No 404 (February 2013).
- Potential Output and Recessions: Are We Fooling Ourselves?"  
- “Inflation and Activity - Two Explorations and their Monetary Policy Implications.”
  Olivier Blanchard, Eugenio Cerutti and Lawrence Summers, WP 15-19, Peterson Institute for International Economics (Nov.)