Income, Expenditures, and the "two map problem"

William D. Nordhaus Yale University

BEA Advisory Committee November 2011 (update from earlier)

See *PNAS*, 2011

ullet

Samuelson on the Statistical Discrepancy

[footnote] Along with civil servants who are heads of units called "Wages," "Interest," and so forth, there is actually someone with the title of "Head of the Statistical Discrepancy." If data were perfect, that individual would be out of a job; but because real life is never perfect, that person's task of reconciliation is one of the hardest of all.

[Paul Samuelson, *Economics*, 1960 with edits.]

Preliminary points

- Very nice and useful paper
- Reminder of my VAST ignorance
- Better to have as % of GDP in Figs 1 4.
- I used to love income side. The more tales of horrors I have heard, the less I liked it. Paper has more horrors.
- But I suspect that if BEA wanted to beat up on the expenditure accounts, I would be better about the income accounts.
- Think the way to proceed is signal extraction more than tales of horrors

A signal extraction problem

- We have two noisy maps (product and income side)
- Have a true location (true GDP)
- How can we extract true location from noisy maps?
- This is a "bootstrap" problem because need some additional information to figure out how to weight
- We used nighttime lights as a proxy. Results were that there is ≈ 0 information grade A statistical systems.
- I will use revisions as an example (map errors)

The statistics of the two map problem GDI = True Y + ε^{I} GDP = True Y + ε^{P} Assume ε^{I} , ε^{P} are i.i.d Best Y = λ GDP + (1- λ) GDI

Take mean absolute error as σ_I , σ_Y from Fixler et al. (this morning) Then optimal weight on product is:

> $\lambda^* = \sigma_I^2 / [\sigma_I^2 + \sigma_P^2]$ = (.030)²/[(.030)² + (.028)²] = 0.53

This given a product weight of 53% and an income weight of 47%

This is for long run in simplest model. Extensions:

- Beyond i.i.d; components; time-series
- Can do for different phases of the cycle.

Conclusion

Elementary considerations would say that we should combine income and product to get best measure.Revisions suggest that they should have approximately equal weights using unemployment as instrument.Can use other approaches (Okun's Law etc.)Complications:

- Statistical problem: Is the SD managed? If so, big statistical problems in determining optimal weights.
- Communications problem: Can this new concept be managed? [Yes. A lot easier than Fisher constructs.]
- Components? This is the new frontier and more complicated. Good work here.

Possible approach for BEA: An experimental index

- 1. One of the major issues in using "blended" output measures is the need to make it consistent with the components (C, I, ... on the expenditure side). While this is possible, it would introduce major complications and confusions.
- 2. An alternative approach would be to develop a "Composite output index." This would be a standalone *experimental* index that would be developed as a "best composite estimate of both nominal and real GDP. It could use different approaches at different points in the revision cycle and the business cycle.
- 3. Advantages: it would be a better index of output; it would include all information; it would reflect state of cycle and revisions; it would not require adjusting components; it would be easy to explain; it would not need detailed justification as experimental.
- 4. Disadvantages: None.