The “Normal Science” of Heterogeneous Agents
Macroeconomics

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RBNZ Conference on
Heterogeneous Agents And Housing
December 11, 2017
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- Microeconomics is the set of questions we can reasonably hope to answer.

- Macroeconomics is the set of questions we want to answer.

- Pick One!
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Bob Solow:

There is no proposition that can be derived from macroeconomic theory that is so crazy that some supporting multiple regression on NIPA data could not be constructed

Translation:

There are more things in heaven and Earth, Horatio . . .

Conclusion:

Do macroeconomics using micro data
Bob Solow:

*There is no proposition that can be derived from macroeconomic theory that is so crazy that some supporting multiple regression on NIPA data could not be constructed*

Translation:

- There are more things in heaven and Earth, Horatio . . .
- . . . than can be extracted from time-series NIPA data

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Broad agreement by 1970s (from all camps):

- Macroeconomics needed better “microfoundations”

Lucas (1970s-vintage)

Macro theories should be tightly constrained to be consistent with all the relevant micro evidence

Call this “Serious” microfoundations

Fatal Step in 1980s: Accepting “unserious” microfoundations

- “If model has has only one agent, it is microfounded”

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- Micro evidence inadmissible
  - Example: Call “habit” $\gamma$ in $\Delta C_{t+1} = \gamma \Delta C_t + \epsilon_{t+1}$
  - EER metadata analysis of 597 estimates
  - NIPA data:
    - Micro data:
      - Response? Ignore micro evidence
- Partial Equilibrium is for wussies
  - RA DSPE (e.g., Mian and Sufi; Steinsson and Nakamura)?

- Only criterion of success:
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*Carroll, Behavioral Macro*
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- Reverse Engineer Theory to Match All the Past Data
- New Data Are A Trickle (almost no out-of-sample testing)
- Resolve “Puzzles” By Adding “Epicycles”

Galilean: Collect New Data
- OMG - Jupiter has Moons!
- When Data Reject Theory, Consider New Theory
  - Not just epicycles on old one
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Culmination of Ptolemaic Astronomy

Figure: Armillary Sphere, 1593
Source: Galileo Museum, Florence
Last Time Anybody Tried This For Economics . . .

Bill Phillips (a Kiwi!):

Figure: MONIAC Hydraulic Model of the Economy

Source: Reserve Bank of New Zealand
“Epicycles”

0. Add “Frictions” of various kinds;
1. Change dynamics of shocks;
2. Change production function;
3. Change Utility Function:
   - Habits
   - Epstein-Weil
   - Time Varying:
     - Risk Aversion
     - Labor/Leisure Preferences
4. Unobservable “shocks” to marginal utility;
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From practitioners, not uncommon to see claims like:

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This A Bug Not A Feature

Not that there’s anything wrong …
- … with (most of) Epicycles \textit{per se}
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- Benchmark RA DSGE Models Now have ≈ 50 parameters
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MPC Heterogeneity and Household Balance Sheets

... for measuring the distribution of MPC’s

- Theory: Concavity of Consumption Function implies
  - MPC higher for low-initial wealth
  - MPC decreasing in size of shock
- Norwegian national registry data has perfect experiment
  - National lottery in which almost everyone participates (!)
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Results For A Benchmark Model

Figure: Precautionary Drop In \( C \) When Uncertainty Doubles
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How Our Young Science Will Mature

Figure: The Rise And Fall of “DSGE”

Source: *The Economist* via Noah Smith
Lessons From “DSGE”

Why Did Growth Take Off in early 2000s? DYNARE!

- Saves years learning tricky model-solution algorithms
- Standardized ‘mod’ files can be swapped:
  - Easy to build on others’ models
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Key things holding HA Macro back?

Same things that held back RA DSGE modeling pre-DYNARE

- Death Star 2 much much bigger than Death Star ...
- Too hard to build a Death Start 2 from scratch
  - You’ve Got to inherit code from your advisor
- Tower of Babel problem:
  - Victor speaks Fortran77, I speak Mathematica, Greg speaks Matlab
  - Even if you post your code ...
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- Open Source Project at github.com/econ-ark/HARK
- Create Robust, Reliable, As-Easy-To-Use-As-Possible Tools
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We Need To Build Some Bridges

1. Pick a “puzzle” that has been resolved by an “epicycle”
2. Test whether that “epicycle” matches micro data
   • Be sure to justify via citing 1970s-vintage Lucas
3. If micro data reject the proposed epicycle
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   - For aggregate data

1. Very simple assumption:
   - People Can See Their Own Idiosyncratic Shocks
   - “Did I get fired last week” is not hard to observe
   - Epidemiological/Calvo beliefs about macroeconomy

2. Result:
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   - Science:
     - Embrace, Don’t Ignore, Discrepancy between micro and macro

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