# The "Normal Science" of Heterogeneous Agents Macroeconomics

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- Microeconomics is the set of questions
- Macroeconomics is the set of questions
- Pick One!

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- we can reasonably hope to answer
- Macroeconomics is the set of questions
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There is no propostion 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

#### Conclusion:

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Conclusion:

• 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"
 Where Did That Leave Us?

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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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- 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 . ( ) ( ) ( )

Carroll Behaviora

# 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;
- 5. Unobservable "intermediate" sectors;

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RA DSGE Models Match The Data Remarkably Well

#### This A Bug Not A Feature

Not that there's anything wrong ...

- ... with (most of) Epicycles *per se*
- Many might even be right

- 0. No way to *test* the epicycles
- 1. Complexity

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- If adding the epicycle fixes the problem ....
  - In principle, nothing more *can* be done
  - What if  $\exists$  5 equally good fixes for existing NIPA data?
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## Recent 'Scientific' Triumphs of HA Macro

Characteristics:

1. About Questions Central to Core Macroeconomic Questions

• Fiscal policy, monetary policy, aggregate shocks, dynamics

2. Impossible To Do Using RA DSGE methodology

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  - 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 (1)
  - Qualitative results match theory
    - For MPX ("X"penditure not "C"onsumption)
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### • Test Previously Unnoticed Implication Of Theory

- When there's an increase in labor-income uncertainty ...
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## Results For A Benchmark Model



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## How Our Young Science Will Mature



Economist.com

#### Figure: The Rise And Fall of "DSGE"

### Source: The Economist via Noah Smith

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#### • Open Source Project at github.com/econ-ark/HARK

- Create Robust, Reliable, As-Easy-To-Use-As-Possible Tools
- Place to post usable archives of their models, papers
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  - Be sure to justify via citing 1970s-vintage Lucas
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