COMMENTS FOR

“CENTRAL BANK MODELS: THE NEXT GENERATION”

ITAY GOLDSTEIN, WHARTON
Key Tradeoff

- Complex general-equilibrium models providing quantitative answers (DSGE):
  - “Core”
- Micro models covering specific phenomena, based on micro-foundation, often providing qualitative answers:
  - “Periphery”

“Macroeconomics after the Crisis: Time to Deal with the Pretense-of-Knowledge Syndrome” (Ricardo Caballero, Journal of Economic Perspectives, 2010)
DSGE models provide general-equilibrium macroeconomic analysis.

However, models, by their nature, are only an abstraction and simplification of the real world. Hence, compromises are required, and with DSGE models this often means:

- Reduced form models
- Leaving out first principles of economic mechanisms, such as:
  - Moral hazard, asymmetric information, strategic complementarities and panics
  - Leaving out institutions and activities, e.g., the financial sector
- Calibration of deep parameters might be a “black box”
Example: Runs

- One of the basic phenomena in financial systems, driving crises and policies

- Traditional bank runs:
  - Banks finance illiquid asset with demandable liabilities
  - This generates strategic complementarities between agents: they want to run if other people run
  - Multiple equilibria arise

- Modern runs:
  - Runs happen more broadly than just in banks and characterize other financial institutions and markets
    - Repo markets, mutual funds, money market funds
  - Key in forecasting future developments, in monetary policy, and in financial-stability policy
The understanding of runs and policy implications was developed in micro-oriented models:
- Deposit Insurance and Suspension of Convertibility
- Probability of a run and its interaction with bank choices and policy; global-games analysis
- Runs in institutions other than banks

Such models are needed to evaluate runs and related policies:
- Liquidity requirements, capital requirements, monetary policy, etc.

Very hard to incorporate runs into DSGE macroeconomic models:
- Some progress recently by Gertler and Kiyotaki (2015)

Progress forward must happen in both dimensions.
The main drawback of models of the periphery is perhaps that they do not provide quantitative conclusions, which are so desired by policymakers.

But, this does not have to be the case.

The sufficient statistic approach developed and used mainly in public finance allows us to develop quantitative policy implications for specific questions:
- Optimal taxes, optimal insurance, etc.
The key advantage of this approach is its reliance on ‘sufficient statistics’ that can be estimated in the data. These are endogenous high level variables and not the deep parameters that are targeted in a calibration exercise. The idea is that it is sufficient to estimate these statistics to address the policy questions at hand. We need a different sufficient statistic estimated for different policy questions.

“Sufficient Statistics for Welfare Analysis: A Bridge Between Structural and Reduced-Form Methods” (Raj Chetty, Annual Review of Economics, 2009)
Sufficient Statistic Approach – Illustration

Primitives

\[ \omega_1 \]
\[ \omega_2 \]
\[ \cdot \]
\[ \cdot \]
\[ \omega_N \]

Sufficient statistics

\[ \beta_1(t) \]
\[ \beta_2(t) \]

Welfare change

\[ \frac{dW}{dt}(t) \]

\[ \omega = \text{preferences, constraints} \]

\[ \beta = f(\omega, t) \]
\[ y = \beta_1 X_1 + \beta_2 X_2 + \epsilon \]

\[ \omega \text{ not uniquely identified} \]

\[ \beta \text{ identified using program evaluation} \]

\[ dW/dt \text{ used for policy analysis} \]
Start from a standard microeconomic model a’ la Diamond and Dybvig (1983)

Tradeoff with deposit insurance:
- Reduces the probability of a run lowering the expected damage from a run
- But sometimes has to be paid causing fiscal costs
- In addition, there are all the effects of deposit insurance on bank and investor behavior, e.g., the often mentioned moral hazard

Presumably, a calibration approach would attempt to calibrate all the underlying parameters, e.g., preferences, technology, etc.
- A daunting task
But, we develop a formula based on four elasticities that can be potentially estimated in the data:

\[ \delta^* = \frac{A \times B}{C \times D} \]

- **Marginal benefit**
  - \( A \): Sensitivity of bank failure probability to DI change
  - \( B \): Drop in depositors consumption at failure threshold

- **Marginal cost**
  - \( C \): Probability of bank failure
  - \( D \): Expected marginal social cost of intervention in case of bank failure
Note, moral hazard and other effects on behavior disappear due to envelope condition

- Banks maximize their objectives, and so the effect through bank behavior approaches zero (perfect competition benchmark)
- Typical in the sufficient statistic approach

Formula provides guidance as to what we should try to measure and estimate

Approach can be applied to other policy questions:
- Liquidity requirements, capital requirements, etc.
DSGE is useful but limited in incorporating many important phenomena.

Progress in incorporating some phenomena into DSGE is welcome, e.g., runs.

But, one cannot avoid using micro models with frictions developed from first principles to address acute issues related to fragility and policy.

Effort should continue on both dimensions.

Sufficient Statistic approach can be useful in taking these models to provide quantitative implications.

It also provides guidance on what needs to be measured.