

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)

# Limitations of DSGE Models

- ▣ 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

# Runs and 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

# Sufficient Statistic Approach

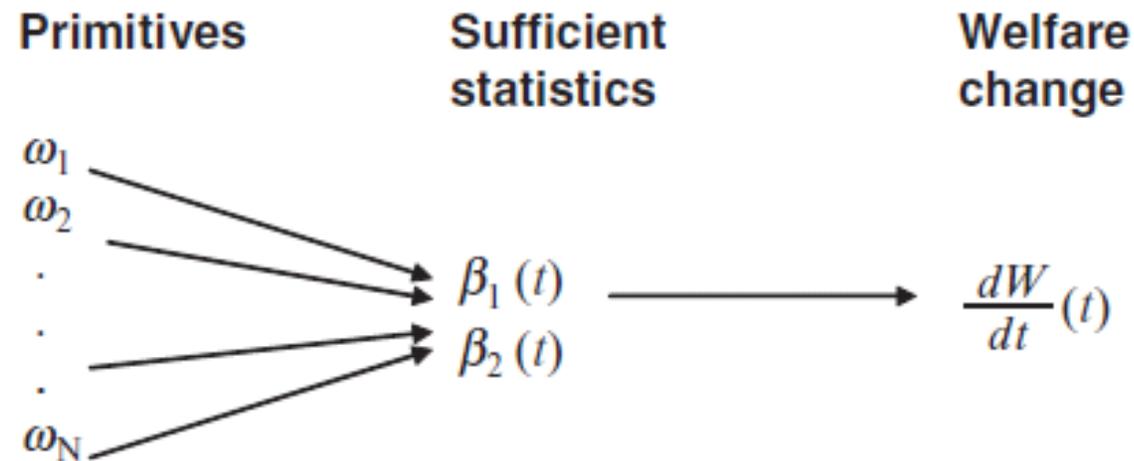
- ▣ The main drawback of models of the periphery is perhaps that they do not provide quantitative conclusions, which are so desired by policymakers
- ▣ But, this does not have to be the case
- ▣ The sufficient statistic approach developed and used mainly in public finance allows us to develop quantitative policy implications for specific questions
  - Optimal taxes, optimal insurance, etc.

# Sufficient Statistic Approach – Cont'd

- ▣ 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



$\omega$  = preferences,  
constraints

$\omega$  not uniquely  
identified

$$\beta = f(\omega, t)$$
$$y = \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

$\beta$  identified using  
program evaluation

$dW/dt$  used for  
policy analysis

# Example: Optimal Deposit Insurance (Davila and Goldstein, 2016)

- ▣ 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

# Optimal Deposit Insurance – Cont'd

- But, we develop a formula based on four elasticities that can be potentially estimated in the data:

Optimal level of DI

$$\delta^* = \frac{\boxed{A} \times \boxed{B}}{\boxed{C} \times \boxed{D}}$$

- Marginal benefit
  - $\boxed{A}$  Sensitivity of bank failure probability to DI change
  - $\boxed{B}$  Drop in depositors consumption at failure threshold
- Marginal cost
  - $\boxed{C}$  Probability of bank failure
  - $\boxed{D}$  Expected marginal social cost of intervention in case of bank failure

# Optimal Deposit Insurance – Cont'd

- ▣ 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.

# Conclusions

- ▣ 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