# Macroeconomic Models for Monetary Policies: A Critical Review from a Finance Perspective

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# Two Companion Papers

- A Critical Review on Macro Models from a Finance Perspective

  by Winston Dou, Andrew Lo, Ameya Muley, and Harald Uhlig

- Global versus Local-Linear Solutions for Macro-Finance Models with Nonlinear Dynamics

  by Winston Dou, Xiang Fang, Andrew Lo, and Harald Uhlig

# Outlines

- Motivation
- History of Monetary Policy Models
- What are Missing?
- Example: A Canonical Model with Financial Sectors
- Conclusion

# Motivation

# Lessons

What do we learn from the global financial crisis and recession?

An important lesson: price stability $\not\Rightarrow$ financial stability

- Financial imbalances build up even under stable prices

  see, e.g. Borio and Lowe (2002)

- Stable prices encourage excessive credit growth and bubbles

  see, e.g. Brunnermeier and Sannikov (2014)

- Financial instability is invisible on balance sheet and income statement

  see, e.g. Brunnermeier, Gorton, and Krishnamurthy (2012)

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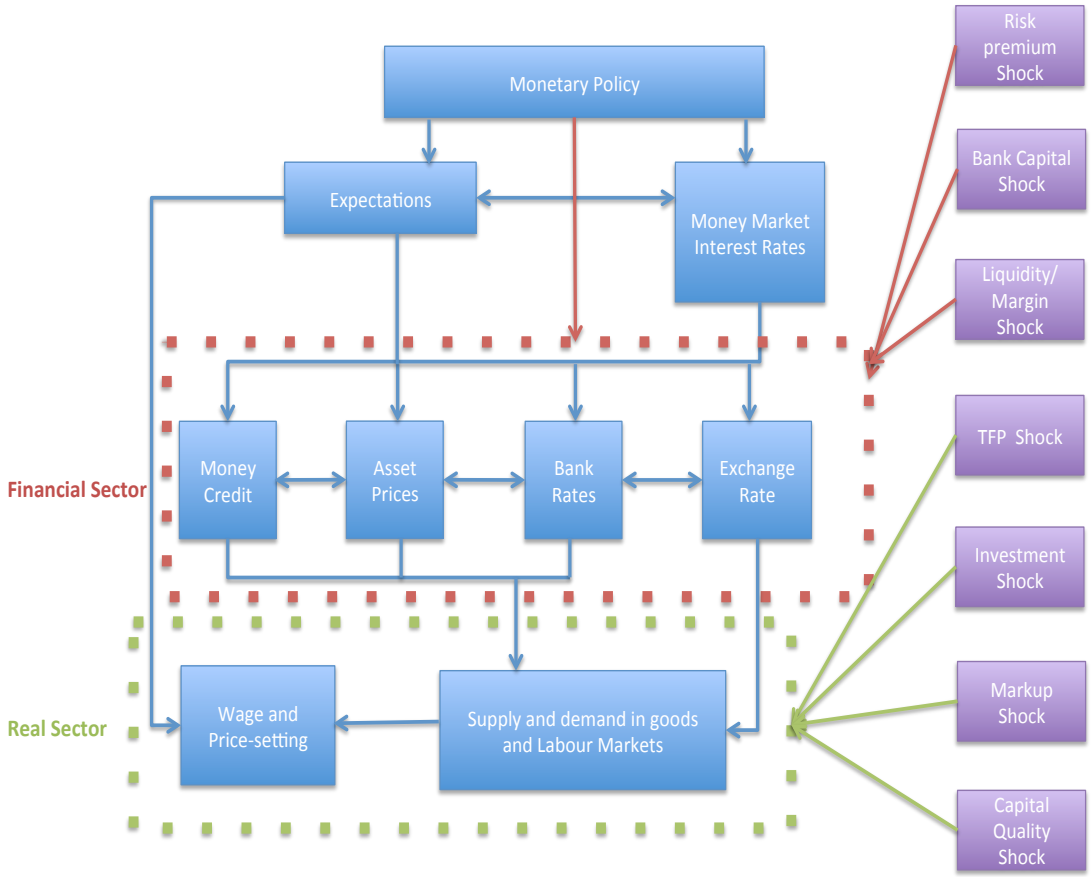
Question: Why models? Why advanced econometric methods?

- Monetary policies affect the key variables indirectly through various transmission channels:
  - The transmission mechanisms are complex

    see, e.g. Blanchard (2009)
  - There numerous channels and shocks

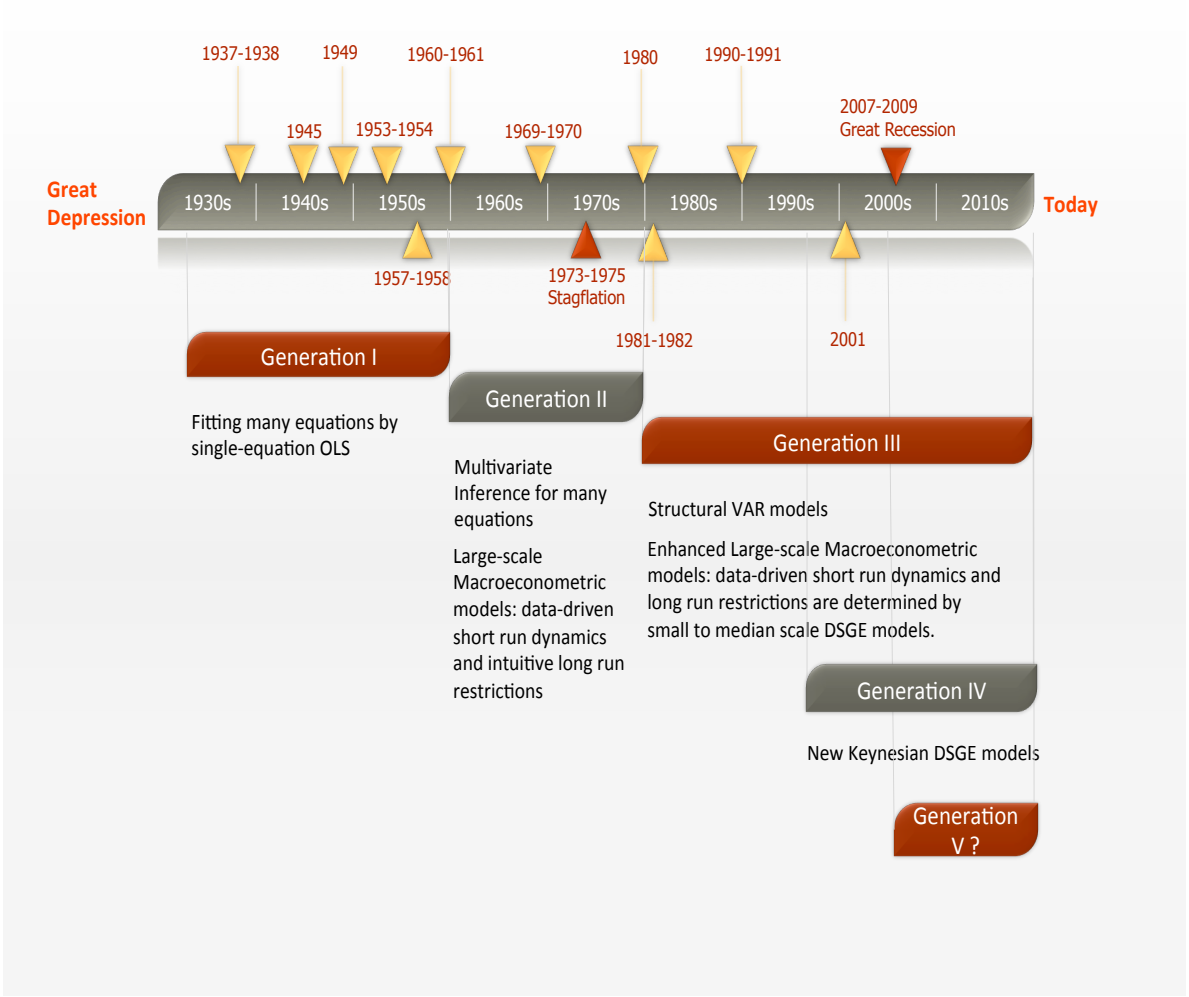
# Transmissions and Shocks




Illustrative Graph for Transmission Channels

# A Brief History

# Evolution of Models for Monetary Policy




Timeline and Decline of Frequency of Recessions

# What May be Missing?

# Government Balance Sheet

- Irrelevance (see Wallace, 1981; Eggertsson and Woodford, 2003):

$$Y = C + I + G + NX.$$

Theoretical conditions:

(1) Assets are valued only for the pecuniary returns;

(2) Assets are traded by investors and government with equal terms;

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- Excessive risks:
  - Risk and liquidity management for credit and fiscal policies (e.g. Sims, 1994; Lucas, 2011)
  - Proper pricing kernel for government's assets and liabilities (e.g. Lucas, 2012)

# Financial Sectors and Risk Premia

- Real roles of financial sectors:
  - Financially constrained nonfinancial firms:
    see, e.g. Bernanke and Gertler (1995); Chari et al. (1995); Bernanke et al. (1999); Iacoviello (2005)
  - Financially constrained intermediaries:
    see, e.g. Gertler and Kiyotaki (2010); Adrian and Shin (2010); Gertler and Karadi (2011); Christiano et al. (2014)
- Key mechanism: time-varying nonlinear risk premia
  - Standard mechanism of operating leverage due to labor market frictions is not enough to understand the joint dynamics of quantities and asset prices during the crisis and recession
    see, e.g. Uhlig (2007); Favilukis and Lin (2012); Kuehn et al. (2012)
- A potential deficiency: the hardwired role of banks

  see, e.g. de Fiore and Uhlig (2011, 2015)

# Uncertainty Shocks

- They have first-order quantitative impact on aggregate economy
  - Negative impact on investment and asset prices
    see, e.g. Bloom (2009)
  - Positive impact on investment and asset prices
    see, e.g. Pástor and Veronesi (2006, 2009)
  - The impact of uncertainty depends on the origin and the risk sharing condition
    see, e.g. Dou (2016)
- Direct interactions with monetary policies:
  - Policy uncertainty's impact
    see, e.g. Baker et al. (2016)
  - Interactions with Zero Lower Bound (ZLB)
    see, e.g. Nakata (2017)
  - The effectiveness of monetary policy is dampened
    see, e.g. Aastveit et al. (2013)

# More to be Incorporated

- Redistribution effect of monetary shocks
  - Wealthy vs. other households
    see, e.g. Gornemann et al. (2012); Auclert (2016)
  - Creditors vs. debtors
    see, e.g. Eggertsson and Krugman (2012); Jermann et al. (2014)
- Nonlinear solution and estimation methods
  - Global solution is important in quantitative policy analysis
    see, e.g. Fernández-Villaverde et al. (2006); Ackerberg et al. (2009)
  - Nonlinear robust econometric methods are also crucial
    see, e.g. Müller and Norets (2016); Chen et al. (2017)
- ...

# A Canonical Model with Financial Sector

# Gertler-Kiyotaki (2010) and Gertler-Karadi (2011)

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- Key idea: violation of Wallace irrelevance item Government can purchase risky assets with unequal terms to private banks

# Model

- Bankers' constraint:

$$\underbrace{V_{j,t}}_{\text{equity}} \geq \lambda \underbrace{Q_t K_{t+1} S_{j,p,t}}_{\text{assets}}$$

where $\lambda$ is inverse pledgeability

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- Government's credit policy:

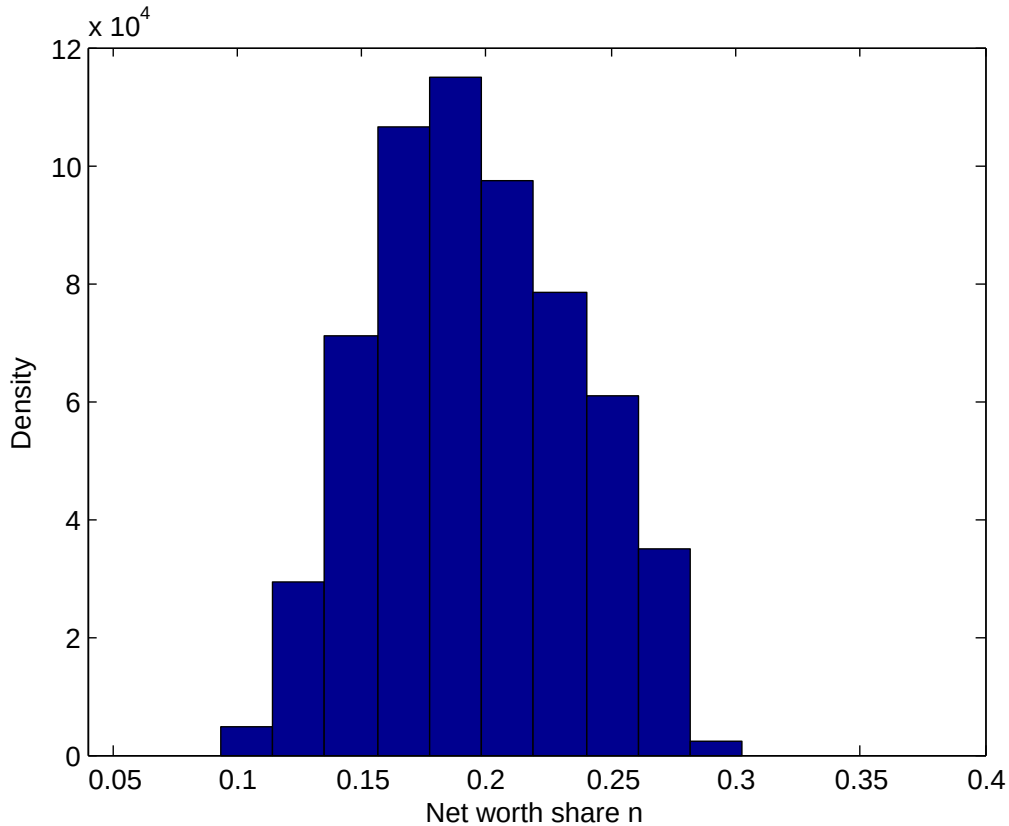
$$Q_t K_{t+1} = \underbrace{Q_t K_{t+1} S_{p,t}}_{\text{intermediaries}} + \underbrace{Q_t K_{t+1} S_{g,t}}_{\text{government}}$$

The policy rule is $S_{g,t} = 1 - S_{p,t}$ with

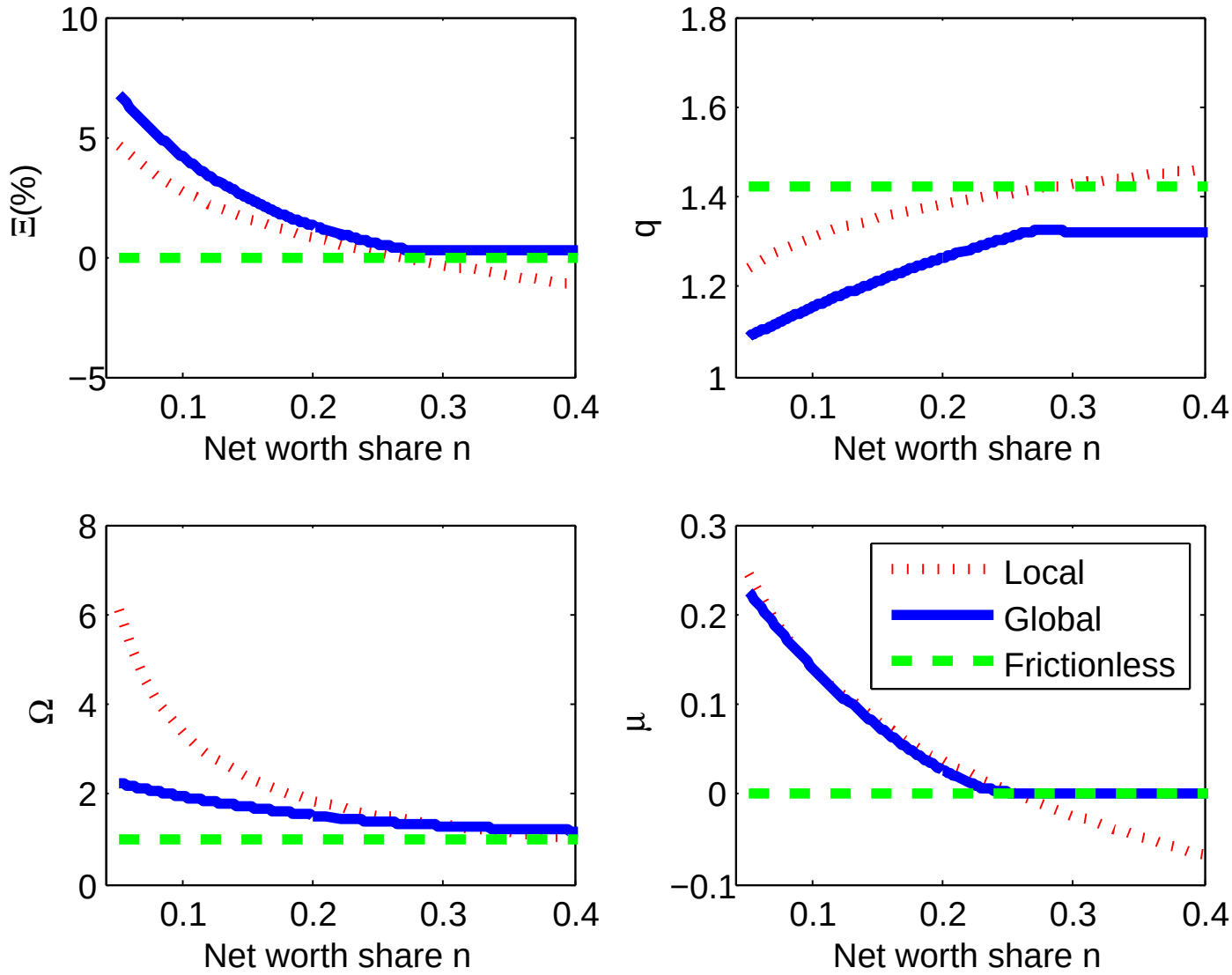
$$S_{p,t} = \frac{1}{1 + \nu_g \left(\Xi_t - \Xi^*\right)}$$

where $\nu_g$ is the aggressiveness of the credit policy and $\Xi_t$ is the risk premium with $\Xi^*$ to be the frictionless premium

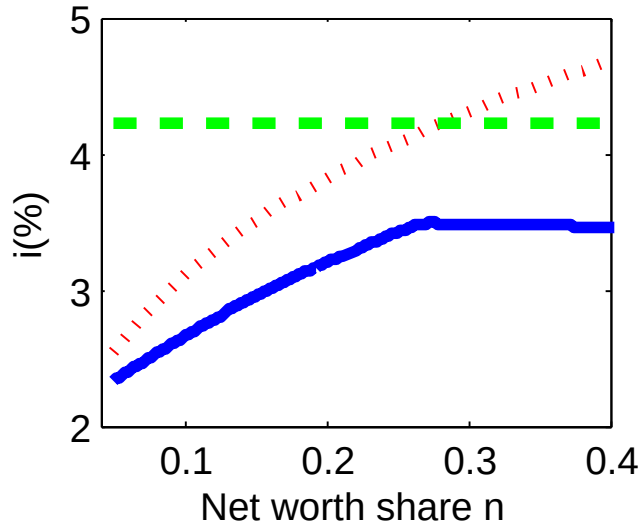
# Stationary Distribution

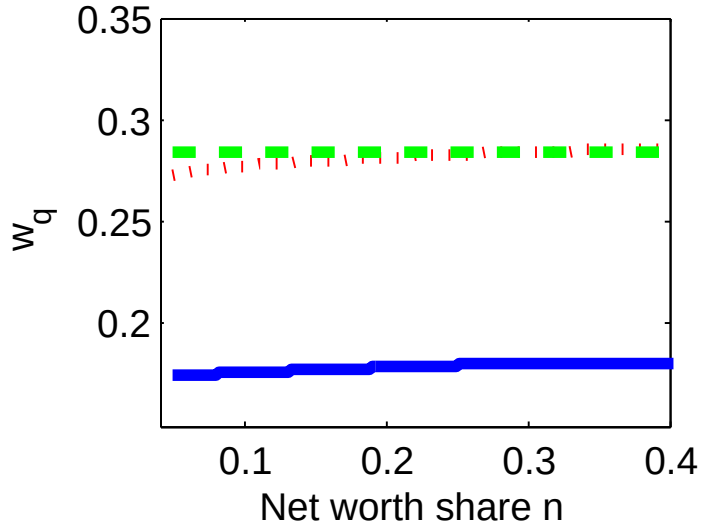


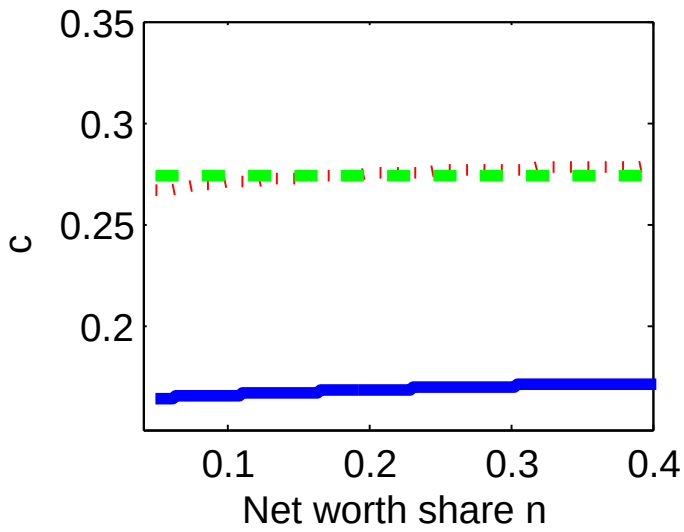
# Equilibrium Policy Functions
# Financial Variables

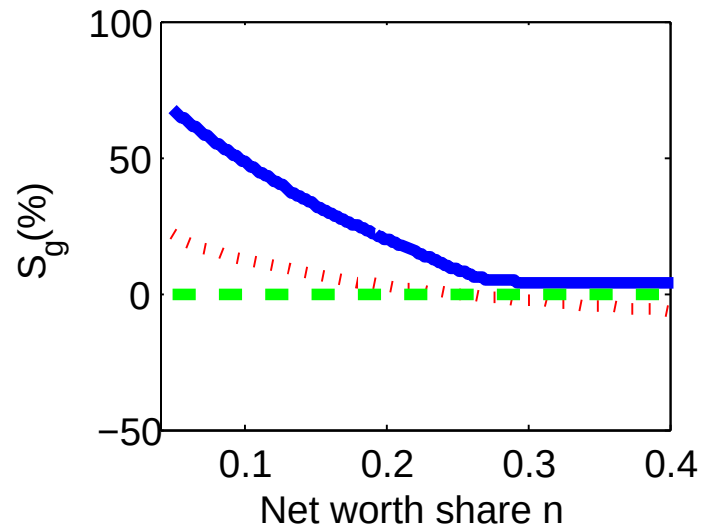


# Equilibrium Policy Functions
# Real Quantities



# Conclusion

- There has been a demand for a new generation of macro policy models
- The challenge is how to incorporate the academic advances into a coherent quantitative framework
- Advanced nonlinear solution and estimation methodologies should be adopted or developed

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