

“Macroeconomic Models where Agents Choose to Learn: Attention, Disagreement and Policy Communication” by Ricardo Reis

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Introduction

- The idea that imperfect information is central to macro fluctuations has been present at least since Phelps (1970) and Lucas (1972).
 - Criticism: Accurate information concerning the aggregate economy is publicly available with little delay.
- Recently, a group of economists has been busy developing macro models with imperfect information, following Sims (1998).
 - If people cannot attend perfectly to all available information, there is a difference between publicly available information and the information actually reflected in decisions.
- Ricardo Reis has been an important member of this group.

How has imperfect information been modeled?

Consider an agent whose objective depends on his or her action Y_t and an exogenous stochastic process X_t .

1. *Exogenous imperfect information*: choose Y_t based on $S_t = X_t + \nu_t$, the stochastic properties of ν_t are given, ν_t may be correlated across agents.
2. *Endogenous imperfect information*: the stochastic properties of ν_t are *optimally chosen*.
 - (a) *Rational inattention*: subject to a constraint on $\mathcal{I}(\{X_t\}; \{Y_t\})$.
 - (b) *Inattentiveness*: pay a fixed cost to obtain $\{X_t, X_{t-1}, \dots\}$.
 - i. *Sticky information*: act based on $S_t = \{X_t, X_{t-1}, \dots\}$ with probability λ and on $S^t = S^{t-1}$ with probability $1 - \lambda$.

What questions have been addressed?

1. Explain the standard macro data better or more parsimoniously than conventional macro models do.
2. Explain data that one cannot explain with perfect information rational expectations models, such as survey data on expectations.
3. Write down a simple model to explain a particular stylized fact or give a policy recommendation.

Ricardo has made important contributions in all those areas.

Let me discuss an example of research falling under (1) and an example of research falling under (3).

What is the key source of slow adjustment in the economy?

- When Sims (1998) proposed the idea of rational inattention, his motivation was the study of business cycles.
- Sims considered a conventional DSGE model and concluded that *multiple* sources of slow adjustment were necessary for that model to match the inertia in the macro data.
- He conjectured that the inertia in the data could instead be understood as the result of a *single* new source of slow adjustment, the assumption that people have limited attention and allocate attention optimally.

- Mirko Wiederholt and I develop a DSGE model with rational inattention on the side of firms and households.
 - Rational inattention is the *only* source of slow adjustment.
- The model fits the macro data about as well as conventional DSGE models, with *multiple* sources of slow adjustment, do.
- At the same time, the outcomes of experiments are very different in this model than in the standard DSGE models.
 - There is a systematic reason: the allocation of attention varies with the economic environment.

Responsiveness of monetary policy to inflation

- Consider the relationship between the coefficient on inflation in the Taylor rule and the variance of the output gap due to aggregate technology shocks.
 - This relationship is *monotonic* in New Keynesian models and models with exogenous imperfect information.
 - This relationship is *non-monotonic* in the rational inattention DSGE model.
- This is important: for reasonable parameter values, fighting inflation more aggressively *increases* the variance of the output gap due to aggregate technology shocks.

Why were people so unprepared for the global financial crisis?

- In the real world, people have to prepare in advance in order to take good action in contingent events.
- Consider a model in which agents make state-contingent plans.
 - Each agent starts with a prior about his or her optimal action in each of multiple possible future events.
 - The agent can process more information about the optimal action, but has a limited ability to do so.
 - The agent's optimal action in a contingent event depends on what other agents will do (*strategic complementarity* or *substitutability*).

- Agents *optimally* prepare little, or *not at all*,
 - for an event that has a low probability,
 - an event in which the optimal action is very different from the optimal action in normal times,
 - an event in which the optimal actions are strategic complements,
 - if agents are subject to limited liability.
- It is *optimal* for the expected loss in such events to be several orders of magnitude larger than in normal times.
- The equilibrium allocation of attention can be inefficient.

These models are rational expectations models

- Agents *know* the data generating process.
 - Agents *do not know* with certainty realizations of all relevant random variables.
- The relevant random variables may be “shocks” (ε_t 's) or “parameters” (θ_t 's).
 - Therefore, rational expectations models can be used to understand equilibrium outcomes under various forms of uncertainty;
 - and, at the same time, these models typically are tightly parameterized, which is an attractive property.

Conclusions

- The literature on imperfect information (in particular, endogenous imperfect information) macro models has made substantial progress since Sims (1998), in part thanks to Ricardo.
- Time will tell whether imperfect information rational expectations models can fit more data or the same data with fewer parameters than alternative models.