

Luminita Stevens
Department of Economics
University of Maryland

Topics in Behavioral Macroeconomics

ECON 702 Syllabus

Fall 20022

Course Information

Lectures: Tu,Th 2 - 3:15 pm, 3100 Tydings Hall

Office hours: By appointment, in person or on Zoom

UMD's policies on graduate courses and graduate student rights and responsibilities can be found here: [Course Related Policies | The University of Maryland Graduate School](#)

Description

ECON 702 is part II of the Economics Department's two-semester sequence in Advanced Macroeconomics, intended for second-year Ph.D. students. This course will focus on recent developments in the fast-growing subfield of behavioral macroeconomics, with applications to business cycles and monetary economics. We will discuss surveys and controlled laboratory experiments that test the full information rational expectations (FIRE) hypothesis, and characterize deviations from FIRE in individual beliefs and actions, and we will study models that relax both the FI and the RE assumptions in general equilibrium settings, to bridge the gap between individual biases and constraints on the one hand and aggregate consequences and policy implications on the other.

Prerequisites

ECON 601 and ECON 602. Students who have not taken these courses and students from other departments or years should talk to me to enroll in or audit this course.

Topics

0. Preamble: Rational expectations foundations

1. Testing REE: Surveys and RCTs
2. Fixed information frictions: sticky and dispersed information
3. Endogenizing information frictions: rational inattention in macro and finance
4. Controlled lab experiments: belief updating, probability distortions, stochastic choice
5. Cognitive constraints and risk preferences
6. Inter-temporal considerations: Finite horizons, myopia, and present bias
7. Habits as optimal adaptations
8. Adaptive expectations and learning models of bounded rationality
9. Diagnostic expectations, the representativeness heuristic, and over-extrapolation
10. Cognitive limitations and strategic considerations
11. Model uncertainty, ambiguity aversion, and robust control
12. Aggregation: Aggregate uncertainty, news and sentiments in business cycles

Grading (see ELMS for details)

- 50% = Research project on any of the main topics
- 30% = Referee report & recorded discussion on a paper from any of the main topics
- 15% = Written comments on 8 papers from any of the main topics
- 5% = In-class discussions on the topics posted on ELMS

Required Advance Reading

- ◇ Woodford, Michael (2020), "Modeling imprecision in perception, valuation, and choice," *Annual Review of Economics* 12: 579–601.

Practical Books

- Adler, Mortimer J & Charles Van Doren (2014), *How to read a book: The classic guide to intelligent reading*, Simon and Schuster.
- Belcher, Wendy Laura (2019), *Writing your journal article in twelve weeks: A guide to academic publishing success*, University of Chicago Press.

Booth, Wayne C, Gregory G Colomb & Joseph M Williams (2008), *The craft of research*, University of Chicago Press.

Goodson, Patricia (2016), *Becoming an academic writer: 50 exercises for paced, productive, and powerful writing*, Sage Publications.

Reading List

Readings marked with \diamond should not be used for comments or referee reports.

Some Background on Rational Expectations

- \diamond Friedman, Milton (1953), "The methodology of positive economics," in *Essays in Positive Economics*, pp. 3–43, University of Chicago Press.
 - \diamond Lucas, Robert E (1976), "Econometric policy evaluation: A critique," *Carnegie-Rochester Conference Series on Public Policy* 1: 19–46.
 - \diamond Lucas, Robert E & Thomas J Sargent (1981), *Rational expectations and econometric practice*, vol. 2, University of Minnesota Press.
 - \diamond Muth, John F (1961), "Rational expectations and the theory of price movements," *Econometrica* pp. 315–335.
 - \diamond Pesaran, M Hashem (1987), *The Limits to Rational Expectations*, Blackwell.
- Lindé, Jesper (2001), "Testing for the Lucas critique: A quantitative investigation," *American Economic Review* 91(4): 986–1005.
- Rudebusch, Glenn D (2005), "Assessing the Lucas critique in monetary policy models," *Journal of Money, Credit and Banking* pp. 245–272.

Testing REE: Direct Survey Evidence

- \diamond Andrade, Philippe & Hervé Le Bihan (2013), "Inattentive professional forecasters," *Journal of Monetary Economics* 60(8): 967–982.
- \diamond Carroll, Christopher D (2003), "Macroeconomic expectations of households and professional forecasters," *The Quarterly Journal of economics* 118(1): 269–298.
- \diamond Coibion, Olivier & Yuriy Gorodnichenko (2012), "What can survey forecasts tell us about information rigidities?" *Journal of Political Economy* 120(1): 116–159.
- \diamond Coibion, Olivier & Yuriy Gorodnichenko (2015), "Information rigidity and the expectations formation process: A simple framework and new facts," *American Economic Review* 105(8): 2644–78.

- ◇ Greenwood, Robin & Andrei Shleifer (2014), “Expectations of returns and expected returns,” *The Review of Financial Studies* 27(3): 714–746.
- ◇ Malmendier, Ulrike & Stefan Nagel (2016), “Learning from inflation experiences,” *The Quarterly Journal of Economics* 131(1): 53–87.
- ◇ Mankiw, N Gregory, Ricardo Reis & Justin Wolfers (2003), “Disagreement about inflation expectations,” *NBER Macroeconomics Annual* 18: 209–248.
- ◇ Manski, Charles F (2004), “Measuring expectations,” *Econometrica* 72(5): 1329–1376.

Testing REE: Surveys with Information Treatments

- ◇ Armantier, Olivier, Scott Nelson, Giorgio Topa, Wilbert Van der Klaauw & Basit Zafar (2016), “The price is right: Updating inflation expectations in a randomized price information experiment,” *Review of Economics and Statistics* 98(3): 503–523.
 - ◇ Cavallo, Alberto, Guillermo Cruces & Ricardo Perez-Truglia (2017), “Inflation expectations, learning, and supermarket prices: Evidence from survey experiments,” *American Economic Journal: Macroeconomics* 9(3): 1–35.
 - ◇ Coibion, Olivier, Yuriy Gorodnichenko & Saten Kumar (2018), “How do firms form their expectations? New survey evidence,” *American Economic Review* 108(9): 2671–2713.
- Andre, Peter, Carlo Pizzinelli, Christopher Roth & Johannes Wohlfart (2021), “Subjective Models of the Macroeconomy: Evidence From Experts and Representative Samples,” University of Bonn and University of Cologne, Germany.
- Armona, Luis, Andreas Fuster & Basit Zafar (2019), “Home price expectations and behaviour: Evidence from a randomized information experiment,” *The Review of Economic Studies* 86(4): 1371–1410.
- Coibion, Olivier, Yuriy Gorodnichenko & Tiziano Ropele (2020), “Inflation expectations and firm decisions: New causal evidence,” *The Quarterly Journal of Economics* 135(1): 165–219.
- Coibion, Olivier, Yuriy Gorodnichenko & Michael Weber (2022), “Monetary policy communications and their effects on household inflation expectations,” *Journal of Political Economy* p. forthcoming.

Joint Behavior of Expectations & Choice Data

- ◇ Andrade, Philippe, Gaetano Gaballo, Eric Mengus & Benoit Mojon (2019), “Forward guidance and heterogeneous beliefs,” *American Economic Journal: Macroeconomics* 11(3): 1–29.
- ◇ Campbell, Jeffrey R, Charles L Evans, Jonas DM Fisher & Alejandro Justiniano (2012), “Macroeconomic effects of Federal Reserve forward guidance,” *Brookings Papers on Economic Activity* pp. 1–80.

Das, Sreyoshi, Camelia M Kuhnen & Stefan Nagel (2020), "Socioeconomic status and macroeconomic expectations," *The Review of Financial Studies* 33(1): 395–432.

Gennaioli, Nicola, Yueran Ma & Andrei Shleifer (2016), "Expectations and investment," *NBER Macroeconomics Annual* 30(1): 379–431.

Giglio, Stefano, Matteo Maggiori, Johannes Stroebel & Stephen Utkus (2021), "Five facts about beliefs and portfolios," *American Economic Review* 111(5): 1481–1522.

Kuchler, Theresa & Basit Zafar (2019), "Personal experiences and expectations about aggregate outcomes," *The Journal of Finance* 74(5): 2491–2542.

Roth, Christopher & Johannes Wohlfart (2020), "How do expectations about the macroeconomy affect personal expectations and behavior?" *Review of Economics and Statistics* 102(4): 731–748.

Modeling Sticky Information

◇ Mankiw, N. Gregory & Ricardo Reis (2002), "Sticky information versus sticky prices: A proposal to replace the New Keynesian Phillips Curve," *The Quarterly Journal of Economics* 117(4): 1295–1328.

◇ Reis, Ricardo (2006), "Inattentive producers," *The Review of Economic Studies* 73(3): 793–821.

Carroll, Christopher D, Edmund Crawley, Jiri Slacalek, Kiichi Tokuoka & Matthew N White (2020), "Sticky expectations and consumption dynamics," *American Economic Journal: Macroeconomics* 12(3): 40–76.

Reis, Ricardo (2006), "Inattentive consumers," *Journal of Monetary Economics* 53(8): 1761–1800.

Models of Dispersed Information

◇ Angeletos, George-Marios & Chen Lian (2016), "Incomplete information in macroeconomics: Accommodating frictions in coordination," in *Handbook of Macroeconomics*, vol. 2, pp. 1065–1240, Elsevier.

◇ Mankiw, N Gregory & Ricardo Reis (2010), "Imperfect information and aggregate supply," *Handbook of Monetary Economics* 3: 183–229.

◇ Nimark, Kristoffer (2008), "Dynamic pricing and imperfect common knowledge," *Journal of Monetary Economics* 55(2): 365–382.

◇ Nimark, Kristoffer (2017), "Dynamic higher order expectations," *CEPR Discussion Paper No. DP11863*.

◇ Woodford, Michael (2003), "Imperfect common knowledge and the effects of monetary policy," in *Knowledge, Information, and Expectations in Modern Macroeconomics: In Honor of Edmund S. Phelps*, Joseph Stiglitz Philippe Aghion, Roman Frydman & Michael Woodford, eds., pp. 25–58, Princeton University Press.

Angeletos, George-Marios & Jennifer La'O (2010), "Noisy business cycles," *NBER Macroeconomics Annual* 24(1): 319–378.

Melosi, Leonardo (2014), "Estimating models with dispersed information," *American Economic Journal: Macroeconomics* 6(1): 1–31.

Rational Inattention I - Noisy and Discrete Choice

- ◇ Caplin, Andrew & Mark Dean (2015), "Revealed preference, rational inattention, and costly information acquisition," *American Economic Review* 105(7): 2183–2203.
 - ◇ Caplin, Andrew, Mark Dean & John Leahy (2019), "Rational inattention, optimal consideration sets, and stochastic choice," *The Review of Economic Studies* 86(3): 1061–1094.
 - ◇ Cover, Thomas M & Joy A Thomas (2006), *Elements of information theory 2nd Edition*, Wiley-Interscience, chapters 2,8,10 in particular.
 - ◇ Jung, Junehyuk, Jeong Ho Kim, Filip Matějka & Christopher A Sims (2019), "Discrete actions in information-constrained decision problems," *The Review of Economic Studies* 86(6): 2643–2667.
 - ◇ Matějka, Filip (2016), "Rationally inattentive seller: Sales and discrete pricing," *The Review of Economic Studies* 83(3): 1125–1155.
 - ◇ Matějka, Filip & Alisdair McKay (2015), "Rational inattention to discrete choices: A new foundation for the multinomial logit model," *American Economic Review* 105(1): 272–98.
 - ◇ Sims, Christopher A (2003), "Implications of rational inattention," *Journal of Monetary Economics* 50(3): 665–690.
- Gabaix, Xavier (2014), "A sparsity-based model of bounded rationality," *The Quarterly Journal of Economics* 129(4): 1661–1710.
- Kőszegi, Botond & Filip Matějka (2020), "Choice simplification: A theory of mental budgeting and naive diversification," *The Quarterly Journal of Economics* 135(2): 1153–1207.
- Miao, Jianjun, Jieran Wu & Eric R Young (2022), "Multivariate rational inattention," *Econometrica* 90(2): 907–945.
- Nimark, Kristoffer P & Savitar Sundaresan (2019), "Inattention and belief polarization," *Journal of Economic Theory* 180: 203–228.

Rational Inattention II - Sluggish and Discrete Adjustment

- ◇ Khaw, Mel Win, Luminita Stevens & Michael Woodford (2017), "Discrete adjustment to a changing environment: Experimental evidence," *Journal of Monetary Economics* 91: 88–103.
- ◇ Sims, Christopher A (1998), "Stickiness," in *Carnegie-Rochester Conference Series on Public Policy*, vol. 49, pp. 317–356.

- ◇ Sims, Christopher A (2010), “Rational inattention and monetary economics,” in *Handbook of Monetary Economics*, vol. 3, pp. 155–181, Elsevier.
 - ◇ Steiner, Jakub, Colin Stewart & Filip Matějka (2017), “Rational inattention dynamics: Inertia and delay in decision-making,” *Econometrica* 85(2): 521–553.
 - ◇ Stevens, Luminita (2020), “Coarse pricing policies,” *The Review of Economic Studies* 87(1): 420–453.
 - ◇ Woodford, Michael (2009), “Information-constrained state-dependent pricing,” *Journal of Monetary Economics* 56: S100–S124.
- Maćkowiak, Bartosz, Filip Matějka & Mirko Wiederholt (2018), “Dynamic rational inattention: Analytical results,” *Journal of Economic Theory* 176: 650–692.
- Maćkowiak, Bartosz & Mirko Wiederholt (2009), “Optimal sticky prices under rational inattention,” *American Economic Review* 99(3): 769–803.
- Maćkowiak, Bartosz & Mirko Wiederholt (2015), “Business cycle dynamics under rational inattention,” *The Review of Economic Studies* 82(4): 1502–1532.

Rational Inattention III - Strategic Considerations

- ◇ Domotor, Erika (2021), “Bringing Rational Inattention to the Market for Lemons,” Working paper, University of Maryland.
 - ◇ Hellwig, Christian & Laura Veldkamp (2009), “Knowing what others know: Coordination motives in information acquisition,” *The Review of Economic Studies* 76(1): 223–251.
 - ◇ Matějka, Filip (2015), “Rigid pricing and rationally inattentive consumer,” *Journal of Economic Theory* 158: 656–678.
- Ravid, Doron (2020), “Ultimatum bargaining with rational inattention,” *American Economic Review* 110(9): 2948–63.
- Yang, Ming (2015), “Coordination with flexible information acquisition,” *Journal of Economic Theory* 158: 721–738.

Rational Inattention IV - Macro Applications

- Acharya, Sushant & Shu Lin Wee (2020), “Rational inattention in hiring decisions,” *American Economic Journal: Macroeconomics* 12(1): 1–40.
- Afrouzi, Hassan (2020), “Strategic inattention, inflation dynamics, and the non-neutrality of money,” CESifo working paper.
- Afrouzi, Hassan & Choongryul Yang (2021), “Dynamic rational inattention and the Phillips curve,” SSRN 3770462.

- Luo, Yulei (2008), "Consumption dynamics under information processing constraints," *Review of Economic Dynamics* 11(2): 366–385.
- Luo, Yulei & Eric R Young (2010), "Risk-sensitive consumption and savings under rational inattention," *American Economic Journal: Macroeconomics* 2(4): 281–325.
- Morales-Jimenez, Camilo & Luminita Stevens (2022), "Nominal rigidities in U.S. business cycles," Working paper, University of Maryland.
- Paciello, Luigi & Mirko Wiederholt (2014), "Exogenous information, endogenous information, and optimal monetary policy," *Review of Economic Studies* 81(1): 356–388.

Rational Inattention V - Applications to Portfolio Choice

- ◇ Kacperczyk, Marcin, Jaromir Nosal & Luminita Stevens (2019), "Investor sophistication and capital income inequality," *Journal of Monetary Economics* 107: 18–31.
- Kacperczyk, Stijn Van Nieuwerburgh, Marcin & Laura Veldkamp (2016), "A rational theory of mutual funds' attention allocation," *Econometrica* 84(2): 571–626.
- Mondria, Jordi (2010), "Portfolio choice, attention allocation, and price comovement," *Journal of Economic Theory* 145(5): 1837–1864.
- Van Nieuwerburgh, Stijn & Laura Veldkamp (2009), "Information immobility and the home bias puzzle," *The Journal of Finance* 64(3): 1187–1215.
- Van Nieuwerburgh, Stijn & Laura Veldkamp (2010), "Information acquisition and underdiversification," *The Review of Economic Studies* 77(2): 779–805.

Some Evidence from The Lab

- ◇ Benjamin, Daniel J (2019), "Errors in probabilistic reasoning and judgment biases," *Handbook of Behavioral Economics: Applications and Foundations* 1 2: 69–186.
 - ◇ Khaw, Mel Win, Luminita Stevens & Michael Woodford (2017), "Discrete adjustment to a changing environment: Experimental evidence," *Journal of Monetary Economics* 91: 88–103.
 - ◇ Schotter, Andrew & Isabel Trevino (2014), "Belief elicitation in the laboratory," *Annual Review of Economics* 6(1): 103–128.
- Armantier, Olivier, Wändi Bruine de Bruin, Giorgio Topa, Wilbert Van Der Klaauw & Basit Zafar (2015), "Inflation expectations and behavior: Do survey respondents act on their beliefs?" *International Economic Review* 56(2): 505–536.
- Dean, Mark & Nate Leigh Neligh (2022), "Experimental tests of rational inattention," Working paper.
- Fuster, Andreas, Ricardo Perez-Truglia, Mirko Wiederholt & Basit Zafar (2020), "Expectations with endogenous information acquisition: An experimental investigation," *The Review of Economics and Statistics* pp. 1–54.

Haaland, Ingar, Christopher Roth & Johannes Wohlfart (2021), "Designing information provision experiments," Working Paper.

Landier, Augustin, Yueran Ma & David Thesmar (2019), "Biases in expectations: Experimental evidence," *Available at SSRN 3046955* .

Cognitive Constraints and Risk Preferences

◇ Frydman, Cary & Lawrence J Jin (2022), "Efficient coding and risky choice," *The Quarterly Journal of Economics* 137(1): 161–213.

◇ Khaw, Mel Win, Ziang Li & Michael Woodford (2021), "Cognitive imprecision and small-stakes risk aversion," *The Review of Economic Studies* 88(4): 1979–2013.

◇ Malmendier, Ulrike & Stefan Nagel (2011), "Depression babies: do macroeconomic experiences affect risk taking?" *The Quarterly Journal of Economics* 126(1): 373–416.

Deck, Cary & Salar Jahedi (2015), "The effect of cognitive load on economic decision making: A survey and new experiments," *European Economic Review* 78: 97–119.

Enke, Benjamin & Thomas Graeber (2019), "Cognitive uncertainty," Working paper.

Gerhardt, Holger, Guido P Biele, Hauke R Heekeren & Harald Uhlig (2016), "Cognitive load increases risk aversion," SFB 649 Discussion Paper.

Inter-temporal considerations: Myopia and Present Bias

◇ Laibson, David (1997), "Golden eggs and hyperbolic discounting," *The Quarterly Journal of Economics* 112(2): 443–478.

◇ Loewenstein, George, Ted O'Donoghue & Matthew Rabin (2003), "Projection bias in predicting future utility," *the Quarterly Journal of economics* 118(4): 1209–1248.

Angeletos, George-Marios & Zhen Huo (2021), "Myopia and anchoring," *American Economic Review* 111(4): 1166–1200.

Epper, Thomas, Ernst Fehr, Helga Fehr-Duda, Claus Thustrup Kreiner, David Dreyer Lassen, Søren Leth-Petersen & Gregers Nytoft Rasmussen (2020), "Time discounting and wealth inequality," *American Economic Review* 110(4): 1177–1205.

Farhi, Emmanuel & Xavier Gabaix (2020), "Optimal taxation with behavioral agents," *American Economic Review* 110(1): 298–336.

Gabaix, Xavier (2020), "A behavioral New Keynesian model," *American Economic Review* 110(8): 2271–2327.

Gabaix, Xavier & David Laibson (2022), "Myopia and discounting," Working paper.

Laibson, David, Peter Maxted & Benjamin Moll (2021), "Present bias amplifies the household balance-sheet channels of macroeconomic policy," Working paper.

Inter-temporal considerations: Finite Horizons

◇ Woodford, Michael (2019), "Monetary policy analysis when planning horizons are finite," *NBER Macroeconomics Annual* 33(1): 1–50.

Woodford, Michael & Yinxi Xie (2022), "Fiscal and monetary stabilization policy at the zero lower bound: Consequences of limited foresight," *Journal of Monetary Economics* 125: 18–35.

Habits as Optimal Adaptations

◇ Khaw, Mel Win & Oskar Zorrilla (2018), "Deeper Habits," *Unpublished Manuscript* .

◇ Laibson, David (2001), "A cue-theory of consumption," *The Quarterly Journal of Economics* 116(1): 81–119.

Matyskova, Ludmila, Brian Rogers, Jakub Steiner & Keh-Kuan Sun (2020), "Habits as adaptations: An experimental study," *Games and Economic Behavior* 122: 391–406.

Adaptive Expectations and Learning

◇ Eusepi, Stefano & Bruce Preston (2011), "Expectations, learning, and business cycle fluctuations," *American Economic Review* 101(6): 2844–72.

◇ Evans, George W & Seppo Honkapohja (2001), *Learning and expectations in macroeconomics*, Princeton University Press, chapters 2,3,8,11,15.

Marcet, Albert & Juan P Nicolini (2003), "Recurrent hyperinflations and learning," *American Economic Review* 93(5): 1476–1498.

Milani, Fabio (2007), "Expectations, learning and macroeconomic persistence," *Journal of monetary Economics* 54(7): 2065–2082.

Diagnostic Expectations and Over-extrapolation

◇ Angeletos, George-Marios, Zhen Huo & Karthik A Sastry (2021), "Imperfect macroeconomic expectations: Evidence and theory," *NBER Macroeconomics Annual* 35(1): 1–86.

◇ Bordalo, Pedro, Nicola Gennaioli, Yueran Ma & Andrei Shleifer (2020), "Overreaction in macroeconomic expectations," *The American Economic Review* 110(9): 2748–82.

◇ Bordalo, Pedro, Nicola Gennaioli & Andrei Shleifer (2018), "Diagnostic expectations and credit cycles," *The Journal of Finance* 73(1): 199–227.

Afrouzi, Hassan, Spencer Yongwook Kwon, Augustin Landier, Yueran Ma & David Thesmar (2020), "Overreaction in expectations: Evidence and theory," Available at SSRN.

Bianchi, Francesco, Cosmin L Ilut & Hikaru Saijo (2021), "Implications of diagnostic expectations: Theory and applications," Working paper.

Kohlhas, Alexandre N & Ansgar Walther (2021), "Asymmetric attention," *American Economic Review* 111(9): 2879–2925.

Level-k and Its Macro Applications

- ◇ Camerer, Colin F, Teck-Hua Ho & Juin-Kuan Chong (2004), “A cognitive hierarchy model of games,” *The Quarterly Journal of Economics* 119(3): 861–898.
 - ◇ Khaw, Mel Win, Luminita Stevens & Michael Woodford (2022), “Adjustment dynamics during a strategic estimation task,” Working paper.
 - ◇ Nagel, Rosemarie (1995), “Unraveling in guessing games: An experimental study,” *The American Economic Review* 85(5): 1313–1326.
 - ◇ Stahl, Dale O & Paul W Wilson (1995), “On players’ models of other players: Theory and experimental evidence,” *Games and Economic Behavior* 10(1): 218–254.
 - ◇ Stahl II, Dale O & Paul W Wilson (1994), “Experimental evidence on players’ models of other players,” *Journal of Economic Behavior & Organization* 25(3): 309–327.
- Coibion, Olivier, Yuriy Gorodnichenko, Saten Kumar & Jane Ryngaert (2021), “Do You Know that I Know that You Know...? Higher-Order Beliefs in Survey Data,” *The Quarterly Journal of Economics* 136(3): 1387–1446.
- Farhi, Emmanuel & Iván Werning (2019), “Monetary policy, bounded rationality, and incomplete markets,” *American Economic Review* 109(11): 3887–3928.
- García-Schmidt, Mariana & Michael Woodford (2019), “Are low interest rates deflationary? A paradox of perfect-foresight analysis,” *American Economic Review* 109(1): 86–120.
- Iovino, Luigi & Dmitriy Sergeyev (2022), “Central Bank balance sheet policies without rational expectations,” Working paper.
- Vimercati, Riccardo Bianchi, Martin S Eichenbaum & Joao Guerreiro (2021), “Fiscal policy at the zero lower bound without rational expectations,” Tech. rep., National Bureau of Economic Research.

Cognitive Limitations and Strategic Considerations

- ◇ Angeletos, George-Marios & Chen Lian (2022), “Dampening General Equilibrium: Incomplete Information and Bounded Rationality,” NBER Working Paper w29776.
 - ◇ Fehr, Ernst & Jean-Robert Tyran (2008), “Limited rationality and strategic interaction: the impact of the strategic environment on nominal inertia,” *Econometrica* 76(2): 353–394.
 - ◇ Haltiwanger, John & Michael Waldman (1985), “Rational expectations and the limits of rationality: An analysis of heterogeneity,” *The American Economic Review* 75(3): 326–340.
 - ◇ Haltiwanger, John & Michael Waldman (1989), “Limited rationality and strategic complements: the implications for macroeconomics,” *The Quarterly Journal of Economics* 104(3): 463–483.
- Angeletos, George-Marios & Zhen Huo (2021), “Myopia and anchoring,” *American Economic Review* 111(4): 1166–1200.

Angeletos, George-Marios & Chen Lian (2018), "Forward guidance without common knowledge," *American Economic Review* 108(9): 2477–2512.

Frydman, Cary & Salvatore Nunnari (2021), "Cognitive imprecision and strategic behavior," Working paper.

Model Uncertainty, Ambiguity Aversion, and Robust Control

◇ Epstein, Larry G & Martin Schneider (2008), "Ambiguity, information quality, and asset pricing," *The Journal of Finance* 63(1): 197–228.

◇ Hansen, Lars Peter, Thomas J Sargent & Thomas D Tallarini Jr (1999), "Robust permanent income and pricing," *Review of Economic studies* pp. 873–907.

◇ Hansen, LarsPeter & Thomas J Sargent (2001), "Robust control and model uncertainty," *American Economic Review* 91(2): 60–66.

◇ Ilut, Cosmin L & Martin Schneider (2014), "Ambiguous business cycles," *American Economic Review* 104(8): 2368–99.

Bachmann, Rüdiger, Kai Carstensen, Stefan Lautenbacher & Martin Schneider (2020), "Uncertainty is more than risk—survey evidence on Knightian and Bayesian firms," Working paper.

Ilut, Cosmin, Rosen Valchev & Nicolas Vincent (2020), "Paralyzed by fear: Rigid and discrete pricing under demand uncertainty," *Econometrica* 88(5): 1899–1938.

Ilut, Cosmin L & Rosen Valchev (2020), "Economic agents as imperfect problem solvers," Working paper.

Michelacci, Claudio & Luigi Paciello (2020), "Ambiguous policy announcements," *The Review of Economic Studies* 87(5): 2356–2398.

Molavi, Pooya (2019), "Macroeconomics with learning and misspecification: A general theory and applications," Job market paper, MIT.

Woodford, Michael (2010), "Robustly optimal monetary policy with near-rational expectations," *American Economic Review* 100(1): 274–303.

News in Business Cycles

◇ Barsky, Robert B & Eric R Sims (2011), "News shocks and business cycles," *Journal of Monetary Economics* 58(3): 273–289.

◇ Jaimovich, Nir & Sergio Rebelo (2009), "Can news about the future drive the business cycle?" *American Economic Review* 99(4): 1097–1118.

Chahrour, Ryan & Kyle Jurado (2018), "News or noise? The missing link," *American Economic Review* 108(7): 1702–36.

Aggregate Uncertainty

- ◇ Basu, Susanto & Brent Bundick (2017), “Uncertainty shocks in a model of effective demand,” *Econometrica* 85(3): 937–958.
 - ◇ Bloom, Nicholas (2009), “The impact of uncertainty shocks,” *Econometrica* 77(3): 623–685.
 - ◇ Fajgelbaum, Pablo D, Edouard Schaal & Mathieu Taschereau-Dumouchel (2017), “Uncertainty traps,” *The Quarterly Journal of Economics* 132(4): 1641–1692.
 - ◇ Jurado, Kyle, Sydney C Ludvigson & Serena Ng (2015), “Measuring uncertainty,” *American Economic Review* 105(3): 1177–1216.
 - ◇ Ludvigson, Sydney C, Sai Ma & Serena Ng (2021), “Uncertainty and business cycles: exogenous impulse or endogenous response?” *American Economic Journal: Macroeconomics* 13(4): 369–410.
- Baker, Scott R, Nicholas Bloom & Steven J Davis (2016), “Measuring economic policy uncertainty,” *The Quarterly Journal of Economics* 131(4): 1593–1636.
- Berger, David, Ian Dew-Becker & Stefano Giglio (2020), “Uncertainty shocks as second-moment news shocks,” *The Review of Economic Studies* 87(1): 40–76.
- Bloom, Nicholas, Max Floetotto, Nir Jaimovich, Itay Saporta-Eksten & Stephen J Terry (2018), “Really uncertain business cycles,” *Econometrica* 86(3): 1031–1065.
- Flynn, Joel P & Karthik Sastry (2021), “Attention cycles,” *Available at SSRN 3592107* .

Sentiments in Business Cycles

- ◇ Angeletos, George-Marios & Jennifer La’O (2013), “Sentiments,” *Econometrica* 81(2): 739–779.
- Angeletos, George-Marios, Fabrice Collard & Harris Dellas (2018), “Quantifying confidence,” *Econometrica* 86(5): 1689–1726.
- Angeletos, George-Marios, Fabrice Collard & Harris Dellas (2020), “Business-cycle anatomy,” *American Economic Review* 110(10): 3030–70.
- Beaudry, Paul, Dana Galizia & Franck Portier (2020), “Putting the cycle back into business cycle analysis,” *American Economic Review* 110(1): 1–47.
- Bhandari, Anmol, Jaroslav Borovička & Paul Ho (2019), “Survey data and subjective beliefs in business cycle models,” Working paper.
- Bianchi, Sydney C. Ludvigson, Francesco & Sai Ma (2022), “Belief distortions and macroeconomic fluctuations,” *American Economic Review* 112(7): 2269–2315.
- Burnside, Craig, Martin Eichenbaum & Sergio Rebelo (2016), “Understanding booms and busts in housing markets,” *Journal of Political Economy* 124(4): 1088–1147.
- Lorenzoni, Guido (2009), “A theory of demand shocks,” *American Economic Review* 99(5): 2050–84.

Welfare Considerations

◇ Brunnermeier, Markus K, Alp Simsek & Wei Xiong (2014), “A welfare criterion for models with distorted beliefs,” *The Quarterly Journal of Economics* 129(4): 1753–1797.

Hassan, Tarek A & Thomas M Mertens (2017), “The social cost of near-rational investment,” *American Economic Review* 107(4): 1059–1103.