Course 1: Causality in Macroeconomics

Topics in Empirical Macroeconomics and Finance, Econ 221

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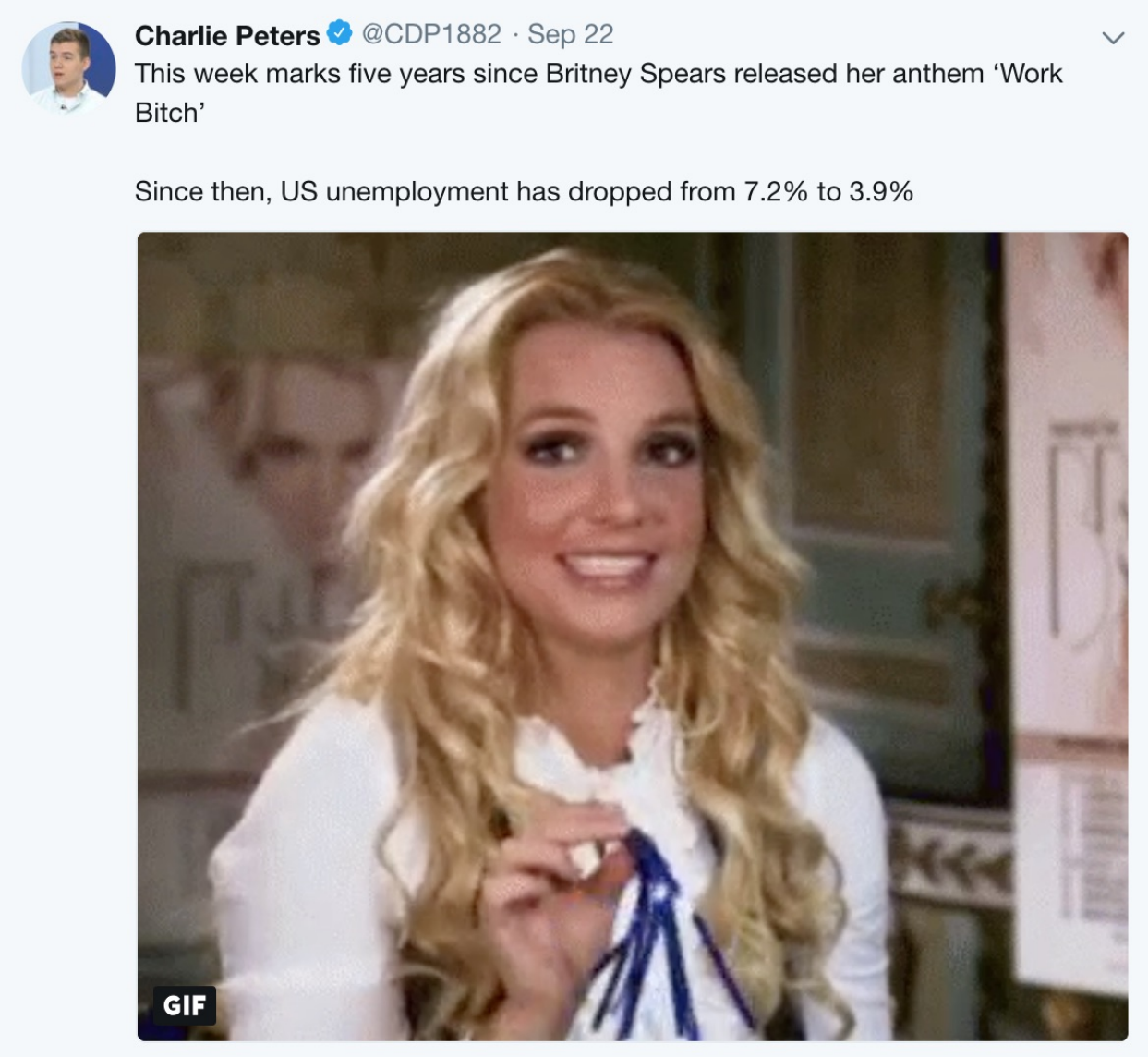
Simultaneity Problem



Grading of the course

1. First, I will ask you to replicate **two** empirical macro or/and finance papers, using **publicly available data** (e.g. national accounts, Compustat, CRSP, Nielsen Scanner data, other WRDS material, etc.), but for which the replication code was not made available online by the authors (or not fully). I shall give you a list of papers among which to choose **next week**. I believe that the best way to learn empirical methods in macroeconomics and finance is to "get your hands dirty", and practice working with data. The first replication exercise will count towards 40% of your final grade, and the second will count towards 40%.

2. Second, I will ask you to **present a recent paper in empirical macroeconomics** during the last two lectures. (30 minutes each) Again, I will give you a list from which to choose. This will count towards 20% of your final grade.

Requirement: Use R ! (with tidyverse)

- So that we are all on the same page, I will teach you R Statistical Software as we go along. As well as the basics of applied econometrics.
- **R statistical software**, which you may download on the UCLA website: `http://cran.stat.ucla.edu/`. You may download the latest release (2018-03-15, Someone to Lean On) which is version 3.4.4. For Mac OSX: `http://cran.stat.ucla.edu/bin/macosx/R-3.4.4.pkg`. For Windows: `http://cran.stat.ucla.edu/bin/windows/base/R-3.4.3-win.exe`.
- I also recommend that you download **R studio** or another Graphical User Interface to make using R more pleasant !
- We'll also be using the package suite "tidyverse", including "dplyr" and "ggplot2", by Hadley Wickam. Here is a tutorial:
  - `https://suzan.rbind.io/2018/01/dplyr-tutorial-1/`
  - `https://suzan.rbind.io/2018/01/dplyr-tutorial-2/`
  - `https://suzan.rbind.io/2018/02/dplyr-tutorial-3/`
  - `https://suzan.rbind.io/2018/04/dplyr-tutorial-4/`

Outline of the course

- This course will follow an inductive, or bottom-up, approach. Whenever possible, I will start from the facts, and review different theories in light of these facts.
- I will particularly emphasize empirical observations that have not been explained by currently discussed theories.
- My hope is that you will find here some inspiration for a dissertation topic.

Four Parts to the Course

- **Evidence-based macroeconomics (4 topics)** The first part of the course will introduce you to empirical methods in macroeconomics. We will discuss identification in macroeconomics through structural, narrative, and cross-sectional approaches; and compare the merits of these various approaches. These methods will be used throughout the rest of the class.
- **Consumption, Investment, the Trade Balance and Asset Pricing (5 topics)** The second part of the class will be structured around empirical "puzzles", which cannot be explained with neoclassical theories of consumption, investment, the trade balance and asset pricing (including exchange rates).

Textbooks 1/2

I will assume that you have basic knowledge of first year macroeconomics and finance, which can be found in many different textbooks. For macroeconomics, I would recommend:

- Romer, David. Advanced Macroeconomics. McGraw-Hill Education, 2011. Link
- Galí, Jordi. Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework and Its Applications, Second Edition. Princeton University Press, 2015. Link
- Blanchard, Olivier Jean, and Stanley Fischer. Lectures on Macroeconomics. Vol. 12. 3. Cambridge, MA: The MIT Press, 1990. Link

Textbooks 2/2

If you are interested in how macroeconomics is used in practice, I strongly recommend:

- Bénassy-Quéré, Agnès, Benoît Coeuré, Pierre Jacquet, and Jean Pisani-Ferry. Economic Policy: Theory and Practice. Vol. 53. 9. Oxford, New York: Oxford University Press, 2013. Link

For finance, I would advise two excellent and complementary textbooks:

- Campbell, John Y. Financial Decisions and Markets: A Course in Asset Pricing. Princeton University Press, 2017. Link
- Cochrane, John H. Asset Pricing (Revised Edition). Princeton University Press, 2009. Link

No comprehensive textbook

- "For a long time, I have felt that my graduate textbook written with Stan Fischer sent the wrong message. We had made the choice to present models and their logic, rather than their applications. The justification was a perfectly good one, namely that we wanted to show the intellectual structure of macroeconomic theory first. But, de facto, the lack of serious empirics sent another message: That theory was largely divorced from practice, and from facts. That message is wrong: Theory without facts is much too easy, and of very little use." (Olivier Blanchard)
- It is telling that at this stage, empirical macroeconomics lacks a textbook !

Four Parts to the Course

- **Low interest rate macroeconomics (4 topics)** The third part will present evidence in favor of the "savings glut" hypothesis, and present overlapping-generations and other models of underconsumption. I will also discuss issues of secular stagnation, competitiveness and external balance, and discuss the relationship to keynesian economics.
- **Heterogeneity and macroeconomics (4 topics)** Finally, the last part of the course will focus on evidence and models of firm size and productivity heterogeneity, the labor income distribution, etc. I will finally cover some static optimal taxation.

Why empirical macroeconomics? the example of Keynes (1936)

- Historically, economics has been shaped by ideas and models, rather than evidence. For example, John Maynard Keynes believed in the power of ideas to change policymarkers' mind and influence their course of action (Keynes (1936)):

  The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct economist.

- Indeed, Keynes (1936) could only look at scattered historical time series. There is very few data in the *General Theory*, and strangely macroeconomics has continued to evolve in this way.

Why empirical macroeconomics? the example of Keynes (1936)

- At the same time, Keynes (1936)'s initial argument/intuition comes from looking at the data:

  For professional economists, after Malthus, were apparently unmoved by the lack of correspondence between the results of their theory and the facts of observation;—a discrepancy which the ordinary man has not failed to observe, with the result of his growing unwillingness to accord to economists that measure of respect which he gives to other groups of scientists whose theoretical results are confirmed by observation when they are applied to the facts.

- The Great Depression provides a good laboratory to test macroeconomic theory. Looking at different policies that are then put in place, he thinks that the economy responds in way that are at odds with the then mainstream:
  - More saving does not lead to more investment.

Why empirical macroeconomics?

- Compared to Keynes (1936)'s time, we should be doing a much better job now ! He did not even have access to the National Income and Product Accounts (NIPA), which were created after World War II.
- Now we have harmonized national accounts for at least **30 OECD countries.** We have more (perhaps less harmonized) from the IMF, the World Bank, the UN.
- We also have:
  - Many more years of data
  - Many fiscal / monetary experiments
  - Case studies (start of the Euro, emerging market crises, etc.)
  - **Individual level data. (administrative, survey)**
  - **Other levels of aggregation.**

Methodology: Debates on Macroeconomics

- McCloskey, Donald N. "The Rhetoric of Economics." Journal of Economic Literature 21, no. 2 (1983): 481–517. Link
- Leamer, Edward E. "Let's Take the Con Out of Econometrics." The American Economic Review 73, no. 1 (1983): 31–43. Link
- Mankiw, N. Gregory. "The Macroeconomist as Scientist and Engineer." Journal of Economic Perspectives 20, no. 4 (December 2006): 29–46. Link
- Caballero, Ricardo J. "Macroeconomics after the Crisis: Time to Deal with the Pretense-of-Knowledge Syndrome." The Journal of Economic Perspectives 24, no. 4 (2010): 85–102. Link
- Romer, Paul M. "The Trouble With Macroeconomics," 2016. Link

Readings for this class (a lot) 1/2

- Sims, Christopher A. "Macroeconomics and Reality." Econometrica 48, no. 1 (1980): 1–48. Link
- Cochrane, John H. "Shocks." Carnegie-Rochester Conference Series on Public Policy 41 (December 1994): 295–364. Link
- Summer Institute Econometric Lecture, 2008, "What's New in Econometrics: Time Series", James H. Stock and Mark W. Watson. Link
- Summer Institute Econometric Lecture, 2010, "Financial Econometrics", Sydney Ludvigson, Yacine Ait-Sahalia, Michael Brandt, & Andrew Lo. Link
- Angrist, Joshua D., and Jörn-Steffen Pischke. "The Credibility Revolution in Empirical Economics: How Better Research Design Is Taking the Con out of Econometrics." Journal of Economic Perspectives 24, no. 2 (2010): 3–30. Link

Readings for this class (a lot) 2/2

- Sims, Christopher A. "But Economics Is Not an Experimental Science." Journal of Economic Perspectives 24, no. 2 (June 2010): 59–68. Link
- Summer Institute Econometric Lecture, 2011, "Computational Tools & Macroeconomic Applications", Lawrence Christiano and Jesus Fernandez-Villaverde. Link
- "Empirical Macroeconomics. Thomas J. Sargent and Christopher A. Sims" Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2011. Link
- Uhlig, Harald. "Economics and Reality." Journal of Macroeconomics, Has macro progressed?, 34, no. 1 (March 1, 2012): 29–41. Link
- Ramey, V. A. "Chapter 2 - Macroeconomic Shocks and Their Propagation." In Handbook of Macroeconomics, edited by John B. Taylor and Harald Uhlig, 2:71–162. Elsevier, 2016. Link

1. Outline of the class

2. Nakamura and Steinsson (2017)

Introduction

- Many of the main empirical questions in macroeconomics are the same as they were 80 years ago when macroeconomics came into being as a separate sub-discipline of economics in the wake of the Great Depression:
  - What are the sources of business cycle fluctuations?
  - How does monetary policy affect the economy?
  - How does fiscal policy affect the economy?
  - Why do some countries grow faster than others?
- How can it be that after all this time we don't know the answers to these questions?
- **Identification** in macroeconomics is difficult.

Monetary policy "shocks"?

- We need exogenous variation in monetary policy.
- Unfortunately, or fortunately, the Federal Reserve employs hundreds of PhD economists to pore over every little bit of incoming data about the economy so as to make monetary policy as endogenous as it possibly can be.
- The main purpose of the Federal Reserve is to vary monetary policy in a way that reacts to other developments that are affecting output and inflation.
- This fact, of course, makes our lives as empirical macroeconomists very difficult.

Challenges

1. **Exogeneity.** Exogenous variation in macro policy? Trump?
2. **External validity.** The natural experiments we can identify in the data are rarely exactly the experiments we would need to answer the policy question we are interested in. One such issue is that the dynamic nature of monetary and fiscal policy makes these policies very high dimensional.e.g. The effects of monetary policy, of course, also depend on the response of fiscal and tax policies.
3. (Related) **Statistical power.** Macroeconomists have relatively few data points to work with.
4. **State dependance.** Effects of monetary and fiscal policy may differ depending on the level of slack in the economy and various other characteristics of the economy, such as how open it is.
5. **Expectations.** The degree to which a policy action is a surprise can affect both how strongly and when the economy reacts to it. (maybe this worry is a bit overstated though?)

Structural work?

- This is why macroeconomists want to write models so much. That's what is called "structural work". Such work typically takes the form of researchers **identifying a set of moments** in the data and arguing that **these moments can discriminate** between different models of how the economy works.
- All too often, this structural mode of inference is viewed as completely separate from empirical work seeking to uncover causal effects. (this is true of the calibration tradition)

Structural work?

- In fact, however, estimates of causal effects (i.e., the response to structural shocks) are often particularly informative moments for distinguishing between important classes of macroeconomic models. The reason for this is that the value of such "identified moments" often provide evidence on a specific causal mechanism and are insensitive to other aspects of the economy.
- The term "identified moments" may seems odd to some. In econometrics, it is parameters that are identified, not moments. We use the term "moment" in a broad sense to refer to a target statistic that a researcher wants his or her model to match. We use the term "identified" because the target statistics we have in mind are estimates of causal effect parameters (or what macroeconomists would call estimated responses to "identified structural shocks") as opposed to simple unconditional moments such as means, variances and covariances. In other words, we are using the term "identified moments" as short-hand for "target statistics derived from estimators of responses to identified structural shocks."

Examples of well-identified moments

- Rotemberg and Woodford (1997); Christiano et al. (2005). Impulse Response to a monetary policy shock? RBC models imply that monetary shocks should affect inflation but not output, while the empirical evidence suggests a substantial response of output.
- Gali (1999) and Basu et al. (2006) argue that identified responses of output and hours to productivity shocks reject RBC models in favor of New Keynesian models. Suggests that improvements in productivity lead firms to fire workers in the short run.
- Estimates of the marginal propensity to consume (MPC) from a transitory fiscal rebate is another example of an identified moment. Quarterly MPC of roughly 0.25 for non-durable consumption (Johnson et al. (2006); Parker et al. (2013)). We'll come back to this moment when looking at consumption.

Advantage of well-identified moments (Greene (2012))

- Aggregate supply and aggregate demand may both determine GDP $\Rightarrow$ IV.

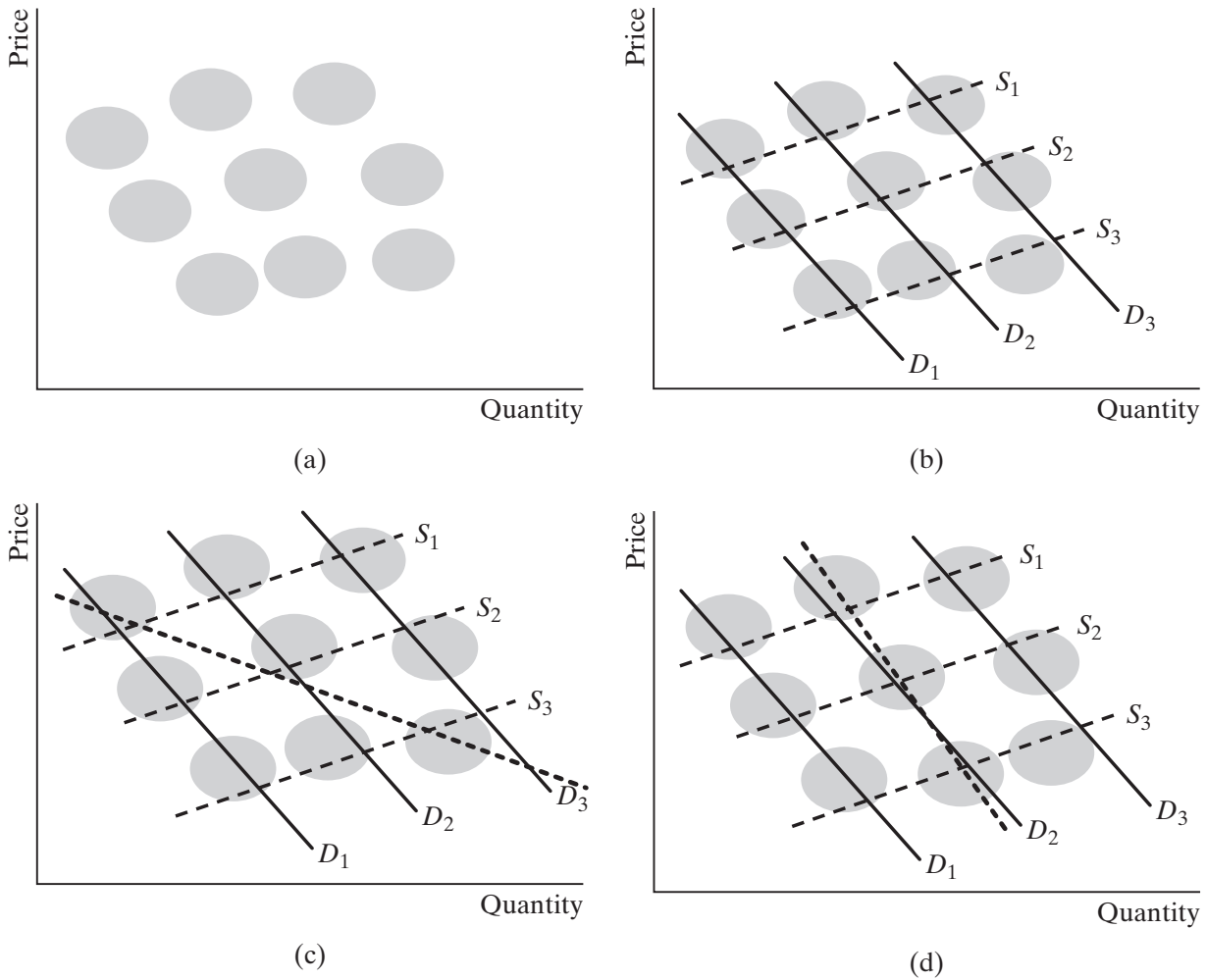


FIGURE 8.1 Identifying a Demand Curve with an Instrumental Variable.

Turning to regional data

- Advantage: multiply the number of data points.
- Disadvantage: how about General Equilibrium Effects.
- For example: Keynesian multipliers are non existent at the individual level, by definition. (only incentive effects matter) Thus, applied micro is not always a panacea. One needs to aggregate!
- Example: Nakamura and Steinsson (2014). Cross-state variation in government spending. However: do not directly answer the policy question macroeconomists are most interested in—the effect of fiscal stimulus at the national level—since various types of general equilibrium effects are "differenced out" by time fixed effects.

"Unconditional" Micro and Macro Moments

- Micro moments: constructed on micro data on the behavior of individuals. e.g. frequency of price change and related statistics on price rigidity. (Nakamura and Steinsson (2008, 2013))
- Much easier to identify !! Thousands, if not millions of data points.
- Macro moments: "equity premium"
- Real wages have risen by a large amount while hours worked have been stable or fallen slightly $\Rightarrow$ income effects are large. (slightly larger than substitution effects)

Identified moments

- Identified moments correspond directly to a particular deep structural parameter.
- Identifying ausal effects using credible research design (RD) based on the use of:
  - Instrumental Variables. (IVs)
  - Difference-in-Difference analysis. (DDs)
  - Regression Discontinuities. (RDs)
  - Randomized Controlled Trials. (RCTs)
- Advantage: more invariant to model features. cf recent debate on the role of changes in house prices in causing the Great Recession of 2007-2009.

Aggregate versus cross-sectional

- Researchers use geographically disaggregated panel data sets — often disaggregated to the state or metropolitan statistical area level — to identify novel causal effects.
- Powerful class of IVs is differential regional exposure to aggregate shocks: Mian and Sufi (2014), Autor et al. (2013).
- Big question is how to aggregate. Problem is GE effects. So cross-sectional identification does not quite answer the right question. Think for example of spillover effects.
- Mian and Sufi (2014) find that the dramatic fall in house prices between 2006 and 2009 did not differentially affect tradables employment increases with larger house prices between 2006 and 2009. (only non-tradables) One way to go is theory + empirics.

Next 3 lectures: we'll dive into the details

1. Model-based identification / Structural VARs:
   1. RBC models: Kydland and Prescott (1982)
   2. Structural VARs: Blanchard and Perotti (2002)
2. Narrative approach and case / event studies:
   1. Romer and Romer (1989), Romer and Romer (2004), Romer and Romer (2010)
   2. Giavazzi and Pagano (1990)
   3. Alesina and Perotti (1997)
   4. Krishnamurthy and Vissing-Jorgensen (2011)
   5. Swanson (2011)
3. Cross-sectional data and model based aggregation:
   1. Mian and Sufi (2010)
   2. Mian et al. (2013)
   3. Mian and Sufi (2014)
   4. Kaplan et al. (2016)

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Johnson, David S., Jonathan A. Parker, and Nicholas S. Souleles, "Household Expenditure and the Income Tax Rebates of 2001," *American Economic Review*, December 2006, *96* (5), 1589–1610.

Kaplan, Greg, Kurt Mitman, and Giovanni L. Violante, "Non-durable Consumption and Housing Net Worth in the Great Recession: Evidence from Easily Accessible Data," Working Paper 22232, National Bureau of Economic Research May 2016.

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Kydland, Finn E. and Edward C. Prescott, "Time to Build and Aggregate Fluctuations," *Econometrica*, 1982, *50* (6), 1345–1370.

Mian, Atif and Amir Sufi, "What Explains the 2007–2009 Drop in Employment?," *Econometrica*, November 2014, *82* (6), 2197–2223.

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Nakamura, Emi and Jón Steinsson, "Five Facts about Prices: A Reevaluation of Menu Cost Models," *The Quarterly Journal of Economics*, November 2008, *123* (4), 1415–1464.

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