

14.772. Development Economics: Macroeconomic Issues

Lectures: Tuesday and Thursday 2:30-4:00 pm, <https://mit.zoom.us/j/96553843618>

Recitations: Time TBD based on class availability

Instructors: Robert Townsend, rtownsen@mit.edu

Office Hours, Thursdays 4:10 – 5:00, <https://mit.zoom.us/j/92539008571>

Lauren Falcao Bergquist, lfb@umich.edu

Teaching Assistant: Lucy Page, lucypage@mit.edu, OHs: Wed 9-10:30 am, by appointment on Canvas, <https://mit.zoom.us/j/98279501375>

Website: <https://canvas.mit.edu/courses/6654>

Course Grading and Requirements:

Grades will be determined based on participation in lectures (10%), regular problem sets (12.5%), quasi-optional problem sets (12.5%), a referee report (10%), a research proposal project (20%), an in-class paper presentation (10%), and a final exam (25%).

Class Participation, in lectures (10%): Classes will be held live over Zoom, and questions are strongly encouraged. Students should attend live if at all possible, but we can make arrangements for students in substantially different time zones. Students are responsible for all content covered in lecture. The starred (*) readings below correspond most closely with featured papers in the lectures. There are review questions posted on Canvas that cover the main takeaways from the lectures.

Regular problem sets (12.5%): Prof. Townsend will assign 2 regular problem sets during the first half of the course, followed by 1 regular problem set from Prof. Bergquist during the second half of the course. All problems on these problem sets will be required.

Quasi-optional problem sets (12.5%): We will post 10 “quasi-optional” problem set questions, of which you must answer 2 by the end of the first half, Townsend segment. These questions are more open-ended than those in the regular problem sets.

Referee report (10%): You will write a referee report on a recent job market paper in development. The list of possible papers from which you may choose will be provided in the second half of the semester, due date TBD.

Research proposal project (20%): Students will write a proposal based on a topic, paper (or a few related papers), method, or theme. The first section of the proposal will be like a referee report on this topic. It should present the motivation for the topic or paper, go through key ideas and equations more succinctly than the original authors, and give a balanced view of strengths and criticisms; the latter are particularly important. The second section builds on the first part by proposing an idea for a project or paper that extends this work in an interesting direction. For

example, the proposal could suggest modifying a model, adding new data, or suggesting novel data analysis. You will present your proposal to the class and turn in a rough draft proposal at the end of the first quarter (4/1), followed by a final draft of the written proposal due at the end of the semester (date TBD).

You should begin thinking about a proposal topic early. Buera, Kaboski, and Townsend (BKT) (2021) is a review paper that should may be helpful in choosing a topic. The extended reading list on Canvas includes many papers cited in BKT, among others. Example proposals from previous years will be posted on Canvas. We will arrange early, quarter-semester meeting(s) with faculty to discuss your preliminary project ideas.

In-class paper presentation (10%): During the second half of the course, you will choose one non-starred paper from the Bergquist section of the syllabus, present it to the class, and lead a short discussion on it. The presentation and discussion should take no more than 15 minutes.

Final exam (25%): There will be a final exam released during the final class period for the course. The exam will cover material covered in the lectures, required readings, review sheets, and problem sets. Details TBA.

Other materials: The readings listed below are all strongly recommended, and starred readings are required as they are coupled with class lectures. You can find additional readings on the extended reading list posted on Canvas. We will also post supplemental materials for skill building, including on method of moments, linear programming, and likelihood functions, to Canvas.

Townsend Section Key Readings (Lectures 2/16 – 3/30)

Lecture 1: (2/16) Economic Science: It's All About Experiments

*Buera, Francisco, Joseph Kaboski, and Robert M. Townsend. 2021. "From Micro to Macro Development," Working paper.

Koopmans, T., 1947. "Measurement without theory." *The Review of Economics and Statistics*, 29(3): 161-172.

Lecture 2: (2/18) Micro Data Tools: Cautionary Tales

*Townsend, R.M. and Urzua, S., 2009. "Measuring the impact of financial intermediation: linking contract theory to econometric policy evaluation." *Macroeconomic Dynamics*, 13(S2), pp. 268-316

Florido, Tiago. "Nonlinear Difference-in-Differences and Noisy Trends," March 2017

Lecture 3: (2/23) Sufficient Partial Identification and Aggregation: choosing model; getting by with less structure

*Acemoglu, Daron. Introduction to Modern Economic Growth. Princeton: Princeton University Press. Chapter 5.2. "The Representative Household," 218-226.

*Harberger, Arnold C. "Three Basic Postulates for Applied Welfare Economics: An Interpretive Essay." *Journal of Economic Literature* 9, no. 3 (1971): 785-97.
<http://www.jstor.org/stable/2720975>.

Lecture 4: (2/25) RCT Through the Lens of Structural Models

*Banerjee, Abhijit, Emily Breza, Robert Townsend, and Diego Vera-Cossio. 2019. "Access to credit and productivity: Evidence from Thai Villages," Working paper.

*Kaboski, Joseph and Robert Townsend. "A Structural Evaluation of a Large-Scale Quasi-Experimental Microfinance Initiative." *Econometrica* 79(5), September 2011: 1357- 1406.

Todd, Petra, E., and Kenneth I. Wolpin. 2006. "Assessing the Impact of a School Subsidy Program in Mexico: Using a Social Experiment to Validate a Dynamic Behavioral Model of Child Schooling and Fertility." *American Economic Review*, 96 (5): 1384-1417.

Lecture 5: (3/2) RCTs Introduced as if at Scale

Bergquist, Lauren, Benjamin Faber, Thibault Fally, Matthias Hoelzlein, Edward Miguel, and Andres Rodriguez-Clare, "Scaling Agricultural Policy Interventions: Theory and Evidence from Uganda," Working Paper, UC Berkeley, 2019.

*Ehrlich, Daniel and Robert Townsend. 2018. "Spatial Spillovers and Labor Market Dynamics: Evidence from Village Financial Interventions in Thailand," Working paper.

Lecture 6: (3/4) Risk Sharing: Without Obstacles as Key Benchmark, How Close to Data. Building from below

*Samphantharak, Krislert and Robert M. Townsend, 2018. "Risk and Return in Village Economies," *American Economic Journal: Microeconomics*, vol. 10(1):1-4.

Schulhofer-Wohl, Sam. "Heterogeneity and tests of risk sharing." *Journal of Political Economy* 119.5 (2011): 925-958.

*Townsend, Robert M. "Risk and Insurance in Village India." *Econometrica* 62, no. 3 (1994): 539-91. doi:10.2307/2951659.

Lecture 7: (3/11) Networks and Risk Sharing

Liu, Ernest. "Industrial policies in production networks." *The Quarterly Journal of Economics* 134.4 (2019): 1883-1948.

*Kinnan, Cynthia, Krislert Samphantharak, Robert Townsend, and Diego Vera-Cossio. (2020). "Insurance and Propagation in Village Networks," Working Paper.

Lecture 8: (3/16) Building from Below: Identifying Real Underlying Obstacles

Attanasio, O. P. and Pavoni, N. (2011), Risk Sharing in Private Information Models With Asset Accumulation: Explaining the Excess Smoothness of Consumption. *Econometrica*, 79: 1027-1068. doi:10.3982/ECTA7063

*Karaivanov, Alexander and Robert M. Townsend. "Dynamic Financial Constraints: Distinguishing Mechanism Design from Exogenously Incomplete Regimes." *Econometrica*, 82 (3) 2014: 887-959.

*Paulson, Anna, Townsend, Robert and Karaivanov, Alexander, (2006), Distinguishing Limited Liability from Moral Hazard in a Model of Entrepreneurship, *Journal of Political Economy*, 114, issue 1, p. 100-144.

Lecture 9: (3/18) Life Cycle Models and Data; Behavior and RCT Interventions; With Insurance Limits, Credit Constraints and Transaction Costs for Liquidity, Life Cycle as Basis for Models of Growth and Inequality

Kaplan, G. and Violante, G. L. (2014), A Model of the Consumption Response to Fiscal Stimulus Payments. *Econometrica*, 82: 1199-1239. doi:10.3982/ECTA10528

*Silva, Dejanir H. and Robert M. Townsend. 2018. "Risk-taking over the Life Cycle: Aggregate and Distributive Implications of Entrepreneurial Risk," Working Paper.

Lecture 10: (3/25) Multiple Obstacles in Economy-Wide Models: Realistic vs Ad Hoc

*Dabla-Norris, Era, Yan Ji, Robert M. Townsend, and D. Filiz Unsal, 2015. "Distinguishing Constraints on Financial Inclusion and Their Impact on GDP, TFP, and Inequality," NBER Working Papers 20821, National Bureau of Economic Research, Inc.

*Moll, Benjamin, Robert M. Townsend, and Victor Zhorin. "Economic development, flow of funds, and the equilibrium interaction of financial frictions." *Proceedings of the National Academy of Sciences* 114.24 (2017): 6176-6184.

Lecture 11: (3/30) Where is Structure Needed, or Not: Imperfect Competition and Finance

Einav, Liran, Amy Finkelstein, Stephen P. Ryan, Paul Schrimpf, and Mark R. Cullen. 2013. "Selection on Moral Hazard in Health Insurance." *American Economic Review*, 103 (1): 178-21

*Joaquim, Gustavo, Robert Townsend, and Victor Zhorin. 2019. “Optimal Contracting and Spatial Competition Among Financial Service Providers,” Working Paper.

<https://economics.mit.edu/files/18094>

Student Presentations: (04/01)

Townsend Section Extended Reading List

Lecture 1: Economic Science: It's All About Experiments

Angrist, Joshua D., and Jörn-Steffen Pischke. 2010. "The Credibility Revolution in Empirical Economics: How Better Research Design Is Taking the Con out of Econometrics." *Journal of Economic Perspectives*, 24 (2): 3-30.

Lucas Jr, R.E., 1980. "Methods and problems in business cycle theory." *Journal of Money, Credit, and Banking*, 12(4): 696-715.

Matzkin, Rosa L., 2007. "Nonparametric Identification," in: J.J. Heckman & E.E. Leamer (ed.), *Handbook of Econometrics*, edition 1, volume 6, chapter 73 Elsevier.

Ragnar Frisch (1926) "On a Problem in Pure Economics: Translated by JS Chipman." Preferences, Utility, and Demand: A Minnesota Symposium. 1926.

Varian, H., 2014. "Big data: new tricks for econometrics." *Journal of Economic Perspectives*, 28(2): 3-28.

Note: All references listed below in Lecture 1 are drawn from Buera, Kaboski, and Townsend (2021), hereafter referred to as "BKT."

Introductory sections of BKT (2021)

Adamopoulos, Tasso, Loren Brandt, Jessica Leight, and Diego Restuccia, "Misallocation, Selection and Productivity: A Quantitative Analysis with Panel Data from China," NBER Working Paper 23039, January 2017.

Banerjee, Abhijit, Rukmini Banerji, James Berry, Esther Duflo, Harini Kannan, Shobhini Mukerji, Marc Shotland, and Michael Walton. "From Proof of Concept to Scalable Policies: Challenges and Solutions, with an Application." *Journal of Economic Perspectives* 31, no. 4 (2017): 73–102. <https://doi.org/10.1257/jep.31.4.73>.

Chen, Chaoran, Diego Restuccia, and Raul Santaeulalia-Llopis, "The Effects of Land Markets on Resource Allocation and Agricultural Productivity," Working Papers tecipa-649, University of Toronto, Department of Economics, September 2019.

Gollin, Douglas and Christopher Udry, "Heterogeneity, Measurement Error, and Misallocation: Evidence from African Agriculture," NBER Working Paper 25440, 2019.

Hsieh, Chang-Tai, and Peter J. Klenow. "Misallocation and Manufacturing TFP in China and India." *The Quarterly Journal of Economics* 124, no. 4 (2009): 1403–48. <https://doi.org/10.1162/qjec.2009.124.4.1403>.

Restuccia, Diego, and Richard Rogerson. "Policy Distortions and Aggregate Productivity with Heterogeneous Establishments." *Review of Economic Dynamics* 11, no. 4 (2008): 707–20. <https://doi.org/10.1016/j.red.2008.05.002>.

Santaaulalia-Llopis, Raul and Diego Restuccia, "Misallocation and Productivity," NBER Working Paper 23128, February 2017.

Aggregate Resource Constraints

Kaboski, Joseph P., Molly Lipscomb, Midrigan Midrigan, and Carolyn Pelnik, "How Important are Indivisibilities for Savings and Development? Experimental Evidence from Uganda," manuscript, University of Notre Dame, 2019.

Parker, Susan W., and Graciela M. Teruel. "Randomization and Social Program Evaluation: The Case of Progresa." *The Annals of the American Academy of Political and Social Science* 599 (2005): 199–219.

Heterogeneity

Kaboski, Joseph P., and Robert M. Townsend. "A Structural Evaluation of a Large-Scale Quasi-Experimental Microfinance Initiative." *Econometrica* 79, no. 5 (2011): 1357–1406. <https://doi.org/10.3982/ECTA7079>.

Mel, Suresh de, David McKenzie, and Christopher Woodruff. "Returns to Capital in Microenterprises: Evidence from a Field Experiment." *The Quarterly Journal of Economics* 123, no. 4 (November 1, 2008): 1329–72. <https://doi.org/10.1162/qjec.2008.123.4.1329>.

Muralidharan, Karthik, Paul Niehaus, and Sandip Sukhtankar, "General Equilibrium Effects of (Improving) Public Employment Programs: Experimental Evidence from India," NBER Working Papers 23838, September 2017.

General Equilibrium Effects

Akram, Agha Ali, Shyamal Chowdhury, and Ahmed Mushfiq Mobarak, "Effects of Emigration on Rural Labor Markets," NBER Working Papers 23929, October 2017.

Cai, Jing. "Interfirm Relationships and Business Performance." *The Quarterly Journal of Economics* 133, no. 3 (20180801): 1229.

Fehr, Ernst, and Lorenz Goette. "Do Workers Work More If Wages Are High? Evidence from a Randomized Field Experiment." *American Economic Review* 97, no. 1 (March 2007): 298–317. <https://doi.org/10.1257/aer.97.1.298>.

Fieler, Ana Cecília. "Nonhomotheticity and Bilateral Trade: Evidence and a Quantitative Explanation." *Econometrica* 79, no. 4 (2011): 1069–1101. <https://doi.org/10.3982/ECTA8346>.

Harberger, Arnold C. "The Measurement of Waste." *The American Economic Review* 54, no. 3 (1964): 58–76.

Leemput, Eva Van, "A Passage to India: Quantifying Internal and External Barriers to Trade," International Finance Discussion Papers 1185, 2016.

Kaboski, Joseph P., and Robert M. Townsend. "The Impact of Credit on Village Economies." *American Economic Journal: Applied Economics* 4, no. 2 (April 2012): 98–133.
<https://doi.org/10.1257/app.4.2.98>.

Obstacles to Trade

Ahlin, Christian, and Robert M. Townsend. "Using Repayment Data to Test across Models of Joint Liability Lending." *The Economic Journal* 117, no. 517 (2007): F11–51.

Allen, Treb, and Costas Arkolakis. "Trade and the Topography of the Spatial Economy *." *The Quarterly Journal of Economics* 129, no. 3 (August 1, 2014): 1085–1140.
<https://doi.org/10.1093/qje/qju016>.

Caliendo, Lorenzo, Fernando Parro, Esteban Rossi-Hansberg, and Pierre-Daniel Sarte. "The Impact of Regional and Sectoral Productivity Changes on the U.S. Economy." *The Review of Economic Studies* 85, no. 4 (October 1, 2018): 2042–96. <https://doi.org/10.1093/restud/rdx082>.

Dabla-Norris, Era, Yan Ji, Robert M. Townsend, and D. Filiz Unsal. "Distinguishing Constraints on Financial Inclusion and Their Impact on GDP, TFP, and the Distribution of Income." *Journal of Monetary Economics*, January 17, 2020. <https://doi.org/10.1016/j.jmoneco.2020.01.003>.

Dekle, Robert, Jonathan Eaton, and Samuel Kortum. "Global Rebalancing with Gravity: Measuring the Burden of Adjustment." *IMF Staff Papers* 55, no. 3 (July 1, 2008): 511–40.
<https://doi.org/10.1057/imfsp.2008.17>.

Desmet, Klaus, Dávid Krisztián Nagy, and Esteban Rossi-Hansberg. "The Geography of Development." *Journal of Political Economy* 126, no. 3 (January 22, 2018): 903–83.
<https://doi.org/10.1086/697084>.

Ehrlich, Dan and Robert Townsend, "Spatial Spillovers and Labor Market Dynamics: Village Financial Interventions in Thailand," manuscript, MIT, 2019.

Moll, Benjamin. "Productivity Losses from Financial Frictions: Can Self-Financing Undo Capital Misallocation?" *American Economic Review* 104, no. 10 (October 2014): 3186–3221.
<https://doi.org/10.1257/aer.104.10.3186>.

Monte, Ferdinando, Stephen J. Redding, and Esteban Rossi-Hansberg. "Commuting, Migration, and Local Employment Elasticities." *American Economic Review* 108, no. 12 (December 2018): 3855–90. <https://doi.org/10.1257/aer.20151507>.

Paulson, Anna L, and Robert Townsend. “Entrepreneurship and Financial Constraints in Thailand.” *Journal of Corporate Finance, Venture Capital, Initial Public Offerings, and Entrepreneurial Finance*, 10, no. 2 (March 1, 2004): 229–62. [https://doi.org/10.1016/S0929-1199\(03\)00056-7](https://doi.org/10.1016/S0929-1199(03)00056-7).

Paulson, Anna L., Robert M. Townsend, and Alexander Karaivanov. “Distinguishing Limited Liability from Moral Hazard in a Model of Entrepreneurship.” *Journal of Political Economy* 114, no. 1 (February 1, 2006): 100–144. <https://doi.org/10.1086/498917>.

Dynamic Optimization and Capital Accumulation

Aghion, Philippe, and Patrick Bolton. “A Theory of Trickle-Down Growth and Development.” *The Review of Economic Studies* 64, no. 2 (April 1, 1997): 151–72. <https://doi.org/10.2307/2971707>.

Aguiar, Mark, and Gita Gopinath. “Emerging Market Business Cycles: The Cycle Is the Trend.” *Journal of Political Economy* 115, no. 1 (February 1, 2007): 69–102. <https://doi.org/10.1086/511283>.

Ahn, SeHyoun, Greg Kaplan, Benjamin Moll, Thomas Winberry, and Christian Wolf. “When Inequality Matters for Macro and Macro Matters for Inequality.” *NBER Macroeconomics Annual* 32 (April 1, 2018): 1–75. <https://doi.org/10.1086/696046>.

Alvarez, Fernando E. and David Argente, “Consumer Surplus of Alternative- Payment Methods: Paying Uber with Cash,” BFI Working Papers 2019-96, Becker Friedman Institute, September 2019.

Bandiera, Oriana, Robin Burgess, Narayan Das, Selim Gulesci, Imran Rasul, and Munshi Sulaiman, “Can Basic Entrepreneurship Transform the Economic Lives of the Poor?,” IZA Discussion Papers 7386, May 2013.

Banerjee, Abhijit V., and Andrew F. Newman. “Occupational Choice and the Process of Development.” *Journal of Political Economy* 101, no. 2 (1993): 274–98.

Blattman, Christopher, and Stefan Dercon. “The Impacts of Industrial and Entrepreneurial Work on Income and Health: Experimental Evidence from Ethiopia.” *American Economic Journal: Applied Economics* 10, no. 3 (July 2018): 1–38. <https://doi.org/10.1257/app.20170173>.

Blattman, Christopher, Stefan Dercon, and Simon Franklin, “Impacts of Industrial and Entrepreneurial Jobs on Youth: 5-year Experimental Evidence on Factory Job Offers and Cash Grants in Ethiopia,” NBER Working Papers 25788, April 2019.

Blattman, Christopher, Nathan Fiala, and Sebastian Martinez. “Generating Skilled Self-Employment in Developing Countries: Experimental Evidence from Uganda.” *The Quarterly Journal of Economics* 129, no. 2 (May 1, 2014): 697–752. <https://doi.org/10.1093/qje/qjt057>.

Blattman, Christopher, Nathan Fiala, and Sebastian Martinez, “The Long Term Impacts of Grants on Poverty: 9-year Evidence From Uganda’s Youth Opportunities Program,” Technical Report, National Bureau of Economic Research 2018.

Buera, Francisco J. and Ezra Oberfield, “The Global Diffusion of Ideas,” NBER Working Papers 21844, January 2016.

Buera, Francisco J., Joseph P. Kaboski, and Yongseok Shin. “Finance and Development: A Tale of Two Sectors.” *American Economic Review* 101, no. 5 (August 2011): 1964–2002. <https://doi.org/10.1257/aer.101.5.1964>.

Buera, Francisco J., and Yongseok Shin. “Financial Frictions and the Persistence of History: A Quantitative Exploration.” *Journal of Political Economy* 121, no. 2 (April 1, 2013): 221–72. <https://doi.org/10.1086/670271>.

de Mel Suresh, and de Mel Suresh. “One-Time Transfers of Cash or Capital Have Long-Lasting Effects on Microenterprises in Sri Lanka.” *Science* 335, no. 6071 (2012): 962.

Desmet, Klaus, Dávid Krisztián Nagy, and Esteban Rossi-Hansberg. “The Geography of Development.” *Journal of Political Economy* 126, no. 3 (January 22, 2018): 903–83. <https://doi.org/10.1086/697084>.

Fried, Stephie and David Lagakos, “Electricity and Firm Productivity: A General-Equilibrium Approach,” NBER Working Paper 27081, May 2020.

Galor, Oded, and Joseph Zeira. “Income Distribution and Macroeconomics.” *The Review of Economic Studies* 60, no. 1 (January 1, 1993): 35–52. <https://doi.org/10.2307/2297811>.

Krusell, Per, and Jr. Smith Anthony A. “Income and Wealth Heterogeneity in the Macroeconomy.” *Journal of Political Economy* 106, no. 5 (October 1, 1998): 867–96. <https://doi.org/10.1086/250034>.

Lucas, Robert E. “Ideas and Growth.” *Economica* 76, no. 301 (2009): 1–19. <https://doi.org/10.1111/j.1468-0335.2008.00748.x>.

Lucas, Robert E., and Benjamin Moll. “Knowledge Growth and the Allocation of Time.” *Journal of Political Economy* 122, no. 1 (February 1, 2014): 1–51. <https://doi.org/10.1086/674363>.

Munshi, Kaivan, and Jacques Myaux. “Social Norms and the Fertility Transition.” *Journal of Development Economics* 80, no. 1 (June 1, 2006): 1–38. <https://doi.org/10.1016/j.jdeveco.2005.01.002>.

Perla, Jesse, and Christopher Tonetti. “Equilibrium Imitation and Growth.” *Journal of Political Economy* 122, no. 1 (February 1, 2014): 52–76. <https://doi.org/10.1086/674362>.

Piketty, Thomas. “The Dynamics of the Wealth Distribution and the Interest Rate with Credit Rationing.” *The Review of Economic Studies* 64, no. 2 (April 1, 1997): 173–89. <https://doi.org/10.2307/2971708>.

Silva, Dejanir and Robert Townsend, “Risk-taking over the Life Cycle: Aggregate and Distributive Implications of Entrepreneurial Risk,” manuscript, University of Illinois at Urbana-Champaign, 2019.

Zhang, Bin, and Colin A. Carter. “Reforms, the Weather, and Productivity Growth in China’s Grain Sector.” *American Journal of Agricultural Economics* 79, no. 4 (1997): 1266–77. <https://doi.org/10.2307/1244283>.

Economies of Scale

Aghion, Philippe, and Peter Howitt. “A Model of Growth Through Creative Destruction.” *Econometrica* 60, no. 2 (1992): 323–51. <https://doi.org/10.2307/2951599>.

Alfaro-Urena, Alfonso, Isabela Manelici, and Jose P. Vasquez, “The Effects of Joining Multinational Supply Chains: New Evidence from Firm-to-Firm Linkages,” NBER Working Paper, April 2019.

Alvarez, Fernando, , Francisco J. Buera, and Jr. Robert E. Lucas, “Idea Flows, Economic Growth, and Trade,” NBER Working Papers 19667, National Bureau of Economic Research, Inc November 2013.

Atkin, David, Amit K. Khandelwal, and Adam Osman. “Exporting and Firm Performance: Evidence from a Randomized Experiment*.” *The Quarterly Journal of Economics* 132, no. 2 (May 1, 2017): 551–615. <https://doi.org/10.1093/qje/qjx002>.

Balboni, Clare, Oriana Bandiera, Maitreesh Ghatak, and Anton Heil, “Why Do People Stay Poor?,” Working paper, 2018.

Brooks, Wyatt, Kevin Donovan, and Terence R. Johnson, “Identification and Quantitative Implications of an Equilibrium Diffusion Model,” Technical Report, University of Notre Dame, 2018.

Carrillo, Paul, Dave Donaldson, Dina Pomeranz, and Monica Singhal, “The Bigger the Better? Using Lotteries to Identify the Allocative Efficiency Effects of Firm Size,” Technical Report, 2019.

Grossman, Gene M., and Elhanan Helpman. “Quality Ladders in the Theory of Growth.” *The Review of Economic Studies* 58, no. 1 (January 1, 1991): 43–61. <https://doi.org/10.2307/2298044>.

Herkenhoff, Kyle, Jeremy Lise, Guido Menzio, and Gordon M. Phillips, “Production and Learning in Teams,” NBER Working Papers 25179, October 2018.

Jack, William, and Tavneet Suri. "Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution." *American Economic Review* 104, no. 1 (January 2014): 183–223. <https://doi.org/10.1257/aer.104.1.183>.

Jarosch, Gregor, Ezra Oberfield, and Esteban Rossi-Hansberg, "Learning from Coworkers," NBER Working Papers 25418, January 2019.

Romer, Paul M. "Endogenous Technological Change." *Journal of Political Economy* 98, no. 5 (1990): S71–102.

Suri, Tavneet, "Mobile Money," *Annual Review of Economics*, 9, (2017): 497–520.

Lecture 2: Micro Data Tools: Cautionary Tales

Heckman, James J. and Vytlacil, Edward J. (2001) Local instrumental variables. In Cheng Hsiao, Kimio Morimune, and James L. Powell (eds.), *Nonlinear Statistical Modeling: Proceedings of the Thirteenth International Symposium in Economic Theory and Econometrics: Essays in Honor of Takeshi Amemiya*, New York: Cambridge University Press, pp. 1-46.

Imbens, Guido W. "Better LATE Than Nothing: Some Comments on Deaton (2009) and Heckman and Urzua (2009)." *Journal of Economic Literature* 48, no. 2 (June 2010): 399–423.

Jeong, Hyeok, and Robert M. Townsend. "Growth and inequality: Model evaluation based on an estimation-calibration strategy." *Macroeconomic dynamics* 12.S2 (2008): 231-284.

Xavier Giné, Robert M. Townsend, Evaluation of financial liberalization: a general equilibrium model with constrained occupation choice, *Journal of Development Economics*, Volume 74, Issue 2, 2004, Pages 269-307, <https://doi.org/10.1016/j.jdeveco.2003.03.005>.

Robert M. Townsend and Kenichi Ueda (2006), Financial Deepening, Inequality, and Growth: A Model-Based Quantitative Evaluation, *The Review of Economic Studies*, Vol. 73, No. 1 (Jan., 2006), pp. 251-280, <http://www.jstor.org/stable/3700624>

Robert M. Townsend, Kenichi Ueda (2010), Welfare Gains from Financial Liberalization, Volume 51, Issue 3, August 2010, Pages 553–597, <http://onlinelibrary.wiley.com/doi/10.1111/j.1468-2354.2010.00593.x/abstract>

Imbens, Guido W. and Angrist, Joshua D. (1994) Identification and estimation of local average treatment effects. *Econometrica* 62, 467-475.

Athey, Susan, and Guido W. Imbens. "Identification and Inference in Nonlinear Difference-in-Differences Models." *Econometrica* 74, no. 2 (2006): 431–97. <https://doi.org/10.1111/j.1468-0262.2006.00668.x>.

Lecture 3: Sufficient Partial Identification and Aggregation: choosing model; getting by with less structure

H. Scarf, with the collaboration of T. Hansen, *The computation of economic equilibria* (Yale University Press, New Haven, 1973).

Dekle, Robert, Jonathan Eaton, and Samuel Kortum. "Unbalanced trade." *American Economic Review* 97.2 (2007): 351-355.

Jones, Ronald W., and J. Peter Neary. "The Positive Theory of International trade." *Handbook of International Economics* 1 (1984): 1-62.

Intermediate Approaches

Chetty, Raj 2009. Sufficient Statistics for Welfare Analysis: A Bridge Between Structural and Reduced-Form Methods. *Annual Review of Economics* 1: 451-488.
http://www.rajchetty.com/chettyfiles/suffstat_ar.pdf

Chetty, Raj 2006. A General Formula for the Optimal Level of Social Insurance. *Journal of Public Economics* 90: 1879-1901. http://www.rajchetty.com/chettyfiles/ui_formula_jpube.pdf

Chetty, Raj and Adam Looney, 2006. Consumption Smoothing and the Welfare Consequences of Social Insurance in Developing Economies, *Journal of Public Economics* 90: 2351-2356.

Melitz, Marc J., and Stephen J. Redding. "Missing Gains from Trade?" *The American Economic Review* 104, no. 5 (2014): 317-21. <http://www.jstor.org/stable/42920956>.

Arkolakis, Costas, Arnaud Costinot, and Andrés Rodríguez-Clare. "New trade models, same old gains?." *American Economic Review* 102.1 (2012): 94-130.

Parallels in the US

Beraja, Martin. "Counterfactual equivalence in Macroeconomics." Working Paper (2018).
<https://economics.mit.edu/files/17173>

Sarto, Andres. "Recovering Macro Elasticities from Regional Data." Working Paper (2018).
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