

Topics in Advanced Macroeconomics: Goods Markets and Market Power

ECON 8200-007 — Spring 2025

Instructor: Lukas Nord (lksnord@sas.upenn.edu, PCPE 531)

Lecture Times: Tuesday 5:15PM-8:15PM (first half of spring term)

Office Hours: Send me an email to schedule an appointment.

Course Description: This course provides students with tools to study Macroeconomic questions related to goods markets. We will discuss the role of household preferences, market power, search frictions, customer capital, and price dynamics in macroeconomic research. The emphasis of the course is on introducing techniques and key concepts commonly used in the literature to enable students to develop their own research in the field.

Course Materials: I provide below a selective list of papers related to the topics of this class. Material from those marked with a **■** will be covered in class. The remaining papers are a starting point for those interested in further reading but not required to follow the course. I will provide additional materials (lecture notes) as we go along.

Evaluation: The evaluation for this class has two parts: The first is a referee report on a paper of your choice. You should propose a paper that you think will be useful to understand in detail for your own research. Any topic in the field of quantitative macro broadly defined is suitable, especially related to goods and labor markets. The only restriction is that the paper must not be published or R&R at a journal. As a rule of thumb, any NBER working paper from the last 12 months should be suitable. Please send me your choice of paper before the second lecture. I will provide more details on how to write a referee report in class.

Second, in combination with this course I am running a workshop (*Mega Class*) together with Hal Cole and Joachim Hubmer, where students can present (preliminary) research ideas. The workshop will meet every Tuesday 10:15:11:45AM, starting on January 28. Send an email to Joachim (jhubmer@sas.upenn.edu) to sign up for the workshop and get access to the workshop folder on dropbox. All students taking this course for credit should actively participate in the workshop as well and have to present once before spring break (i.e. before March 10). Depending on which stage of the PhD you are in, the presentation can be a paper you are interested in (i.e. the paper you write the referee report on), an early stage research proposal or a project you would like feedback on. We will discuss in class how to get the most out of your presentation.

Course Outline: I will give five lectures (Tuesdays 5:15PM). Each lecture covers one of the topics listed below. This is a suggestive outline, the list of topics and/or papers covered may be revised during the course, depending on progress and students' interests.

1 Demand Functions for Macroeconomists

Households' preference structure and the resulting demand functions are a fundamental object in any theory involving multiple goods or differentiated varieties. We start by deriving demand functions and price indices for standard constant elasticity of substitution (CES) preferences. Building on the standard framework we consider two extensions: (1) Non-homothetic CES preferences that allow consumption bundles to vary with income, commonly used in research on inequality and growth. (2) Preferences with non-constant elasticities of substitution, commonly used in research on market power and markups.

☞ Avinash K Dixit and Joseph E Stiglitz. Monopolistic competition and optimum product diversity. *The American economic review*, 67(3):297–308, 1977

☞ Diego Comin, Danial Lashkari, and Martí Mestieri. Structural change with long-run income and price effects. *Econometrica*, 89(1):311–374, 2021

☞ Peter J Klenow and Jonathan L Willis. Real rigidities and nominal price changes. *Economica*, 83(331):443–472, 2016

☞ Andrew Atkeson and Ariel Burstein. Pricing-to-market, trade costs, and international relative prices. *American Economic Review*, 98(5):1998–2031, 2008

Simon Alder, Timo Boppart, and Andreas Müller. A theory of structural change that can fit the data. *American Economic Journal: Macroeconomics*, 14(2):160–206, 2022

David Argente and Munseob Lee. Cost of living inequality during the great recession. *Journal of the European Economic Association*, 19(2):913–952, 2021

Raphael Auer, Ariel Burstein, Sarah Lein, and Jonathan Vogel. Unequal expenditure switching: Evidence from switzerland. *Review of Economic Studies*, 91(5):2572–2603, 2024

Clement E Bohr, Martí Mestieri, and Emre Enes Yavuz. Aggregation and closed-form results for nonhomothetic ces preferences. *arXiv preprint arXiv:2311.06740*, 2023

Clement Bohr, Martí Mestieri, and Frédéric Robert-Nicoud. *Heterothetic cobb douglas: Theory and applications*. Centre for Economic Policy Research, 2023

Rebecca Diamond and Enrico Moretti. Where is standard of living the highest? local prices and the geography of consumption. Technical report, National Bureau of Economic Research, 2021

Benjamin Faber and Thibault Fally. Firm heterogeneity in consumption baskets: Evidence from home and store scanner data. *The Review of Economic Studies*, 89(3):1420–1459, 2022

Robert C Feenstra. New product varieties and the measurement of international prices. *The American Economic Review*, pages 157–177, 1994

Jessie Handbury. Are poor cities cheap for everyone? non-homotheticity and the cost of living across us cities. *Econometrica*, 89(6):2679–2715, 2021

Joachim Hubmer. The race between preferences and technology. *Econometrica*, 91(1):227–261, 2023

Xavier Jaravel. The unequal gains from product innovations: Evidence from the us retail sector. *The Quarterly Journal of Economics*, 134(2):715–783, 2019

Nicholas Li. An engel curve for variety. *Review of Economics and Statistics*, 103(1):72–87, 2021

Miles S. Kimball. The quantitative analytics of the basic neomonetarist model. *Journal of Money, Credit and Banking*, 27(4):1241–1277, 1995

2 Markups: Estimation and Implications

Trends in market power and their implications have received increasing attention in macroeconomic research over the past decade. A key measure of market power in the goods market is the price-cost markup that firms choose when setting their prices. We discuss the most common approach to estimate markups in the macroeconomic literature, building on firms’ production function. In addition we study one of the main implication of markup dispersion: Distortions to the aggregate level of production and its distribution across firms.

▀ Steve Bond, Arshia Hashemi, Greg Kaplan, and Piotr Zoch. Some unpleasant markup arithmetic: Production function elasticities and their estimation from production data. *Journal of Monetary Economics*, 121:1–14, 2021

▀ Maarten De Ridder, Basile Grassi, and Giovanni Morzenti. The hitchhiker’s guide to markup estimation. 2024

▀ Chang-Tai Hsieh and Peter J Klenow. Misallocation and manufacturing tfp in china and india. *The Quarterly journal of economics*, 124(4):1403–1448, 2009

▀ Chris Edmond, Virgiliu Midrigan, and Daniel Yi Xu. How costly are markups? *Journal of Political Economy*, 131(7):1619–1675, 2023

Eric Anderson, Sergio Rebelo, and Arlene Wong. Markups across space and time. 2023

David Autor, David Dorn, Lawrence F Katz, Christina Patterson, and John Van Reenen. The fall of the labor share and the rise of superstar firms. *The Quarterly Journal of Economics*, 135(2):645–709, 2020

David Rezza Baqaee and Emmanuel Farhi. Productivity and misallocation in general equilibrium. *The Quarterly Journal of Economics*, 135(1):105–163, 2020

Jonathan Becker, Chris Edmond, Virgiliu Midrigan, and Daniel Yi Xu. Local concentration, national concentration, and the spatial distribution of markups. 2024

David Berger, Kyle Herkenhoff, and Simon Mongey. Labor market power. *American Economic Review*, 112(4):1147–1193, 2022

Steven Berry, James Levinsohn, and Ariel Pakes. Automobile prices in market equilibrium. *Econometrica: Journal of the Econometric Society*, pages 841–890, 1995

Steven T Berry and Philip A Haile. Foundations of demand estimation. In *Handbook of industrial organization*, volume 4, pages 1–62. Elsevier, 2021

Mark Bills, Peter J Klenow, and Benjamin A Malin. Resurrecting the role of the product market wedge in recessions. *American Economic Review*, 108(4-5):1118–1146, 2018

- Corina Boar and Virgiliu Midrigan. Markups and inequality. *Review of Economic Studies*, page rdae103, 2024
- Gideon Bornstein and Alessandra Peter. Nonlinear pricing and misallocation. Technical report, National Bureau of Economic Research, 2024
- Varadarajan V Chari, Patrick J Kehoe, and Ellen R McGrattan. Business cycle accounting. *Econometrica*, 75(3):781–836, 2007
- Jan De Loecker, Jan Eeckhout, and Gabriel Unger. The rise of market power and the macroeconomic implications. *The Quarterly Journal of Economics*, 135(2):561–644, 2020
- Jan De Loecker and Chad Syverson. An industrial organization perspective on productivity. In *Handbook of industrial organization*, volume 4, pages 141–223. Elsevier, 2021
- Jan De Loecker, Jan Eeckhout, and Simon Mongey. Quantifying market power and business dynamism in the macroeconomy. Technical report, National Bureau of Economic Research, 2021
- Chris Edmond, Virgiliu Midrigan, and Daniel Yi Xu. Competition, markups, and the gains from international trade. *American Economic Review*, 105(10):3183–3221, 2015
- Robert E Hall. Market structure and macroeconomic fluctuations. *Brookings papers on economic activity*, 1986(2):285–338, 1986
- Robert E Hall. The relation between price and marginal cost in us industry. *Journal of political Economy*, 96(5):921–947, 1988
- Loukas Karabarbounis and Brent Neiman. The global decline of the labor share. *The Quarterly journal of economics*, 129(1):61–103, 2014
- Simon Mongey and Michael Waugh. Pricing inequality. *Unpublished manuscript, Federal Reserve Bank of Minneapolis, United States*, 2024
- Michael Peters. Heterogeneous markups, growth, and endogenous misallocation. *Econometrica*, 88(5):2037–2073, 2020
- Diego Restuccia and Richard Rogerson. Policy distortions and aggregate productivity with heterogeneous establishments. *Review of Economic dynamics*, 11(4):707–720, 2008
- Sergio Salgado, Serdar Ozkan, Joachim Hubmer, Guangbin Hong, and Mons Chan. Scalable vs. productive technologies. 2024
- Kunal Sangani. Markups across the income distribution: Measurement and implications. 2023
- Chad Syverson. Macroeconomics and market power: Context, implications, and open questions. *Journal of Economic Perspectives*, 33(3):23–43, 2019
- Johannes Stroebel and Joseph Vavra. House prices, local demand, and retail prices. *Journal of Political Economy*, 127(3):1391–1436, 2019
- Michael E Waugh. Heterogeneous agent trade. Technical report, National Bureau of Economic Research, 2023

3 Search Frictions and Product Market Power

Many product markets are characterized by substantial dispersion in prices for homogeneous products. This price dispersion suggests the presence of search frictions in product markets that prevent buyers from accessing all available prices. The presence of search frictions allows sellers to charge positive price-cost markups, i.e. search frictions are a source of market power in the product market. We study a version of the canonical Burdett-Judd model of price dispersion and discuss its extension to heterogeneous consumers, heterogeneous firms and endogenous product differentiation.

■ Kenneth Burdett and Kenneth L Judd. Equilibrium price dispersion. *Econometrica: Journal of the Econometric Society*, pages 955–969, 1983

■ Guido Menzio. Optimal product design: Implications for competition and growth under declining search frictions. *Econometrica*, 91(2):605–639, 2023

■ Guido Menzio. Markups: A search-theoretic perspective. Technical report, National Bureau of Economic Research, 2024

■ Lukas Nord. Shopping, demand composition, and equilibrium prices. *Available at SSRN 4178271*, 2023

Mark Aguiar and Erik Hurst. Life-cycle prices and production. *American Economic Review*, 97(5):1533–1559, 2007

James Albrecht, Guido Menzio, and Susan Vroman. Vertical differentiation in frictional product markets. *Journal of Political Economy Macroeconomics*, 1(3):586–632, 2023

George Alessandria and Joseph P Kaboski. Pricing-to-market and the failure of absolute ppp. *American Economic Journal: Macroeconomics*, 3(1):91–127, 2011

Yavuz Arslan, Bulent Guler, and Temel Taskin. Price search, consumption inequality and expenditure inequality over the life-cycle. *International Economic Review*, 62(1):295–320, 2021

Kenneth Burdett and Guido Menzio. The (q, s, s) pricing rule. *The Review of Economic Studies*, 85(2):892–928, 2018

Allen Head, Lucy Qian Liu, Guido Menzio, and Randall Wright. Sticky prices: A new monetarist approach. *Journal of the European Economic Association*, 10(5):939–973, 2012

Greg Kaplan and Guido Menzio. The morphology of price dispersion. *International Economic Review*, 56(4):1165–1206, 2015

Greg Kaplan and Guido Menzio. Shopping externalities and self-fulfilling unemployment fluctuations. *Journal of Political Economy*, 124(3):771–825, 2016

Greg Kaplan, Guido Menzio, Leena Rudanko, and Nicholas Trachter. Relative price dispersion: Evidence and theory. *American Economic Journal: Microeconomics*, 11(3):68–124, 2019

Guido Menzio. Search theory of imperfect competition with decreasing returns to scale. *Journal of Economic Theory*, 218:105827, 2024

Krzysztof Pytka. Shopping frictions with household heterogeneity: Theory & empirics. *Available at SSRN 4833503*, 2024

Francisca Sara-Zaror. Inflation, price dispersion, and welfare: The role of consumer search. 2024

George J Stigler. The economics of information. *Journal of political economy*, 69(3):213–225, 1961

Hal R Varian. A model of sales. *The American economic review*, 70(4):651–659, 1980

4 Customer Capital and the Extensive Margin of Demand

A growing body of research emphasizes the role of demand for firm growth. Much of firms’ demand is driven by the extensive margin, i.e. the number of customers a firm sells to, rather than the intensive margin, i.e. the quantity sold to each customer. In addition, firms spend substantial resources on marketing activities to reach a wider set of customers. We discuss evidence and theories of the dynamics of firms’ customer base and their implications for firm growth and performance.

Doireann Fitzgerald, Stefanie Haller, and Yaniv Yedid-Levi. How exporters grow. *Review of Economic Studies*, 91(4):2276–2306, 2024

Liran Einav, Peter J Klenow, Jonathan D Levin, and Raviv Murciano-Goroff. Customers and retail growth. Technical report, Working Paper, 2022

Luigi Paciello, Andrea Pozzi, and Nicholas Trachter. Price dynamics with customer markets. *International Economic Review*, 60(1):413–446, 2019

Leena Rudanko. Price setting with customer capital: Sales, teasers, and rigidity. 2024

Hassan Afrouzi, Andres Drenik, and Ryan Kim. Concentration, market power, and misallocation: The role of endogenous customer acquisition. Technical report, National Bureau of Economic Research, 2023

David Argente, Doireann Fitzgerald, Sara Moreira, and Anthony Priolo. How do entrants build market share? the role of demand frictions. *American Economic Review: Insights*, 2021

David Argente, Munseob Lee, and Sara Moreira. The life cycle of products: Evidence and implications. *Journal of Political Economy*, 132(2):337–390, 2024

Yan Bai and José-Víctor Ríos-Rull. Demand shocks and open economy puzzles. *American Economic Review*, 105(5):644–649, 2015

Yan Bai, Jose-Victor Rios-Rull, and Kjetil Storesletten. Demand shocks as technology shocks. Technical report, National Bureau of Economic Research, 2024

Scott R Baker, Brian Baugh, and Marco Sammon. Customer churn and intangible capital. *Journal of Political Economy Macroeconomics*, 1(3):447–505, 2023

Salome Baslandze, Jeremy Greenwood, Ricardo Marto, and Sara Moreira. The expansion of varieties in the new age of advertising. *Review of Economic Dynamics*, 50:171–210, 2023

Johannes Boehm, Ruairidh South, Ezra Oberfield, and Mazhar Waseem. The network origins of firm dynamics: Contracting frictions and dynamism with long-term relationships. 2024

Bart J. Bronnenberg, Jean-Pierre Dube, and Chad Syverson. Marketing investment and intangible brand capital. *Journal of Economic Perspectives*, 36(3):53–74, August 2022

- Laurent Cavenaile and Pau Roldan-Blanco. Advertising, innovation, and economic growth. *American Economic Journal: Macroeconomics*, 13(3):251–303, 2021
- Laurent Cavenaile, Murat Alp Celik, Jesse Perla, and Pau Roldan-Blanco. A theory of dynamic product awareness and targeted advertising. Technical report, Working Paper, 2023
- Laurent Cavenaile, Murat Alp Celik, Pau Roldan-Blanco, and Xu Tian. Style over substance? advertising, innovation, and endogenous market structure. *Journal of Monetary Economics*, page 103683, 2024
- Andrea Chiavari. Customer accumulation, returns to scale, and secular trends. 2024
- Emin M Dinlersoz and Mehmet Yorukoglu. Information and industry dynamics. *American Economic Review*, 102(2):884–913, 2012
- Lukasz A Drozd and Jaromir B Nosal. Understanding international prices: Customers as capital. *American Economic Review*, 102(1):364–395, 2012
- Marcela Eslava, John Haltiwanger, and Nicolas Urdaneta. The size and life-cycle growth of plants: The role of productivity, demand, and wedges. *Review of Economic Studies*, 91(1):259–300, 2024
- Jesús Fernández-Villaverde, Federico Mandelman, Yang Yu, and Francesco Zanetti. The “matthew effect” and market concentration: Search complementarities and monopsony power. *Journal of Monetary Economics*, 121:62–90, 2021
- Lucia Foster, John Haltiwanger, and Chad Syverson. The slow growth of new plants: Learning about demand? *Economica*, 83(329):91–129, 2016
- Francois Gourio and Leena Rudanko. Customer capital. *Review of Economic Studies*, 81(3):1102–1136, 2014
- Jeremy Greenwood, Yueyuan Ma, and Mehmet Yorukoglu. “you will.” a macroeconomic analysis of digital advertising. *Review of Economic Studies*, page rdae067, 2024
- Robert E Hall. What the cyclical response of advertising reveals about markups and other macroeconomic wedges. *NBER working paper*, 18370, 2014
- Bianca He, Lauren I Mostrom, and Amir Sufi. Investing in customer capital. Working Paper 33171, National Bureau of Economic Research, November 2024
- Colin J Hottman, Stephen J Redding, and David E Weinstein. Quantifying the sources of firm heterogeneity. *The Quarterly Journal of Economics*, 131(3):1291–1364, 2016
- Zhen Huo and José-Víctor Ríos-Rull. Tightening financial frictions on households, recessions, and price reallocations. *Review of Economic Dynamics*, 18(1):118–139, 2015
- Zhen Huo and José-Víctor Ríos-Rull. Demand induced fluctuations. *Review of Economic Dynamics*, 37:S99–S117, 2020
- Claudio Michelacci, Luigi Paciello, and Andrea Pozzi. The extensive margin of aggregate consumption demand. *The Review of Economic Studies*, 89(2):909–947, 2022
- Pau Roldan-Blanco and Sonia Gilbukh. Firm dynamics and pricing under customer capital accumulation. *Journal of Monetary Economics*, 118:99–119, 2021

5 Price Rigidity and Inflation

How frequently firms change the prices they charge is a key ingredient into New Keynesian theories of the business cycle. We discuss two main approaches to modelling price rigidities – time dependent vs. state dependent pricing decisions – their implications for the dynamics of inflation and the (non)-neutrality of monetary shocks.

☞ Guillermo A Calvo. Staggered prices in a utility-maximizing framework. *Journal of monetary Economics*, 12(3):383–398, 1983

☞ Ricardo J Caballero and Eduardo MRA Engel. Price stickiness in ss models: New interpretations of old results. *Journal of monetary economics*, 54:100–121, 2007

☞ Carl E Walsh. *Monetary theory and policy*. MIT press, 2017 (Chapter 6)

☞ Mikhail Golosov and Robert E Lucas Jr. Menu costs and phillips curves. *Journal of Political Economy*, 115(2):171–199, 2007

Fernando Alvarez, Francesco Lippi, and Panagiotis Souganidis. Price setting with strategic complementarities as a mean field game. *Econometrica*, 91(6):2005–2039, 2023

Fernando Alvarez, Francesco Lippi, and Aleksei Oskolkov. The macroeconomics of sticky prices with generalized hazard functions. *The Quarterly Journal of Economics*, 137(2):989–1038, 2022

Adrien Auclert, Rodolfo Rigato, Matthew Rognlie, and Ludwig Straub. New pricing models, same old phillips curves? *The Quarterly Journal of Economics*, 139(1):121–186, 2024

Mark Bills, Peter J Klenow, and Benjamin A Malin. Reset price inflation and the impact of monetary policy shocks. *American Economic Review*, 102(6):2798–2825, 2012

Andres Blanco, Corina Boar, Callum J Jones, and Virgiliu Midrigan. Non-linear inflation dynamics in menu cost economies. Technical report, National Bureau of Economic Research, 2024

Andrés Blanco, Corina Boar, Callum J Jones, and Virgiliu Midrigan. The inflation accelerator. Technical report, National Bureau of Economic Research, 2024

Andrew S Caplin and Daniel F Spulber. Menu costs and the neutrality of money. *The Quarterly Journal of Economics*, 102(4):703–725, 1987

Michael Dotsey, Robert G King, and Alexander L Wolman. State-dependent pricing and the general equilibrium dynamics of money and output. *The Quarterly Journal of Economics*, 114(2):655–690, 1999

Joel P Flynn, George Nikolakoudis, and Karthik A Sastry. A theory of supply function choice and aggregate supply, 2023

Joel P Flynn, Georgios Nikolakoudis, and Karthik A Sastry. Prices vs. quantities: A macroeconomic analysis, 2024

Jordi Galí. Monetary policy, inflation, and the business cycle: an introduction to the new keynesian framework and its applications second edition. *Economics Books*, 2015 (Chapter 3)

Jonathon Hazell, Juan Herreno, Emi Nakamura, and Jón Steinsson. The slope of the phillips curve:

evidence from us states. *The Quarterly Journal of Economics*, 137(3):1299–1344, 2022

Peter J Klenow and Benjamin A Malin. Microeconomic evidence on price-setting. In *Handbook of monetary economics*, volume 3, pages 231–284. Elsevier, 2010

Virgiliu Midrigan. Menu costs, multiproduct firms, and aggregate fluctuations. *Econometrica*, 79(4):1139–1180, 2011

Simon Mongey. Market structure and monetary non-neutrality. Technical report, National Bureau of Economic Research, 2021

Emi Nakamura and Jón Steinsson. Price rigidity: Microeconomic evidence and macroeconomic implications. *Annu. Rev. Econ.*, 5(1):133–163, 2013

Emi Nakamura, Jón Steinsson, Patrick Sun, and Daniel Villar. The elusive costs of inflation: Price dispersion during the us great inflation. *The Quarterly Journal of Economics*, 133(4):1933–1980, 2018

Emi Nakamura and Jón Steinsson. Five facts about prices: A reevaluation of menu cost models. *The Quarterly Journal of Economics*, 123(4):1415–1464, 2008

Links to Useful Resources

The following links list some resources that are useful for the course requirements (referee report, giving a presentation) and for how to approach your PhD more generally. While much of this comes down to idiosyncratic preferences and experiences, these references provide a good starting point to develop your own approach to all things academia.

<https://sites.google.com/view/econgradadvice/>

https://users.nber.org/~denardim/teaching/referee_guide_v2.pdf

<https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.31.1.231>

<https://missing.csail.mit.edu>