

Search Theory
Econ 883
Spring 2019

Instructor: Peter Norman Gardner 300C, normanp@email.unc.edu

Office Hours Wednesdays 1:00-2:00 or by appointment.

Logistics: We meet Tuesdays and Thursdays at 8:00-9:15 in GA 007.

Graded Work: Your grade will be based on four distinct activities.

1. Class participation (20%). Our class meetings will involve balanced discussion among all of us. Please contribute constructively and frequently.
2. Homework assignments (30%). There will be 3 to 4 homework assignments. Howeworks will be handed out roughly one week prior to the due date. Since this is a small class I will be somewhat flexible with due dates if you have heavy assignments in other classes, but you should tell me about such issues when the homework is assigned and not on the announced due date.
3. Final paper, including a presentation of the paper in class (0-50%). Many of you already have several paper assignments in other classes, so you may opt out of this. If you choose to write a paper I want it to outline a novel idea. It may, however, be brief (say 8-12 pages), incomplete, and as long as it relates to search frictions in some form it may be either pure theory or an idea on how to use existing theory for an empirical project.
4. Take home final and presentation of a paper (0-50%). If you don't write a class paper you will instead take a take home exam. Those of you who choose this option will also present a paper in class. The choice of paper should be agreed upon well in advance with me.

Course Description

Search frictions have long been recognized as a reason for the existence of labor and capital unemployment. It is also a leading explanation for the price and wage dispersion, a standard tool in monetary economics. In fact, search theory has become a standard part of the toolbox in industrial organization, labor economics, macroeconomics, and applied microeconomic theory. This course will cover a number of widely used models of search frictions, and discuss how they relate to imperfect information about individual or match-specific characteristics and or coordination problems. We will cover applications related to many fields, but the course will be purely theoretical. Models to be covered can be put in three basic categories First, we will have a brief discussion of *decision theory* models of search. Next, we will cover equilibrium models with *random search*, which means that the matching technology is exogenously fixed (examples include urn-ball matching or more general constant returns to scale matching technologies) Finally, we will consider *directed search* and its close cousin *equilibrium search*. In these models, the matching function is an object determined in equilibrium. The key idea is that is that even if contracts are posted for all agents to observe and agents can decide which principal to visit there may still be more agents visiting a particular principal than that principal can serve in equilibrium. Hence, there will be rationing in equilibrium, which creates an endogenous friction and an associated equilibrium matching function.

The course is intended to be useful both for students that are interested in working on structural or non-structural quantitative work where guidance from theory may be helpful (such as much of empirical I/O, labor and macro) and students planning to write an applied theory dissertation.

Policies

To minimize distractions, please turn off all phones, laptops, and other electronic devices during class. Anything in the syllabus may be changed if needed, including due dates and exam dates. Any such changes will be announced as early as possible.

All graded components fall under the jurisdiction of the Honor Code. If you have any questions concerning the Honor Code Policy for this course, please ask.

Outline and Reading List

The following schedule is approximate and we will surely deviate from it at some point

Foundations/Decision Theory (2 Weeks):

McCall, J. 1970. Economics of Information and Job Search. *Quarterly Journal of Economics* 84 (1): 113–126.

Weitzman, M. 1979. Optimal Search for the Best Alternative. *Econometrica* 47: 641-54.

Mortensen, D. 1970. Job Search, the Duration of Unemployment and the Phillips Curve. *American Economic Review* 60: 847–62.

The Diamond Paradox (1 Week)

Diamond, P. 1971. A Model of Price Adjustment. *Journal of Economic Theory* 3: 217–27.

Albrecht, J.W. and B. Axell. 1984. An Equilibrium Model of Search Unemployment. *Journal of Political Economy*, 92, 824-40.

Burdett, Kenneth, and Kenneth L. Judd. "Equilibrium price dispersion." *Econometrica: Journal of the Econometric Society* (1983): 955-969.

Matching and bargaining (2 Weeks)

Pissarides, C. 1985. Short-Run Equilibrium Dynamics of Unemployment, Vacancies, and Real Wages. *The American Economic Review* 75 (4): 676–690.

Petrongolo, B., and C. Pissarides. 2001. Looking into the Black Box: A Survey of the Matching Function. *Journal of Economic Literature* 39: 390–431.

Muthoo, A. 1999. *Bargaining Theory with Applications*. Cambridge MA: Cambridge University Press.

Rubinstein, A. 1982. Perfect Equilibrium in a Bargaining Model. *Econometrica*, 50: 97–110.

Binmore, K., A. Rubinstein, and A. Wolinsky. 1986. The Nash Bargaining Solution in Economic Modeling. *Rand Journal of Economics* 17: 176–88.

Gul, F., H. Sonnenschein. 1988. On Delay in Bargaining with One-Sided Uncertainty. *Econometrica* 56: 601–11.

Haller, Hans. "Non-cooperative bargaining of $N \geq 3$ players." *Economics Letters* 22.1 (1986): 11-13.

Equilibrium Labor Search Models (Random Search) (3 Weeks)

Jovanovic, B. 1979. Job Matching and the Theory of Turnover. *Journal of Political Economy*.

Moscarini, G. 2005. Job Matching and the Wage Distribution. *Econometrica*.

Mortensen, D. 1970. Job Search, the Duration of Unemployment and the Phillips Curve. *American Economic Review* 60: 847–62.

- Burdett, K. 1978. Employee Search and Quits. *American Economic Review*.
- Albrecht, J.W. and B. Axell. 1984. An Equilibrium Model of Search Unemployment. *Journal of Political Economy*, 92, 824-40.
- Mortensen, D. and C. Pissarides. 1999. New Developments in Models of Search in the Labor Market. In *Handbook of Labor Economics*, edited by O. Ashenfelter and D. Card.
- Hosios, A. 1990. On the Efficiency of Matching and Related Models of Unemployment. *Review of Economic Studies*.
- Mortensen, D. and C. Pissarides. 1994. Job Creation and Job Destruction in the Theory of Unemployment. *Review of Economic Studies* 61(3): 269-300.
- Shimer, R. 2005. The Cyclical Behavior of Unemployment and Vacancies. *American Economic Review*, 95: 25-49.
- Kennan, John. "Private information, wage bargaining and employment fluctuations." *The Review of Economic Studies* 77.2 (2010): 633-664.
- Hopenhayn, H. and J. Nicolini. 1997. Optimal Unemployment Insurance. *Journal of Political Economy* 105 (2), 412-438.
- Acemoglu, D., and R. Shimer. 1999. Efficient Unemployment Insurance. *Journal of Political Economy* 107: 893-928.

Monetary Models (1 Week)

- Kiyotaki, Nobuhiro, and Randall Wright. "On money as a medium of exchange." *The Journal of Political Economy* (1989): 927-954.
- Kiyotaki, Nobuhiro, and Randall Wright. "A search-theoretic approach to monetary economics." *The American Economic Review* (1993): 63-77.
- Trejos, Alberto, and Randall Wright. "Search, bargaining, money, and prices." *Journal of political Economy* (1995): 118-141.
- Burdett, Kenneth, et al. "Buyers and sellers: should I stay or should I go?." *The American Economic Review* 85.2 (1995): 281-286.

Mismatch (1 Lecture)

- Lagos, R. 2000. An Alternative Approach to Search Frictions. *Journal of Political Economy* 108: 851-73.
- Coles, M., and E. Smith. 1998. Marketplaces and Matching. *International Economic Review* 39 (1): 239-254.
- Lucas, R. and E. Prescott. 1974. Equilibrium Search and Unemployment. *Journal of Economic Theory* 7 (2): 188-209.

Contracts (1 Lecture)

- Beaudry, P., and J. DiNardo. 1991. The Effect of Implicit Contracts on the Movement of Wages Over the Business Cycle: Evidence from Micro Data. *Journal of Political Economy* 99: 665-688.
- Atkeson, A. and R. Lucas. 1992. On Efficient Distribution with Private Information. *Review of Economic Studies* 59: 427-53.
- Phelan, C. and R. Townsend. 1991. Computing Multi-period, Information-Constrained Optima. *Review of Economic Studies* 58: 853-882.

Directed and Competitive Search (2 Weeks)

- Burdett, K. Shi S., and R. Wright, (2001). "Pricing and Matching with Frictions," *Journal of Political Economy*, 109(5), October 2001, 1060-1085.

- Moen, E. R. (1997). "Competitive Search Equilibrium." *Journal of Political Economy*, 105(2), 385–411.
- Julien, B., J. Kennes and I. King, (2000), "Bidding for labor," *Review of Economic Dynamics*, 3(4), 619-649.
- Galenianos, M. and P. Kircher, (2012) "On the Game-theoretic Foundations of Competitive Search Equilibrium," *International Economic Review*, 53(1), 1-21.
- Norman, Peter (2016), "Matching with Frictions and Entry with Poisson Distributed Buyers and Sellers." mimeo, University of North Carolina.
- Peters, M. (1984). "Bertrand Equilibrium with Capacity Constraints and Restricted Mobility.", *Econometrica*, 52(5): 1117–27.
- Peters, M. (2000), "Limits of Exact Equilibria for Capacity Constrained Sellers with Costly Search," *Journal of Economic Theory*, 95(2), 139-168.

Labor Market Applications of Directed Search (1-2 Weeks)

- Galenianos, M. and P. Kircher, (2009) "Directed Search with Multiple Job Applications," *Journal of Economic Theory*, 144(2), 2009, 445-471.
- Albrecht, J., P. A. Gautier, and S. Vroman (2006), "Equilibrium Directed Search with Multiple Applications," *Review of Economic Studies*, 73,, 869-891.
- Albrecht, J., P. A. Gautier, S. Tan, and S. Vroman (2004), "Matching with Multiple Applications Revisited," *Economics Letters*, 84,, 311-314.085.
- Montgomery, J.D. (1991) "Equilibrium Wage Dispersion and Interindustry Wage Differentials," *Quarterly Journal of Economics*, 106, 163-179.
- Shimer, R., (2005), "The assignment of workers to jobs in an economy with coordination frictions," *Journal of Political Economy*, 113(5), 996-1025.
- Kircher, P., (2009), "Efficiency of simultaneous search," *Journal of Political Economy*, 117(5), 861- 913.
- Li, F. and C. Tian, "Directed Search and Job Rotation, " *Journal of Economic Theory*, Volume 148 (3), May 2013, 1268–1281.

Some Other Applications of Directed Search (Whatever amount of Time is Left)

- Coles, M. and J. Eeckhout (2003), "Indeterminacy and Directed Search," *Journal of Economic Theory*, 11, Pages 265-276.
- Galenianos, M. P. Kircher and G. Virag (2011), "Market power and efficiency in a search model," mimeo, London School of Economics.
- Geromichalos, A. (2012) "Directed search and optimal production," *Journal of Economic Theory*, 47(6), Pages 2303–2331.
- Guerreri, V., Shimer R. and R. Wright, "Adverse Selection in Competitive Search Equilibrium," *Econometrica*, 2010, 78 (6), 1823-1862
- Julien, B., Kennes, J., & King, I. (2008). Bidding for money. *Journal of Economic Theory*, 142(1), 196-217.
- Kim, J. and G. Camera (2014). "Uniqueness of equilibrium in directed search models," *Journal of Economic Theory* 151, 248-267.
- Lester, B., (2011) "Information and Prices with Capacity Constraints," *American Economic Review*, 101(4), 1591-1600.
- Lester, B, Visschersz L., and R. Wolthoff, "Meeting Technologies and Optimal Trading Mechanisms in Competitive Search Markets," *mimeo*, September 2014.
- Lester, B Ali Shourideh, Venky Venkateswaran, and Ariel Zetlin-Jone (2015) "Screening and Adverse Selection in Frictional Markets," mimeo, Philadelphia Fed.
- McAfee P. (1993), "Mechanism design by competing sellers," *Econometrica* 61(6), 1281- 1312.
- Myerson, Roger B. (2000). "Large Poisson Games," *Journal of Economic Theory* 94 (1): 7–45. doi:10.1006/jeth.1998.2453.