

Search Theory
Econ 883
Spring 2020

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

Office Hours Wednesdays 1:30-3:00 or by appointment.

Logistics: We meet Tuesdays and Thursdays at 11:00-12:15 in GA 307.

Graded Work: Your grade will be based on four distinct activities. Details are flexible, negotiable and to be decided.

1. Class participation. Please contribute constructively and frequently.
2. Homework assignments.
3. Class presentation. You will be asked to present a paper. It COULD be your own, but, more likely, you will present a published paper or a recent working paper. The choice of paper should be agreed upon well in advance with me.
4. You could possibly write a term paper, but I don't think it is that great of an idea to write a term paper in more than one class.

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

The usual boilerplate applies.

Outline and Reading List

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

Foundations/Decision Theory

- 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

- 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

- 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)

- 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*.
Burdett, K. and E Smith. 2002. The Low Skill Trap. *European Economic Review* 46: 1439–1451.
Burdett, K. and D Mortensen. 1998. Wage Differentials, Employer Size, and Unemployment. *International Economic Review*: 257–273.
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*.

Carillo-Tudela, C, Menzio, G and E Smith. 2011. Job Search with Bidder Memories. *International Economic Review*, 52, 639-655.

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

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.

Lago, Ricardo, and Randall Wright. "A Unified Framework for Monetary Theory and Policy Analysis." *Journal of Political Economy* (2005): 463-484.

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

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

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.

Marriage & Matching

Burdett K. and MC Coles. 1997. Marriage and Class. *Quarterly Journal of Economics* 112: 141-168.

Burdett K. and MC Coles. 2001. Transplants and Implants: The Economics of Self-Improvement. *International Economic Review* 42: 597-616.

Crime

Burdett K., Lagos R. and R Wright. 2003. Crime, Inequality, and Unemployment. *American Economic Review* 93: 1764-1777.

Burdett K., Lagos R. and R Wright. 2003. Crime, Inequality, and Unemployment, Second Version, PIER working paper No 03-029.

Burdett K., Lagos R. and R Wright. 2004. An On-the-Job Search Model of Crime, Inequality, and Unemployment. *International Economic Review* 45: 681-706.

Shi S. and T Temzelides. 2004. A Model of Bureacracy and Corruption. *International Economic Review* 45: 873-908.

Directed and Competitive Search

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

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

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.