Outline

• Basics:
  – Definition, Basic Matching Function, Analogy to the Production Function, Job-Finding and Job-Filling Rates, Theoretical and Empirical Matching Functions

• Standard Matching Function (SMF)
  – Sources of Instability in the SMF (AKA Fluctuations in Matching Efficiency), Simple Empirical Check on the Performance of the SMF

• Brief Remarks on Selected Aspects of Fluctuations in Matching Efficiency
Matching Function: A Definition

“The matching function summarizes a trading technology between agents who place advertisements, read newspapers and magazines, go to employment agencies, and mobilize local networks that eventually bring them together into productive matches.”

“The key idea is that this complicated exchange process is summarized by a well-behaved function that gives the number of jobs formed at any moment in time in terms of the number of workers looking for jobs, the number of firms looking for workers, and a small number of other variables.”

Petrongolo & Pissarides (hereafter “P&P”, 2001)
A Basic Matching Function

- Retaining our focus on labor markets, the simplest matching function is

\[ H = m(U, V), \]

where \( H \) is the number of job matches formed in a given time interval, \( U \) is the number of jobseekers, and \( V \) is the number of vacant jobs.

- \( m \) is increasing in both arguments, concave, and usually taken to be homogenous of degree 1 (CRS)

- See P&P (2001) for other widely adopted regularity conditions
“The matching function is a modeling device that occupies the same place in the macroeconomist's tool kit as other aggregate functions, such as the production function …

Like the other aggregate functions, its usefulness depends on its empirical viability and on how successful it is in capturing the key implications of the heterogeneities and frictions in macro models.”

Petrongolo & Pissarides (2001)
Job-Finding and Job-Filling Rates

• The average job-finding rate per unit time among jobseekers is \( m(U,V)/U \).

• The average job-filling rate per unit time is \( m(U,V)/V \).

• For an \( m \) function that has CRS, we can express the job-finding and job-filling rates as functions of the tightness ratio, \( V/U \).

• See P&P (2001) for a summary of evidence that (mostly) supports CRS specifications.

• For heterogeneous jobseekers, job-finding rates vary with individual characteristics but all job-finding rates move up and down with market tightness. An analogous statement holds for vacant jobs.
Matching Functions in the Literature


• Prominent empirical studies that feature matching functions include Pissarides (1986), Blanchard and Diamond (1989, 1990), Layard et al. (1991), and Yashiv (2000).

• On the theoretical microfoundations of matching functions and references to the literature, see Sections 3.2 to 3.6 in P&P (2001).
Theoretical & Empirical Matching Functions, 1

• Theoretical models of search and matching often distinguish between the meeting technology and match formation.
  – When two parties meet as the result of a frictional search process, they may acquire additional information about the quality and attractiveness of the prospective match. Depending on what they learn, the parties may or may not choose to consummate the match.
  – Thus, there is a distinction between the meeting rate and the matching rate. See Section 3.1 in P&P (2001) for an explicit, but simple treatment of this point.
Most empirical studies of search and matching lack data that would allow for a clean distinction between meeting and matching.

For this reason, empirical matching functions are, in most cases, best interpreted as describing outcomes that are jointly determined by the meeting technology and other features of the matching process.
The standard aggregate matching function relates the flow of hires to job vacancies ($V$) and job seekers ($U$) according to a CRS Cobb-Douglas function:

$$H = \mu V^{1-\theta} U^\theta$$

$$\frac{H}{V} = \mu \left(\frac{U}{V}\right)^\theta$$

Standard measurement approach:

- $V$ = stock of open job vacancies
- $U$ = stock of unemployed persons.
Empirical Performance of SMF

\[
\frac{H}{V} = \mu \left( \frac{U}{V} \right)^\theta
\]

Evaluating the SMF

- Get monthly data on \( H \) and \( V \) from the Job Openings and Labor Turnover Survey (JOLTS).
- Get monthly data on \( U \) from the Current Population Survey (CPS).
- Calculate \( H/V \), the empirical vacancy yield, using JOLTS.
- Calculate the theoretically implied vacancy yield by plugging \( U \) and \( V \) into right side of above equation.
- How well does the implied vacancy yield track the empirical vacancy yield? Similarly, we can ask how well the implied job-finding rate tracks the empirical rate.
A Simple Check on the Empirical Performance of the Standard Aggregate Matching Function

Elasticity parameter $\theta$ set to $1/2$ in calculating the implied yields.
Sources of Instability in the SMF – AKA Fluctuations in Matching Efficiency

1. Mismeasurement of job seekers
2. Mismeasurement of effective vacancies
3. Mismatch: Aggregating over markets that vary in tightness
4. Composition: Aggregating over markets that vary in matching efficiency
5. Search technology, screening & evaluation technology, etc.

All of 1-5 are potential sources of instability in the SMF – i.e., sources of fluctuations in the value of the matching efficiency, $\mu$, that makes the equation hold exactly.
Sources of Instability in the SMF –
AKA Fluctuations in Matching Efficiency

1. Measuring job seekers

2. Measuring effective vacancies

3. Mismatch: Aggregating over local markets that vary in tightness
   – Examples include Layard et al. (1991), Herz and van Rens (2011), Daly et al. (2012), Estevao and Smith (2013), Sahin et al. (2014 AER), and Barnichon and Figura (2015).
4. Composition: Aggregating over markets that vary in matching efficiency

   The next slide provides evidence that match efficiency is higher in Construction than other industries. Slide 16 suggests the industry mix of vacancies varies over time in ways that have potentially important implications for the average matching efficiency in the economy. I have a dormant working paper that seeks to quantify this effect. Gavazza, Mongey and Violante (2017) give some attention to this matter.

5. Search and sorting technologies, screening & evaluation technologies, etc.

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<td>18.8</td>
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Construction Contribution to Changes in Job-Filling Rates During and After the Great Recession

Numbers in blue reflect a simple shift-share calculation

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<td>Percent Change in National Job-Filling Rate Relative to 2007Q4</td>
<td>39.0</td>
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<td>Construction Employment Share As of 2007:4</td>
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<td>Percent of National Change Accounted for by Construction</td>
<td><strong>43.0</strong></td>
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Reproduced from Table 1 in Davis, Faberman and Haltiwanger (2012, AER P&P). Authors’ calculations using JOLTS data.
DHI-DFH Index of Recruiting Intensity Per Vacancy, January 2001 to November 2017

Effective vacancies equal this index value times the number of measured vacancies.

Empirical Performance of the SMF Compared to One that Incorporates Role of Recruiting Intensity

Recruiting intensity accounts for about 30% of gap that opens up between empirical & SMF-implied vacancy yield from 2007-2009.
Stock-Flow Matching

• Studies of stock-flow matching models do not fit neatly into the schema on slide 12.
  – Stock-flow matching implies that the SMF involves a rather profound mismeasurement of both the $U$ and the $V$ inputs to the matching function, as well as its functional form.

• Theoretical analyses of stock-flow matching include Coles and Smith (1998), P&P (2001, Section 3.5), and Shimer and Ebrahimy (2010).

• My working paper with Samaniego de la Parra on “Application Flows” (discussed later in the course) contains some evidence in line with stock-flow matching behavior. See, also, the working paper by Ketteman, Mueller and Zwimuller (2017).


References, 2


• Davis, Steven J. and Brenda Samaniego de la Parr, 2017. “Application Flows,” working paper, University of Chicago.

• Estevao, Marcello and Christopher Smith, 2013, “Skill Mismatches and Unemployment in the United States,” International Monetary Fund


• Jarosch, Gregor and Laura Pilossoph, 2017. “Statistical Discrimination and Duration Dependence in the Job Finding Rate,” working paper, 21 December
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