

Assignment Models and Qualitative Mismatches

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Qualitative Mismatches: Structure

	Short Run	Long Run
Causes	Costs of searching by worker or firm prevent best matches	Unbalanced shifts in supply and demand
Methods of observation, measurement	Differences in individual job and worker characteristics	Aggregate differences in supply and demand for labor categories
Methods of analysis	Study how workers search for jobs and how firms recruit workers	Examine consequences of trends in technological and organizational change, globalization, ICT, education
Consequences	Costly search, losses in worker wages and lower firm output	Lost returns to worker human capital investments, inadequate labor force for firm expansion and growth
Policies that address mismatches	Labor institutions that encourage more efficient matches	Adapt educational policies to anticipated changes

Recruitment Paradigms and Qualitative Mismatches (Searle, 2009)

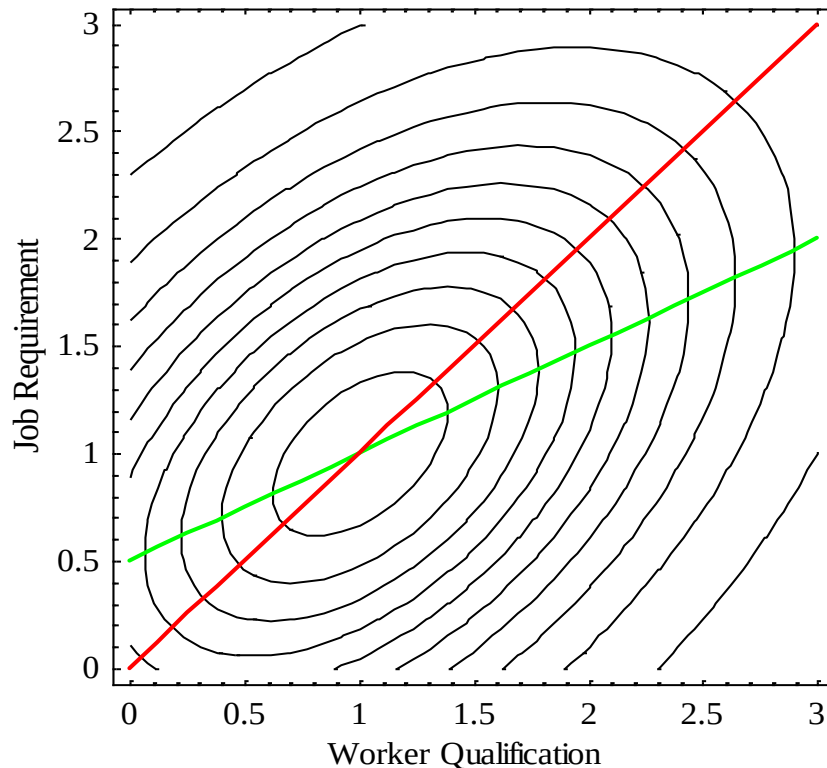
- Psychometric paradigm: Compare worker characteristics and job requirements (as in mismatch literature).
- Social process paradigm: recruitment occurs through social interaction between applicant, organization.
- Fit between the person and the organization.

Incidence of Mismatches (OECD Employment Outlook 2011, p. 201)

	Overqualified	Underqualified	Matched	Totals
Overskilled	8.4	6.5	17.8	32.7
Underskilled	3.3	2.6	7.3	13.2
Matched	11.4	12.3	30.7	54.4
Totals	23.1	21.4	55.8	100

- Both overqualified and underqualified; both overskilled and underskilled
- Well matched in qualifications can be mismatched in skills, well matched in skills can be mismatched in qualifications
- Only 30.7 percent are well matched in both skills and qualifications
- Some overqualified are underskilled, and some overskilled are underqualified
- Only weak relation between mismatches with respect to skills and qualifications

Mismatch Patterns: Regression Towards the Mean



Conclusions: workers with higher qualifications more likely to be overqualified; jobs with greater requirements more likely to have underqualified workers.
Evidence: Greater education increases likelihood of overeducation (Wasmer et al, 2007, Table 5.2)

Wage Consequences of Mismatches

Worker perspective:

	Job Qualification Level 1	Job Qualification Level 2
Worker Qualification Level 1	W_{11}	$1.15 W_{11}$ (15% more)
Worker Qualification Level 2	$.8 W_{22}$ (20% less)	W_{22}

Employer perspective:

	Job Qualification Level 1	Job Qualification Level 2
Worker Qualification Level 1	W_{11}	$.84 W_{22}$ (16% less)
Worker Qualification Level 2	$1.14 W_{11}$ (14% more)	W_{22}

Source: : OECD 2011b, pp. 210-211, Glenda Quintini, 2011a, Annex 4.A6, Table 4.A6.3

Problem of Explaining Wage Consequences

- Joop Hartog: “The most important problem of ORU [Over, Required and Undereducation] analysis is the lack of a coherent theoretical framework.” (2000, p. 145)
- Kostas Mavromaras and Seamus McGuinness: “Although there has been considerable research development in the last 10 years, this has taken place in the form of piecemeal, empirically driven research with neither theoretical advances nor definitive empirical conclusions.” (2007, p. 282)

Possible Theories

- Human Capital (Jacob Mincer, Gary Becker). Basic Mincer earnings function:

$$\text{Log } Y_s = \text{Log } Y_0 + (\text{rate of return})(\text{years of schooling})$$

This can be extended to include other sources of human capital accumulation such as on-the-job training or experience.

- Job Competition (Lester Thurow, 1975). Wage depends on job after worker receives on-the-job training.

Possible Theories, Continued

- Assignment theory (Jan Tinbergen, A.D. Roy, Tjalling Koopmans and Martin Beckmann, Sattinger; review by Sattinger, 1993).
Heterogeneous workers, heterogeneous jobs; assignment determined by preferences, comparative advantage, capital. Wage depends on both worker and job characteristics.
- Problem: In simple versions, assignment model does not provide specific predictions

Assignment with Nash Bargaining

Outputs:

	Job type 1	Job type 2
Worker type 1	1	1.3
Worker type 2	1.3	1.69

Assumptions: Random searching, matching function $UV/(U+V)$, bargaining power = .5, equal numbers of workers and jobs.

Wages:

	Job type 1	Job type 2
Worker type 1	.5	.506
Worker type 2	0.794	0.845

Assignment with Nash Bargaining

	Job type 1	Job type 2
Worker type 1	0.5	0.506
Worker type 2	0.794	0.845

Why is worker type 1 paid more in job type 2?

$$w_{12} - w_{11} = .506 - .5 =$$

$$w_{01} + \beta(a_{12} - w_{01} - z_{02}) - (w_{01} + \beta(a_{11} - w_{01} - z_{01})) \\ = \beta(a_{12} - a_{11}) - \beta(z_{02} - z_{01})$$

Worker is paid more because employers cannot capture all of the difference in output at job type 2.

Assignment with Nash Bargaining

	Job type 1	Job type 2
Worker type 1	0.5	0.506
Worker type 2	0.794	0.845

How does wage penalty for overqualification (.845 - .794) compare to wage reward for underqualification (.506 - .5)?

$$\beta((a_{22} - a_{21}) - (a_{12} - a_{11})) = \beta((1.69 - 1.3) - (1.3 - 1))$$

Wage penalty is greater if difference in outputs (between workers of types 1 and 2) is greater at job type 2.

OECD Results: Wage penalty .23 W_{11} to .285 W_{11} and wage reward .15 W_{11} to .197 W_{11}

Shimer (2005) Coordination Frictions

	Job type 1	Job type 2
Worker type 1	0.622	1.226
Worker type 2	0.675	0.959

Note that underqualified worker (worker type 1 in job type 2) is paid more than qualified worker in same job (worker type 2 in job type 2) because of employer need to attract applicants.

Likelihood of finding job:

	Job type 1	Job type 2
Worker type 1	0.596	0.345
Worker type 2	0.948	0.661

Note that high wage (1.226) compensates for low likelihood of finding a job.

Training as an Alternative to Matched Workers

- Melvin Reder (AER, 1955) argues that faced with short supply, firms can pay high wage, lower their hiring standards, or hire underqualified workers and train them.
- Cost of training places a limit on wage differential.
- Underqualified workers would be paid more to reduce quitting after training.
- Hiring underqualified worker and training are simultaneous decisions.

Long Run Qualitative Mismatches: Examples of Imbalances

- Growth of office jobs in early 20th century (Goldin and Katz, 2008). High returns to training for office work, endogenous technological change, incentives for high school movement.
- Trade in grain in 19th century (Derry and Williams, 1960). Movement of resources out of grain production in Europe, Danish folk high school movement, cooperative forms of production.
- Responses of England and Germany to rapid technological change in late 19th century (Derry and Williams). Network of technical institutes and trade schools in Germany, inadequate attention to science and elementary education in England.

Jan Tinbergen's Race Between Technology and Education

Tinbergen (1974, 1975): University graduate labor can be substituted for other labor, so increasing numbers of graduates can be absorbed by economy, reducing educational differentials. Technological change, however, raises their share of output and increases educational differentials. In U.S., race may be lost (1975, p. 103).

Observation and Measurement: Mismatches at Individual Level

Hartog (2000):

Country	Period	Method	Overeducation	Undereducation
Netherlands	1960-1977	Job assessment	Up from 7% to 26%	Down from 36% to 21%
Netherlands	1974-1995	Worker self-assessment	Up from 17% to 24%	Down from 30% to 12%
Spain	1985-1990	Worker self-assessment	Up from 17% to 28%	Down from 30% to 12%
Portugal	1985-1992	Job assessment	Up from 26% to 33%	Down from 43% to 38%
U.S.	1969-1977	Worker self-assessment	Down from 35% to 32%	Not available

Observation and Measurement: Income Shares of Skilled Workers

Manacorda and Petrongolo (1999).

Technological change alters exponent of skilled labor in Cobb-Douglas production function.

Mismatch index is the proportional change in input shares minus the proportional change in employment. This index can reflect either supply or demand shocks.

Growth in Net Relative Demand for Skilled

Country	Period	Net Relative Demand	Outcome
France	1984-1994	0.36	Substantial shift against unskilled
Britain	1974-1992	0.73	Substantial shift against unskilled
Germany	1976-1989	0.58	Substantial shift against unskilled
Italy	1977-1991	0.06	Virtually no shift
Netherlands	1979-1993	-1.08	Substantial shift against skilled
Sweden	1970-1989	0.41	Substantial shift against unskilled
U.S.	1970-1979	-1.11	Substantial shift against skilled
U.S.	1979-1989	1.48	Substantial and greater shift against unskilled

Source: Manacorda and Petrongolo, 1999, Table 2.

Shifts in Demand

- Capital-skill complementarity
- Skill-biased technological change
- Computerization
- Globalization
- Organization of work

Shifts in Supply: Goldin and Katz, 2008

OECD Education at a Glance 2011

Criterion	U.S.	OECD	EU21
% Attaining upper secondary, 25-34	88	81	83
% Attaining upper secondary, 55-64	89	61	63
% Attaining tertiary, 25-34	41	37	34
% Attaining tertiary, 55-64	41	22	20
Upper secondary graduation rate as % of population	76	82	85
Tertiary entry rate (University)	70	59	58
Tertiary graduation rate (University)	37	N.A.	39

Problem: Why have U.S. students not responded to higher educational differentials?

OECD Education at a Glance, 2011

Criterion	Year	U.S.	OECD
Relative earnings below upper secondary, 25-64	2009	64/100	77/100
Relative earnings for all tertiary, 25-64	2009	179/100	153/100
Private direct costs of tertiary education	2007	\$69,907	\$10,746
Public direct costs of tertiary education	2007	\$32,281	\$24,711

Other Explanations for Supply Slowdown in U.S.

- U.S. does not provide high quality education to less advantaged students (Goldin and Katz, 2008). Widening gaps in college attendance by income and ethnic groups (Carneiro and Heckman, 2003).
- Cost increases are so high that credit constraints are binding (Lochner and Monge-Naranjo, 2011).
- Students expect compensation for risk (Schweri, Hartog and Solter, 2011).

Open Questions in Short Run

Qualitative Mismatches

1. Can the job search model be extended to explain when seekers accept jobs with qualitative mismatches?
2. What is the recruitment strategy for firms facing workers with qualitative mismatches? How do firms set employment criteria?
3. What is the basis for wage differences observed in the mismatch literature?
4. How are self-assessed skills, competences and education related? Do skills and training substitute for formal education?
5. How are institutional features of the labor market related to levels of qualitative mismatches?

Open Questions in Business Cycle Qualitative Mismatches

1. Do qualitative mismatches change over the business cycle?
2. Do firms change employment criteria and job requirements over the business cycle?
3. How do qualitative mismatches affect job-to-job transitions?
4. How do mismatches affect the rate of change of wages?
5. Can a search and matching model with explicit qualitative mismatches explain changes in the matching rate and shifts in the Beveridge Curve?

Open Questions in Long Run Qualitative Mismatches

1. Why did numbers of high school and college graduates in the U.S. not increase more in response to increasing educational premiums?
2. How does a long run qualitative mismatch affect the requirements for a particular job?
3. How do short run, business cycle, and long run qualitative mismatches combine to determine mismatches observed at the individual worker-job level?
4. Do potential long run qualitative mismatches impose a limit on growth and returns to educational reforms?