"Educational mismatches and wages: evidence from a matched employer/employee dataset"

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Road Map

- ☐ Motivation
- ☐ Previous Literature
- ☐ Methodology and Data
- ☐ Results

Skills mismatch in the labor market

- Matter of great concern;
- Arise from several imbalances between the skills offered and the skills demanded in the labor market due to:
  - Information asymmetries;
  - Transaction costs;
  - Unresponsive education and training systems to the world of work.

- Inefficiencies in the utilization of labor;
- Detrimental effects on productivity and growth.

Why does it matter?

Overinvestment on college education?

- US - 1970's: boom in the supply of graduates (Freeman, 1976);

- In recent years:
  - Topic of concern in European Countries;
  - Huge massification of higher education enhanced by the Bologna process.

Previous Literature

- There is a growing body of literature that aims to study:

  - ➢ The effects of overeducation on wages and other labor market outcomes (Duncan and Hoffman, 1981; Hartog and Groeneveld, 2004; Kiker, Santos and Oliveira, 1997; Verdugo and Verdugo, 1989)

In this paper:

- Educational mismatches among the employed and their effects on wages.

- Rich matched employer/employee dataset

- Vertical mismatches in the Portuguese labor market over the period 1995-2012

- Main goal: investigate to what extent job-mismatched workers suffer *a penalty on wages* when compared with similar well job-matched workers.

Data: Quadros de Pessoal (QP)

☐ a large longitudinal linked employer-employee administrative dataset collected by the Portuguese Ministry of Employment.

☐ QP covers virtually all firms operating in the Portuguese private sector and employing at least one wage earner.

☐ Available information:

  ■ **at the firm level** includes employment, sales, industry, ownership, location, among others.

  ■ **at the individual-level**, QP reports information on each worker's age, education, gender, qualifications, wages, occupation, tenure, number of hours worked, and type of contract.

☐ All firms, establishments, and workers are identified with **a unique** identification number, so they can be matched and followed over time.

How to define educational mismatch?

The criteria used to define:

educational mismatch among the employed

is crucial to our analysis

previous literature showed that the patterns of skills mismatch strongly depend on the criteria adopted to measure mismatches (ILO, 2014).

How to define educational mismatch?

To identify vertical mismatches:

- statistical measures based on realized matches

- objective method: Job Analysis

Definition:

A *vertical mismatch* occurs when the level of education/qualification is higher or lower than the one required for the job.
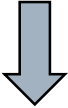
This definition is the most commonly used in the literature that studies the impact of overeducation on wages

(e. g., Duncan and Hoffman, 1981; Verdugo and Verdugo, 1989; Oliveira et al., 2000; Hartog and Groeneveld, 2004; Korpi and Tahlin, 2009).

Required education (RE): Realized matches

- ☐ RE: defined as the mean or mode level education:
  - ■ for all workers in a three-digit occupation
  - ■ or newly hired workers (tenure less than 12 months);

- ☐ Then, required education for a given occupation is compared to

  the actual level of schooling attained by the worker in that same occupation

in order to classify the individuals as over or under educated (e. g., Kiker et al., 1997).

Required education (RE): Job Analysis

1-Digit Level	Major Group according to CPP/2010	Level of Competence	ISCED/97 Groups	Years of Schooling
1	Representative of the state Legislature and executive bodies, executives, directors, executive managers.	3	5b Bachelor 5a Graduate and Post-graduate	15
		4	6 Master and Doctorate Second stage of tertiary education	
2	Expert on intellectual and scientific activities	4	5a Graduate and Post-graduate 6 Master and Doctorate	16
3	Technicians and associate professionals	3	5b Bachelor	15
4	Administrative Staff	2	2 Third Cycle of basic education 3 and 4 Secondary	9
5	Service and Sales workers	2	2 Third Cycle of basic education 3 and 4 Secondary	9
6	Skilled Agricultural, forestry and fishery workers	2	2 Third Cycle of basic education 3 and 4 Secondary	9
7	Skilled construction and industry sector workers	2	2 Third Cycle of basic education 3 and 4 Secondary	9
8	Plant and machine operators and assemblers	2	2 Third Cycle of basic education 3 and 4 Secondary	9
9	Unskilled workers	1	1 First and second Cycle of basic education	4

PUBLIC ADMINISTRATION, WORKERS FROM ARMED FORCES AND AGRICULTURE ARE EXCLUDED FROM OUR DATASET.

Required education (RE): Job Analysis

Workers having the required education for the job are those whose years of schooling in a major group at 1-digit level are as follows:

> major group 1: 15 years of schooling;
> major group 2: 16 years of schooling;
> major group 3: 15 years of schooling;
> major groups 4, 5, 6, 7 and 8: 9 years of schooling
> major group 9: 4 years of schooling.

Workers having more or less years of schooling than this required education are considered overeducated or undereducated, respectively.

Incidence of Over and Undereducation in Portugal, 1995-2012

	Mode All workers	Mode newly hired workers	ISCED
Overeducated (%)	30,12	21,26	24,61
Undereducated (%)	23,67	34,65	49,83

more than 50% of the Portuguese workers in the private sector suffer from an educational job-mismatch

Regression Analysis

Based on these indicators of the individual's educational mismatch status, we will estimate a Mincerian wage equation that controls for workers observed and unobserved heterogeneity, firm and job title observed characteristics.

OLS Results: Duncan and Hoffman (ORU model), Portugal 1995-2012

	Required Education			Overeducation			Undereducation		
	Full Sample	Females	Males	Full sample	Females	Males	Full sample	Females	Males
Mode	0,058***	0,066***	0,054***	0,032***	0,035***	0,031***	-0,039***	-0,042***	-0,036***
	(0,00006)	(0,00008)	(0,00008)	(0,00007)	(0,0001)	(0,0001)	(0,00008)	(0,0001)	(0,0001)
Mode if newly hired	0,059***	0,067***	0,056***	0,032***	0,035***	0,030***	-0,040***	-0,043***	-0,036***
	(0,00006)	(0,00009)	(0,00008)	(0,0008)	(0,0001)	(0,0001)	(0,0007)	(0,0001)	(0,0001)
ISCED	0,064***	0,068***	0,061***	0,031***	0,033***	0,028***	-0,047***	-0,055***	-0,042***
	(0,00007)	(0,0001)	(0,0001)	(0,00008)	(0,0001)	(0,0001)	(0,00008)	(0,0001)	(0,0001)

Notes: *, **, and *** denote significant at 10, 5, and 1% respectively. Worker-clustered standard errors in parentheses.

Other variables included in the regressions are female, tenure and tenure squared, log of the number of worker in a firm,

dummies for age, location, sector of activity, occupation and year.

- When compared with their co-workers who are adequately educated, overeducated workers receive a wage bonus for the extra years of schooling and undereducated workers a wage penalty for the extra years of deficit education.
- However, the additional returns to a year of overeducation are lower than the returns to required education.

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OLS results: Verdugo and Verdugo model, Portugal 1995-2012

	Years of scholling			Overeducation			Undereducation		
	Full Sample	Females	Males	Full sample	Females	Males	Full sample	Females	Males
Mean	0,058***	0,064***	0,054***	-0,131***	-0,144***	-0,124***	0,118***	0,144***	0,108***
	(0,00006)	(0,00009)	(0,00009)	(0,0004)	(0,0006)	(0,0005)	(0,0004)	(0,0006)	(0,0005)
Mode	0,053***	0,060***	0,050***	-0,077***	-0,097***	-0,065***	0,071***	0,083***	0,073***
	(0,00005)	(0,00008)	(0,00008)	(0,0003)	(0,0004)	(0,0004)	(0,0003)	(0,0004)	(0,0004)
Mode if newly hired	0,055***	0,061***	0,052***	-0,082***	-0,0984***	-0,073***	0,070***	0,0759***	0,073***
	(0,00005)	(0,00008)	(0,00008)	(0,0003)	(0,0005)	(0,0004)	(0,0003)	(0,0004)	(0,0004)
ISCED	0,057***	0,061***	0,054***	-0,089***	-0,103***	-0,079***	0,050***	0,026***	0,070***
	(0,00007)	(0,0001)	(0,00009)	(0,0004)	(0,0005)	(0,0005)	(0,0003)	(0,0005)	(0,0005)

Notes: *, **, and *** denote significant at 10, 5, and 1% respectively. Worker-clustered standard errors in parentheses.
Other variables included in the regressions are female, tenure and tenure squared, log of the number of worker in a firm, dummies for age, location, sector of activity, occupation and year.

- Overeducated workers earn less and undereducated workers earn more, than similar workers with the same years of schooling, but who hold jobs for which they are adequately educated.

These results are, in general, in accordance with previous related literature.

Fixed-effects results (full sample): Duncan and Hoffman (ORU model), Portugal 1995-2012

	Required Education		Overeducation		Undereducation	
	OLS	FE	OLS	FE	OLS	FE
Mode	0,058***	0,015***	0,032***	0,007***	-0,039***	-0,012***
	(0,00006)	(0,00008)	(0,00007)	(0,00008)	(0,00008)	(0,00009)
Mode if newly hired	0,059***	0,014***	0,032***	0,006***	-0,040***	-0,012***
	(0,00006)	(0,00008)	(0,0008)	(0,00008)	(0,0007)	(0,00008)
ISCED	0,064***	0,018***	0,031***	0,007***	-0,047***	-0,011***
	(0,00007)	(0,00008)	(0,00008)	(0,00009)	(0,00008)	(0,00008)

Notes: *, **, and *** denote significant at 10, 5, and 1% respectively. Worker-clustered standard errors in parentheses.
Other variables included in the regressions are female, tenure and tenure squared, log of the number of worker in a firm, dummies for age, location, sector of activity, occupation and year.

The fixed-effects results indicate that taking into account workers unobserved (permanent) heterogeneity reduces considerably the discrepancy between the wages of well job-matched workers and job mismatched workers, evince that failure to control for individual unobserved heterogeneity may overestimate the impact of over- and undereducation on earnings.

Fixed-effects results (full sample): Verdugo and Verdugo model, Portugal 1995-2012

	Years of scholling		Overeducation		Undereducation	
	OLS	FE	OLS	FE	OLS	FE
Mean	0,058***	0,014***	-0,131***	-0,04***	0,118***	0,013***
	(0,00006)	(0,00008)	(0,0004)	(0,0003)	(0,0004)	(0,0003)
Mode	0,053***	0,012***	-0,077***	-0,019***	0,071***	0,001***
	(0,00005)	(0,00008)	(0,0003)	(0,0002)	(0,0003)	(0,0002)
Mode if newly hired	0,055***	0,012***	-0,082***	-0,019***	0,070***	0,0004***
	(0,00005)	(0,00008)	(0,0003)	(0,0002)	(0,0003)	(0,0002)
ISCED	0,057***	0,014***	-0,089***	-0,024***	0,050***	0,021***
	(0,00007)	(0,00008)	(0,0004)	(0,0003)	(0,0003)	(0,0003)

Notes: *, **, and *** denote significant at 10, 5, and 1% respectively. Worker-clustered standard errors in parentheses. Other variables included in the regressions are female, tenure and tenure squared, log of the number of worker in a firm, dummies for age, location, sector of activity, occupation and year.

Note: FE estimates of the returns to overeducation and undereducation are identified only from persons who have changed their educational level or job level.

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Thank you!