YOUTH EMPLOYMENT IN EUROPE: THE ROLE OF EDUCATION AND MARKETS REGULATION

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Abstract

In this paper we empirically investigate the joint effect of high education and both labour and product markets regulation on youth labour market performance. Our estimates, based on an original country-level data-set for the 1998-2010 period covering all the OECD EU countries, show that the share of young men with tertiary education increases the male employment rate and decreases the NEET rate, while in the case of females a higher share of those highly educated is significantly associated only with lower NEET rates. Regarding markets regulation, we do not find statistically significant results either for males or for females in the case of Employment Protection Legislation (EPL), while Product Market Regulation (PMR) negatively affects employment opportunities more for young women compared to young men. However, not all the PMR components have negative effects on youth labour market performance: the strictness of regulation of entrepreneurship (in terms of legal and administrative barriers to start-up and run a business) reduces significantly the employment rate for both males and females, while product market regulation related to state control of business enterprises significantly improves the labour market performance mainly of young men. Our attempts to control for the quality of education confirm that high education *per se* is not sufficient to increase the youth employment rate.

Keywords: Youth employment rate, NEET rate, education, apprenticeship, regulation

JEL codes: J08, J16, J21, J78

1. Introduction

Young people have been particularly hit by the current economic crisis, as shown by the high and increasing unemployment and inactivity rate, as well as by the changing labour market conditions, with flexible forms of employment gaining in importance in all EU Member States. As for the adult population, the crisis has worsened the labour market conditions more for young men than for young women. Furthermore, across all age groups those who have been more hit by the crisis are the low educated/low skilled ones: in the OECD countries between 2008 and 2011 the unemployment rate of low-educated individuals increased on average by almost 4 percentage points, while it increased by only 1.5 percentage points for highly educated individuals, causing the unemployment gap by skill to widen. The impact of education on unemployment is much greater for the young than for older adults: OECD averages show that, among the young (25-34 years old), in 2011 the unemployment rate was around 18% for those without secondary education, 6.8% for those with tertiary education. The corresponding figures for the older adults (55-64 years old) were 8.8% and 4%, respectively.

Hence, educational attainment has a huge impact on employability and the crisis has strengthened this impact even further.

However, there are large differences between countries in terms of youth labour market performance by skill: while youth unemployment has been increasing especially among low-educated young people in EU countries such as Estonia, Greece, Ireland and Spain, the same indicator has been declining in other EU countries, notably in Austria and Germany.

Furthermore, in most EU countries young women still face worse labour market conditions relative to young men, despite they have on average higher attainment rates in upper secondary and tertiary education than men of the same age.

This evidence implies that education *per se* is not sufficient to protect young people from unemployment. OECD evidence shows that, even during an economic downturn, young people with a college degree from fields of study which are highly demanded usually find a job easily, ending up in “high skills – high wage” career paths. In other cases a tertiary qualification does not bring the expected results in terms of occupation, job career or earnings, either because the labour market for those skills is shrinking fast

– often protecting older workers at the expense of the youngest – or because the chosen field of study was not aligned with the needs of the labour market (OECD 2013).

The high heterogeneity in labour market response to the economic crisis registered across OECD (and EU) countries suggests that (high) youth unemployment may be the product of the interaction between the economic context and particular policies/institutions.

In this paper, we focus our analysis on the role of education and markets regulation. Our main research hypothesis is that the effect of high education on the youth labour market performance may depend on the degree of rigidity/flexibility that characterizes both labour and product markets. More specifically, if highly educated workers are complement to high technology and innovation, the incentives to acquire education (and the actual effect of the latter on youth employment and unemployment) depends on whether and how labour and product markets regulation fosters innovation and research. In this respect, Bassanini and Ernst (2002) provide some cross-country evidence showing that higher competition in the product market is positively associated to the innovation performance of a country. Conversely, the relationship between innovation and employment protection is less clear-cut, since the sign and magnitude of the effect depends on the systems of industrial relations and the specific characteristics of each industry. In industries with a cumulative knowledge base, employment protection, by stabilizing employment and encouraging training as well as the accumulation of firm-specific human capital, should incentive innovation and the subsequent employment of highly skilled (educated) workers.

Furthermore, since young women with a "scientific" college degree are still a minority (and the situation has changed only slightly in the last decade, despite of a number of public initiatives to promote gender equality in OECD countries and at the EU level) [1] interaction between high education and markets regulation may be quite different by gender.

In light of these considerations, this paper is structured as follows: in Section 2 we review the main literature on the effects of education and regulation on labour market

[1] According to recent OECD statistics, in most OECD countries one-third or fewer of all graduates in the fields of engineering, manufacturing and construction are women, who by contrast represent 70% or more of tertiary students in the fields of education, health and welfare. Furthermore, the proportion of women graduates in mathematics, science and technology has grown slightly from 40% in 2000 to 41% in 2011, albeit the proportion of women graduates in all fields grew from 54% to 58% during that period.

performance, focusing mainly on those studies analyzing also the gender gaps; in Section 3 we present our empirical strategy and the data; some descriptive statistics and pairwise correlations are discussed in Section 4, while the main econometric results are in Section 5. We then report further estimates and a number of robustness checks in Section 6; we finally summarize our main results and discuss their policy implications in the last Section.

2. Literature review

Socio-economic literature has been mainly aimed at finding explanations for the persistent gender pay gaps in industrialized countries (for a review, see Altonji and Blank 1999) and, more recently, for gender gaps in unemployment rates (Azmat et al. 2006; Arslan and Taskin 2011).

Albeit not explicitly addressed to the youth, most of these explanations may be relevant also to explain differences between young men and women in the labour market. Other than gender discrimination, two main factors can be put forward to explain these differences: gender differences in labour market attachment and labour market institutions (Azmat et al. 2006).

According to standard human capital theory and the vast literature on education, high education is one of the main factors influencing labour market attachment, particularly in the case of women (Goldin and Olivetti 2013). However, even if it is true that young women are on average more educated than young men and hence they potentially start their job careers with a larger endowment of initial human capital, they still often choose different fields of studies than men (such as humanities), which may translate in lower employment opportunities and larger skill mismatch for women compared to men (Flabbi 2012). Furthermore, gender differences in human capital tend to increase with age because of the unbalanced division of housework and care activities among men and women in the household, with women experiencing more and longer out-of-work spells than men in the presence of children. In this respect, Dex et al (1998) find that highly educated women are those exhibiting the most continuity in employment after childbirth; similarly, Goldin (2006) points out that high education should counterbalance the negative effect of childbirth on women labour market participation,

since women with advanced degrees have shorter out of work spells than other women, also among those with children.

Gender differences in the labour market are also influenced by labour market institutions and policies. A few studies have looked at the effect of EPL on gender gaps, finding quite mixed results: strict EPL reduces the out flow from employment, especially of workers with long job tenures, but it also reduces the hiring of new workers, particularly of those less attached to the labour market. Genre et al (2010) find that the strictness of EPL negatively affects female participation rates, particularly in the case of young women (15-24 years). Rubery (2011) points out that gender gaps are influenced by the asymmetry of employment protection between permanent and temporary contracts: if the latter have much lower firing costs and such types of contracts are more widespread among the young and women, these categories of workers are more likely to move back and forth from unemployment and to have unstable job careers. This asymmetry has been exacerbated by the EPL reforms "at the margin" implemented in most countries in the last decades, which have increased flexibility only for temporary contracts.

Recent studies have pointed out that product market regulation (PMR) may be also relevant in affecting gender gaps. For example, the empirical analysis by OECD (2006) on the effects of institutions on labour market performance points out that the main negative significant effects on aggregate women's employment are associated with unemployment benefits, the tax wedge and product market regulation, but it is only the latter that actually displays quite different effects by gender: strict PMR does not affect (prime-age) men's employment, while it has a negative effect on women's employment, of a size comparable to that of unemployment benefits and the tax wedge.

A number of recent papers have also studied the joint effect of EPL and PMR on labour market performance. Fiori et al (2007) show that that product market deregulation is beneficial for employment and it is more effective when coupled with high labor market regulation, which *per se* reduces employment. In this sense, PMR and EPL may be substitute. However, they also find evidence that product market deregulation leads over time to labor market deregulation, implying some complementarity in deregulation, but the reverse causality does not hold, since labor market deregulation does not affect PMR. Amable et al (2011) find evidence of a positive effect of EPL and a negative

effect of PMR on employment performance. Furthermore, they find that EPL and PMR are substitute in terms of their effects on labour market performance.

Only few papers have considered the joint effect of education and markets regulation on labour market indicators. Charlot and Malherbert (2013) develop a theoretical model to study the returns to education, equilibrium unemployment and welfare in the case of a dual EPL system, characterized by the coexistence of highly protected permanent jobs and highly deregulated temporary ones. They show that, by stabilizing employment relationships, high EPL may actually favour investments in education, with subsequent gains in welfare and productivity.

Albeit not explicitly considering the effects on the labour market, Aghion et al (2009) study the joint effects of high education, EPL and PMR on economic growth (measured by changes in total factor productivity). Using panel data for a sample of OECD countries, they find that high education is beneficial for economic growth only for countries closed to the technological frontier. Furthermore, only for the latter deregulation of markets rigidities increases productivity.

3. Empirical strategy and data

The aim of the empirical analysis is to estimate the effect of education and markets regulation on gender-specific youth labor market indicators and the corresponding gender gaps.

More specifically, we estimate the following model:

$$Y_{it} = \alpha + \beta_1 Educ + \beta_2 EPL_{it} + \beta_3 PMR_{it} + \beta_4 X_{it} + c_i + \tau_t + \varepsilon_{it} \qquad [1]$$

where *Y* is a gender-specific labour market indicator (or the corresponding gender gap) in country i at time t, *Educ* is the share of the youth population with tertiary education, EPL an indicator of the strictness of employment regulation, PMR an indicator of the strictness of product market regulation, X is a vector of country-level time varying controls, c_i are country fixed effects, τ_t are time fixed effects and ε the usual error term.

In order to take into account of interaction effects between education and markets regulation, we estimate also the following specification:

$$Y_{it} = \alpha + \beta_1 Educ + \beta_2 EPL_{it} + \beta_3 PMR_{it} + \beta_4 X_{it} + \beta_5 Educ * REG + c_i + \tau_t + \varepsilon_{it} \qquad [2]$$

where REG is either the EPL or the PMR indicator.

Estimates are based on an original country-level panel dataset matching youth labour market indicators with policy and institutions indicators for all the EU Member States over the 1998-2010 period. More specifically, we compute country-level data on youth characteristics and labour market indicators on the basis of EU-LFS microdata, while data on policies and institutions comes from different Eurostat and OECD databases[2].

We focus our analysis on youth population aged 15-29 years.

We measure youth labour market performance with two main indicators: the employment rate and the NEET rate (e.g. the percentage of the 15-29 population who is not employed and not involved in further education or training). For each indicator, we consider the gender-specific rate (for example, the male and female employment rate) and the corresponding gender gap (e.g.: male employment rate-female employment rate).

Among the regressors, we focus our attention on three main variables: the share of young people with tertiary education, strictness of Employment Protection Legislation (EPL) and Product Market Regulation (PMR).

We use EU-LFS microdata to compute the first indicator, which measures the share of young males (females) in the corresponding total population with tertiary education (ISCED 5-6).

The other two indicators come, respectively, from the OECD Employment database and the OECD Product Market Regulation Database.

The OECD indicators of employment protection measure the procedures and costs involved in dismissing individuals or groups of workers and the procedures involved in hiring workers on temporary contracts. For each country, employment protection is measured along 21 basic items, which are then classified into three main areas: (i) protection of regular workers against individual dismissal; (ii) regulation of temporary forms of employment; (iii) specific requirements for collective dismissals. All these indicators vary from 0 (lowest strictness) to 6 (highest strictness). Our empirical analysis is mainly based on the overall indicator of employment protection (which is the unweighted average of the first two indicators). However, since most EU countries have

[2] See Table I in Appendix for a detailed description and basic statistics of all the variables used.

in the last years implemented only reforms "at the margin" of EPL, increasing flexibility for temporary contracts while leaving EPL for permanent ones almost unchanged, in some specifications we used also the sub-indicator measuring the strictness of regulation of temporary contracts.

The OECD Indicators of Product Market Regulation (PMR) are a comprehensive and internationally-comparable set of indicators that measure the degree to which policies promote or inhibit competition in product markets. In our analysis we use the economy-wide indicator, which covers formal regulations in the following areas: state control of business enterprises; legal and administrative barriers to entrepreneurship; barriers to international trade and investment. The main sources are the Regulatory Indicators Questionnaire filled out by national governments in 1998, 2003 and 2008 and data published by the OECD and other international organizations.

Since the OECD indicators are not available for non-OECD countries, we focus our analysis on the EU-OECD countries[3].

4. Descriptive evidence

The current economic crisis has hit particularly the youth labour market, which is significantly more volatile and sensitive to the business cycle than that of adult workers. As for the adult population, the crisis has worsened the labour market conditions more for young men than for young women, reducing the existing gender gaps. This is due to the characteristics of the recession, strongly hitting the manufacturing and construction sectors, which traditionally employ mainly men. However, young women still face worse labour market conditions relative to young men.

As shown in Figure 1, except for the mild crisis in 2002-2003, the youth employment rate for both males and females has been roughly stable between the end of the Nineties and 2005, with the male employment rate around 55% and the female one between 8-10 points lower. For both sexes the employment rate slightly increased in the second half of the 2000s. Overall, before the crisis female labour market performance has been slightly better than male one and the gender gap in the employment rate has been slowly

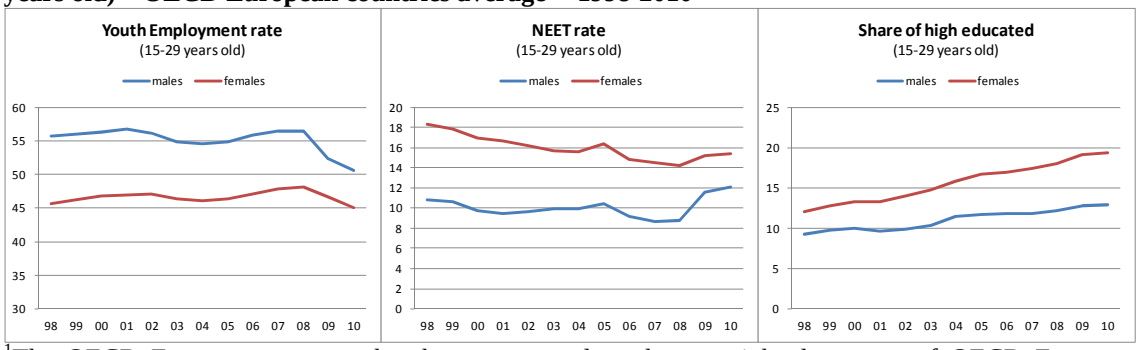
[3] Only six of the EU-27 Member States (i.e., Bulgaria, Cyprus, Lithuania, Latvia, Malta and Romania) are not currently members of the OECD. Our analysis is then based on twenty one EU-27 countries.

but continuously reducing from 10 percentage points in 1998 to 8.8 percentage points in 2007. Between 2007 and 2010, the youth male employment rate dropped by almost 6 percentage points (from 56.5% to 50.6%), while the employment rate for women declined less sharply, from 47.8% to 45.1%. The relatively sharp decrease in the employment rate of young males has reduced gender gaps: in 2010 young men employment rate is 5.5 percentage points higher than the female one.

Furthermore, discouragement resulting from the lack of job opportunities has raised the inactivity of young people; therefore, the NEET rate, which reached the minimum point of the last 15 years immediately before the crisis, has been increasing steadily since 2008. The second panel of Figure 1 shows that the NEET rate is higher for females than males, especially with regard to the inactive component of NEETs, but gender gaps are reducing in recent years due to the very high increase in young men unemployment due to the recession.

Such gender gaps in the youth labour markets are not explained by educational attainment differentials: as shown in the last panel of Figure 1, in OECD European countries younger women have actually higher attainment rates than younger men over the whole period considered. Furthermore, the share of people with tertiary education has been increasing steadily more for women than for men, resulting in widening gender differences over time: in 2010 the share of young women with tertiary education reached 19.4% (it was 12.1% in 1998) compared to 12.9% for young men (9.3% in 1998). The large gender gap in education in favour of women in OECD European countries has more than doubled, going from less than 3 percentage points in 1998 to 6.6 percentage points in 2010.

Figure 1 – Employment rate, NEET rate and share of high educated on the total population (15-29 years old) – OECD European countries average[1] - 1998-2010



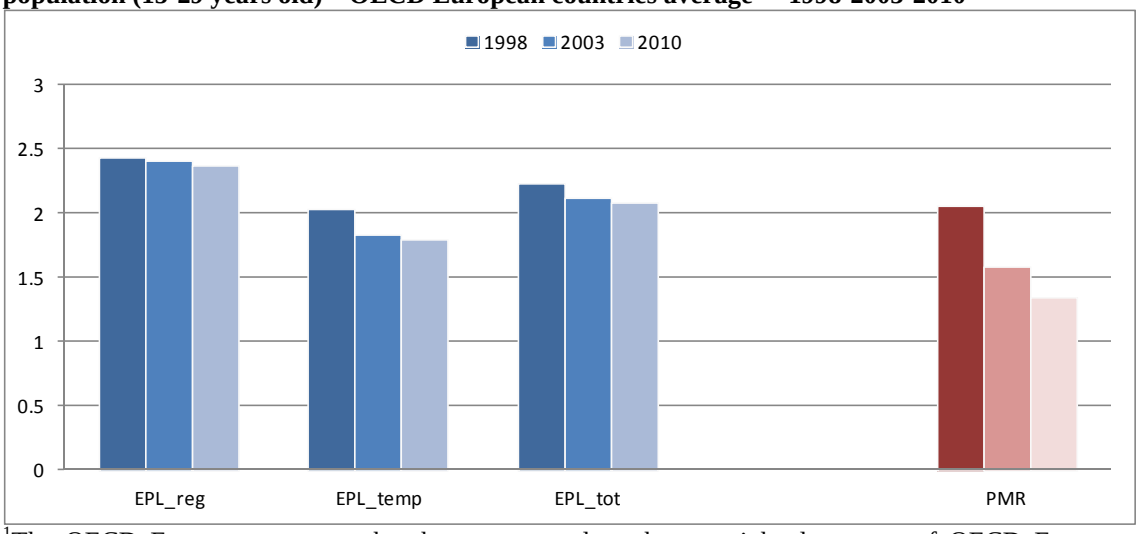
[1]The OECD European average has been computed as the unweighted average of OECD European countries.

Figure 2 reports the EPL and PMR average scores in 1998, 2003 and 2010 showing as the OECD countries have extensively reduced strictness both in EPL than PRM.

The figure shows a reduction in the EPL especially with regard to the temporary component, due to the reforms which have been increasing flexibility for temporary contracts, while EPL for permanent one is almost unchanged between 1998 and 2010.

OECD countries have instead extensively liberalised product markets over the past ten years. The aggregate PMR score[4] moved from around 2.1 index points in 1998 to around 1.3 index points in 2008 on average across countries.

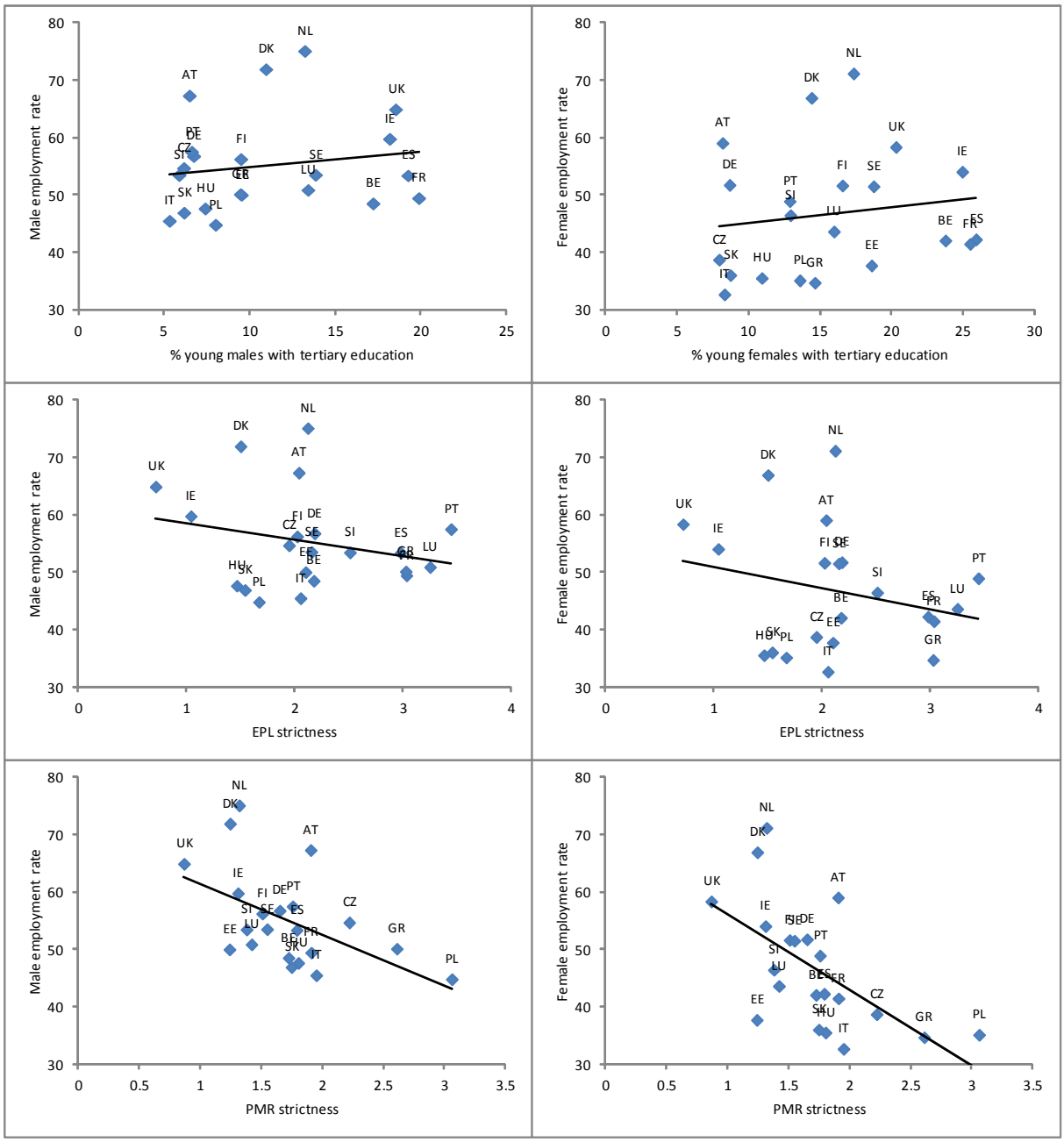
Figure 2 – Employment Protection Legislation, NEET rate and share of high educated on the total population (15-29 years old) – OECD European countries average [1] - 1998-2003-2010



[1]The OECD European average has been computed as the unweighted average of OECD European countries.

[4] The indicators represent the stringency of regulatory policy on a scale from 0 to 6 with higher numbers being associated with policies that are more restrictive to competition.

Figure 3 — Pairwise correlation between youth employment rate and education and regulation indicators by gender - 1998-2010 average

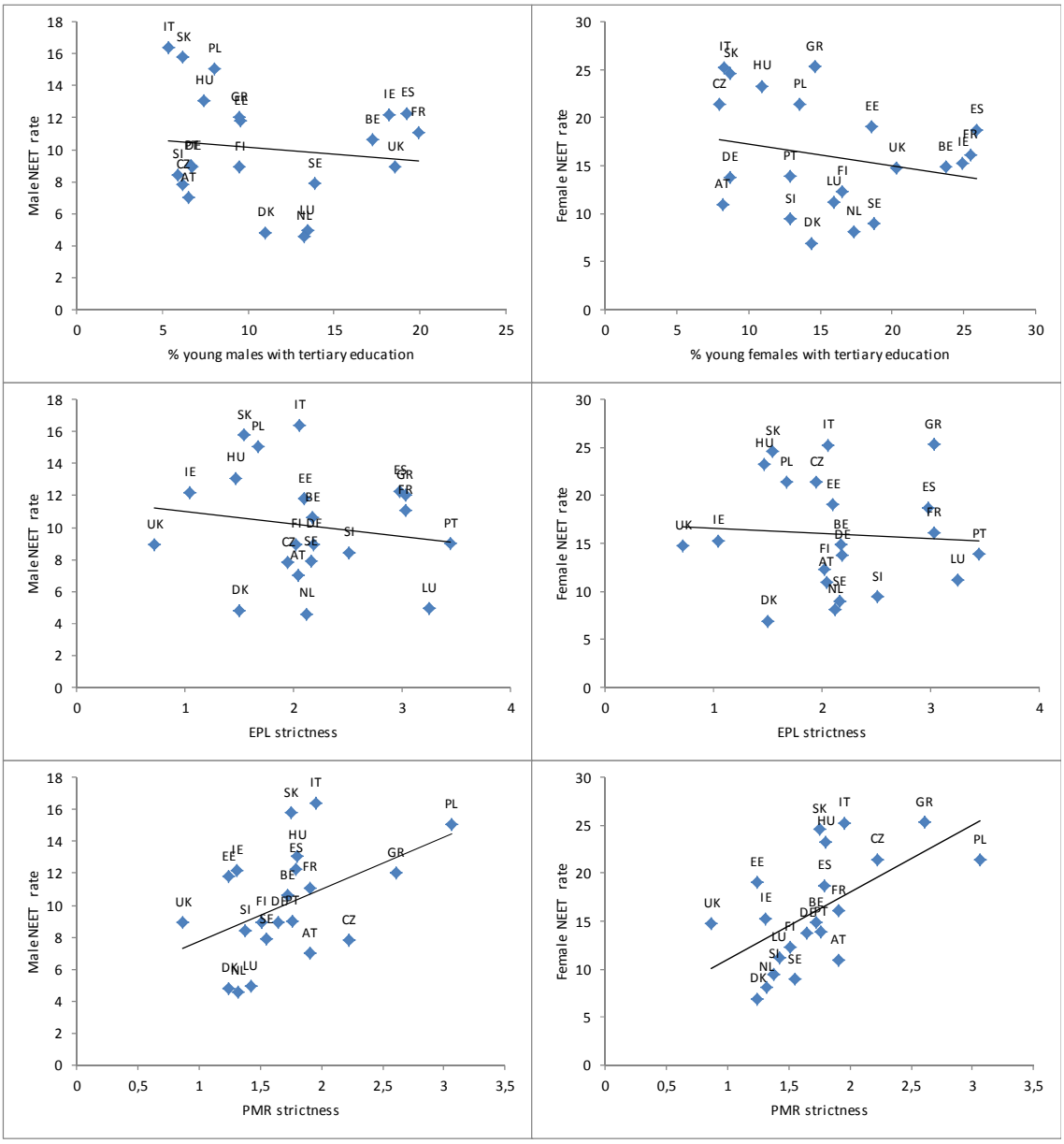


Figures 3 and 4 show the correlation between the youth labour market indicators by gender and (i) the share of highly educated, (ii) the EPL strictness and (iii) the PMR stringency.

The figures suggest a slightly positive relationship between the employment rate and the incidence of the high educated in the total young population (Figure 3), while the

association is negative considering the NEET rate (Figure 4). Figures also show that high strictness in EPL is negatively associated with youth employment rates, while it does not seems to be related with the NEET rates. A much stronger correlation seems to emerge in the case of PMR: the PMR strictness is negatively associated with youth employment rates, especially for women, while the correlation is positive considering PMR strictness and NEET rates.

Figure 4 — Pairwise correlation between NEET rate and education and regulation indicators by gender - 1998-2010 average



5. Main results

Tables 1-3 present the main estimates of the effect of high education and markets regulation on youth labour market performance. As mentioned in Section 3, in all Tables we used as dependent variables the employment and the NEET rate. In Table 1 we report estimates for males, in Table 2 for females and in Table 3 the corresponding gender gaps (see the Table in Appendix for detailed definitions). In all the table results are displayed according to the same layout: in column 1 we start with a very parsimonious specification in which, other than country and time fixed effects, we control only for the share of youth (either males or females) with tertiary education; in column 2 we add some country-level structural controls (the real GDP growth rate, Cohort dimension, the share of part-time); in column 3 we include the two regulation indicators (for, respectively, Employment Protection Legislation – EPL - and Product Market Regulation - PMR). In the remaining two columns we add an interaction term between high education and, in turn, EPL (column 4) and PMR (column 5).

According to our estimates, high education is quite important for males, since it significantly increases the male employment rate and it reduces the NEET rate: according to our preferred specification (column 3), a 1 per cent increase in the share of highly educated young men is associated with a one quarter of percentage point increase in the employment rate and a reduction in the NEET rate of around 0.37 percentage points. In the case of young women, the effect of high education on the employment rate is usually negative but never statistically significant, while it significantly reduces the NEET rate: a 1 percentage point increase in the share of highly educated women is associated with a reduction of around 0.2% of the female NEET rate. Overall, high education seems then more effective on young women participation than on their employment opportunities.

Regarding markets regulation, we do not find statistically significant results either for males or for females in the case of EPL, while PMR seems relevant particularly for female employment, since more rigid product markets are associated with a lower female employment rate (and results are weakly statistically significant). The effect of PMR is more evident on the gender gaps: a one point increase in the PMR indicator is associate with an increase in both the employment rate and the NEET rate differential by, respectively around 2 and 1.5 percentage points.

The effect of the interaction between high education and PMR is evident in the case of the gender gaps in the employment rate: as shown in column 5 of Table 3, the latter declines when the share of females with tertiary education increases, but this effect is partly off-set when PMR is higher.

Table 1 - Effect of Tertiary education and regulation on the labour market indicators (Male 15-29)

	Employment rate					NEET rate				
	1	2	3	4	5	1	2	3	4	5
High Education (EDUC)	0,268 **	0,255 *	0,262 *	-0,016	0,401 *	-0,43 ***	-0,398 ***	-0,375 ***	-0,543 **	0,058
	(0.133)	(0.142)	(0.146)	(0.383)	(0.225)	(0.085)	(0.086)	(0.088)	(0.229)	(0.130)
Structural Controls										
GDP growth		0,214 **	0,21 **	0,217 **	0,221 **		-0,333 ***	-0,354 ***	-0,35 ***	-0,321 ***
		(0.104)	(0.108)	(0.108)	(0.108)		(0.063)	(0.064)	(0.065)	(0.062)
Cohort Dimension		0,188	0,199	0,215	0,216		-0,168	-0,067	-0,058	-0,015
		(0.259)	(0.288)	(0.289)	(0.289)		(0.155)	(0.172)	(0.173)	(0.166)
Part-time		-0,8	-0,093	-0,084	-0,1		0,098 *	0,113 *	0,118 *	0,091
		(0.10)	(0.102)	(0.103)	(0.103)		(0.06)	(0.061)	(0.062)	(0.059)
Regulation										
EPL			-0,825	-1 427	-0,922			-0,152	-0,516	-0,454
			(1.195)	(1.421)	(1.201)			(0.716)	(0.851)	(0.693)
PMR			0,112	0,035	0,563			-0,911	-0,958	0,484
			(1.057)	(1.063)	(1.194)			(0.634)	(0.637)	(0.689)
EDUC*EPL				0,131					0,079	
				(0.166)					(0.01)	
EDUC*PMR					-0,064					-0,199 ***
					(0.079)					(0.045)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs.	273	273	273	273	273	273	273	273	273	273
Adj. R2	0,887	0,888	0,888	0,887	0,887	0,769	0,797	0,797	0,796	0,811

*** statistically significant at 1%; ** statistically significant at 5%; * statistically significant at 10%

Table 2 - Effect of Tertiary education and regulation on the labour market indicators (Female 15-29)

	Employment rate					NEET rate				
	1	2	3	4	5	1	2	3	4	5
High Education (EDUC)	-0,096	-0,161 *	-0,139	-0,241	0,172	-0,247 ***	-0,207 ***	-0,228 ***	-0,16	0,029
	(0.080)	(0.088)	(0.091)	(0.185)	(0.149)	(0.059)	(0.063)	(0.066)	(0.133)	(0.107)
Structural Controls										
GDP growth		-0,043	-0,073	-0,068	-0,038		-0,13 **	-0,114 *	-0,117 *	-0,085
		(0.087)	(0.089)	(0.089)	(0.089)		(0.062)	(0.064)	(0.065)	(0.064)
Cohort Dimension		-0,472 **	-0,307	-0,294	-0,202		0,071	-0,017	-0,026	0,069
		(0.222)	(0.248)	(0.249)	(0.248)		(0.159)	(0.179)	(0.180)	(0.178)
Part-time		0,006	0,039	0,043	0,021		0,15 **	0,148 **	0,146 **	0,134 **
		(0.083)	(0.084)	(0.085)	(0.084)		(0.060)	(0.061)	(0.061)	(0.060)
Regulation										
EPL			0,345	0,036	-0,033			0,647	0,853	0,335
			(1.012)	(1.125)	(1.010)			(0.731)	(0.813)	(0.726)
PMR			-1 625 *	-1 665 *	-0,48			0,595	0,622	1 543 **
			(0.883)	(0.887)	(0.975)			(0.638)	(0.641)	(0.701)
EDUC*EPL				0,05					-0,033	
				(0.079)					(0.057)	
EDUC*PMR					-0,13 ***					-0,108 ***
					(0.049)					(0.036)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs.	273	273	273	273	273	273	273	273	273	273
Adj. R2	0,947	0,947	0,948	0,948	0,949	0,911	0,914	0,914	0,914	0,917

*** statistically significant at 1%; ** statistically significant at 5%; * statistically significant at 10%

Table 3 - Effect of Tertiary education and regulation on the labour market indicators (Gender Gap 15-29)

	Gender gap in the Employment rate					Gender gap in the NEET rate				
	1	2	3	4	5	1	2	3	4	5
Male High Education (EDU(	0,346 **	0,241 *	0,191	0,663 *	0,559 *	0,102	0,053	0,044	-0,002	-0,246
	(0.139)	(0.130)	(0.126)	(0.392)	(0.318)	(0.117)	(0.113)	(0.112)	(0.347)	(0.292)
Female High Education (EDI	-0,055	0,07	0,08	-0,149	-0,523 **	-0,056	0,017	-0,012	0,137	0,087
	(0.100)	(0.095)	(0.094)	(0.225)	(0.249)	(0.085)	(0.083)	(0.084)	(0.180)	(0.299)
Structural Controls										
GDP growth		0,258 ***	0,293 ***	0,293 ***	0,256 ***		0,217 ***	0,25 ***	0,244 ***	0,24 ***
		(0.056)	(0.055)	(0.056)	(0.054)		(0.049)	(0.049)	(0.049)	(0.050)
Cohort Dimension		0,567 ***	0,388 **	0,381 **	0,26 *		0,257 **	0,074	0,059	0,048
		(0.142)	(0.154)	(0.154)	(0.150)		(0.124)	(0.136)	(0.137)	(0.139)
Part-time		-0,102 *	-0,15 ***	-0,158 ***	-0,14 ***		-0,041	0,021	0,017	0,03
		(0.053)	(0.053)	(0.053)	(0.051)		(0.047)	(0.047)	(0.047)	(0.047)
Regulation										
EPL			-0,952	-0,586	-0,678			0,543	0,89	0,754
			(0.632)	(0.759)	(0.617)			(0.560)	(0.672)	(0.567)
PMR			1 960 ***	2 017 ***	0,871			1,489 ***	1,531 ***	0,993 *
			(0.549)	(0.552)	(0.592)			(0.487)	(0.490)	(0.545)
Male EDUC*EPL				-0,22					0,026	
				(0.174)					(0.154)	
Female EDUC*EPL				0,109					-0,076	
				(0.099)					(0.088)	
Male EDUC*PMR					-0,288					0,203
					(0.214)					(0.197)
Female EDUC*PMR					0,343 **					-0,01
					(0.158)					(0.145)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Obs.	273	273	273	273	273	273	273	273	273	273
Adj. R2	0,835	0,86	0,87	0,87	0,88	0,86	0,872	0,876	0,876	0,878

Note: Gender gaps in employment rates are defined as males-females; gender gaps in NEET rates are defined as females-males.
*** statistically significant at 1%; ** statistically significant at 5%; * statistically significant at 10%

6. Further estimates

In this Section we further explore some of the main findings discussed in the previous Section.

First, we investigate the potential heterogenous effect of different components of PMR. More specifically, the OECD index is the weighted average of three sub-indicators: state-control, barriers to entrepreneurship and barriers to trade and investments. We expect that mainly the second component, by imposing excessive burdens and costs to (young) people willing to start-up their own business, may be quite detrimental for (youth) employment.

Tables 4-6 presents the main estimates for gender-specific indicators (Table 4 for males, Table 5 for females) and the corresponding gender gaps (Table 6). Columns differ for the PMR sub-indicator considered: in columns (1) and (4) we used the PMR indicator for state-control (PMR_state), in columns (2) and (5) the PMR indicator for barriers to

entrepreneurship (PMR_entre) and the remaining columns (3) and (6) the PMR indicator for barriers to trade and investments (PMR_trade).

Estimates for young males in Table 4 show that, as expected, the strictness of regulation of entrepreneurship reduces significantly the employment rate. On the contrary, product market regulation related to state control significantly improve the labour market performance of young men, since it significantly increases the employment rate and decreases the NEET rate. The size of these effects are remarkable: a 1 point increase in PMR related to entrepreneurship causes a decline of almost 3 percentage points in the employment rate, while a similar increase in PMR related to State control increases the male employment rate by almost 1.6 points and it reduces the NEET rate by more than 1.3 points.

Table 4 - Alternative definitons of PMR (sub-indicators)
Males 15-29

	Employment rate			NEET rate		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Male high educ	0.165	0.352**	0.264*	-0.314***	-0.401***	-0.397***
	[0.149]	[0.142]	[0.144]	[0.088]	[0.088]	[0.086]
GDP growth	0.218**	0.144	0.202*	-0.342***	-0.331***	-0.321***
	[0.104]	[0.104]	[0.109]	[0.062]	[0.064]	[0.066]
Cohort Dimension	-0.094	0.227	0.230	0.088	-0.171	-0.204
	[0.291]	[0.255]	[0.278]	[0.174]	[0.157]	[0.167]
Part-time	-0.073	-0.059	-0.086	0.084	0.099	0.090
	[0.100]	[0.099]	[0.105]	[0.060]	[0.061]	[0.063]
EPL	-0.893	-0.526	-0.973	0.118	0.075	0.303
	[1.150]	[1.137]	[1.313]	[0.685]	[0.702]	[0.790]
PMR_state	1.591**			-1.345***		
	[0.700]			[0.417]		
PMR_entre		-2.831***			0.084	
		[0.807]			[0.498]	
PMR_trade			-0.132			0.241
			[0.674]			[0.405]
Constant	55.637***	60.991***	56.433***	13.453***	12.717***	12.693***
	[4.691]	[4.798]	[4.753]	[2.792]	[2.962]	[2.858]
Time fixed effects	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
Observations	273	273	273	273	273	273
R-squared	0.905	0.908	0.903	0.831	0.824	0.824

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

The detrimental effect of PMR regulation of entrepreneurship is even larger in the case of young women (Table 5), since a 1 point increase in this indicator causes a reduction in the female employment rate of more than 3 percentage points. Furthermore, as in the case of young men, the direct presence of the State in running specific firms/industries positively affect the female labour market performance (by increasing the employment rate and reducing the NEET rate), but the estimated effects are much smaller in size and never statistically significant. Finally, also PMR related to trade and investments seems to negatively affect female labour market performance, particularly the NEET rate.

Table 5 - Alternative definitons of PMR (sub-indicators)
Females 15-29

	Employment rate			NEET rate		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Female high educ	-0.209**	-0.106	-0.178**	-0.193***	-0.218***	-0.212***
	[0.095]	[0.087]	[0.089]	[0.068]	[0.065]	[0.064]
GDP growth	-0.035	-0.104	-0.074	-0.129**	-0.125*	-0.085
	[0.087]	[0.085]	[0.091]	[0.063]	[0.064]	[0.065]
Cohort Dimension	-0.630**	-0.473**	-0.392	0.138	0.053	-0.071
	[0.258]	[0.215]	[0.238]	[0.185]	[0.162]	[0.170]
Part-time	0.024	0.049	0.046	0.152**	0.155**	0.122*
	[0.084]	[0.081]	[0.087]	[0.061]	[0.061]	[0.062]
EPL	0.836	1.104	0.108	0.460	0.467	1.278
	[0.986]	[0.945]	[1.107]	[0.709]	[0.711]	[0.791]
PMR_state	0.613			-0.401		
	[0.603]			[0.433]		
PMR_entre		-3.166***			0.109	
		[0.661]			[0.498]	
PMR_trade			-0.776			0.886**
			[0.562]			[0.402]
Constant	55.476***	61.134***	56.220***	13.492***	13.135***	12.770***
	[3.899]	[3.888]	[3.899]	[2.802]	[2.927]	[2.784]
Time fixed effects	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
Observations	273	273	273	273	273	273
R-squared	0.955	0.959	0.955	0.926	0.926	0.927

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Estimates in Table 6 show that PMR related to State control significantly increases the gender gaps in both the employment and the NEET rate, while PMR related to entrepreneurship does not display any statistically significant effect on either of the two

indicators consider. If we read these results in light of the gender-specific estimates discussed above, we can conclude that the first effect is mainly driven by the relative improvement of male labour market performance, while the second actually hides quite substantial negative effects for both male and female employment rates which, being not so different in size, does not affect the corresponding gender gap.

Table 6 - Alternative definitons of PMR (sub-indicators)
Gaps 15-29

	Employment rate			NEET rate		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Male high educ	0.195	0.197	0.215*	0.047	0.055	0.063
	[0.126]	[0.130]	[0.129]	[0.112]	[0.114]	[0.113]
Female high educ	0.051	0.109	0.112	-0.032	0.013	0.011
	[0.096]	[0.096]	[0.096]	[0.085]	[0.085]	[0.084]
GDP growth	0.256***	0.260***	0.278***	0.222***	0.218***	0.246***
	[0.054]	[0.056]	[0.058]	[0.048]	[0.050]	[0.051]
Cohort Dimension	0.352**	0.618***	0.535***	0.055	0.252**	0.165
	[0.160]	[0.142]	[0.150]	[0.142]	[0.126]	[0.132]
Part-time	-0.107**	-0.128**	-0.147***	0.053	0.042	0.018
	[0.053]	[0.054]	[0.055]	[0.047]	[0.048]	[0.048]
EPL	-1.454**	-1.554**	-0.936	0.160	0.119	0.688
	[0.614]	[0.629]	[0.704]	[0.545]	[0.556]	[0.619]
PMR_state	1.292***			0.942***		
	[0.373]			[0.331]		
PMR_entre		0.485			0.046	
		[0.439]			[0.387]	
PMR_trade			0.624*			0.621**
			[0.355]			[0.313]
Constant	1.682	1.395	1.771	1.136	1.429	1.091
	[2.454]	[2.605]	[2.507]	[2.180]	[2.301]	[2.205]
Time fixed effects	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
Observations	273	273	273	273	273	273
R-squared	0.888	0.883	0.884	0.893	0.890	0.892

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Second, we test whether quality of tertiary education is more relevant than quantity of tertiary education to explain both the different labour market performance of young males and females and the different effect of PMR by gender. As we argued in previous sections, young women are on average more educated than young men but, compared to the latter, they are more likely to choose fields of studies, such as humanities, which are

already characterized by an excess of supply and offer both less job opportunities and career prospects. According to Eurostat statistics, in 2011 in the EU-27 the share of graduates in Mathematics, Science and Technology (MST) was just above 12 per cent for females, more than 39 per cent for males. Furthermore, in the last decade no significant improvement has been registered in this indicator for young women.

As a proxy for the quality of education, we consider the share of females (males) graduating in MST in total population aged 20-29.

Tables 7 and 8 report our main results for the employment rate and the NEET rate respectively. We report estimates of the model specification with time and country fixed effects and structural country-level controls. The two tables share the same outline.

Table 7 - The role of the field of education
Employment rates

	Males				Females			Gaps	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Male high educ		0.152	0.217					0.101	0.067
		[0.151]	[0.161]					[0.124]	[0.125]
Male graduates in MST	0.195**	0.172*	0.323*				0.157**	0.102	0.250
	[0.091]	[0.094]	[0.165]				[0.076]	[0.077]	[0.164]
Female high educ					-0.138	-0.050		0.096	0.071
					[0.095]	[0.101]		[0.096]	[0.096]
Female graduates in MST				0.003	0.029	0.525**	0.165*	0.192**	-0.309
				[0.100]	[0.102]	[0.231]	[0.098]	[0.097]	[0.279]
EPL	-0.042	-0.245	-0.291	0.097	0.473	0.366	0.000	-0.405	-0.376
	[1.158]	[1.175]	[1.175]	[0.980]	[1.011]	[1.002]	[0.595]	[0.614]	[0.611]
PMR	1.340	1.082	1.853	-1.502*	-1.232	-0.218	2.833***	2.443***	2.163***
	[1.040]	[1.071]	[1.276]	[0.878]	[0.895]	[0.982]	[0.536]	[0.547]	[0.664]
Male graduates*PMR			-0.084						-0.083
			[0.076]						[0.094]
Female graduates*PMR						-0.300**			0.314*
						[0.125]			[0.178]
Constant	53.497***	52.291***	51.028***	54.385***	56.075***	54.018***	-0.724	-2.131	-1.089
	[4.770]	[4.916]	[5.044]	[3.821]	[3.984]	[4.036]	[2.563]	[2.588]	[2.608]
Time fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Structural controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	266	266	266	266	266	266	266	266	266
R-squared	0.911	0.911	0.911	0.958	0.958	0.959	0.899	0.902	0.905

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

More specifically, for each gender and the corresponding gap, we use three different specification: in the first column we control for the (gender-specific) share of graduates

in MST, in the second column we add the share of people with tertiary education and in the third column we interact the share of graduates in MST with the PMR indicator.

Estimates in Table 7 confirm that high education per se is not sufficient to increase the youth employment rate. In the case of males, the share of graduates in MST has a positive and statistically significant effect on the male employment rate, while the effect of high education is positive but never statistically significant. Such effect does not depend on PMR, since the interaction term is not statistically significant. In the case of females, the share of young women with tertiary education has a negative (albeit not statistically significant) effect on the employment rate, while the effect of the share of graduates in MST is positive and statistically significant only when we introduce the interaction with PMR (column 6): the share of young women graduating in MST increases, ceteris paribus, their employment rate, but this effect is lower the higher is PMR.

Table 8 - The role of the field of education
NEET rates

	Males			Females			Gaps		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Male high educ		-0.277***	-0.225**					-0.084	-0.082
		[0.088]	[0.094]					[0.110]	[0.110]
Male graduates in MST	-0.326***	-0.285***	-0.163*				0.073	0.075	0.406***
	[0.054]	[0.055]	[0.096]				[0.066]	[0.068]	[0.144]
Female high educ					-0.204***	-0.176**		0.050	0.061
					[0.069]	[0.074]		[0.084]	[0.085]
Female graduates in MST				-0.241***	-0.204***	-0.048	0.113	0.112	-0.444*
				[0.074]	[0.074]	[0.170]	[0.085]	[0.086]	[0.245]
EPL	-1.141*	-0.772	-0.809	-0.191	0.363	0.329	0.923*	0.891	0.815
	[0.687]	[0.684]	[0.682]	[0.724]	[0.736]	[0.737]	[0.517]	[0.541]	[0.537]
PMR	-2.001***	-1.533**	-0.912	0.191	0.590	0.909	1.983***	2.018***	2.602***
	[0.617]	[0.623]	[0.741]	[0.648]	[0.652]	[0.723]	[0.465]	[0.483]	[0.584]
Male graduates*PMR			-0.068						-0.212**
			[0.044]						[0.082]
Female graduates*PMR						-0.094			0.392**
						[0.092]			[0.157]
Constant	16.198***	18.389***	17.370***	10.232***	12.723***	12.075***	-2.443	-2.213	-2.051
	[2.831]	[2.862]	[2.929]	[2.822]	[2.901]	[2.969]	[2.224]	[2.281]	[2.294]
Time fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Structural controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	266	266	266	266	266	266	266	266	266
R-squared	0.838	0.845	0.847	0.925	0.928	0.928	0.908	0.909	0.911

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Estimates for the NEET rates confirm that high education is negatively correlated with this indicator for both males and females, but such effect increases with the share of graduates in MST. According to our estimates, the type of education reinforces the effect of the quantity of education in reducing the likelihood to be NEET.

7. **Conclusions**

In this paper we study the joint effect of high education and markets regulation on youth labour market performance by gender and the corresponding gender gaps.

Estimates are based on an original country-level panel dataset we created by matching youth labour market indicators (computed on the basis of EU-LFS microdata for young people aged 15-29) with policy and institutions indicators (computed on the basis of both Eurostat and OECD databases) for all the EU Member States over the 1998-2010 period. Since we are interested in the effect of markets regulation and comparable indicators are available only for OECD country, we focus our analysis on OECD EU Member States.

Our estimates confirms that high education *per se* is not a guarantee of better labour market outcomes, particularly in the case of females, whose employment opportunities are significantly negatively affected more by product market regulation rather than by employment protection. More rigid product markets are in fact associated with a lower female employment rate, a higher NEET rate and larger corresponding gender gaps.

The interaction between PMR and high education partly off-set the positive effects of high education on employment opportunities of young women, exacerbating gender differences.

However, not all the PMR components have negative effects on youth labour market performance: the strictness of regulation of entrepreneurship reduces significantly the employment rate for both males and females, but product market regulation related to state control significantly improves the labour market performance mainly of young men.

Our attempts to control for the quality of education confirm that high education per se is not sufficient to increase the youth employment rate. In the case of males, the share of

graduates in Mathematics, Science and Technology (MST) has a positive and statistically significant effect on the male employment rate, while the effect of high education is positive but never statistically significant. In the case of females, we find that the share of young women graduating in MST increases their employment rate, but this effect is lower the higher is PMR. Furthermore, for both males and females the type of education reinforces the effect of the quantity of education in reducing the likelihood to be NEET.

In terms of policy implications, our results suggest that education policies may be less effective in too regulated product markets and the progressive deregulation progress implemented in the last decades in many EU Member States may have contributed to counterbalance the negative effect of other factors (such as population ageing, pensions reforms, increasing migration flows) on job opportunities for the young, particularly for women.

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APPENDIX

TABLE A1. Definitions and basic statistics
Pooled data, 1998-2010

Variable	Definition	N. Obs	Mean	Std. Dev.	Min	Max
er_m	Male employment rate	273	55.2	8.9	39.3	79.0
er_f	Female employment rate	273	46.7	10.9	29.2	74.2
er_gap	Male-Female employment rate	273	8.5	4.3	-3.5	19.5
neet_m	Male NEET rate	273	10.1	4.0	3.0	22.4
neet_f	Female NEET rate	273	16.0	6.1	5.4	31.4
neet_gap	Female-Male NEET rate	273	5.9	3.9	-2.5	18.8
ter_m	Share of males with tertiary education	273	11.0	5.2	2.7	21.7
ter_f	Share of females with tertiary education	273	15.7	6.6	3.7	30.5
grad_mst_m	Share of male graduates in Mathematics, Science and Technology in male population aged 20-29	265	16.0	7.1	2.7	34.3
grad_mst_f	Share of female graduates in Mathematics, Science and Technology in female population aged 20-29	265	7.5	3.7	0.1	18.5
gdp_gr	Real GDP annual growth rate	273	2.5	3.2	-14.3	10.5
cohort	Share of people aged 15-29 in total population	273	13.1	1.7	10.1	17.4
pt_tot	Share of part-time employment	273	16.8	12.3	1.0	59.4
EPL	OECD index of Employment Protection Legislation	273	2.1	0.7	0.6	3.7
PMR	OECD index of Product Market Regulation	273	1.7	0.6	0.8	3.9
pmr_state	PMR related to State control	273	2.7	0.8	1.3	4.8
pmr_entre	PMR related to legal and administrative barriers to entrepreneurship	273	1.8	0.6	0.8	3.7
pmr_trade	PMR related to barriers to trade and investments	273	0.6	0.7	0.0	3.9

NOTE: if not differently indicated, all labour market statistics refer to people aged 15-29.