Fiscal consolidation and education: effects on growth (WP5 - Task 3)

(preliminary results)

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Relation with the general framework…

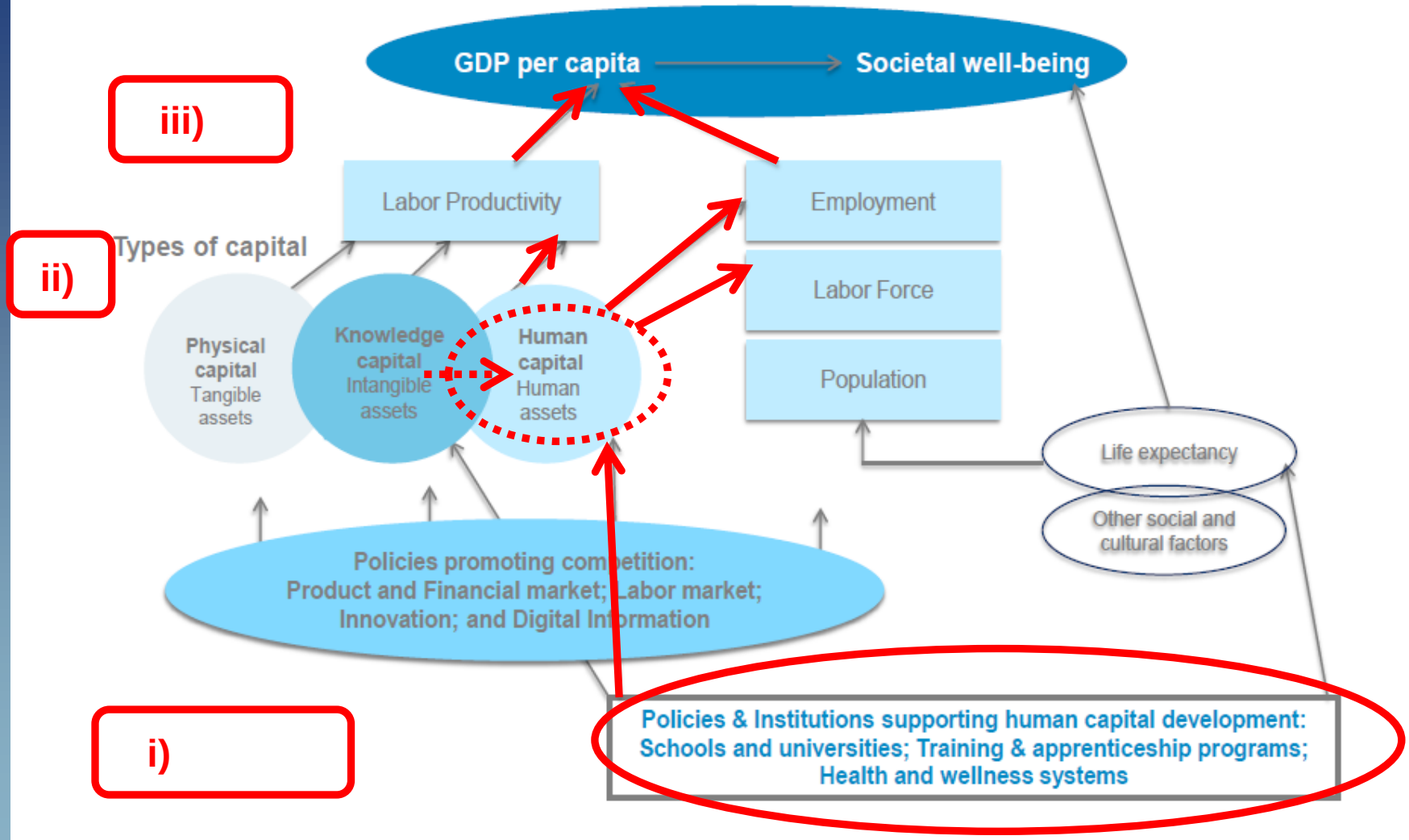


Figure 3: Links from policies to types of capital, GDP per capita, and societal well-being

Objectives

- The **aim** is to analyze the **impact** of budgetary measures on economic **growth** through its effect on the **education** sector and **human capital** accumulation.
- i) examining the effect of crisis and fiscal consolidation on the education sector (i.e. changes in resources, enrolment, completion, etc.)
- ii) analyzing the effects on human capital accumulation and through it on activity rates, employability and productivity
- iii) estimating the long-run impact on output
- Analysis carried out for the EU and for some specific countries especially affected by fiscal consolidation.

Motivation

- Analyze potential effects of budgetary measures on education and on human capital accumulation...
- since human capital plays a very important role in labour activity, employability and productivity it is only to be expected that long-term growth could be affected.
- Substantial heterogeneity across EU economies…
- …with some increasing the number of teachers while others reduce them, changes on the fees and rules of financing in some places but not in others and so on.

Motivation

- This analysis may be especially interesting because this is a rare field in which the last crisis could have some long-run **positive effects**, fostering accumulation of human capital by reducing dropping out and extending schooling…
- precisely in those countries more affected by the crisis and for that reason also by fiscal consolidation policies (lower probability of employment for young people there).
- The net effect on education could be even positive due to the combined effects of fiscal consolidation and crisis.
- Fiscal consolidation might be less harmful than expected, especially if combined with changes affecting the intangible inputs used by the education sector.

What about human capital?

- The literature on the positive effects of education is wide, having an old established tradition; e.g. Schultz (1960), Jorgenson & Griliches (1967), Mincer (1974), Mankiw et al. (1992), etc.

- Some recent contributions focus on the role of education variables as determinants of long-run growth; e.g. Hanushek and Woessmann (2011).

- Also evidence for positive labour market and productivity effects, e.g. Mahony & Stevens (2009), with an approach also additionally explored within the INDICSER project, Hanushek et al. (2015), etc.

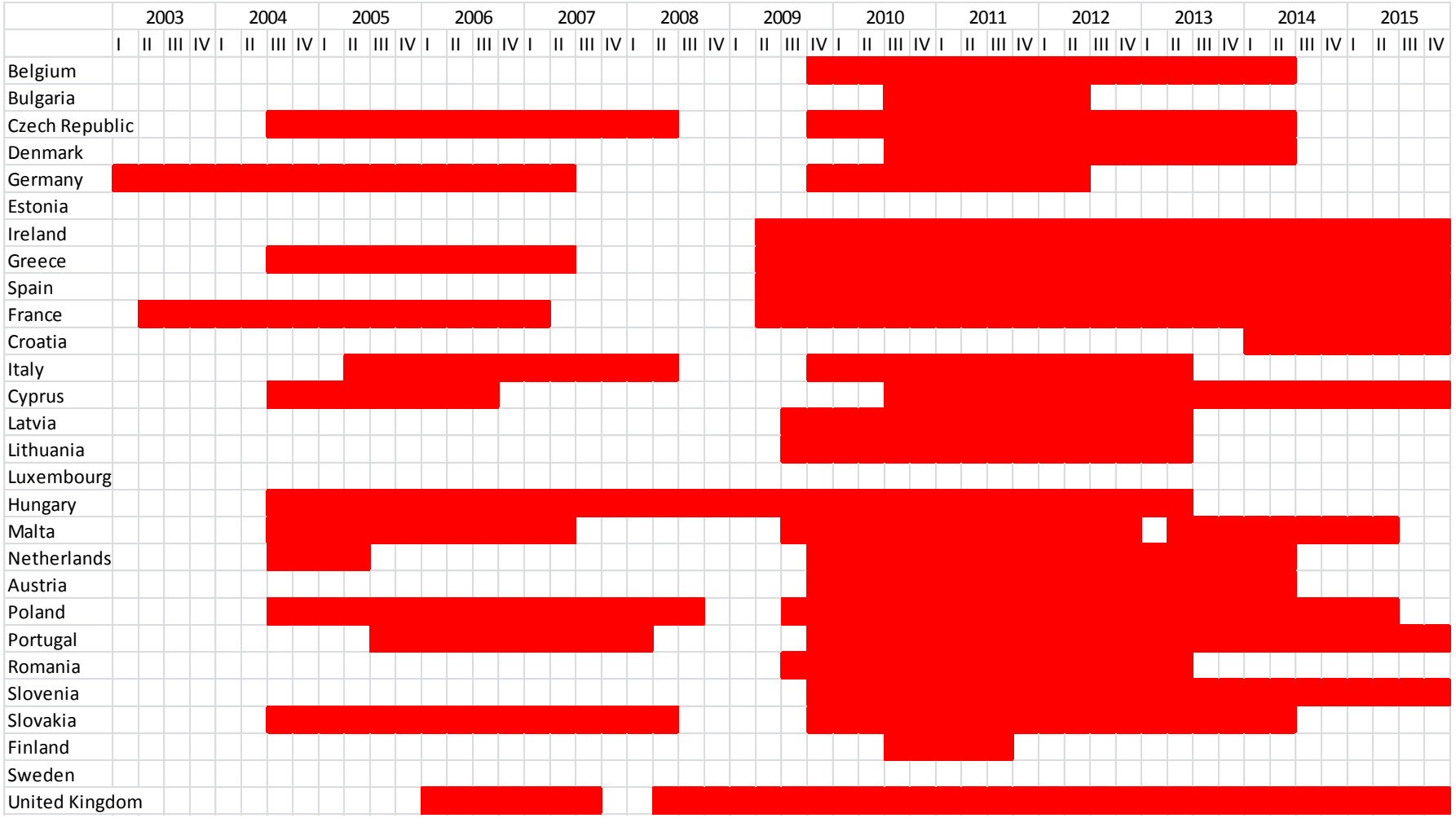
What about fiscal consolidation?

- Theoretically the total net effect through negative standard Keynesian demand effects and potentially positive non-Keynesian demand effects and/or supply side effects. Empirical results are mixed.

- We will consider the potential supply side effects through human capital accumulation of fiscal consolidation affecting expenditure on education.

- Different approaches to identify fiscal consolidation periods: quantitative definitions based on fiscal indicators or qualitative definitions based the evaluation of intentions and actions in policy documents (see SPINTAN D5.1 Kleis & Moessinger 2015).

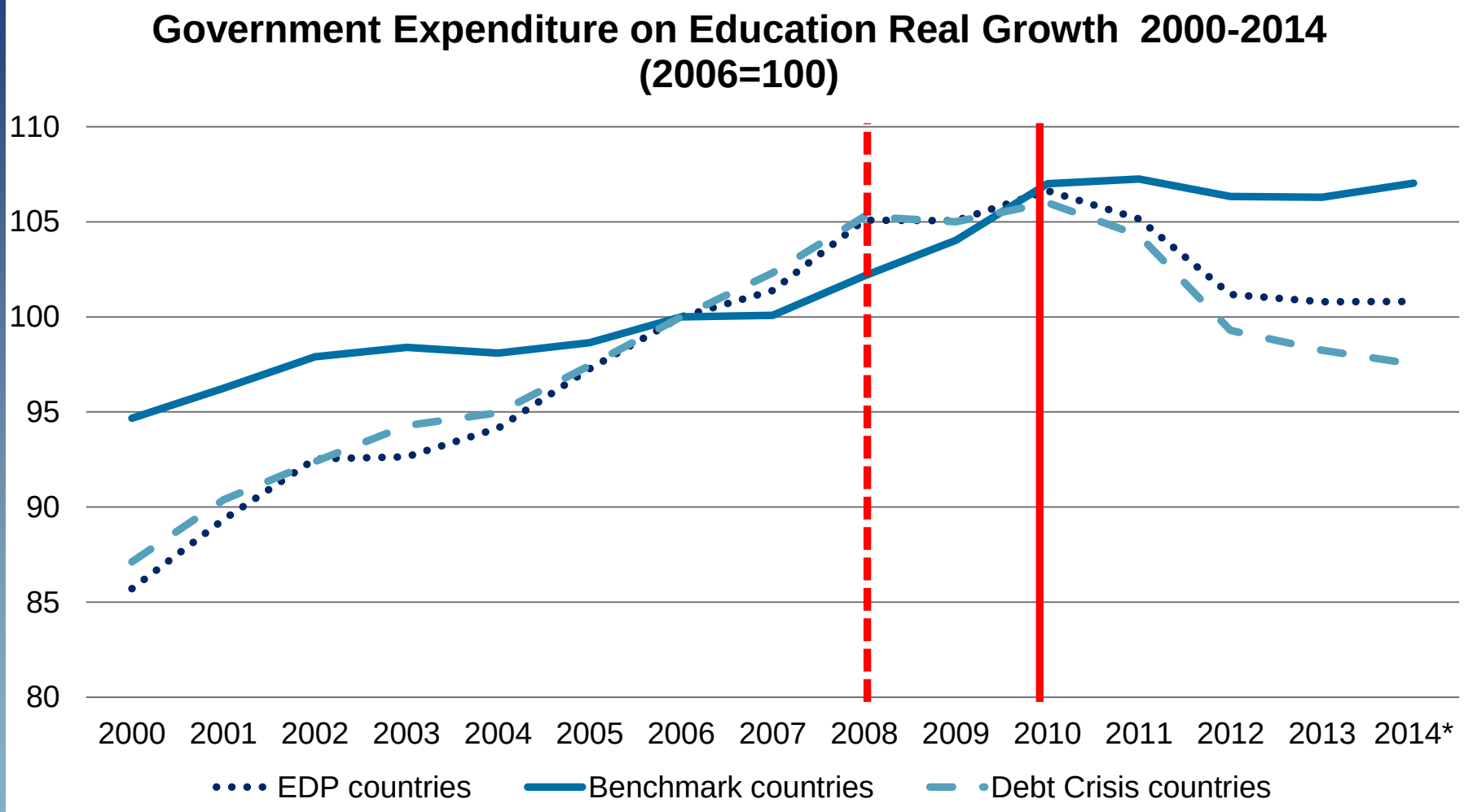
Europe: The Age of Excessive Deficit Procedures



What about fiscal consolidation?

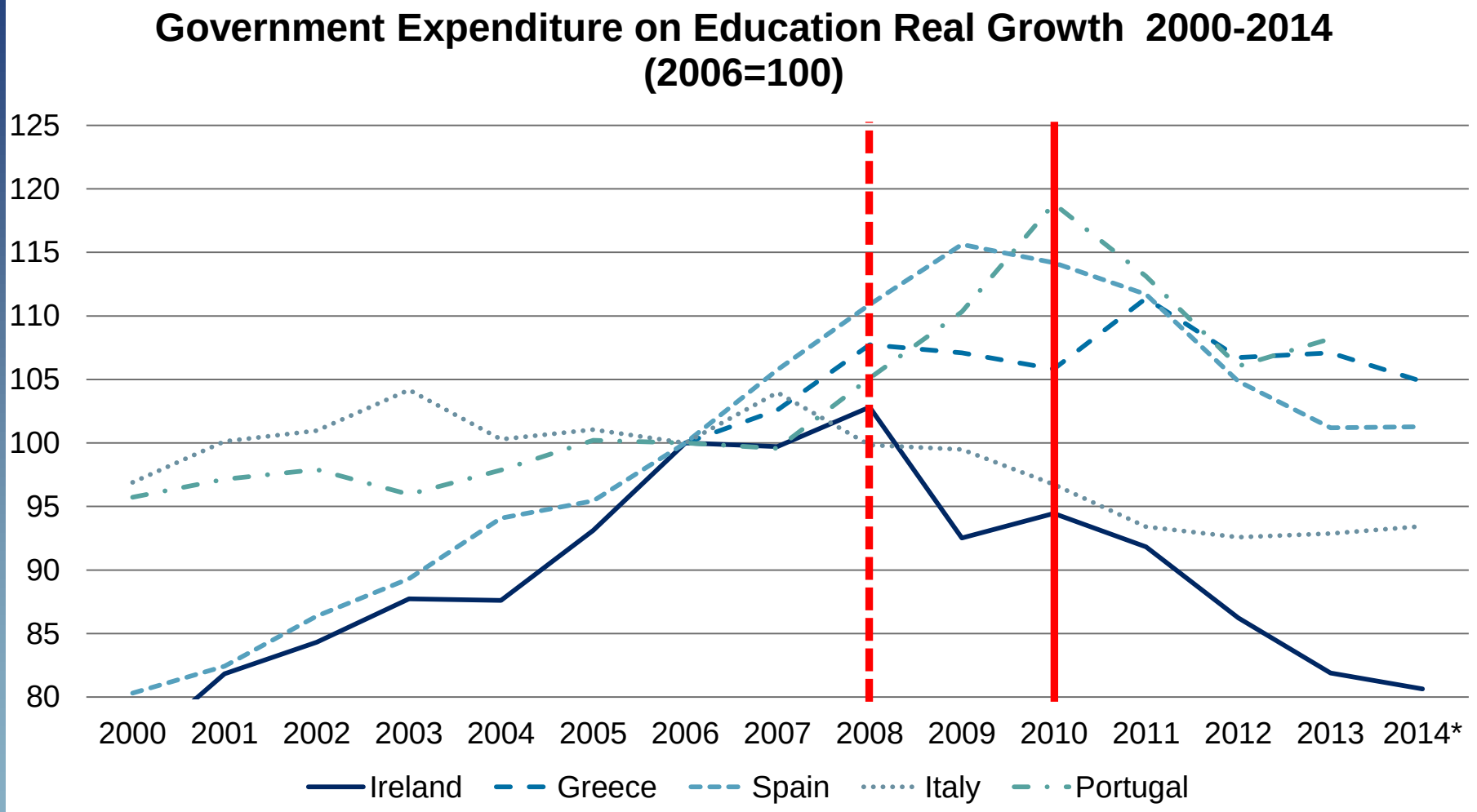
- "Fiscal consolidation" countries: the whole EU?
- Special attention to countries:
  - With an EDP (Excessive Deficit Procedure) since at least 2009 and still open (Ireland, Greece, Spain, France, Croatia, Cyprus, Portugal, Slovenia, UK).
  - With a significant Public Debt Crisis (Ireland, Greece, Spain, Italy, Portugal).
  - Specific results for some individual countries: Ireland, Greece, Spain, France, Italy, Portugal, UK.
  - (Benchmark countries: Belgium, Netherlands, Germany, Austria, Denmark, Finland, Sweden)
- Crisis 2008 onwards. Significant fiscal consolidation mainly 2010 onwards.

Fiscal consolidation and education inputs



Source: Eurostat, 2014 elaborated from Eurydice based on budget data.

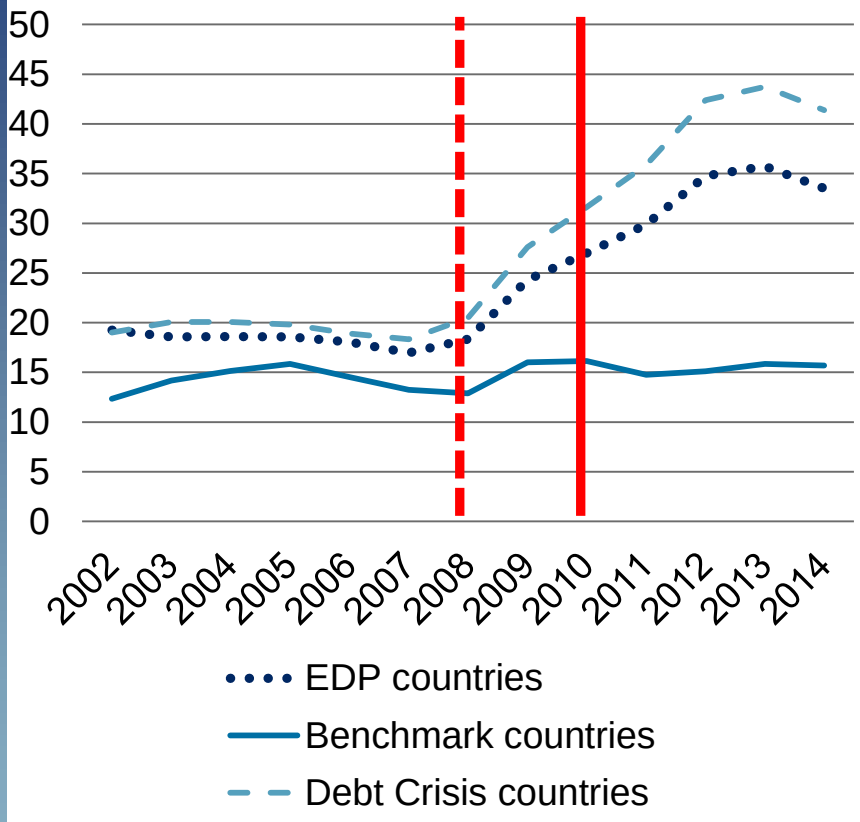
Fiscal consolidation and education inputs



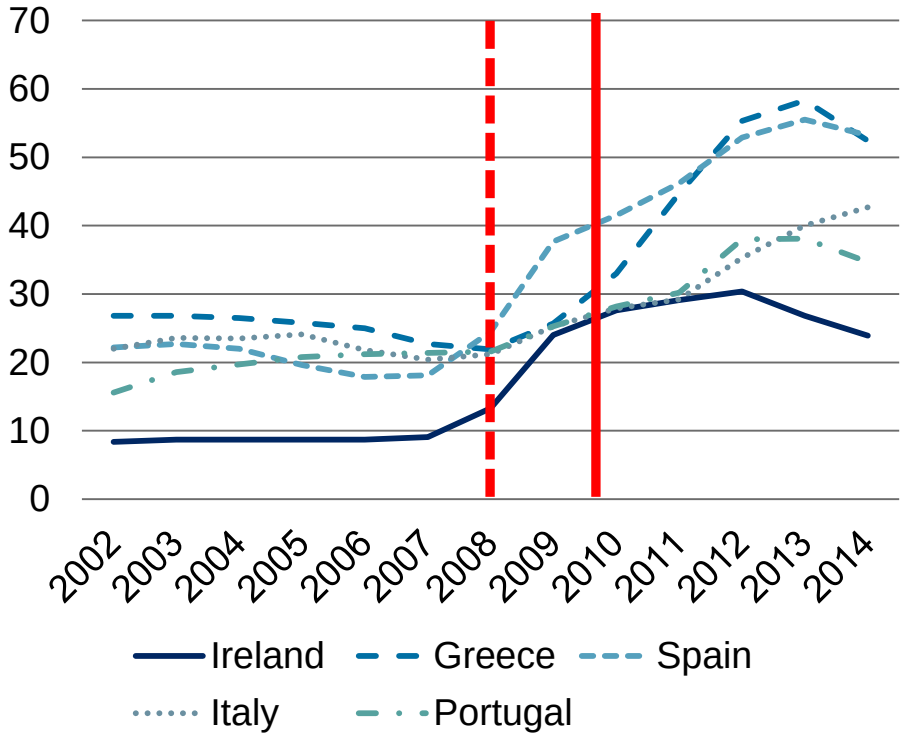
* 2014 based on budget data

Crisis and unemployment

Youth unemployment rates

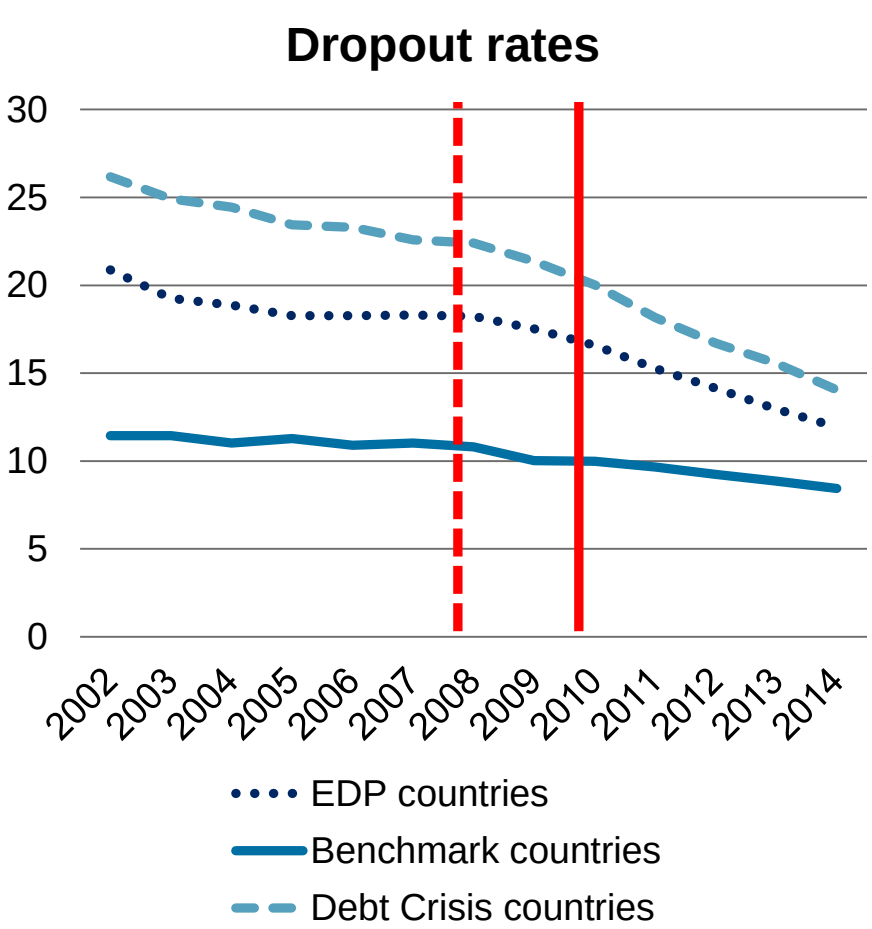


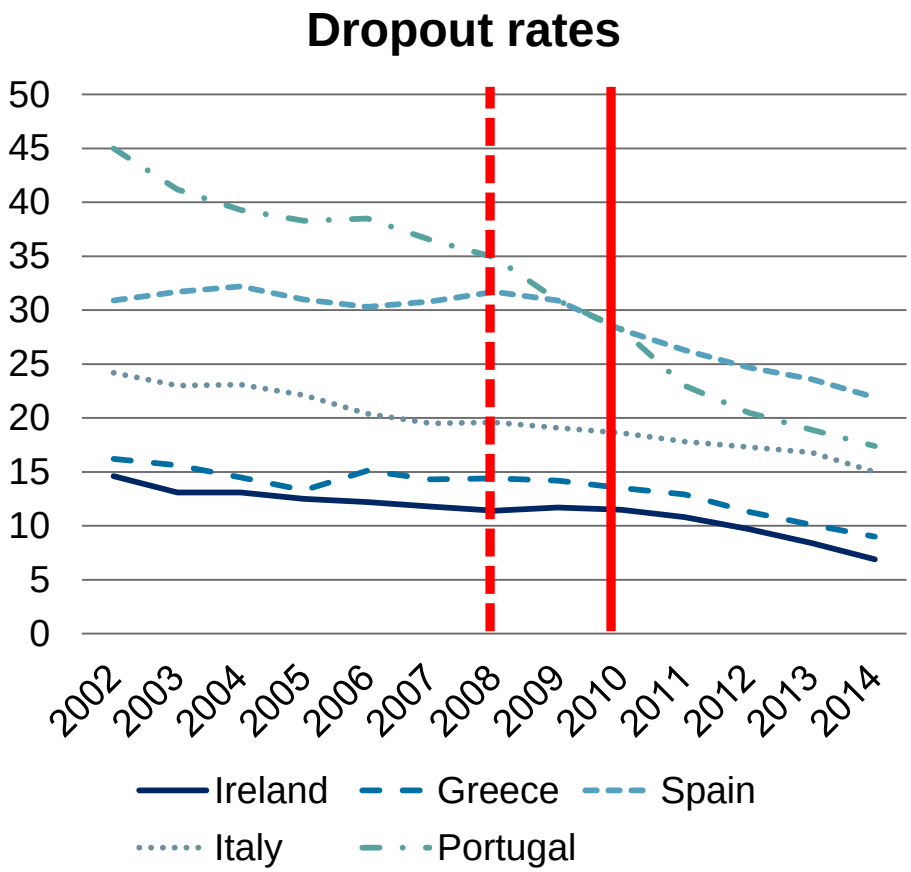
Youth unemployment rates (%)



Source: EU-LFS (Eurostat)

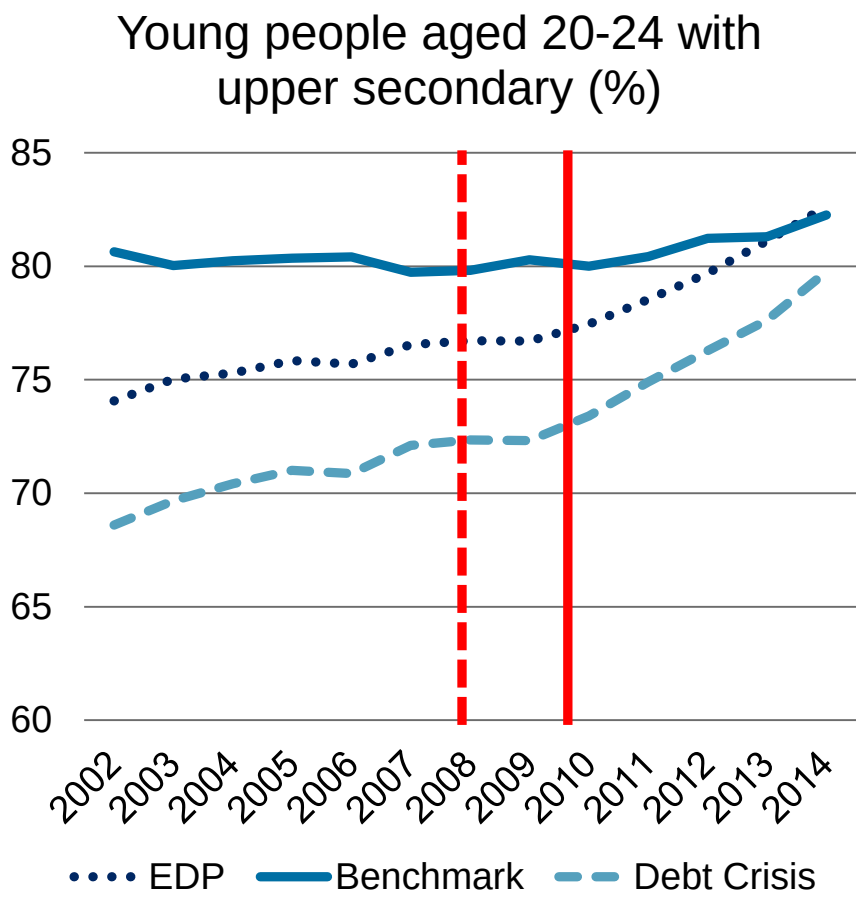
Fiscal consolidation and education indicators

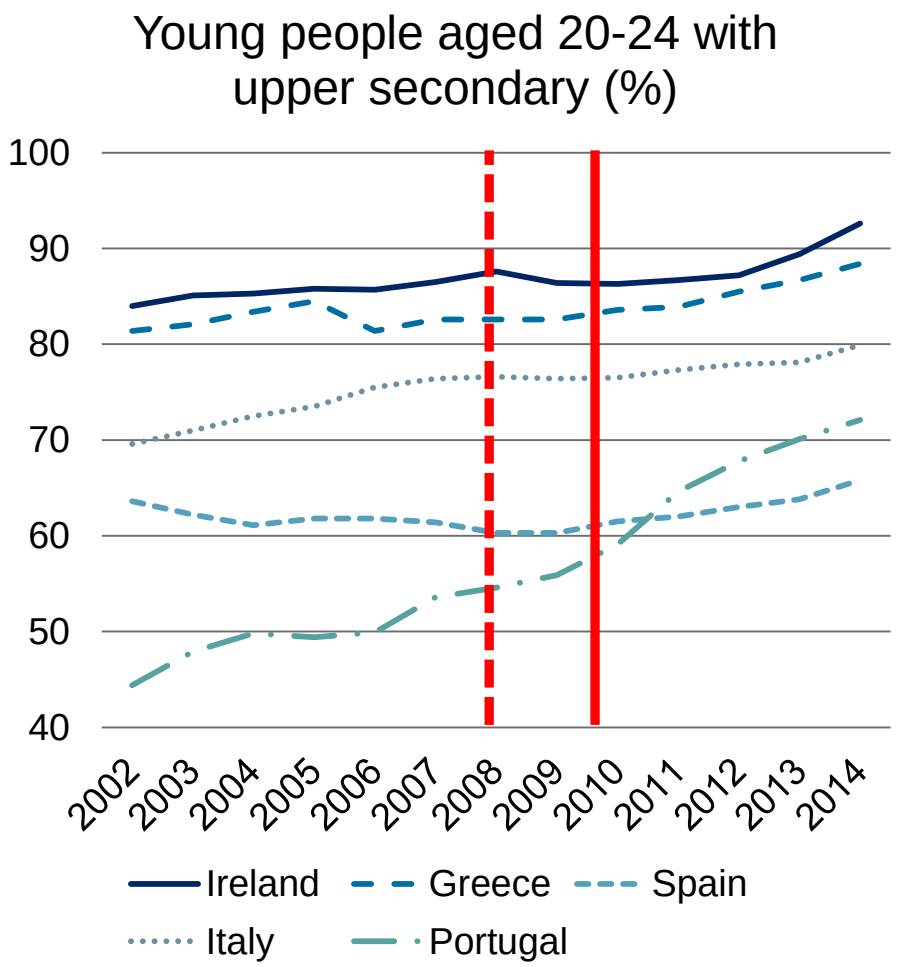




Source: Eurostat

Fiscal consolidation and education outputs





Source: Eurostat

Methodology

i) examining the effect of crisis and fiscal consolidation on the education sector:

- Probit model of the determinants of the probability of dropping out of education

$$drop_{ijt} = \beta_0 + \beta_j F_j + \beta_t T_t + \gamma_x X_{ijt} + \theta_z Z_{jt} + \varepsilon_{ijt}$$

- where $drop_{ijt}$ is 1 if the individual *i* is a dropout in period *t* and 0 otherwise; F_j economy fixed effects; T_t time effects; X_{ijt} a vector of personal and family characteristics (gender, nationality, parents' education, compulsory schooling success); Z_{jt} a vector of environmental aggregate variables changing over time (youth unemployment rates, expenditure on education per pupil) and ε_{ijt} is an error term.

Probability of dropping out

Table 1. Probit of the probability of dropping out (1). Marginal effects.

	All EU (1)	All EU (2)	EDP (3)	EDP (4)	Debt Crisis (5)	Debt Crisis (6)
Female	-0.0465***	-0.0475***	-0.0589***	-0.0604***	-0.0876***	-0.0937***
Foreigner	0.0433**	0.0419**	0.0171	0.0077	0.0766***	0.0748**
Mother upper secondary	-0.0821***	-0.0795***	-0.0711***	-0.0715***	-0.1520***	-0.1689***
Mother Tertiary	-0.1398***	-0.1391***	-0.1527***	-0.1552***	-0.2180***	-0.2369***
Father upper secondary	-0.0674***	-0.0677***	-0.0590***	-0.0614***	-0.1389***	-0.1516***
Father Tertiary	-0.1280***	-0.1272***	-0.1548***	-0.1568***	-0.2039***	-0.2153***
Compulsory education success	-0.3125***	-0.3207***	-0.3334***	-0.3498***	-0.4278***	-0.4572***
Youth unemp. rate	-0.0001	0.0003	-0.0009**	-0.0007	-0.0013*	0.0013
Exp. Educ. per pupil at secondary level of education		-2.13e-06		-0.00001		-0.00004*
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Observ.	2,372,074	1,552,004	640,884	359,131	724,988	421,691
Period	2004-13	2004-11	2004-13	2004-11	2004-13	2004-11

Note: Young people aged 20-24, *** significant at 1%, ** significant at 5%, * significant at 10%. Standard errors adjusted for country clusters. Microdata from EU-LFS (Eurostat).

Probability of dropping out

Table 2. Probit of the probability of dropping out (2). Marginal effects.

	All EU (1)	All EU (2)	EDP (3)	EDP (4)	Debt Crisis (5)	Debt Crisis (6)
Female	-0.0465***	-0.0475***	-0.0589***	-0.0604***	-0.0876***	-0.0937***
Foreigner	0.0433**	0.0419*	0.0171	0.0076	0.0766***	0.0751**
Mother upper secondary	-0.0821***	-0.0795***	-0.0711***	-0.0716***	-0.1520***	-0.1689***
Mother Tertiary	-0.1398***	-0.1392***	-0.1527***	-0.1553***	-0.2180***	-0.2369***
Father upper secondary	-0.0674***	-0.0677***	-0.0590***	-0.0614***	-0.1389***	-0.1516***
Father Tertiary	-0.1280***	-0.1272***	-0.1548***	-0.1568***	-0.2039***	-0.2153***
Compulsory education success	-0.3125***	-0.3208***	-0.3334***	-0.3497***	-0.4278***	-0.4572***
Youth unemp. rate	-0.0001	0.0002	-0.0009**	-0.0008	-0.0013*	0.0009
Exp. Educ. per pupil all levels		-2.95e-06		-3.3e-06		-0.00005*
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Obser.	2,372,074	1,548,301	640,884	359,131	724,988	421,691
Period	2004-13	2004-11	2004-13	2004-11	2004-13	2004-11

Note: Young people aged 20-24, *** significant at 1%, ** significant at 5%, * significant at 10%. Standard errors adjusted for country clusters. Microdata from EU-LFS (Eurostat).

Probability of dropping out

- Family and personal characteristics are most important.
- Country and time effects are significant, indicating that aggregate factors play a role too. Country effects are highest for Portugal, Spain, Malta, Italy, Romania, Hungary and Bulgaria (marginal effect > 10 p.p. versus probit benchmark, Finland).
- These preliminary results show weak evidence for an effect of expenditure (only for the “Debt Crisis” countries).

Methodology

ii) analyzing the effects on human capital accumulation and through it on **activity rates**, **employability** and productivity;

- Probit models of the determinants of the probability of being active (or probability of employment)

$$y_{ijt}\begin{cases} ACT_{ijt} \\ EMP_{ijt} \end{cases} = \beta_0 + \beta_j F_j + \beta_t T_t + \gamma_x X_{ijt} + \varepsilon_{ijt}$$

- where y_{ijt} is 1 if the individual *i* is active (is employed) in period *t* and 0 otherwise; F_j economy fixed effects; T_t time effects; X_{ijt} a vector of personal and family characteristics (gender, age, nationality, **education**, etc.) and ε_{ijt} is an error term.

Labour Market Effects

- Participation effect (marginal effects)

Table 3. Probit of the probability of participation (2013)

	All EU (1)	EDP (2)	Debt Crisis (3)	ES (4)	IREL (5)	PT (6)	GRE (7)	IT (8)
Female	-0.1047	-0.0975	-0.1374	-0.0993	-0.1581	-0.0948	-0.1428	-0.1704
Foreigner	*-0.0082*	*-0.0135*	0.0494	0.0289	-0.0196	*0.0190*	0.0688	0.0771
Age 25-34	0.2725	0.2984	0.3304	0.3524	0.2841	0.4268	0.3787	0.2884
Age 35-44	0.3222	0.3240	0.3827	0.3605	0.2859	0.4548	0.3961	0.3860
Age 45-54	0.2992	0.3037	0.3535	0.3099	0.2755	0.4062	0.3166	0.3818
Age 55+	-0.1240	-0.1033	-0.0571	-0.0922	-0.0557	*-0.0005*	-0.0738	-0.0370
Upper Second.	0.1591	0.1590	0.1334	0.0943	0.1790	0.1078	0.0809	0.1697
Tertiary	0.2384	0.2333	0.2022	0.1638	0.2717	0.1579	0.1934	0.2415
Country effects	Yes	Yes	Yes					
Observ.	3,514,151	826,937	1,137,190	90,541	161,293	139,939	215,244	530,173

Note: Sample people between 15 and 64. All estimates significant at 1% except those in italics. Standard errors adjusted for country clusters (est. 1-3). Data from the EU-LFS (Eurostat).

- Probability of employment effect based on averages for the period 2005-2014

Methodology

ii) analyzing the effects on human capital accumulation and through it on activity rates, employability and **productivity**;

- Mincer wage equations

$$log\, w_{ijt} = \beta_0 + \beta_j F_j + \beta_t T_t + \gamma_x X_{ijt} + \varepsilon_{ijt}$$

- Where w_{ijt} is the wage; F_j economy fixed effects; T_t time effects; X_{ijt} a vector of personal and family characteristics (gender, nationality, experience, **education**, etc.) and ε_{ijt} is an error term.

Labour Productivity Effects

Table 4. Mincer wage equations (OLS)

	All EU (1)	EDP (2)	Debt Crisis (3)	ES (4)	GRE (5)	IREL (6)	PT (7)	IT (8)
Female	-0.225	-0.228	-0.229	-0.241	-0.248	-0.185	-0.274	-0.207
Foreigner	-0.097	-0.100	-0.224	-0.239	-0.252	-0.148	-0.069	-0.256
Exp. (years of experiece)	0.046	0.038	0.042	0.037	0.050	0.052	0.036	0.049
Exp2	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.000	-0.001
Upper Secondary	**0.328**	**0.226**	**0.299**	**0.255**	**0.295**	**0.195**	**0.417**	**0.317**
Tertiary	**0.812**	**0.676**	**0.711**	**0.616**	**0.751**	**0.741**	**1.085**	**0.754**
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes					
Observations	1,292,494	356,461	224,250	79,582	19,440	23,715	27,164	74,349
Period	2004-13	2004-13	2004-13	2005-13	2007-13	2004-13	2007-13	2007-13
Adjusted R^2	0.432	0.273	0.262	0.226	0.309	0.269	0.320	0.206

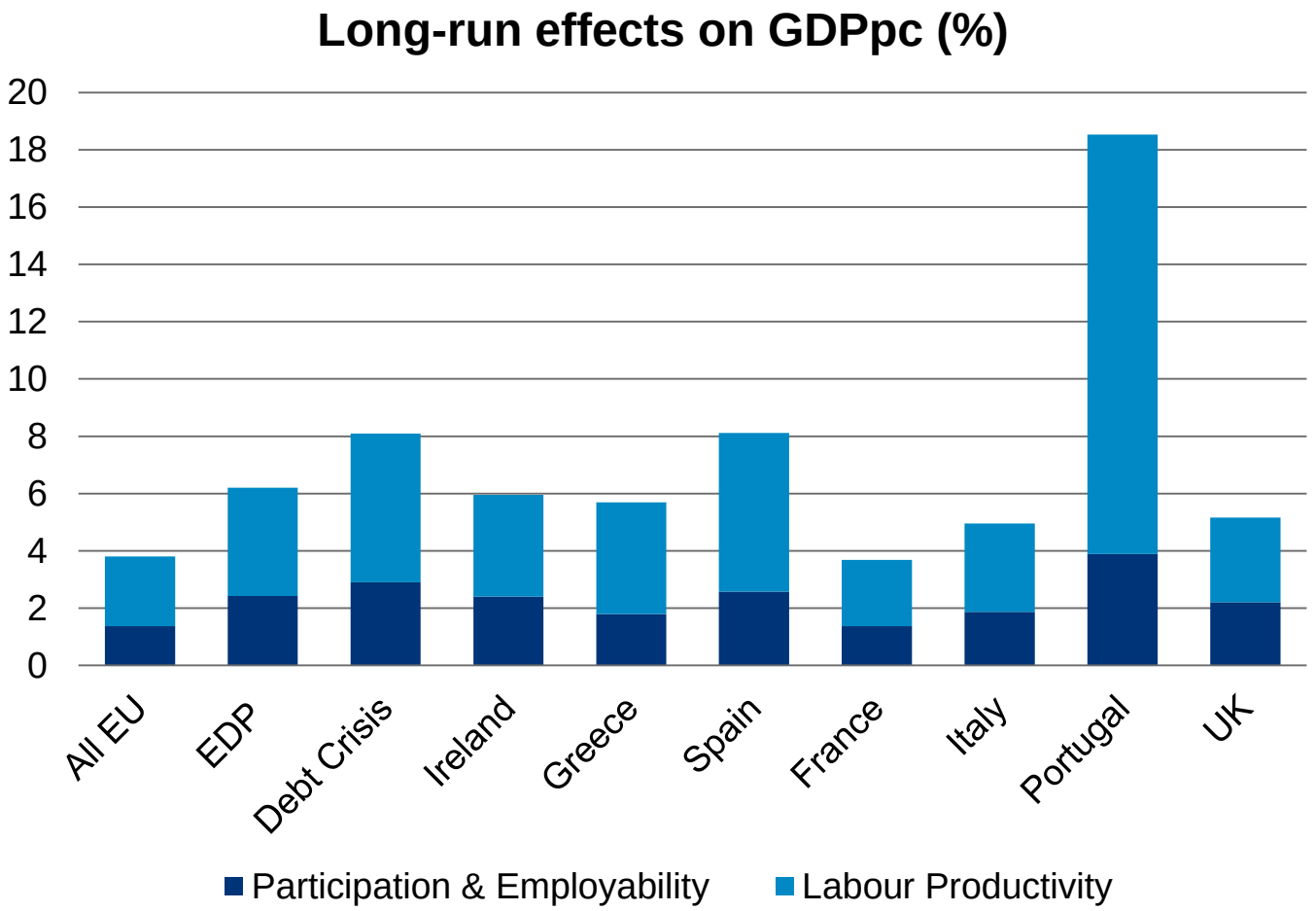
Note: Sample of fulltime employees who work more than 30 hours per week on his/her main job. Dependent variable: log wage obtained from total gross (cash and non-cash) employee income. All estimates significant at 1%. Standard errors adjusted for country clusters (est. 1-3). Data source: EU-SILC (Eurostat).

Methodology

iii) estimating the impact on output in the (very) long-run

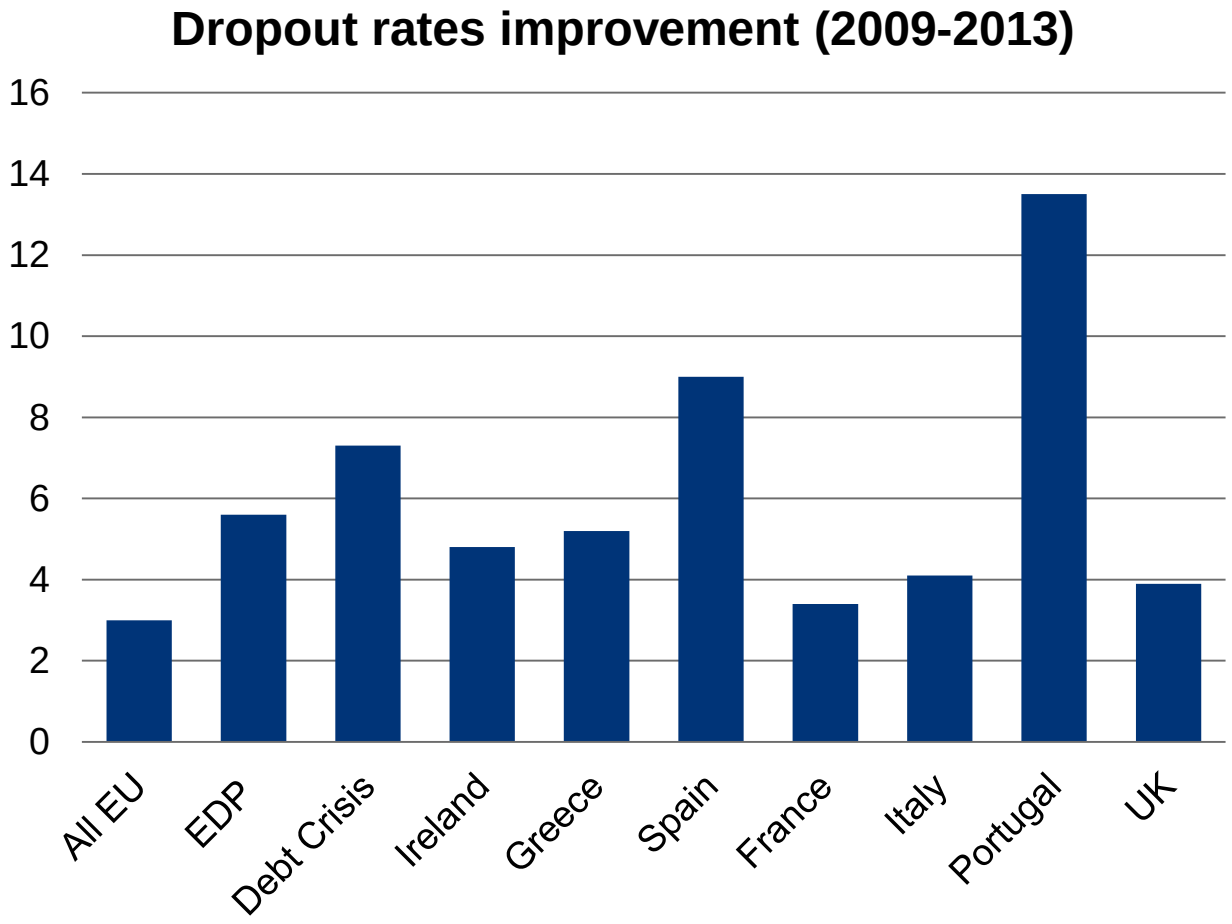
- Assuming that changes are permanent (affecting to all cohorts within the working age population).
- GDP per capita long-run effects estimated as the final result of changing:
  - participation rates
  - employability
  - labour productivity
  - demographics (no change assumption)
- $$GDPpc = \frac{Y}{Emp}\frac{Emp}{Act.Pop.}\frac{Act.Pop.}{Working\ Age\ Pop.}\frac{Working\ Age\ Pop.}{Pop.}$$

Long-run effects



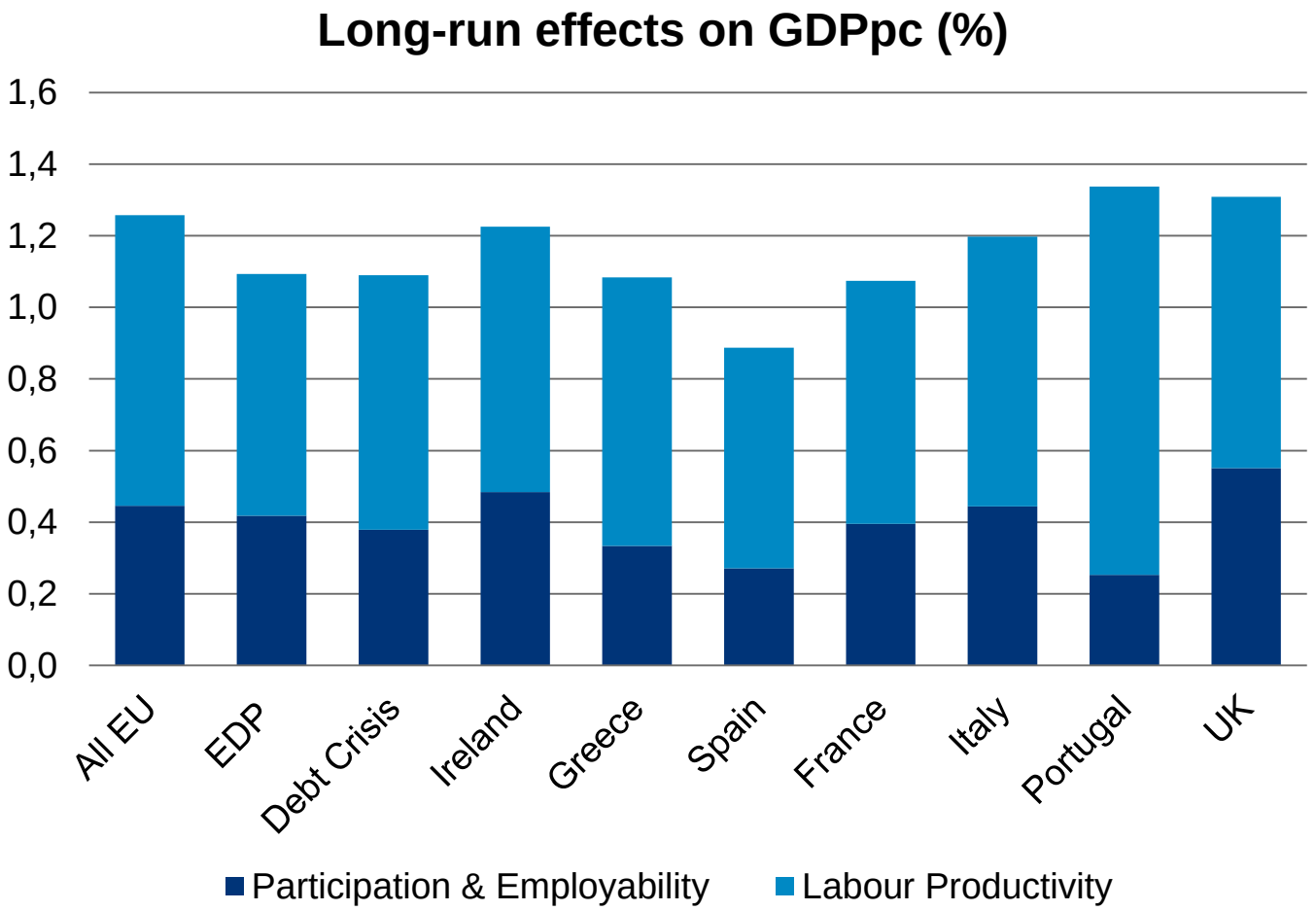
- Own elaboration. Estimates assuming that the actual changes in dropout rates from 2009 to 2013 are permanent.

Long-run effects



- Source: Eurostat

Long-run effects



- Own elaboration. Estimates assuming a permanent 1 p.p. reduction in dropout rates.

Summary of preliminary results

- Fiscal consolidation: negative effect on public expenditure on education in affected countries (but many maintain pre-crisis levels).
- *Ceteris paribus* some weak evidence for a negative effect of this on education output.
- But no evidence of decreasing dropout rates or post-compulsory schooling completion. Other factors dominate that potential negative effect.
- Long-run effects estimates assuming permanence are better for the “fiscal consolidation” countries through higher participation, employability and labour productivity.
- Due to a more intense human capital accumulation. The effect for a similar education improvement tends to be lower.

Next Steps

- Incorporate SPINTAN intangible capital data to test its effects.
- Additional countries (e.g. New Member States).
- Deeper analysis of tertiary education.
- Robustness, more scenarios under different assumptions.

THE END

Thank you for your attention!