The Joint Impact of Labour Policies and the "Great Recession" on Unemployment in Europe

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Abstract

The paper consists in an empirical analysis of the separate as well as joint impacts on total and youth unemployment of indicators of labour market policies, on the one hand, and the financial crisis associated with the "Great Recession", on the other. In particular, we investigate labour market data in the past two decades for the Enlarged Europe and we adopt a variable accounting for the idiosyncratic-severity shock of the crisis. This time-varying and country-specific crisis variable enables us to test empirically and in a novel way the joint impact of labour market policies and the economic crisis on labour market dynamics even when accounting for common macro shocks.

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1. Introduction and Motivation

A large body of literature investigates the impact of labour market institutions and policies, such as active and passive labour market policies, on unemployment. Moreover, a growing number of scholars have more recently focused on the impact of economic and financial crises on labour market dynamics in general. However, there are still few studies that address the question of the complex joint impact on unemployment of both labour market policies and the financial and economic crisis occurring during the "Great Recession".

Our empirical analysis and econometrics exercise seek to determine the role of labour market policies in shaping the relation between the financial and economic crisis and (total and youth) unemployment. To this end, we calculate the effect of the last crisis on unemployment for different types and levels of labour market policies, and we also consider the interaction among proxies for the crisis and labour market policies.

The paper is organised as follows. Section two provides an extensive literature review on the determinants of unemployment, as well as on the relationship between (youth) unemployment, on the one hand, and labour market policies and financial crises on the other. Section three presents our testable hypotheses and empirical strategy. Section four describes the data and provides details on the calculations of labour market policy indicators, as well as of the severity of the last economic and financial crisis. Section five develops the empirical analysis and sets out the empirical model's results by looking at a longitudinal panel of 30 European countries in the past two decades. Finally, section six concludes with some policy implications.

2. Literature Review

There is a huge body of theoretical and empirical literature on the determinants of total and youth unemployment differences across countries and regions, and their dynamics. The best-known unemployment determinants are related to general macroeconomic conditions, such as GDP growth and productivity dynamics, according to Okun's law (see Lee, 2000; Solow, 2000; and IMF, 2010; for empirical applications). In this section, we concentrate on more specific unemployment determinants of crucial interest for this paper, namely: (i)

institutions and policies, (ii) institutions and shocks, (iii) the impact of the past and the most recent economic and financial crisis.

2.1. Labour Institutions and Policies

Since the seminal OECD Jobs Study (1994), the so-called "Eurosclerosis" phenomenon – defined as the weak employment performance of Europe – has been related to institutional variables. According to the institutional economics tradition, the labour market (and market only) institutions comprise: labour taxes, unemployment benefits (amount, duration, and the replacement ratio) as key indicators of so-called passive labour market policies, the degree of unionisation (union density and union coverage), the structure of collective bargaining (degree of coordination and/or centralisation), Employment Protection Legislation (EPL), the incidence of temporary and part-time contracts, active labour market policies (ALMP), the liberalisation of product markets, housing policies, and many other factors besides.[1]

Among the empirical works in this field, the OECD report (2006) highlights the statistical significance of tax wedges in explaining high unemployment rates together with generous (unemployment) benefit systems and stringent (anti-competitive) product market regulations,[2] while the degree of coordination in collective bargaining appears to improve labour market performance. As far as the EPL is concerned (e.g. tight firing regulations in Southern European countries), the available evidence is mixed, although the majority of studies find a positive relation between EPL and the unemployment rate (e.g. Heckman and Pagés, 2003). Turning to product market regulations, "economic freedom" affects the labour market favourably both by improving the functioning of such markets (direct effect) and by stimulating economic growth (indirect effect).[3]

[1] Nickell (1997) proposes measures for eight "labour market institutions" and he finds that in general high unemployment is associated with welfare systems that do not put pressure on the unemployed to search for and accept work offers, with high taxes on labour and also with no co-ordination in wage bargaining. The key role of ALMP, together with unemployment benefits, in explanation of changes in employment and unemployment rates is confirmed by the estimations of Destefanis and Mastromatteo (2010), while Betcherman et al. (2004) observe that only some active labour market policies have a positive impact on labour market performance. As for investigations at both national and regional levels in the European context, see Perugini and Signorelli (1994 and 1997).

[2] Hence, product market reforms can reduce unemployment rates (Fiori et al., 2008).

[3] In some empirical studies, an "index of the economic freedom of the world" has been used (Feldmann, 2010), but more particular "freedoms" have additionally been investigated: the size of the government, the rule of law

More generally, changes in policies and institutions, together with changes in the output gap, are estimated to explain 74% of the cross-country variance in the unemployment changes observed for the period 1982-2003 (OECD, 2006). Finally, several authors have investigated the key role of differences in "welfare systems" for labour market performance (e.g. Boeri, 2002; Bruno and Rovelli, 2010; Esping-Andersen, 1996 and 1999).[4] In particular, Bruno and Rovelli (2010) find that higher employment rates are positively associated with active labour market policies and negatively with institutions and policies determining rigidity in the labour market; they also find that the relation between Active Labour Market Policies (i.e. ALMP) and employment levels is non-monotonic and that it is conditional on the informal institutions of the different countries.

2.2. Institutions and Shocks

There is an innovative literature on the interaction between institutions and shocks. Blanchard and Wolfers (2000) highlight the fact that adverse shocks can explain the general increase in unemployment in the European context vis-à-vis the United States, while differences in institutions can explain differences in performance across European countries. According to these authors, labour market institutions can shape the effects of shocks by affecting their impact on unemployment and by affecting the persistence of unemployment precisely in response to shocks.[5] For example, if institutions filter the effect that higher unemployment can exert on the labour market by reducing wages, they will increase the persistence of unemployment in response to shocks (see also Layard and Nickell, 1987). Sargent and Ljundqvist (1995) investigated the effect of unemployment insurance rules on the relationship between shocks (turbulence) and equilibrium unemployment. Mortensen and Pissarides (2001) analysed the effect of unemployment insurance and EPL on the relationship between relative demand shifts and equilibrium unemployment. Finally, not only is the impact of

and security of property rights, the liberalisation of international trade, and flexible regulations. Moreover, such reforms are mutually reinforcing, justifying comprehensive reform programmes rather than separate labour market reforms, and they may interact with macroeconomic conditions and shocks (see next sub-section). Brandt et al. (2005) used a synthetic index of the intensity of "reform policies" and found that OECD-inspired reforms improve labour-market performance with a five-year lag (see also Bassanini and Duval, 2006), signalling the medium to long run effects of such reforms.

4 As for the transition economies, see Bruno (2006).

[5]Blanchard and Summers (1987) shown that, while the permanent effect of shocks is unlikely, institutions can lead to high persistence.

macroeconomic shocks amplified by the existence of certain policies and institutions, but the persistence of the shocks is increased because of long-run effects on labour demand (Marelli et al., 2013).

2.3. Past and Most Recent Financial Crises

A growing number of studies have tried to estimate the effects on total and youth unemployment of the last financial crisis and the so-called "Great Recession" (for example, Brada and Signorelli, 2012; Furceri and Mourougane, 2009; World Bank, 2010; ILO, 2010 and 2012; O'Higgins, 2012; Marelli, Patuelli and Signorelli, 2012, Boeri et al, 2013)[6].

Following the recent review by Boeri et al. (2013), the literature envisages a number of links between financial and labour markets: the risk adjustment effect (Hart, 1983; Greenwald and Stiglitz, 1987); the quasi-fixed investment effect of labour demand (Oi, 1962; Farmer, 1985); the stickiness of the bank-borrower relationship in the presence of asymmetric information (Holmstrom and Tirole, 1997; Wasmer and Weil, 2004); the relationship between firm leverage and labour market flexibility (Monacelli et al, 2011 among many others) and, finally, the link between financial frictions and search-based unemployment in the event of a financial shock.

The overall lesson that can be drawn from these studies is that the labour market is hugely affected by the financial market's dynamics and that there may be large employment-unemployment variations during economic recessions caused by financial crises.

Turning to the findings on the youth unemployment rate during financial crises, the established literature finds that the impact of financial distress on the youth unemployment rate is larger than that on the adult unemployment rate.[7] This is because, in times of crisis, the structural problems characterising the transition from school to work are exacerbated. For example, labour demand is typically lower, school-leavers compete with more jobseekers for fewer vacancies,

6 As for the performance of the "flexicurity system" in crisis time, see Auer (2010), Boeri et al. (2012), Jørgensen (2010), Lyhne Ibsen (2010); while Signorelli et al. (2012) invesigated the impact of financial crises on female labour.

7 The huge literature investigating the structural reasons determining, in several countries, a much higher youth unemployment rate with respect to adult rate is not considered here (for a survey, see Pastore, 2014); see also OECD (2005), Carmeci and Mauro (2003), Bernal-Verdugo et al. (2012), Feldmann (2010), Caroleo and Pastore (2007), Quintini and Manfredi (2009) and Ryan (2001).

and unemployment may become structural. This may be the case in some Eurozone countries, which have been affected by a very long (and possibly double-dip) recession where young people are at risk of becoming a "lost generation" (Scarpetta et al. 2010). Furthermore, O'Higgins (2011 and 2012) highlights that the key problem is not only that young people are more vulnerable to crises but also that these effects are likely to be more long-lasting for youngsters than for adults.[8] Moreover, the size of the group of "youth left behind" is generally larger than the Youth Unemployment Rate indicates, and it can be proxied by the number of young people who are neither employed nor in education or training (NEETs) (O'Higgins, 2012; Scarpetta et al., 2010).

There are also papers that have sought to gain insights from studying the impact of past financial crises on unemployment.[9] For example, Verick (2009), in order better to investigate the impact of the last crisis (especially on young men and women), analyses the effects on unemployment of the past "Big 5 Crises" (Spain 1977, Norway 1987, Finland 1991, Sweden 1991 and Japan 1992). His analysis confirms that young people are hit the hardest and that the negative impact persists long after the economy has started growing again (hysteresis effect, see also Blanchard and Summers, 1987). Finally, Choudhry et al. (2012) find that the impact of crises on the youth unemployment rate is significant and robust: youth unemployment increases until five years after a financial crisis, with the largest effects in the second and third years.

3. Testable Hypotheses and Empirical Strategy

We formulated the following hypotheses and we tested them via a longitudinal panel data analysis:

1) labour market policies exert an impact on the level of (total and youth) unemployment in Europe, since ALMP (vis-à-vis PLMP) is more or less suitable for coping with external shocks in different countries;
2) the country-specific severity of the crisis will be a determinant of the long-lasting effect of the crises on (total and youth) unemployment;

[8] Long periods of unemployment erode the skills of young workers, reduce their employability, cause a permanent loss of human capital, and make unemployment persistent.
[9] Signorelli et al. (2012) investigated the gender-specific effect of past financial crises.

3) the severity of the crisis will moderate the impact of the labour market policies (and conversely the labour market policies will moderate the impact of the severity of the crisis) on (total and youth) unemployment.

In our empirical exercise, we considered a wide range of labour market policies, at both the aggregate and disaggregated levels. Thus, following the work of Algan and Cahuc (2009), we were able to obtain some conclusive results on the dichotomy between "active" and "passive" labour market policies. In particular, we expected to find that, *ceteris paribus*, high expenditure on active labour market policies enhances labour productivity and will thus help to restrain unemployment increase in the case of adverse economic shocks. Conversely, high expenditure on passive labour market policies should increase the unemployment rate, and this is particularly true in the case of a crisis. This is because, as documented by Bruno and Rovelli (2010), in the presence of generous passive labour market policies, it is likely that a self-reinforcing and perverse cycle between moral hazard behaviour and scarce job search will arise.

As in Blanchard and Wolfers (2000), Nickell et al. (2005) and Bruno, and Rovelli (2010), we estimated a longitudinal panel model on the relationship between the unemployment rate[10] and labour market policies by including a full set of country[11] and year dummies. This was to ensure that the estimated coefficients on the labour market policy variables were not distorted by either time-invariant omitted variables at the country level or by common macro shocks.[12][13]

Formally, our estimable equations were:

$$unrate_{it} = \beta_0 + \beta_1 Policy_{it} + \beta_2 Crisis_{it} + \beta_3 (Policy^{*} Crisis)_{it} + \mu_i + \tau_t + \varepsilon_{it} \qquad (1)$$

[10] Ideally, we could also analyse the impact of the very same independent variables on employment. However, our focus is the opportunity cost of being employed when *policies for the unemployed* are particularly generous: hence the focus on the latter - unemployed - instead of the former - employed.

[11] Employment Protection Legislation, bargaining system etc. will be mainly accounted by these countries dummies, since these variables are typically very stable over time.

[12] For a comparison see equation (1) page 19 and equation (2) page 25 in Blanchard Wolfers (2000).

[13] We also ran some robustness checks for quadratic terms for both policies and the crisis instead of the interaction term, new and old member states and pre and post crises regressions. These results are available upon request. We thank an anonymous referee for suggesting these further robustness checks.

$$Yunrate_{it} = \beta_0 + \beta_1 Policy_{it} + \beta_2 Crisis_{it} + \beta_3 (Policy * Crisis)_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (2)$$

where 'unrate' is the unemployment rate, 'Yunrate' is the youth unemployment rate, 'Policy' stands for labour market policy, 'Crisis' represents the severity of the financial crisis, 'Policy*Crisis' is the interaction term between labour market policy and crisis severity and, finally μ_i and τ_t represent, respectively, the country and year dummies.

The indexes *i* and *t* stand for countries and years. It is thus immediately apparent that the variables which we employed were both country and time-specific. This is an improvement with respect to previous studies, because it enabled us to evaluate the responsiveness of the unemployment rate to the aforementioned economic shocks by exploiting the variability in both the cross-sectional and time dimensions.

Moreover, to be noted is that while the coefficients β_1 and β_2 account, respectively, for the direct impacts of labour market policies and the financial crisis (*ceteris paribus*) as in Hypothesis 1) and 2), β_3 serves to evaluate the joint effect of policy *and* crisis as in Hypothesis 3). Thus, the overall effect of labour market policies (crisis) on unemployment was calculated considering both the estimated β_1 (β_2) and β_3, where the estimated coefficients are indicated with a "hat" (i.e. $\hat{\beta}$ henceforth).

4. Data and Descriptive Statistics

In our empirical exercise we considered a total of 30 countries, the 28 EU countries together with Norway and Island[14], observed at yearly intervals in the period 1990-2012.[15]

Our dependent variables were the total and the youth unemployment rates. The former was defined as the number of people unemployed as a percentage of the labour force; where, following the definitions and recommendations of the International Labour Organisation, unemployed people are all persons 15 to 74 years of age (16 to 74 years in Spain, Italy and United

[14] The results were not affected by introduction of these two additional countries, which share some similar features with EU economies.

[15] The panel was unbalanced due to some missing values; therefore the number of observations might change from one regression to another.

Kingdom) not employed during the reference week, had actively sought work during the past four weeks, and were ready to begin working immediately or within two weeks. The youth unemployment rate was similarly calculated considering only people of less than 25 years of age. Unemployment rates, both total and youth (see Figures A1 and A2 in Appendix), together with labour market policies and GDP data, were sourced from Eurostat, while we referred to Laeven and Valencia (2010, 2012) when assessing the initial year of the financial crisis for each country.

Table 1 reports our main variables' summary statistics. It is important to note that in order to assess the impact of labour market policies on unemployment rates, we considered the opportunity cost of being employed with respect to being a beneficiary of a selected labour market policy. In particular, each of our 'Policy' variables was constructed as the country-year specific ratio of labour market policy entitlement per beneficiary (i.e. the amount of Euros spent on a selected labour market policy divided by the total number of beneficiaries) and the country-year specific GDP per capita, which proxies for the average wage rate. Thus, if the value of the Policy variable increases, it becomes more convenient to be a beneficiary of the labour market policy than to work; or put otherwise, the opportunity cost of being employed increases because the amount of money that the beneficiary loses, as incentives or subsidies, increases. As to its construction, the Policy variable was bounded between 0 and 1.

Moreover, we built an original indicator that accounted for the country and time-specific severity of the idiosyncratic financial crisis. In particular, crisis severity (i.e. variable "countrysev") was calculated as the country-specific ratio of the number of quarters of negative GDP growth in one year to the total number of quarters of negative GDP growth experienced by the country in the period 2008-2012.[16] This variable was thus both country-specific and time varying. Moreover, by construction, the variable ranged from 0 to 1 along the crisis period (see Figure A3 in Appendix). We adopted the severity of the crisis variables instead of the crisis itself because we wanted to separate two different phenomena:, we envisaged capturing the timing of the crisis, on the one hand, and the strength of the crisis on the other. We proceeded in two steps. The timing

[16] 2012 is usually considered to mark the end of the financial crises for the European countries, but it was also the last year available in our database.

of the crisis was drawn from the Laeven and Valencia 2010 database, meaning that the crisis variable started and ended in different years, depending on the country (see figure A3). This allowed the interaction term in the regressions to have an impact only starting (ending) in the relevant years for each country. This may be conceived as a pure crisis effect. However, there is not much variation across countries as far as the timing is concerned, and this is only part of the story. In fact we proceeded with a second step: each country was hit more or less at the same time by the crisis with different intensities. We therefore decided to re-name it 'severity' (number of negative growth quarters in the crisis time span over the total). The relevant question was whether this was sufficiently heterogeneous across countries to be justified. It turned out that it was (see figure A3), and so we trusted the use of this measure in the interaction term.

Table 1: Average labour market policies benefits per person and average opportunity cost of being employed (yearly average in Euros €)

Sampled Countries	Total LMP per beneficiary €	Active LMP per beneficiary €	Passive LMP per beneficiary €	Total LMP opportunity cost %	Active LMP opportunity cost %	Passive LMP opportunity cost %
Austria	12042.81	8642.584	12226.8	0.39	0.28	0.41
Belgium	8608.096	7596.362	7805.754	0.28	0.25	0.28
Bulgaria	1170.28	1320.13	925.4853	0.29	0.32	0.23
Cyprus	8151.734	6100.496	8290.672	0.39	0.29	0.40
Czech Rep.	3573.498	3303.156	2285.65	0.28	0.26	0.19
Denmark	21167.81	19074.66	19200.6	0.52	0.53	0.52
Estonia	2768.346	3914.914	2369.294	0.27	0.42	0.23
Finland	10536.4	11768.82	9492.728	0.36	0.40	0.32
France	10018.21	8229.614	9654.608	0.37	0.31	0.36
Germany	11650.27	10850.74	10396.14	0.43	0.41	0.39
Greece	5687.169	6849.936	3647.698	0.28	0.41	0.21
Hungary	2666.413	2643.831	2251.465	0.29	0.28	0.25
Ireland	11677.78	10612.66	8038.793	0.30	0.31	0.23
Italy	7757.881	3697.116	11039.02	0.30	0.15	0.45
Latvia	2208.418	2812.087	1817.521	0.29	0.37	0.23
Lithuania	2720.967	2794.734	1848.841	0.33	0.36	0.22
Luxembourg	16918.48	10828.85	22821.22	0.25	0.16	0.38
Malta	2500.975	2708.01	2026.12	0.17	0.19	0.14
Netherlands	15973.39	11366.28	13398.72	0.47	0.37	0.44
Norway	20334.4	22374.9	17496.5	0.42	0.44	0.34
Poland	2635.991	2281.093	2487.38	0.32	0.28	0.31

Portugal	5969.581	4373.695	5469.195	0.39	0.28	0.37
Romania	1426.415	878.4591	1435.678	0.31	0.19	0.31
Slovakia	2283.656	991.7724	3072.922	0.22	0.09	0.30
Slovenia	5932.106	3674.272	6203.459	0.35	0.22	0.37
Spain	5804.999	2321.41	9711.303	0.26	0.12	0.50
Sweden	12115.88	13773.35	9118.254	0.37	0.42	0.29
United Kingdom	10006.73	10839.56	3934.773	0.33	0.37	0.14

5. Empirical Results

Table 2 analyses the labour market policies in regard to their aggregates. Set out in Column 1 is the total amount of labour policies (expressed as the opportunity cost of being employed); in Column 2 only the aggregate for Active Labour Market Policies; and in Column 3 only the aggregate for passive labour market policies. Due to the fact that our regression controlled for common time shocks (among which the crisis itself) and time invariant countries effect, there is no significant result for the relative severity of crises *per se* (1st column). However, this result of "no impact" is present in the total Active Labour Market Policies, but not in the Passive ones. In fact, the aggregate PLMP do have a significant impact on unemployment, as well as the relative crises and their interaction. In section 5.1 we propose a detailed interpretation of these results (section "Non-monotonous Effects" below).

Table 2: Unemployment rate, Aggregate Policies and Crisis

Dependent variable: Total Unemployment			
Total Labour Mkt Policies	3.05		
	(3.05)		
Active Labour Mkt Policies		0.69	
		(1.54)	
Passive Labour Mkt Policies			3.74*
			(2.22)
Crisis	-6.11	-2.69	-6.22**
	(4.27)	(2.12)	(3.12)
Policy*Crisis	23.34*	14.42***	22.39***
	(12.69)	(5.83)	(9.19)
Dc: country dummies	Y***	Y***	Y***
Dt: year dummies	Y***	Y***	Y***
Observations:	237	278	302
F-stats	F(16,193) = 6.14	F(16,234) = 6.60	F(16,258) = 7.71
P-Value	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000
R-Square	0.3122	0.3109	0.3235
Hausman Test: FE vs RE	Prob>chi2 = 0.0613	Prob>chi2 = 0.7728	Prob>chi2 = 0.6607

Notes: Standard errors in parentheses; * statistically significant at 10%, ** statistically significant at 5% and *** statistically significant at 1%.

Table 3 goes into much greater detail and decomposes the labour market policies into nine sub-components (for definitions of the variables see Table A1 in the Appendix). Rehabilitation and start-up expenses are now significant. Consequently, these results give us a much richer picture of the relation among the unemployment rate, policies, and financial crises.

Table 3: Unemployment rate, Disaggregate Policies and Crisis

Dependent variable: Total Unemployment								
Training	-0.41							
	(0.39)							
Job Rotation		0.6						
		(0.6)						
Employment Incentives			0.63					
			(0.52)					
Rehabilitation				2.48***				
				(0 .78)				
Job Creation					0.88			
					(0.71)			
Start-up Incentives						-0.43***		
						(0.15)		
Early Retirement							-0.68	
							(0.75)	
Out of work and maintenance								3.52
								(2.18)
Crisis	1.78	10.04**	0.17	5.13***	0.57	1.51	-2.12	-5.4*
	(2.21)	(4.61)	(1.53)	(2)	(1.76)	(1.44)	(4.15)	(2.87)
Policy*Crisis	-0.66	-19.8*	4.8	-8.25***	2.74	-2.24	13.48	20.57**
	(3.33)	(10.67)	(3.16)	(3.4)	(4.65)	(1.5)	(10.11)	(8.56)
Dc: country dummies	Y***	Y***	Y***	Y***	Y***	Y***	Y***	Y***
Dt: year dummies	Y***	Y***	Y***	Y***	Y***	Y***	Y***	Y***
Observations:	280	102	275	207	246	189	166	304
F-stats	F(16,236) = 6.23	F(16,74) = 3.35	F(16,232) = 6.01	F(16,168) = 5.80	F(16,204) = 4.03	F(16,164) = 4.63	F(16,134) = 2.30	F(16,260) = 7.59
P-Value	Prob > F = 0.0000	Prob > F = 0.0002	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0051	Prob > F = 0.0000
R-Square	0.2969	0.4201	0.2931	0.356	0.2401	0.3113	0.2155	0.3184
Hausman Test: FE vs RE	Prob>chi2 = 0.0008	Prob>chi2 = 0.0000	Prob>chi2 = 0.8318	Prob>chi2 = 0.8242	Prob>chi2 = 0.3316	Prob>chi2 = 0.0053	Prob>chi2 = 0.6920	Prob>chi2 = 0.6774

Notes: Standard errors in parentheses; * statistically significant at 10%, ** statistically significant at 5% and *** statistically significant at 1%.

In Tables 4 and 5 we consider Youth Unemployment as the dependent variable, and we investigate the same relationships (see Equation 2). The results are qualitatively unchanged, but now the country-specific crisis effect is much more important.

Table 4: Youth Unemployment rate, Aggregate Policies and Crisis

Dependent variable: Youth Unemployment			
Total Labour Mkt Policies	2.55		
	(6.12)		
Active Labour Mkt Policies		3.01	
		(3.08)	
Passive Labour Mkt Policies			1.95
			(4.56)
Crisis	-10.77	-2.47	-10.4*
	(8.56)	(4.25)	(6.4)
Policy*Crisis	47.78*	23.34**	43.94**
	(25.43)	(11.72)	(18.84)
Dc: country dummies	Y***	Y***	Y***
Dt: year dummies	Y***	Y***	Y***
Observations:	237	278	302
F-stats	F(16,193) = 7.66	F(16,234) = 8.34	F(16,258) = 9.67
P-Value	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000
R-Square	0.3884	0.363	0.357
Hausman Test: FE vs RE	Prob>chi2 = 0.0007	Prob>chi2 = 0.4979	Prob>chi2 = 0.8317

Notes: Standard errors in parentheses; * statistically significant at 10%, ** statistically significant at 5% and *** statistically significant at 1%.

Table 5: Youth Unemployment rate, Disaggregate Policies and Crisis

Dependent variable: Youth Unemployment								
Training	-0.32							
	(0.79)							
Job Rotation		1.7						
		(1.22)						
Employment Incentives			1.23					
			(1.05)					
Rehabilitation				3.9**				
				(1.65)				
Job Creation					1.95			
					(1.41)			
Start-up Incentives						-0.71**		
						(0.31)		
Early Retirement							-0.64	
							(1.49)	
Out of work and maintenance								1.67
								(4.46)
Crisis	5.11	24.1***	1.61	12.21***	3.71	4.02	-2.7	-8.89
	(4.51)	(9.33)	(3.14)	(4.32)	(3.53)	(3.1)	(8.28)	(5.87)
Policy*Crisis	-2.15	-38.78*	9.07	-16.93**	0.94	-25.15	26.92	40.59**
	(6.7)	(21.57)	(6.41)	(7.23)	(9.3)	(19.2)	(20.21)	(17.54)
Dc: country dummies	Y***	Y***	Y***	Y***	Y***	Y***	Y***	Y***
Dt: year dummies	Y***	Y***	Y***	Y***	Y***	Y***	Y***	Y***
Observations:	280	102	275	207	246	189	166	304
F-stats	F(16,236) = 8.19	F(16,74) = 4.24	F(16,232) = 8.01	F(16,168) = 6.83	F(16,204) = 5.90	F(16,164) = 5.80	F(16,134) = 4.22	F(16,260) = 9.58
P-Value	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000
R-Square	0.3571	0.4786	0.3558	0.3941	0.3162	0.3615	0.335	0.3708
Hausman Test: FE vs RE	Prob>chi2 = 0.0106	Prob>chi2 = 0.0000	Prob>chi2 = 0.9137	Prob>chi2 = 0.9504	Prob>chi2 = 0.2717	Prob>chi2 = 0.0383	Prob>chi2 = 0.7787	Prob>chi2 = 0.8495

Notes: Standard errors in parentheses; * statistically significant at 10%, ** statistically significant at 5% and *** statistically significant at 1%.

5.1 Non-Monotonous Effects: accounting for Interactions

In order to investigate the joint effect on unemployment of the crisis and policy variables, we used an interaction effect in each and every regression. This joint impact turned out to be non-monotonous. In other words, the impact of the crisis on unemployment was positive, non-significantly different from zero, or negative depending on the actual value of the policy variable. By the same token, the impact of the policy variable of unemployment was positive, non-significantly different from zero, or negative depending on the crisis's values.

More in detail, the joint effect of policies and crisis on unemployment was calculated in two steps. First, we retrieved the estimated thresholds for policies and crisis. Thus, we found the value of crisis (policy) such that the policy (crisis) variable had zero impact on unemployment. Second, we evaluated the joint impact of policies and crisis from below and above the thresholds and thus assessed their non-monotonous effects. The steps taken in order to calculate the non-monotonous effect of Policy for the given Crisis Threshold were the following:

1) Finding the Crisis Threshold:

As the total effect of Policy on Unemployment Rate is equal to: $\hat{\beta}_1 Policy + \hat{\beta}_3 (Policy * Crisis)$, the Crisis Threshold is such that: $Policy(\hat{\beta}_1 + \hat{\beta}_3 Crisis) = 0$ or $(\hat{\beta}_1 + \hat{\beta}_3 Crisis) = 0$

Thus, the Crisis Threshold= $-\frac{\hat{\beta}_1}{\hat{\beta}_3}$

2) Assessing the non-monotonous effects of Policy for the calculated Crisis Threshold: this was simply done by evaluating whether the variable Policy increased (decreased) the unemployment rate, for crisis values above (below) the Crisis Threshold.

Likewise, the Policy Threshold was written as $-\frac{\hat{\beta}_2}{\hat{\beta}_3}$ and the non-monotonous effect of the crisis was assessed by evaluating whether the variable Crisis increased (decreased) the unemployment rate, for policy values above (below) the Policy Threshold. The formal construction of these thresholds is shown in Tables 6 and 7. Moreover, we provide a statistical interpretation in the following section 5.2 by looking at Graphs 1 to 9.

Table 6: Non-monotonous effects, total unemployment

Dependent variable: untot	Statistical Significance			Crisis Threshold	Effect of Policy on unemployment rate		Policy Threshold	Effect of Crisis on unemployment rate	
	Policy	Crisis	Interaction		Crisis>Threshold	Crisis<Threshold		Policy>Threshold	Policy<Threshold
ratio_totlmp_on_gdppc	N.S.	N.S.	S*	-0.130676949	u increases	u decreases	0.2617823	u increases	u decreases
ratio_almp_on_gdppc	N.S.	N.S.	S***	-0.047595378	u increases	u decreases	0.1867811	u increases	u decreases
ratio_plmp_on_gdppc	S*	S**	S***	-0.167115053	u increases	u decreases	0.2775178	u increases	u decreases
ratio_train2_on_gdppc	N.S.	N.S.	N.S.	-0.629662182	u decreases	u increases	2.7124006	u decreases	u increases
ratio_rot3_on_gdppc training	N.S.	S**	S*	0.030103224	u decreases	u increases	0.5073436	u decreases	u increases
ratio_emplinc4_on_gdppc	N.S.	N.S.	N.S.	-0.13058368	u increases	u decreases	-0.034713	u increases	u decreases
ratio_rehab5_on_gdppc	S***	S***	S***	0.301064886	u decreases	u increases	0.623122	u decreases	u increases
ratio_jobcr6_on_gdppc	N.S.	N.S.	N.S.	-0.322139012	u increases	u decreases	-0.208106	u decreases	u increases
ratio_stup7_on_gdppc	S***	N.S.	N.S.	-0.191964286	u decreases	u increases	0.6741071	u decreases	u increases
eret8_on_gdppc	N.S.	N.S.	N.S.	0.05076157	u increases	u decreases	0.1569253	u increases	u decreases
ratio_outwork9_on_gdppc	N.S.	S*	S**	-0.171064037	u increases	u decreases	0.2624989	u increases	u decreases

Table 7: Non-monotonous effects, Youth unemployment

Dependent variable: youthun	Statistical Significance			Crisis Threshold	Effect of Policy on unemployment rate		Policy Threshold	Effect of Crisis on unemployment rate	
	Policy	Crisis	Interaction		Crisis>Threshold	Crisis<Threshold		Policy>Threshold	Policy<Threshold
ratio_totlmp_on_gdppc	N.S.	N.S.	S*	-0.053369611	u increases	u decreases	0.2254081	u increases	u decreases
ratio_almp_on_gdppc	N.S.	N.S.	S**	-0.128947111	u increases	u decreases	0.1057561	u increases	u decreases
ratio_plmp_on_gdppc	N.S.	S*	S**	-0.04444604	u increases	u decreases	0.2367152	u increases	u decreases
ratio_train2_on_gdppc	N.S.	N.S.	N.S.	-0.150830285	u decreases	u increases	2.3746861	u decreases	u increases
ratio_rot3_on_gdppc training	N.S.	S***	S*	0.043737785	u decreases	u increases	0.6206122	u decreases	u increases
ratio_emplinc4_on_gdppc	N.S.	N.S.	N.S.	-0.136178183	u increases	u decreases	-0.177807	u increases	u decreases
ratio_rehab5_on_gdppc	S**	S***	S**	0.230278922	u decreases	u increases	0.7214596	u decreases	u increases
ratio_jobcr6_on_gdppc	N.S.	N.S.	N.S.	-2.08071527	u decreases	u increases	-3.955298	u increases	u decreases
ratio_stup7_on_gdppc	S**	N.S.	N.S.	-0.028230616	u decreases	u increases	0.159841	u decreases	u increases
eret8_on_gdppc	N.S.	N.S.	N.S.	0.023854445	u increases	u decreases	0.1005967	u increases	u decreases
ratio_outwork9_on_gdppc	N.S.	N.S.	S**	-0.041304753	u increases	u decreases	0.2191773	u increases	u decreases

5.2 Non-Monotonous Effects: Confidence Intervals of the interaction effects[17]

Following Brambor et al. 2006, we now turn to detailed description of the statistical relevance and the marginal effects of the interaction terms stemming from our analyses. In the following graphs 1 to 5 (each composed of two panels) we show the marginal effect of the policy on the unemployment rate ($\partial U/\partial$policy) conditional on the crises, as well as the marginal effect of the crisis ($\partial U/\partial$crisis)

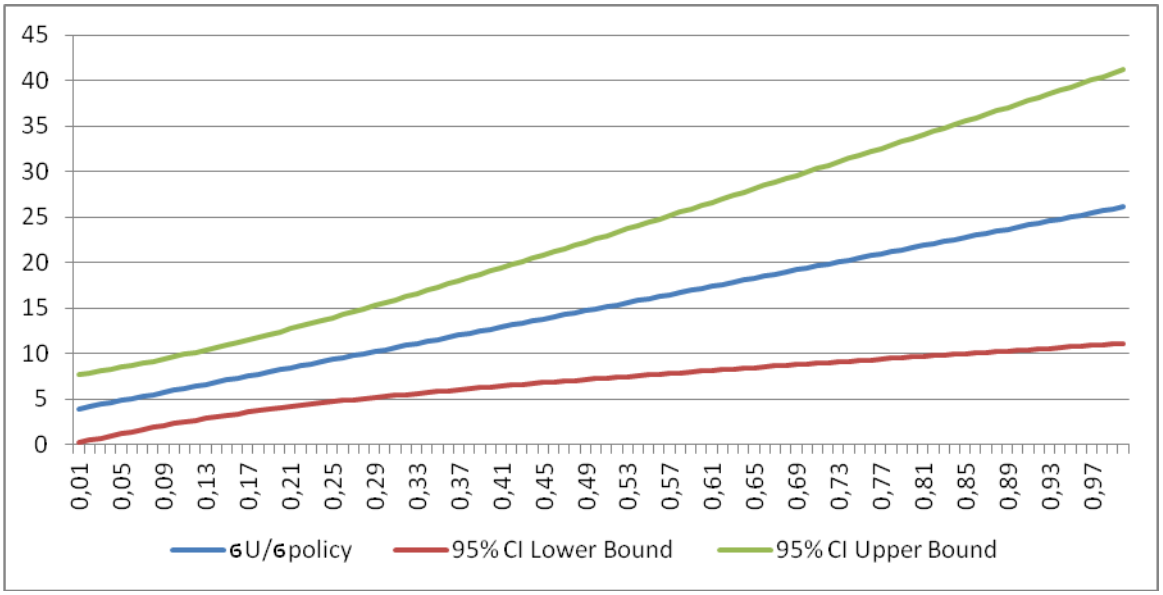
[17] We thank an anonymous referee for suggesting the interpretation of the marginal effects of interaction terms and their relevant statistical significance.

conditional on the policies. In the same way we explore the marginal effects on Youth Unemployment in graphs 6 to 9 (∂YU/∂policy & ∂YU/∂crisis).

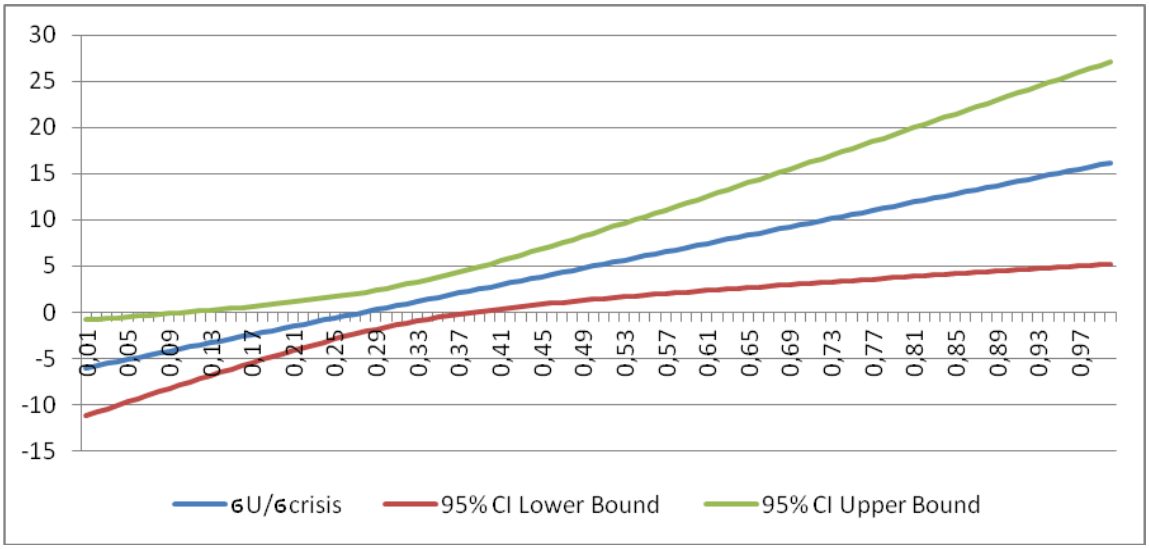
In other words, graphs 1 to 9 depict the joint effect of policies and crisis severity on the unemployment rate (or youth). The graphs can be read as follows. The blue line represents the linear marginal effect. The 95% confidence intervals are the lower bound (LB) red lines and the upper bound (UB) green ones. When both confidence intervals lie above (or below) the zero effect line, we can assess that there is a statically significant effect of the policy (or the crisis) on unemployment. If in the same graphs the confidence interval switches from above to below, then there is a statistically significant non-monotonous effect. We should also recall that both the policy and the crisis variables are constructed on a (0,1) scale. Let us analyse them in order.

Graph 1: Tot unemployment rate: Total Passive Labour Market Policies (panel A) and the Crisis Joint Effect (panel B)

Panel A



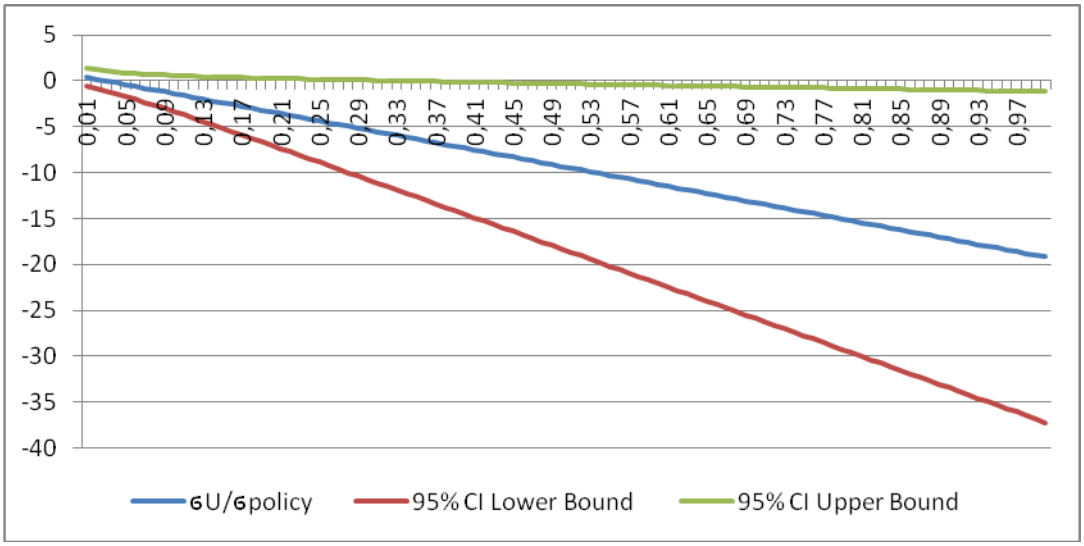
Panel B



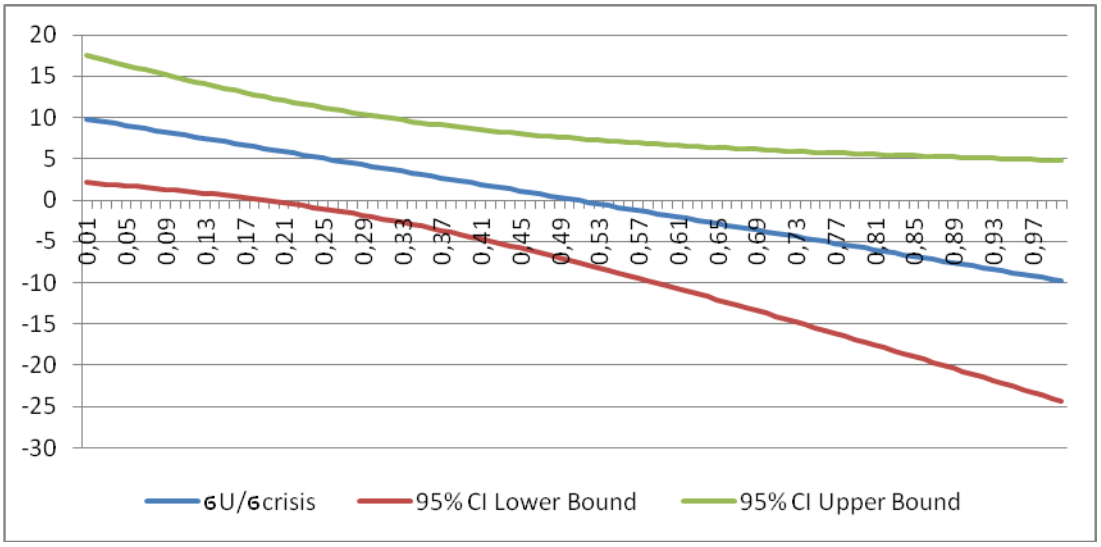
Both passive labour market policies and the crisis impact with a positive sign on unemployment, i.e. the more generous the policies and the more serious the crisis, the higher the unemployment rate. However, the crisis seems to work as a disciplining device whenever the level of the policy (opportunity cost of being employed) is below 9% of the average wage, i.e. below the point at which the upper bound of the CI hits the zero effect line. In other words, moderate levels of passive labour market policies may enhance a reduction of unemployment during a crisis, which is policy relevant.

Graph 2: Total unemployment Rate: Rotation Policies (panel A) and the Crisis (panel B) Joint Effect

Panel A



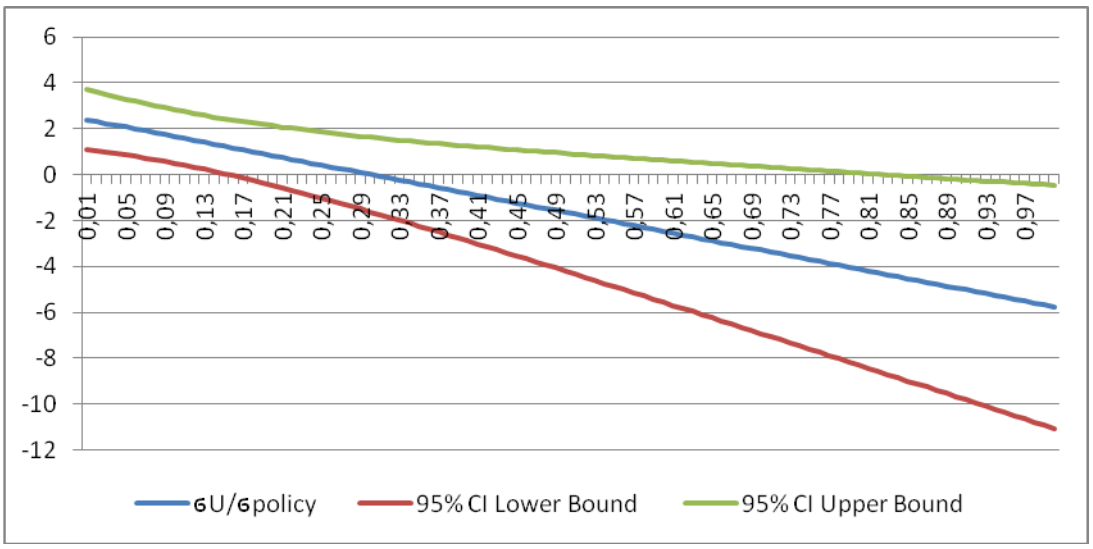
Panel B



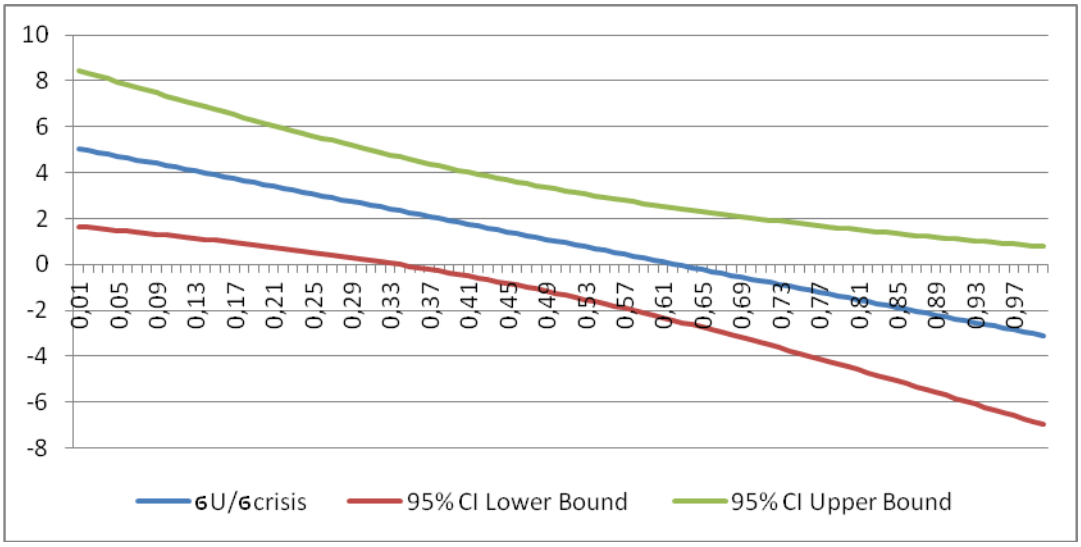
Rotation policies do not exert a marginal effect on unemployment. However, when the policies are below 20%, the crisis has a positive impact on unemployment. We can interpret these results as a smoothing effect of rotation policies on the crisis's detrimental impact. The crisis is less unemployment conducive whenever the rotation-policies are relative higher.

Graph 3: Total unemployment Rate: Rehabilitation Policies (panel A) and the Crisis (panel B) Joint effect

Panel A



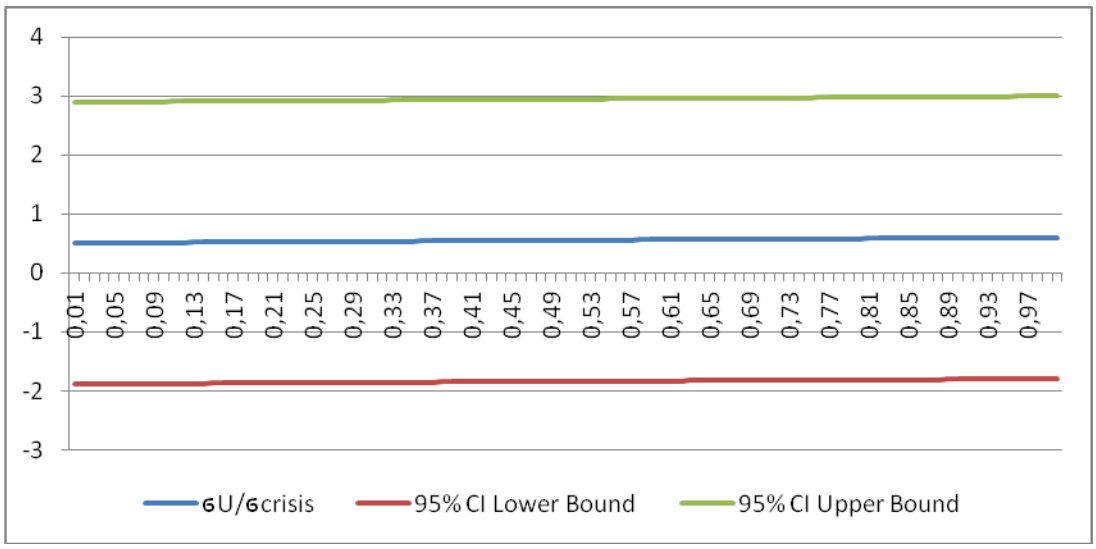
Panel B



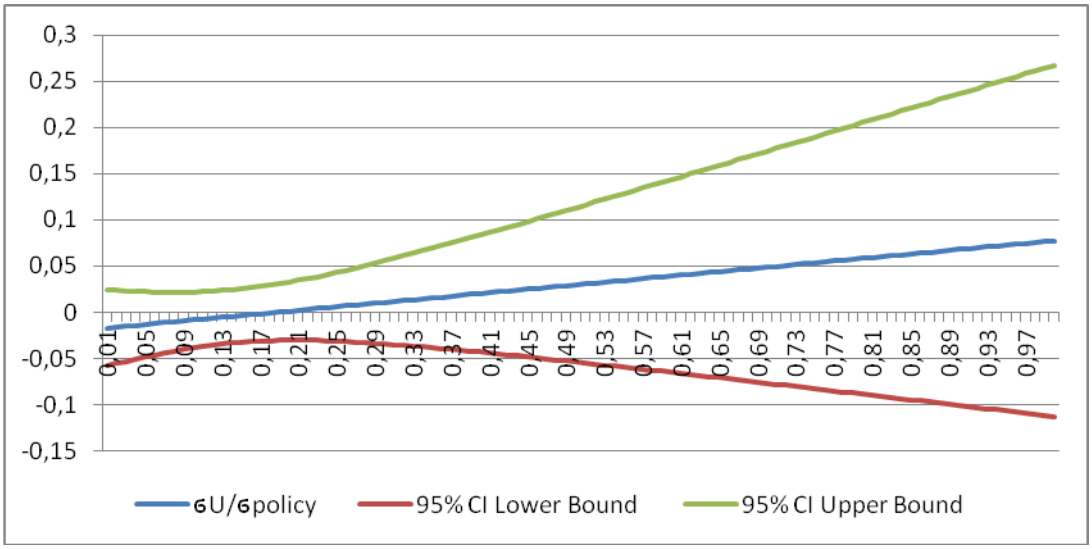
Rehabilitation policies register a genuine non-monotonous effect: when the crisis is less then 0.17% severe, they tend to increase unemployment; vice-versa when the crisis is extremely severe (more than 85%) they tend to reduce unemployment. Similarly to the rotation policies, we can also assess that the crisis makes unemployment higher whenever the policies are below 33%.

Graph 4: Total unemployment Rate: Start-up Policies (panel A) and the Crisis (panel B) Joint effect

Panel A



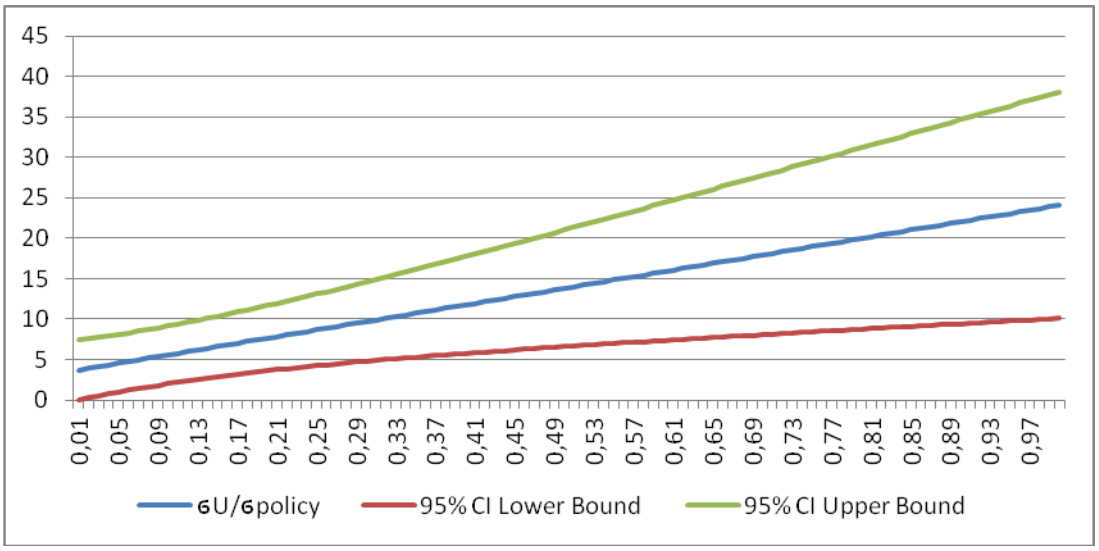
Panel B



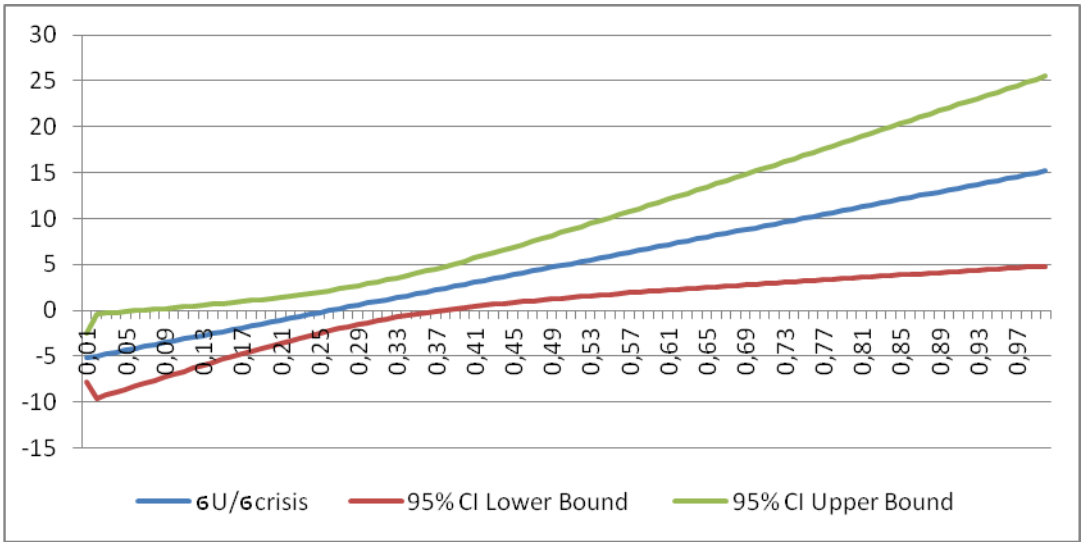
On a different note, start-up and crisis do not interact at all on unemployment, and this is highlighted by the very wide CI around the zero effect line.

Graph 5: Total unemployment Rate: Out of Work Policies (panel A) and the Crisis (panel B) Joint effect

Panel A



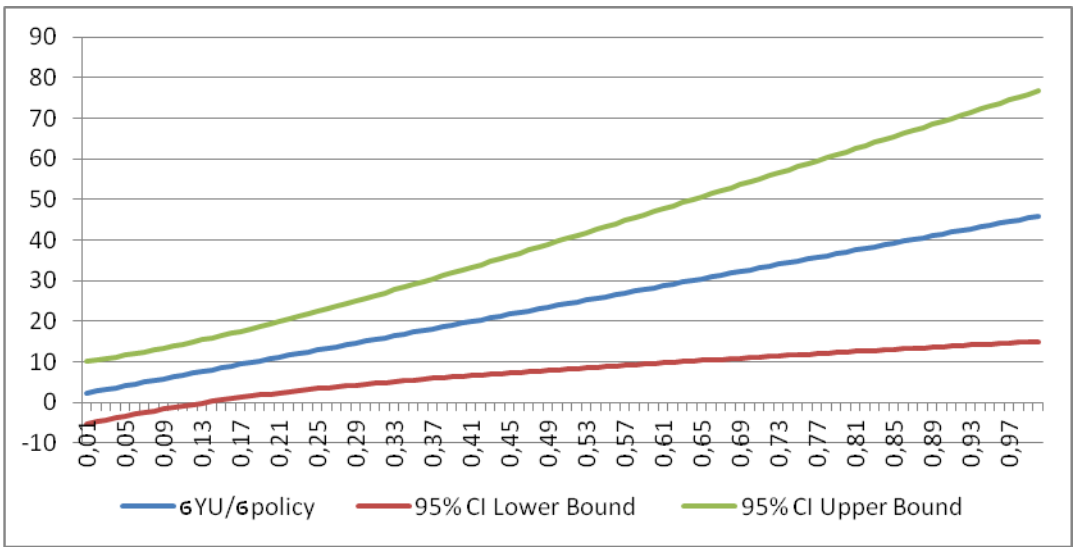
Panel B



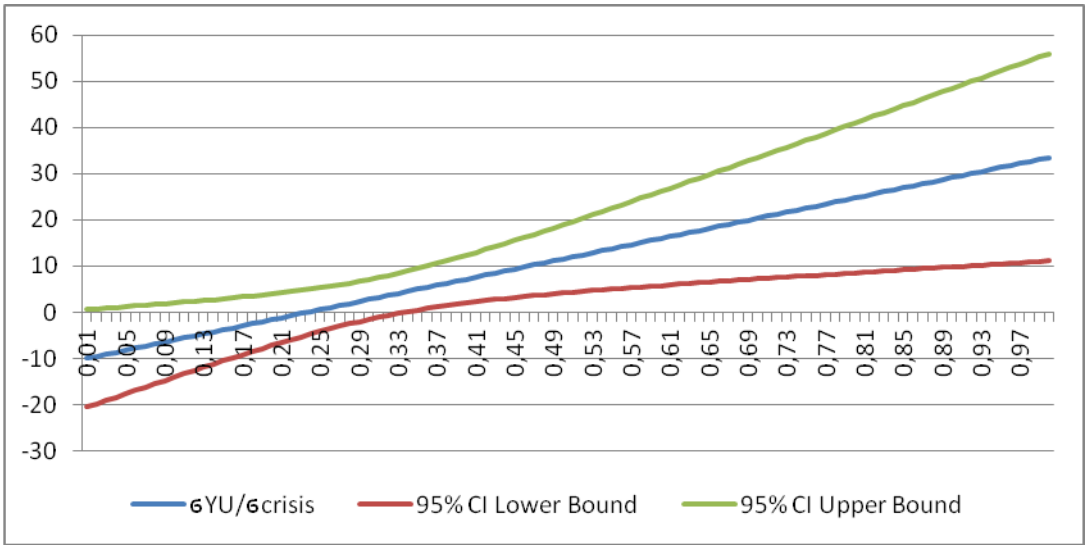
Out of labour force policies induce higher unemployment, and this effect is amplified by the crisis. By the same token, the crisis has an amplified effect when out of labour polices are excessively generous (above 40%).

Graph 6: Youth unemployment rate: Total Passive Labour Market Policies (panel A) and the Crises (panel B) Joint Effect

Panel A



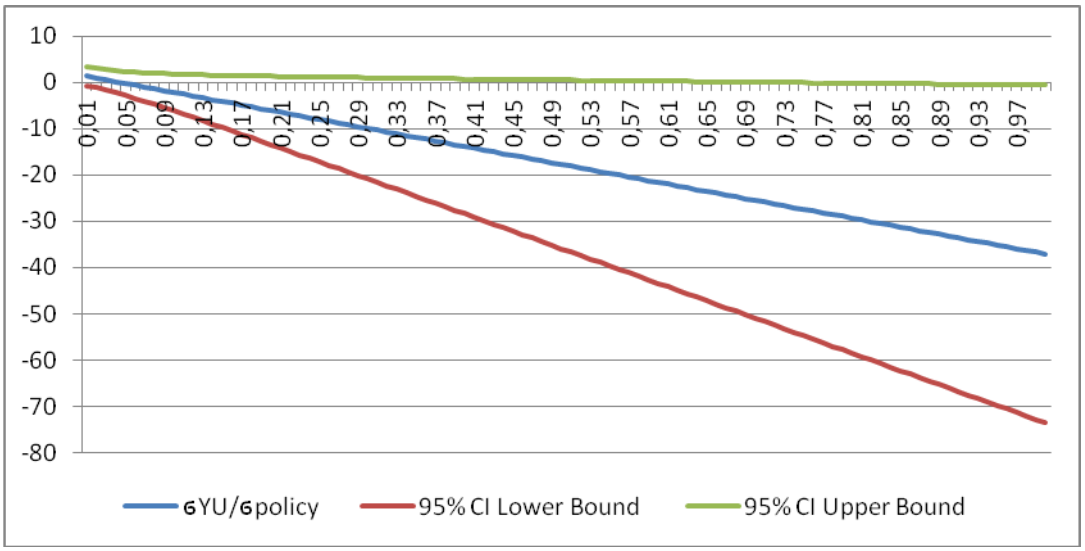
Panel B



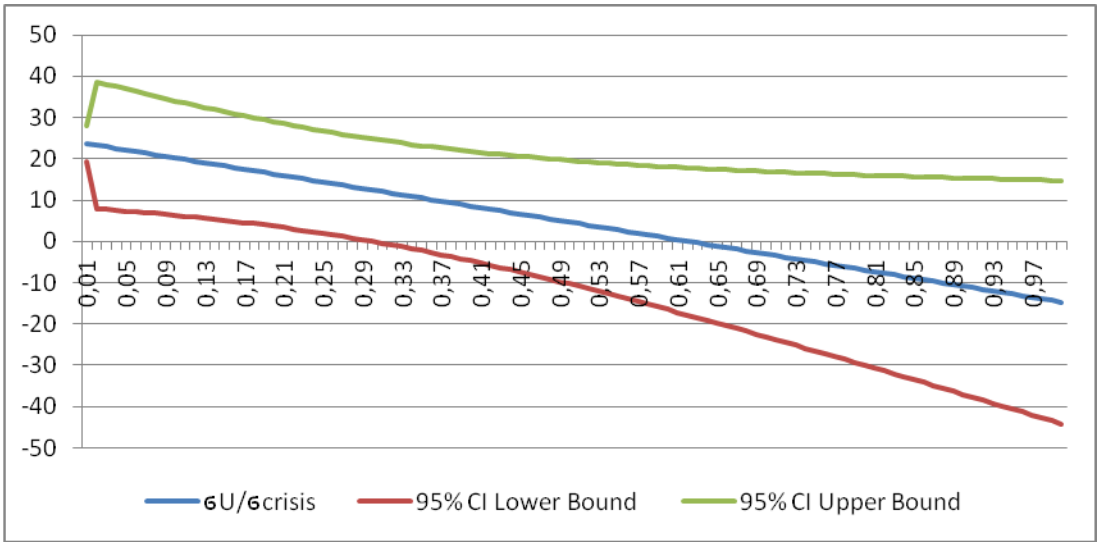
Total passive labour market policies are detrimental for the youth labour market when they are too generous, i.e. the worse the crisis (above 13%) the higher the positive effect on unemployment. Conversely, the crisis is conducive to higher unemployment when the policies are more than 35%.

Graph 7: Youth unemployment rate: Rotation Policies (panel A) and the Crisis (panel B) Joint Effect

Panel A



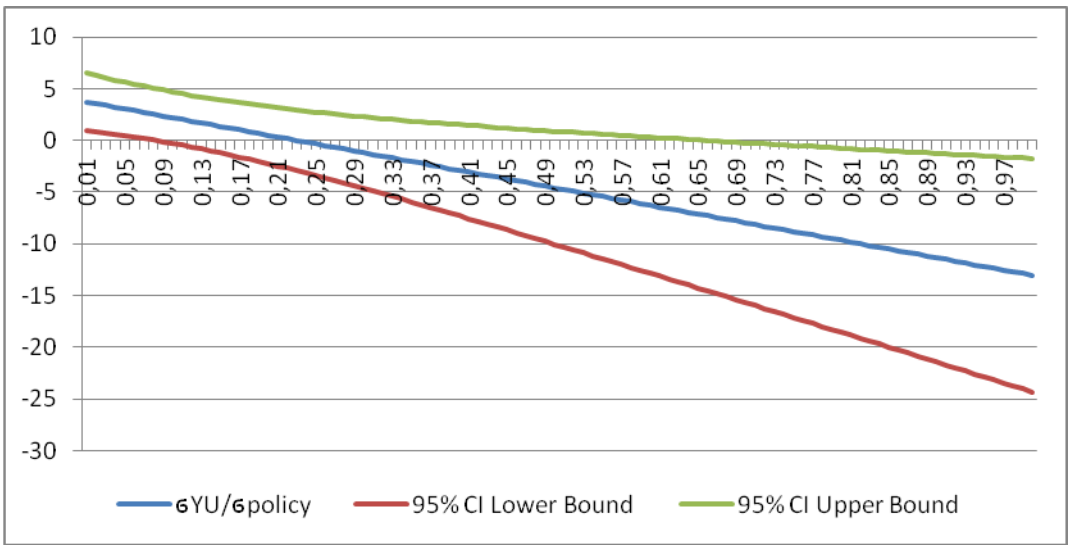
Panel B



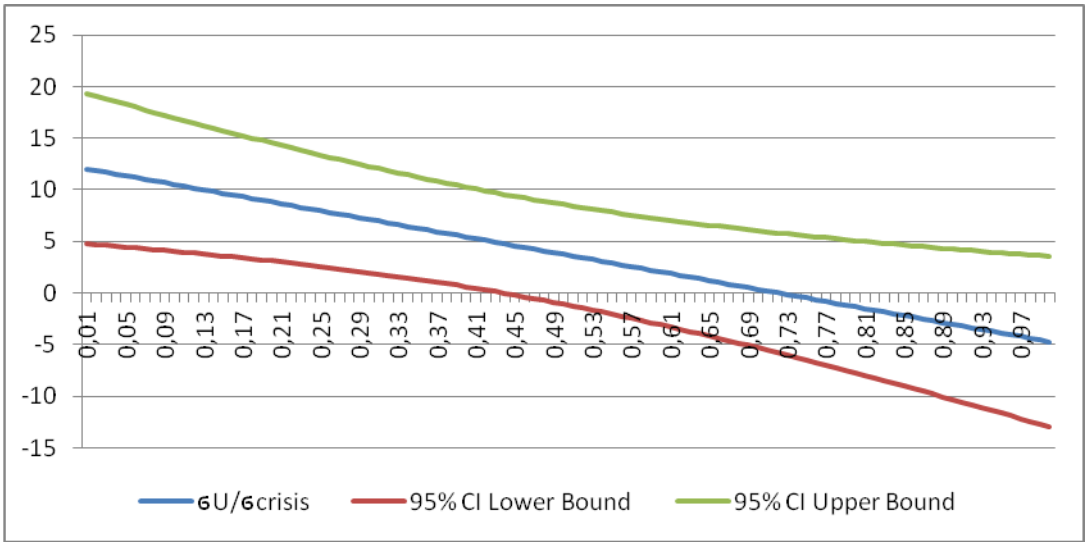
As regards rotation policies, we find a similar result to that for overall unemployment: no independent impact on youth unemployment but a mitigating effect with respect to the crisis's marginal effect. Below 29%, the crisis hits the labour market, above 29% it does not.

Graph 8: Youth unemployment rate: Rehabilitation Policies (panel A) and the Crisis (panel B) Joint Effect

Panel A



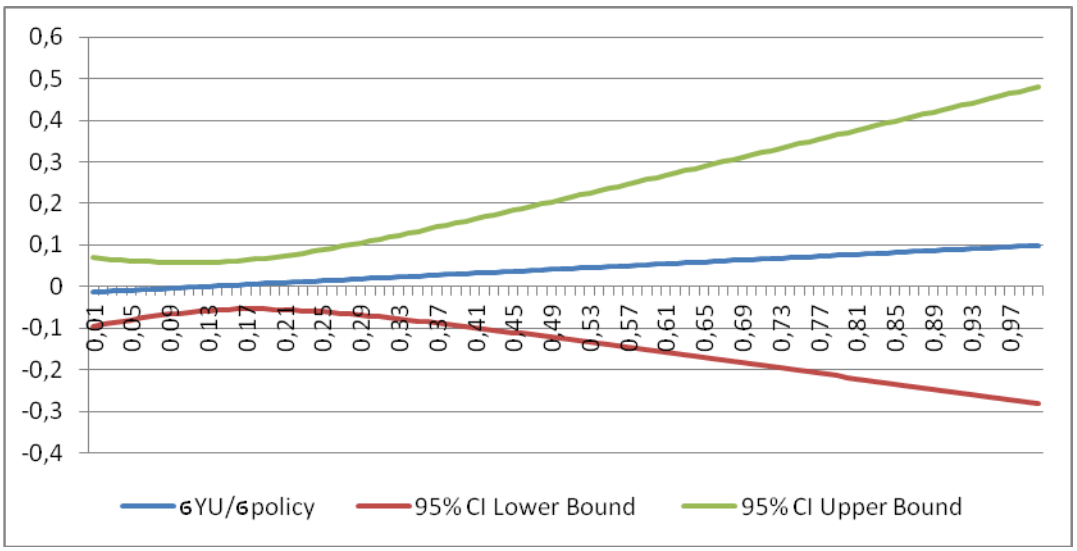
Panel B



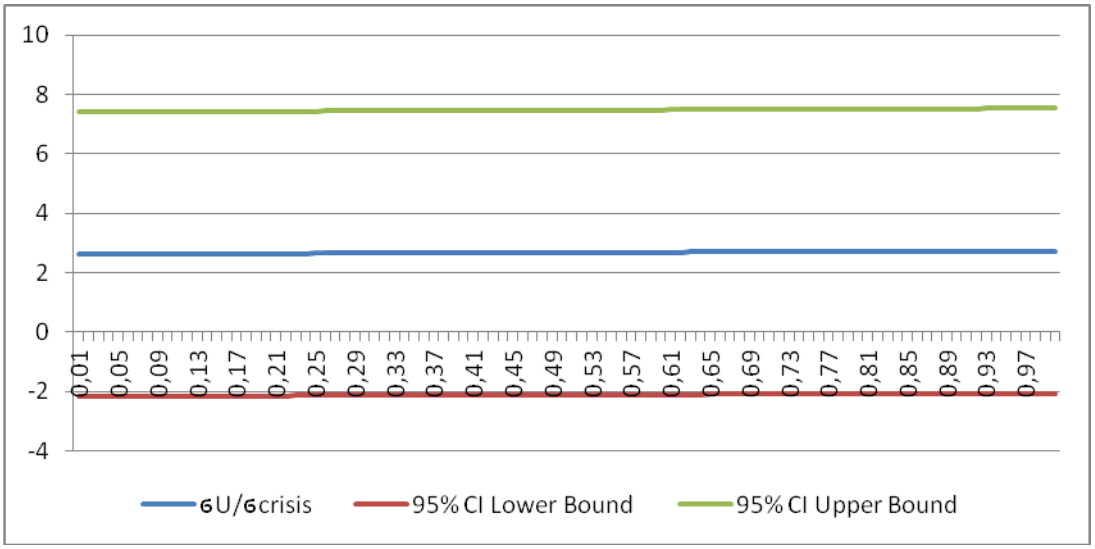
A genuine non-monotonous effect also appears for rehabilitation: for low levels of the crisis (in normal times) it seems to increase unemployment, but for a very severe crisis period it has the opposite effect. Again, the crisis hits unemployment positively for a value of the policies below 45% but then it fades away.

Graph 9: Youth unemployment rate: Start Up Policies (panel A) and the Crisis (Panel B) Joint Effect

Panel A



Panel B



Finally, Start-up policies have no relevant and significant results on youth unemployment.

To sum up, we can comfortably conclude that all three testable hypotheses have been confirmed, but the impact of each and every policy is substantially different when interacted with the crisis – which in general exerts a positive impact on unemployment, as one would expect. We discuss these concluding results in the next section.

6. Conclusions

The aim of this paper has been to fill the gap in the literature concerning the complex joint impact of labour market policies and financial crises on labour market outcomes. In particular, we have addressed this research question by applying an innovative empirical approach to 30 European countries over the past two decades and considering the effects of the 2007-2008 financial crisis, which is associated with the "Great Recession". More in detail, we have measured labour market policies in terms of the opportunity cost of being employed instead of being a labour market policy beneficiary, and we have constructed a country-specific and time-varying variable accounting for the idiosyncratic-severity effect of the last crisis. This pair of variables has enabled us to test the joint impact of labour market policies and economic crises on (total and youth) unemployment, exploiting the variability in both the cross-sectional and time dimension.

Operationally, we began by looking at an empirical specification able to disentangle the effect of the crisis on (total and youth) unemployment from the

effect of labour market policies. This first step was instrumental in analysing the direct effect of these two separate components (crisis vs. policies) in the enlarged European context. In fact, we were interested in the combined effect of crisis *and* policies as our overall research question. As far as the interaction effect is concerned, our main findings are the following: passive labour market policies, ideally targeted on reducing the effects of crises by guaranteeing generous unemployment benefits, turn out to be detrimental in times of crisis, whereas they may be good policy instruments if they are not too generous; specific types of active labour market policies, such as rehabilitation and training incentives, are to be preferred in times of crisis because they may reduce unemployment more rapidly. Finally, young people should be targeted with special policies because they are particularly vulnerable to crises. Policy makers might therefore look at the complex joint effect of policies and crisis in order to design better general as well as specific, traditional as well as innovative, economic and labour policies.

Being aware of the specific nature of these results, we envisage further research[18] on the channels through which economic crises and the labour market policies and institutions interplay in determining short and long run labour market performance. This is of key importance for any economist, decision maker or scholar working on the determinants of better and more jobs in the current European context characterised - especially in some countries - by a high risk of long stagnation without net job creation, i.e. with persistently high total and youth unemployment rates, after some years of more or less dramatic economic recession.

[18] For example by looking at the impact of the macroeconomic policies in times of crisis and/or by distinguishing Old vs. New EU member states.

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Appendix

Figure A1: Unemployment rate by Country, all population

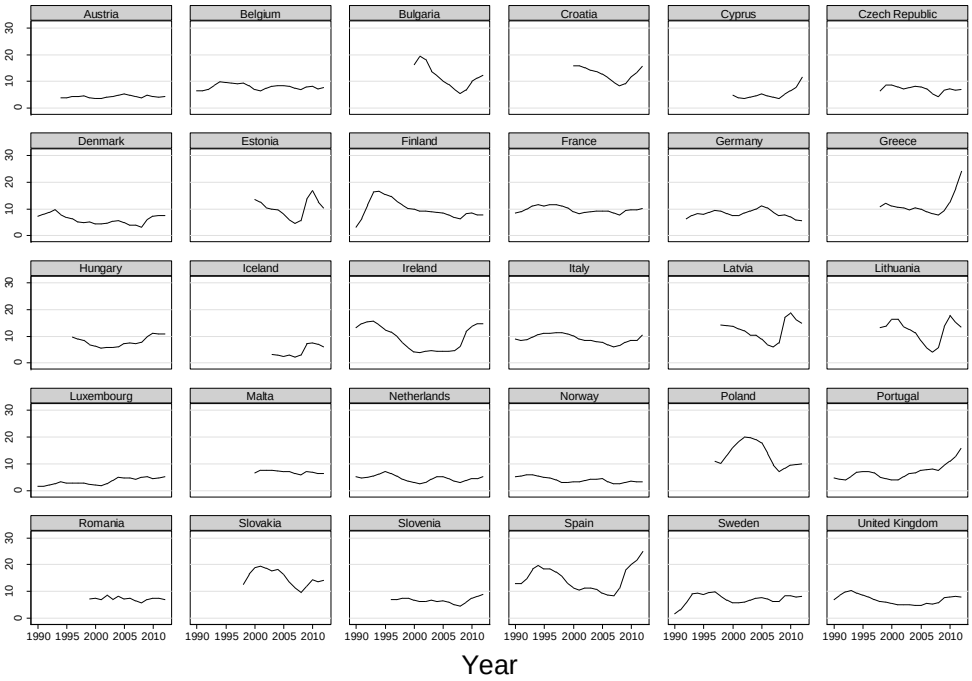

Figure A2: Youth Unemployment rate by Country

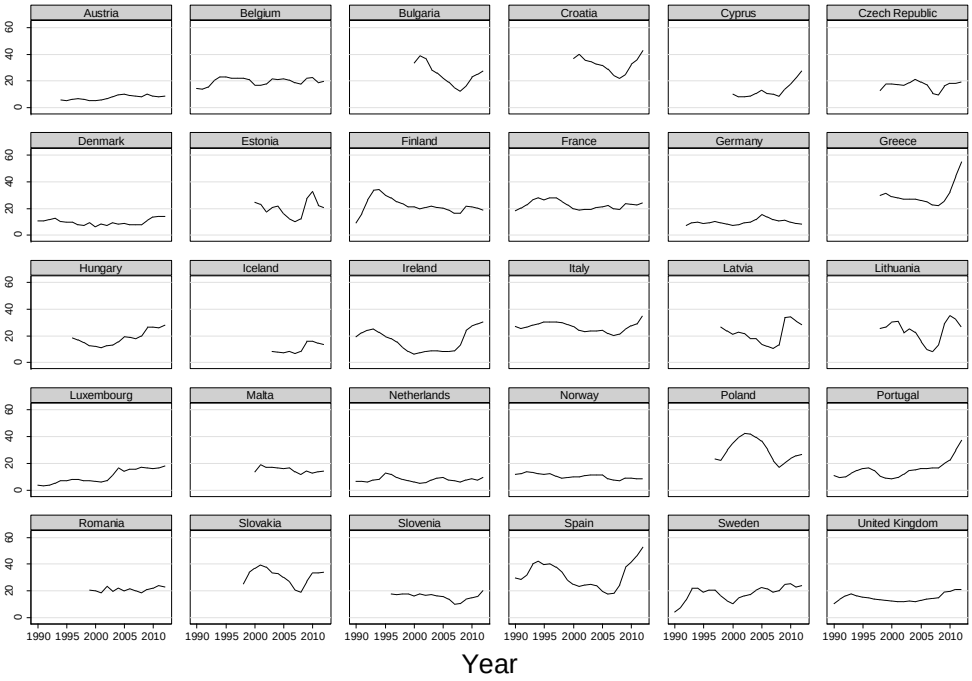

Figure A3: Crisis Severity by Country

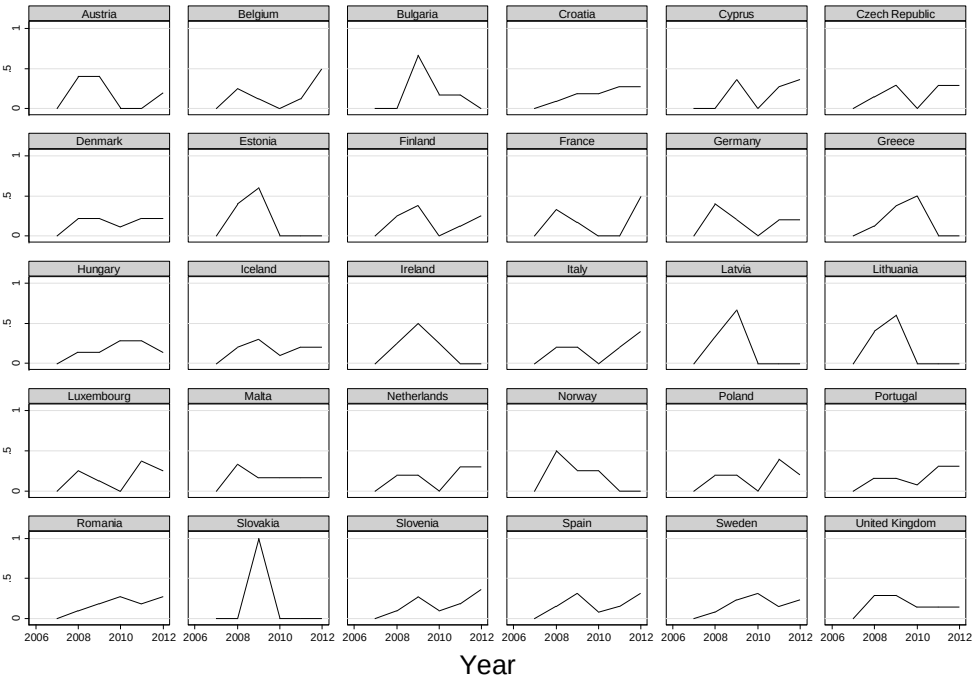

Table A1: Detailed Variables Description

Name of the Variable	Description	Source
GDP		
gdp	GDP at market prices, millions of Euros (ECU until 1998)	Eurostat, Quarterly National Accounts
gdppc	GDP per inhabitant in Euros at current market prices	Eurostat, National Accounts and GDP
quarterly_gdp	Quarterly GDP at current market prices, seasonally adjusted	Eurostat, National Accounts and GDP
Unemployment		
Total Unemployment	Unemployment rate, all population	Eurostat, Labour Market Statistics
Youth Unemployment	Unemployment rate of people aged under 25, % of total labour force	Eurostat, Labour Market Statistics
Labour Market Policies (LMP)		
totlmp	Labour market policy public expenditure in % of GDP	Eurostat, Labour Market Statistics
almp	active lmp, total, in % GDP	Eurostat, Labour Market Statistics

plmp	passive lmp, total, in % GDP	Eurostat, Labour Market Statistics
train2	active lmp, training; Millions of Euros and annual stock (i.e. average people involved)	Eurostat, Labour Market Statistics
rot3	active lmp, job rotation and job sharing, Millions of Euros and annual stock (i.e. average people involved)	Eurostat, Labour Market Statistics
emplinc4	active lmp, employment incentives; Millions of Euros and annual stock (i.e. average people involved)	Eurostat, Labour Market Statistics
rehab5	active lmp, supported employment and rehabilitation; Millions of Euros and annual stock	Eurostat, Labour Market Statistics
jobcr6	active lmp, direct job creation; Millions of Euros and annual stock (i.e. average people involved)	Eurostat, Labour Market Statistics
stup7	active lmp, start-up incentives; Millions Euro and annual stock (i.e. average people involved)	Eurostat, Labour Market Statistics
eret8	passive lmp, early retirement; Millions of Euros and annual stock (i.e. average people involved)	Eurostat, Labour Market Statistics
outwork9	passive lmp, out of work and maintenance; Millions of Euros and annual stock	Eurostat, Labour Market Statistics
Opportunity cost of being employed		
Total LMP	opportunity cost of being employed vs. average totlmp beneficiary: (totlmp in Euro/totlmp beneficiaries)/gdppc	own calculations
Active LMP	opportunity cost of being employed vs. average almp beneficiary: (almp in Euro/almp beneficiaries)/gdppc	own calculations
Passive LMP	opportunity cost of being employed vs. average plmp beneficiary: (almp in Euro/plmp beneficiaries)/gdppc	own calculations
Training	opportunity cost of being employed vs. training beneficiary: (train2 in Euro/train2 beneficiaries)/gdppc	own calculations

Job Rotation	opportunity cost of being employed vs. training beneficiary: (rot3 in Euro/rot3 beneficiaries)/gdppc	own calculations
Employment Incentives	opportunity cost of being employed vs. employment beneficiary:(emplinc4 in Euro/emplinc4 beneficiaries)/gdppc	own calculations
Rehabilitation	opportunity cost of being employed vs. rehabilitation beneficiary: (rehab5 in Euro/rehab5 beneficiaries)/gdppc	own calculations
Job Creation	opportunity cost of being employed vs. job creation beneficiary: (jobcr6 in Euro/jobcr6 beneficiaries)/gdppc	own calculations
Start-up Incentives	opportunity cost of being employed vs. start-up beneficiary: (stup7 in Euro/stup7 beneficiaries)/gdppc	own calculations
Early Retirement	opportunity cost of being employed vs. early retirement beneficiary: (eret8 in Euro/eret8 beneficiaries)/gdppc	own calculations
Out of work and maintenance	opportunity cost of being employed vs. out of work beneficiary: (outwork9 in Euro/outwork9 beneficiaries)/gdppc	own calculations
Crisis		
bc2008	banking crisis started in 2008	Laeven and Valencia (2010, 2012)
bc2007	banking crisis started in 2007	Laeven and Valencia (2010, 2012)
qdrops	country and year specific number of quarters of negative GDP growth, from crisis beginning	own calculations
countrydrops	country specific total number of qdrops between 2008-2012	own calculations
Crisis	country-year specific severity of the crisis: qdrops/countrydrops	own calculations
Interaction Terms		
Policy*Crisis	opportunity cost of being employed* crisis, e.g. ratio_totlmp_on_gdppc*countrysev	own calculations, one policy specific interaction term for each of the listed labour market policies has been calculated