

Key Determinants of Youth Unemployment in OECD Countries

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Abstract

The paper estimates the impact of several institutions and policies on youth and total unemployment rates, for a large set of developed countries during the last three decades. The estimation techniques used is a fixed effect panel analysis. Our empirical analysis shows that, in addition to economic growth, economic freedom, labour market reforms, a high share of part time employment, and active labour market polices reduce unemployment and improve labour market performance. Considering the relatively worse condition of young people, our results permit to select - among the numerous policies and reforms able to reduce overall unemployment – the measures with a comparatively higher effect on youth unemployment.

JEL: J08, J48, J68

keywords: youth unemployment, institutions and policies, fixed effects panel estimation

1. Introduction

Unemployment is detrimental for society from many points of view: it is a waste of resources (in many countries GDP could be 10-15% higher without unemployment); it causes a permanent loss of human capital, thus dampening long run growth prospects; it has an impact on health and it diminishes well-being of society (not only for the unemployed); it causes an expansion of fiscal costs for the government (lower taxes and higher expenditures).

The youth unemployment rate is in most countries at least twice as high as the total unemployment rate. This phenomenon is particularly serious because it refers to people who have freshly invested in human capital: their unemployment erodes such investments and raises the risks of being excluded from the labour market (ending in a bad status of “neither in employment or education or training”). It is also a known fact that young people were badly hit by the recent crisis.

What are the causes of high unemployment rates in general and of youth unemployment in particular? As we shall see, the causes are numerous, but we want to consider in particular, in this paper, the possible impact of policies and institutions.

The emphasis given to the role of policies and institutions is motivated by the outcomes of previous studies. For example, OECD(2006, chapter 7) has shown that almost two-thirds of non-cyclical unemployment changes are explained by changes in policies and institutions. It is since OECD's *Jobs Study* of 1994 that the poor employment performance in Europe – the so-called “eurosclerosis” – is explained in terms of labour market rigidities and wrong policies or institutions. Since then, many things have changed also in most European countries (see also Blanchard, 2006, and the follow-up OECD study by Brandt et al., 2005).

The contribution of this paper is the consideration of a long period, ending in the worst year (2009) of the recent crisis, as well as the singling out the differences between youth unemployment (and their determinants) and total unemployment.

Our empirical analysis shows that, in addition to economic growth, economic freedom, labour market reforms, a high share of part time employment, and active labour market polices reduce unemployment. On the contrary high interest rate, taxes on labour and unemployment benefits can have unfavourable impact on the unemployment rate. We also find that estimation

results for youth and overall unemployment rate are different and this difference in results is statistically significant.

The structure of the paper is the following. In section 2, a trend analysis for youth and total unemployment rate is presented. In Section 3, after a brief discussion of the causes of unemployment in general, there is a review of the determinants of youth unemployment. Section 4 presents our econometric investigations on the determinants of total and youth unemployment rate. Section 5 concludes the paper.

2. Youth unemployment: trends and comparisons

Let us consider, first, some problems of definitions. In most countries “youth unemployment” refers to the age group “15-24 years”, but some other age breaks are sometimes considered. Moreover, problems such as underemployment and informal sector employment may be more relevant for young people. Some authors (e.g. O’Higgins, 2011; Scarpetta et al., 2010) observe that the size of the group of “youth left behind” can be proxied by the number of young people who are neither employed nor in education or training (NEET).¹

In the world, total unemployment had increased during the recent crisis – from 2007 to 2009 – from 170 to over 210 millions. But there was a trend increase already in the previous two decades. The phenomenon refers to both emerging and advanced economies. In the UE, the unemployment rate in 2008 was close to 7%, then in 2010-11 it rose again toward 10% (especially in the Euro area), a ceiling already reached a decade earlier. The recession led – sooner (in the most flexible labour markets) or later (where rigidities or internal flexibilities were prevailing)² – to an increase in unemployment. After normal recessions, it takes four to five years, on average, before employment returns to its pre-crisis levels, but the lags are even longer in the case of financial crises.

The trend in unemployment rate in high income OECD countries is presented in Table 1. Unemployment rate has increased in most countries as a consequence of financial and economic crises. The table shows that the largest increases – from 2005 to 2010 – have been recorded in Spain, Ireland, Iceland, Hungary, but even in the United States the unemployment rate almost doubled (from 5.1% to 9.6%); an opposite trend has been exhibited by Germany.

Arpaia and Curci (2010) produce a broad analysis of labour market adjustments in EU-27 after the 2008-2009 recession in terms of employment, unemployment, hours worked and wages, and they highlight that young workers – with weaker work contracts and lower qualifications and experience – have borne the brunt of the “Great Recession”. In fact, the increase in youth unemployment rate has been generally larger than the rise in the total rate. Verick (2009) has noticed that during and after severe recessions, young people find it increasingly difficult both to acquire a job, as a new entrant in the labour market, and to remain employed.

The worst impact on young people is generally recognized, notwithstanding some exceptions³ and despite the recent study by the European Commission (2010) indicates that the largest amount of the increase in total unemployment between 2008 and 2010 (almost one third of the total) was accounted for by the growth amongst 25-34 year olds. In any case, although in some countries the initial impact of the crisis on youth unemployment has been moderate, its long run consequences – loss of work experience and human capital, lower employability and reduced

¹ This group represented (on average for the OECD area) 11% of 15-25 year olds in 2007. The NEET definition was firstly used by OECD, that has recently (2009) introduced two new categories: poorly integrated (young people who do not find stable jobs, but move between temporary employment, unemployment and inactivity) and left behind youth (those young people who face long-term joblessness).

² In some countries, internal flexibility and labour hoarding have been favoured by public support for short-time working. This was the case of Germany, where unemployment decreased even in the crisis’ years. In this respect, the differences between Germany and Italy are analysed by Aricò and Stein (2012).

³ Just in three countries - Austria, Germany and Luxembourg - youth unemployment rates actually fell over the period 2008q3 – 2010 q3. On the contrary the relative position of young people worsened especially in Italy, Portugal, and the New Member States. In the EU youth unemployment rates increased, on average, by more than one third or 5.5 percentage points (see O’Higgins, 2012).

earnings over the entire life cycle, poorer job quality and precarious employment – are worrying. Long-term unemployment is especially pernicious and in the case of young people it raises the risk of a “lost generation” (e.g., Scarpetta et al. 2010).

Table 1: Trends in Total Unemployment Rate

	1980	1985	1990	1995	2000	2005	2010
Australia	6.1	8.3	6.9	8.5	6.3	5.0	5.2
Austria		3.6	3.2	3.7	3.5	5.2	4.4
Belgium		11.3	7.3	9.3	6.6	8.4	8.3
Canada	7.5	10.6	8.1	9.5	6.8	6.8	8.0
Czech Republic				4.0	8.8	7.9	7.3
Denmark		7.8	8.3	7.0	4.5	4.8	7.4
Finland	4.7	5.1	3.1	15.3	9.7	8.4	8.4
France	6.4	10.3	9.4	11.8	10.2	8.9	9.3
Germany				8.1	7.7	11.1	7.1
Greece	4	7.8	7.0	9.1	11.1	9.9	12.5
Hungary				10.2	6.4	7.2	11.2
Iceland				4.9	2.3	2.6	7.6
Ireland		17.9	14.1	12.0	4.3	4.3	13.5
Italy	7.5	9.4	9.8	11.7	10.8	7.7	8.4
Japan	2.0	2.6	2.1	3.2	4.8	4.4	5.0
Korea, Republic of	5.2	4.0	2.5	2.1	4.4	3.7	3.7
Luxembourg		3.0	1.6	2.9	2.3	4.5	4.4
Netherlands	7.9	10.5	7.7	7.2	2.7	4.7	4.5
New Zealand			7.8	6.5	6.2	3.8	6.5
Norway	1.6	2.6	5.3	4.9	3.4	4.6	3.6
Portugal	6.7	8.6	4.7	7.2	3.9	7.6	10.8
Slovakia				13.1	18.8	16.2	14.4
Spain	11.1	21.0	16.0	22.7	13.9	9.2	20.1
Sweden	2.2	3.1	1.8	9.1	5.8	7.7	8.4
Switzerland			2.1	3.3	2.7	4.4	4.2
United Kingdom		11.3	6.8	8.6	5.5	4.6	7.8
United States	7.1	7.2	5.6	5.6	4.0	5.1	9.6

Source: ILO (2012).

Trends in youth unemployment rate (YUR) during the 1980-2010 period in high income OECD countries are presented in Table 2. Youth unemployment rate is high and showed increasing trend in most countries in our sample. If we focus our attention on the EU, which is one of the most affected areas in the world, we can analyse the recent evolution of the YUR (for young people in the 15-24 age group) and disentangle the peculiarities of individual countries. Higher than average figures are shown by different groups of countries: (i) some Mediterranean countries (Spain, Italy, Greece) plus France and Belgium; (ii) many Nordic countries (Sweden and Finland); (iii) some NMS (Hungary and Slovakia).⁴ And the pattern further deteriorated after the crisis, in 2010.

⁴ The situation was bad also in other countries (not shown in the table) such as Poland and the Baltic states.

Table 2: Trends in Youth Unemployment Rate

	1980	1985	1990	1995	2000	2005	2010
Australia	12.5	15.2	13.0	15.4	12.1	10.6	11.5
Austria		4.3	3.8	5.2	5.1	10.3	8.8
Belgium		23.5	14.5	21.5	15.2	21.5	22.4
Canada	12.8	16.1	12.3	14.8	12.7	12.4	14.8
Czech Republic				7.8	17.0	19.3	18.3
Denmark		11.5	11.5	9.9	6.7	8.6	13.8
Finland	8.8	9.7	8.9	27.0	20.3	18.9	20.3
France		25.7	19.8	27.1	20.6	20.3	22.5
Germany				8.2	8.4	15.2	9.7
Greece	13.8	24.2	23.3	27.9	29.5	26.0	32.9
Hungary				18.6	12.7	19.4	26.6
Iceland				11.0	4.7	7.2	16.2
Ireland		25.0	19.7	19.0	6.5	8.6	27.5
Italy	25.0	32.1	28.9	33.5	31.5	24.0	27.8
Japan	3.6	4.8	4.3	6.1	9.2	8.7	9.2
Korea, Republic of	11.5	10.0	7.0	6.3	10.8	10.2	9.8
Luxembourg		6.7	3.6	7.2	6.4	13.7	14.2
Netherlands		17.6	11.1	12.1	5.3	8.2	8.7
New Zealand			14.1	12.3	13.6	9.7	17.1
Norway	4.7	6.5	11.8	11.9	10.2	12.0	9.3
Portugal	16.4	19.0	9.6	15.7	8.6	16.1	22.3
Slovakia				24.8	37.0	29.9	33.6
Spain	25.3	43.8	30.2	40.4	25.3	19.7	41.6
Sweden	6.3	7.2	4.6	19.5	11.6	22.0	25.2
Switzerland			3.2	5.5	5.0	8.8	7.2
United Kingdom		17.8	10.1	15.3	11.7	12.2	19.1
United States	13.8	13.6	11.2	12.1	9.3	11.3	18.4

Source: ILO (2012).

After this needed introduction – considering the present situation and perspectives – about the impact of the crisis, we now extend our viewpoint, in line with the aim of the paper. Thus, we notice that even before the recent crisis, youth unemployment had been increasing in many countries, both developed and emerging.⁵ In the world, young people – between 15 and 24 years – represent more than two fifths of total unemployment.

Youth unemployment as a ratio of adult⁶ unemployment and its share in total unemployment for 2010 is presented in Figure 1. Share of youth unemployment in total unemployment rate is quite high. For example in Australia, New Zealand, Iceland, Sweden, Norway and United Kingdom youth unemployment rate share account for more than one third of total unemployment. As to the ratio between youth and adult unemployment rates (right-hand axis of Figure 1), it is higher than 2

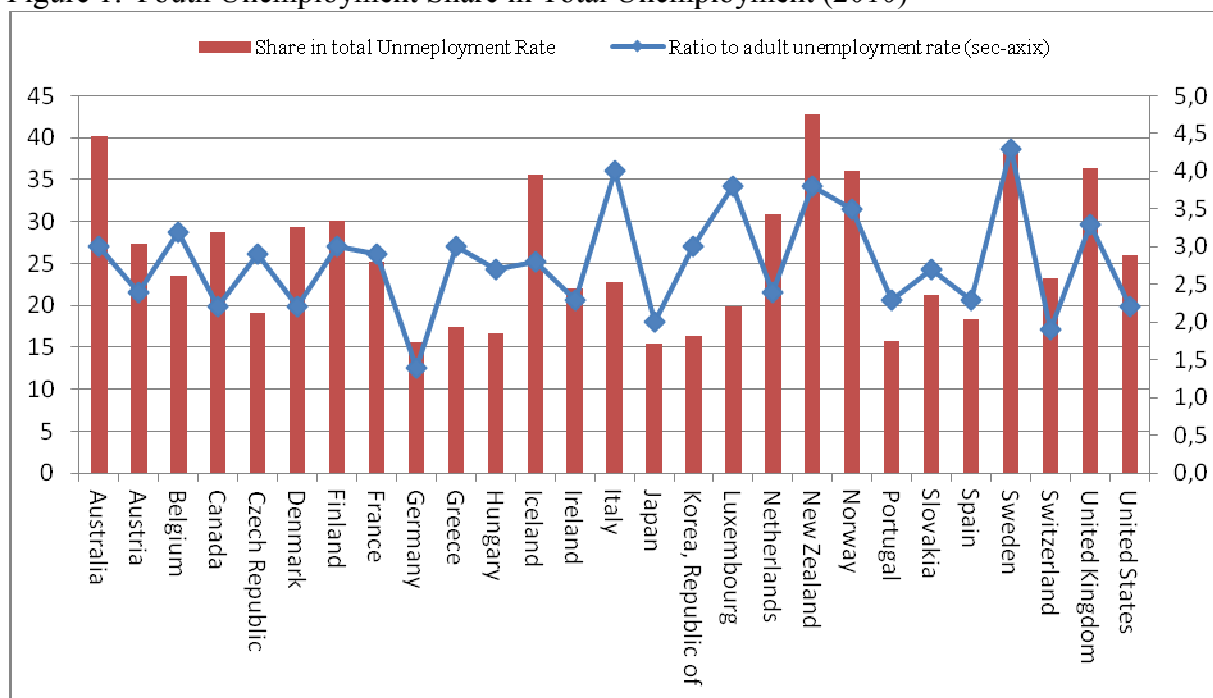
⁵ O'Higgins (2005) examines trends in the youth labour market in developing and transition countries, highlighting the considerable difficulties of integrating young people into "decent work". For transition countries, see also Perugini and Signorelli (2010a and 2010b).

⁶ Adult unemployment means unemployment among 25 to 64 years of age.

in most of countries, reaching top values (above or close to 4) in Italy, Sweden, New Zealand, Luxembourg.

Many studies have tried to assess why the youth unemployment rate is persistently higher than the adult (or total) unemployment rate.⁷ We shall discuss alternative interpretations in Section 3.

Figure 1: Youth Unemployment Share in Total Unemployment (2010)



Source: Elaborations on ILO (2012).

3. Key determinants of youth unemployment

Let us review, in the first place, the literature considering “unemployment” in general, before discussing the issues related to youth unemployment. A first group of causes include macroeconomic cyclical conditions. The key explanatory variable of unemployment (rate) changes is GDP growth: the link between the two variables is the well-known Okun’s law, that has been established in many empirical studies. However, the relationship is not stable over time and varies across countries, as confirmed by Lee (2000), who in any case concluded that the impact of growth on (un)employment is still valid. Also Solow (2000), arguing that a good deal of European unemployment is due to lack of demand, used an Okun equation. More recently, IMF (2010) examined the role of institutions and policies in explaining changes in Okun’s law across countries and over time.⁸ Finally, Bartolucci et al. (2011) estimate a model that is able to detect an additional impact of financial crises on unemployment, beyond their effect passing through GDP changes; such additional impact is ascribed to the increase in systemic uncertainty.

In addition to GDP, or the output gap (in alternative specifications individual countries’ GDP growth rates are normalized for their trend growth rates), some macroeconomic variables that turn out to be significant in explaining unemployment include productivity growth, trade openness, terms of trade dynamics, inflation rate and real (long-term) interest rates. While the impact of some

⁷ See, for example, Clark and Summers (1982), Kolev and Saget (2005).

⁸ From a methodological point of view, a dynamic version of Okun’s law is used, in which the change in unemployment depends on the lagged values of the change in output, of the change in unemployment itself and some control variables (including a dummy to indicate a state of recession).

of these variables on (un)employment is obvious, we observe that a negative effect of inflation on unemployment may be due to the fact that if the actual price level exceeds the expected price level, real wages are lower than expected, during the wage bargaining process, and consequently employment increases and unemployment decreases.⁹

Regarding cyclical conditions, there are already some – although still rare – specific investigations of the effects on unemployment of the last financial crisis and “Global Recession”: see e.g. ILO (2010), O’Higgins (2012), Marelli et al. (2012).¹⁰ In many papers, the impact of financial crises on youth unemployment rate has been found to be larger than the impact on overall unemployment rate.¹¹

A second group of variables that are found to be significant in determining unemployment and labour market performance comprises either demographic or structural conditions. The demographic variables relate to population density or the percentage of young (or old) people on total populations; or also to the role of migration flows (Pissarides and McMaster, 1990). The structural conditions that may be relevant, in addition to the sectoral mix of production¹², to the trade specialisation of countries and to the links between the financial structure and real economic activities, include primarily the degree of competitiveness, hence for instance some indices of “economic freedom”.

Then, there is a third group of variables – we may call them “institutional” variables – including labour taxes, unemployment benefits (as to amount, duration, replacement ratio), degree of unionisation (union density and union coverage), structure of collective bargaining (degree of coordination and/or centralization), employment protection legislation (EPL), incidence of temporary (or part-time) contracts, active labour market policies, liberalization of product markets, housing policies, and many others.¹³ While most of empirical investigations refer to developed or OECD countries, some of them analyse both advanced and emerging economies.¹⁴

Different empirical studies, by referring to diverse samples (countries, periods) and employing various econometric methods, exhibit different rankings – in some cases even different signs – as to the specific impact of the above variables. In some studies static models – in which institutional variables affect unemployment rates – are used; in other studies, dynamic models are preferred, where institutional variables determine the change in unemployment over time. The lagged level of unemployment is often added to investigate persistence effects.¹⁵ In addition, the outcomes may differ if we want to explain variation in unemployment rather than employment rates, since policies and institutions may affect also participation rates.

As to the key results concerning unemployment rates, OECD (2006, chapter 7) stresses the statistical significance – in explaining high unemployment rates and bad labour market performance – of tax wedges and (unemployment) benefit systems as well as stringent (anti-competitive) product market regulations. Hence, also product market reforms can reduce unemployment rates (Fiori et al., 2007). On the contrary, no significant impact is found for the strictness of EPL, consistently with previous studies (the only certain evidence is the lower volatility of employment growth in

⁹ See Nickell (1998), Nickell et al. (2005), Belot and van Ours (2001).

¹⁰ While the first two studies deal specifically with youth unemployment, the third one refers to the impact of the crisis on unemployment in general, but with an analysis at the regional (NUTS-2) level for the EU countries. In addition, Demidova and Signorelli (2012) investigate the determinants of youth unemployment in Russian regions for the period 2000-2009.

¹¹ With reference to previous financial crises, Choudhry et al. (2012) – considering about 70 countries in the world – found that the crises impact on youth unemployment rate is significant and robust; youth unemployment increases till five years after a financial crisis, with the largest effects in second and third year.

¹² For example, the share of construction workers turns out to be significant in the analysis of Destefanis and Mastromatteo (2010).

¹³ Brandt et al. (2005) use a synthetic index of the intensity of the “reform policies”; they found that OECD-inspired reforms improve labour market performance (with a five year lag) in terms of both employment and unemployment rates. See also the review by Bassanini and Duval (2006).

¹⁴ Including up to 97 countries in the world (Bernal-Verdugo et al., 2012), 85 countries (Botero et al., 2004), 73 countries (Feldmann, 2009) and 100 countries (Feldmann, 2010).

¹⁵ Furthermore, some econometric analyses control for possible endogeneity and reverse causality from unemployment to labor market institutions (e.g., Bernal-Verdugo et al., 2012).

high EPL countries); a similar outcome refers to the impact of union density, while the degree of coordination in collective bargaining seems more significant (OECD, 2006).¹⁶

It is important to highlight that not only labour market but also product market characteristics – including institutions and policies – are relevant in shaping labour market outcomes. In particular, “economic freedom” affects unemployment favourably both by improving the functioning of such markets (direct effect) and by stimulating economic growth (indirect effect). In some empirical studies, an “index of the economic freedom of the world” (EFW) has been used (Feldmann, 2010), but more particular “freedoms” have also been investigated: size of government, rule of law and security of property rights, liberalization of international trade, more flexible regulations.¹⁷

Moreover, such reforms are mutually reinforcing, thus justifying comprehensive reform programmes rather than separate labour market reforms¹⁸, and may interact with macroeconomic conditions and shocks.¹⁹ Changes in policies and institutions, together with changes in the output gap, are estimated to explain 74% of the cross-country variance of the observed unemployment changes for the period 1982-2003 (OECD, 2006).

Not only is the impact of macroeconomic shocks amplified by the existence of certain policies and institutions, but their persistence is increased because of long run effects on labour demand.²⁰ On the other hand, active labour market programmes can reduce the negative effects generated by high unemployment benefits; expenditure for training programmes is especially effective. The key role played by active labour market policies (ALMP), as well as by unemployment benefits, in the explanations of changes in both employment and unemployment rate, is confirmed by the empirical analysis of Destefanis and Mastromatteo (2010).²¹

Discussing now the specific determinants of youth unemployment, although many authors found that a “scarring” effect of unemployment on young people depends on the overall labour market conditions, it is significantly higher for disadvantaged youth. Hence, youth unemployment rates are more sensitive to the business cycle than adult unemployment rates. But what are the specific reasons for the worse youth labour market performance (compared to adults)?

On the labour supply side, a lower level and/or different quality of youth’s human capital and productivity may be one reason. Of course, human capital is a prominent element in determining the transition of young people from school to the labour market, the risk of unemployment they face, their performance at work, the quality and stability of their positions. Young people with low human capital and low skills are more exposed to long-term unemployment, unstable and low quality jobs, and perhaps social exclusion (OECD, 2005). In most countries, well educated youngsters exhibit higher employment (and labour force participation) rates and lower unemployment rates; in addition, they have been more able (in general) to reduce the negative impact of the crises.²²

The problem, however, is that young people, despite a (generally) higher education, often lack the other two components of human capital: generic and job-specific work experience. In fact, educated young people need to acquire firm-specific knowledge through working activities for “schooling” human capital to become productive (see Carmeci and Mauro, 2003). Thus, the existence of a “youth experience gap” harms the employability of young people. The characteristics

¹⁶ Also in other studies it has been found that a central (or coordinated) wage bargaining can improve labour market performance (see Belot and van Ours, 2004). Even the tax wedge exhibits a greater role, on labour costs and employment, when bargaining is carried out at the industry level, as is the case in continental Europe.

¹⁷ Feldmann (2010) considered 100 industrial and developing countries for the period 1980-2008.

¹⁸ This point is also stressed in Bassinini and Duval (2009), since improvements in labor market performance require reforms in more than one area of the labor market.

¹⁹ See Blanchard and Wolfers (2000).

²⁰ This can be estimated by using a dynamic model, in which previous unemployment rate is added among the regressors for explaining changes in current unemployment rates.

²¹ They consider 30 OECD countries over the period 1994-2004. According to their results, much of the overall explanatory power of labour market institutions derives from the performing-enhancing effects of ALMP.

²² Notice that crisis’ time may be a good opportunity to encourage young people to remain in, or return to, education: see Bell and Blanchflower (2010).

of the educational systems and the different processes of human capital formation have also been investigated; for example, countries operating a “dual apprenticeship system” improve youth labour performance.²³

The institutional framework of the labour market is more related to the demand side. In addition to the impact of high taxes, high unemployment benefits (and in some studies also high unionisation rates) – that are found to be relevant also in the case of youth unemployment – specific institutional variables that have been considered include, for example, minimum wages (whose impact is however found to be ambiguous) and the diffusion of temporary contracts (see Neumark and Wascher, 2004, and Booth et al., 2002, respectively).

Employment protection legislation, that has been found not being significant in explaining the behaviour of total unemployment rates, seems more significant for young workers (but more for the employment specifications rather than the unemployment ones): in fact, EPL and lay-off regulation affect more the distribution of unemployment – as well as its duration (by affecting worker turnover) – rather than its level (OECD, 2006); however, the magnitude of the effect is in general small also in the case of youth unemployment. In any case, empirical results range from non-significant relations (or even positive effects of EPL)²⁴ to large (negative) impact of EPL or similar indices. For example, Bernal-Verdugo et al. (2012) found that hiring and firing regulations and hiring costs have the strongest effect on unemployment outcomes, especially for youth unemployment; the effect is significant for both OECD and non-OECD groups of countries.²⁵ Also reforms strengthening “economic freedom” are found to impact more on youth unemployment than on general unemployment rates (Feldmann, 2010).²⁶

As to the matching between labour demand and supply, it mainly depends on a different set of institutional variables, such as the school-to-work transition (STWT) processes. In fact, such processes are quite heterogeneous, in different groups of countries, and change over time (see Caroleo and Pastore, 2007; Quintini and Manfredi, 2009; Ryan, 2001).

Notice that the above variables may interact making worse the youth unemployment problem. For example, cyclical conditions (recessions) may cause a greater impact on the young because of the higher diffusion of temporary contracts between the youngsters or of strict EPL protecting adult workers.²⁷ In fact, not only are the young (already in the labour market) generally among the first to lose their jobs, especially in countries with the highest EPL on “permanent contracts”, but labour hoarding practices can further reduce labour demand of young people, thus they have greater difficulties in finding another job.

Furthermore, the crises exacerbate structural problems affecting the transition from school to work: in fact, because of reduction of labour demand, school-leavers compete with more jobseekers for fewer vacancies (see Scarpetta et al., 2010). The risk of a “lost generation” highlights the need to adopt effective active and passive labour policies, as well as adequate STWT institutions, to minimise the increase in the number of young people losing effective contact with the labour market and permanently damaging their employment prospects.

²³ Brunello et al. (2007), Checchi (2006). Another possible cause of high youth unemployment and low quality employment has been found in the mismatch between the knowledge acquired through formal education and the skills required by the labour market. As for a case study of the characteristics and timing of university-to-work transitions, see Sciulli and Signorelli (2011).

²⁴ O’Higgins (2012), using data for the recent crisis period, finds a beneficial influence of the EPL index on youth labour performance; that is, in countries where EPL is strong, young people were less likely to become discouraged workers or unemployed.

²⁵ They consider a large panel of countries over the period 1985-2008, thus controlling for unobserved country-specific characteristics (that may affect labor market performance) and assessing how the effect of labor markets institutions has evolved over time. The main explanatory variable is the mentioned EFW index; in addition, they consider also the six sub-components of the composite labor market index.

²⁶ This author estimates that if Italy had enjoyed the same degree of economic freedom as the United States, its unemployment rate might have been reduced by 1.2-1.6% and its youth unemployment rate by 2.3-3.0% (further raised to a 3.5-3.9% reduction if the indirect effects via greater economic growth are taken into account).

²⁷ In the EU, just before the crisis (2008), 41.8% of young people were in temporary employment (compared to 14.4% for employees as a whole); the incidence has risen to 44.3% after the crisis. In many countries, for example in Italy, practically all new employment opportunities arising in this period have been temporary (O’Higgins, 2012).

Finally, O'Higgins (2011 and 2012) warns that the key problem is not only young people being more vulnerable to crisis's effects than adults, but also that these effects are likely to be more long-lasting for them. Long spells of unemployment erode the skills of young workers, reduce their employability, cause a permanent loss of human capital and make unemployment persistent. In other words, extended difficulties in the search for work early on are likely to have long-term negative consequences, concerning both employment prospects and wages.

4. An econometric investigation

In this section we present the econometric analysis of our basic research question, i.e. the determinants of youth unemployment rate (YUR), compared to total unemployment rate (TUR), and the specific role played by policies and reforms.

4.1. Variables, data and sample

In order to econometrically estimate the impact of various macroeconomic, structural and institutional variables on unemployment rate – especially on youth unemployment rate – we used the sample of high income OECD countries for the period of 1980-2009; the initial number of countries included in the regressions is equal to 26. One reason to limit our sample to high income OECD countries is availability of reliable data on various indicators, specifically for labor market reforms and policies. A list of countries included in our analysis is in Table A1 in appendix.

As regards unemployment, according to the International Labor Organization (ILO), from which the YUR and TUR data were extracted, the unemployed comprise all persons above a specified age who, during the reference period, were: (a) without work, (b) currently available for work, and (c) actively seeking work. So the unemployment rate is defined as the number of unemployed in an age group divided by the labour force for that group²⁸.

We have included various explanatory variables to capture their impact on YUR and TUR. These control variables belong to different categories, i.e. macroeconomic situation, demographic condition, governance and economic freedom, labour market condition, policies and reforms. The choice of control variables for econometric analysis was well motivated above (in section 3); in particular, we take guidance from previous literature (Booth et al., 2002; OECD, 2006; Destefanis and Mastromatteo, 2010; Feldmann, 2012). Our control variables include: lagged GDP growth rate, inflation, real interest rate, education level, youth population (share), labour market reform index, economic freedom index, active labour market policies expenditure and unemployment benefits.

Data for GDP growth, inflation rate, real interest rate and population of 0-14 years are taken from World Bank Development Indicators (WDI) historical database. Data on labour market reforms (LMR) index and economic freedom index are taken from Fraser institute. LMR index is our main variable for evaluating labour market reforms impact on youth unemployment rate; LMR is a un-weighted composite index based on six measures of labour market institutions (minimum wage, hiring and firing regulations, centralized collective bargaining, mandated cost of hiring, mandated cost of worker dismissal and conscription). Similarly, economic freedom is summary for Economic Freedom of the World, scaled to take values between 0 (least free) and 10 (most free); the index measures the degree of economic freedom in five different dimensions.

Detailed explanation of definitions, calculation and sources of all data used in empirical analysis is presented in the Appendix (Table A2). The summary statistics of dependent and independent variables used in empirical estimations are presented in Table A3.

²⁸ In the case of our YUR, the labour force of that age group (15-24 years) is used as the denominator. Similarly, when we are using total unemployment rate as our dependent variable, it is calculated as total unemployed labour force divided by total labour force (in the age group 15-64).

4.2. Model and econometric specification

The empirical investigation of the impact of potential determinants of unemployment rate on YUR is carried out for a sample of high income OECD countries for the period of 1980-2009. The empirical estimation is done with unbalanced panel data, to fully utilize the available information for our variables of interest.

The baseline model for estimation is:

$$YUR_{it} = LMR_{it}\beta + MEC_{it}\lambda + Z_{it}\mu + \varepsilon_{it} \quad (1)$$

where, YUR_{it} represents youth unemployment rate in country i at time t and it is our dependent variable. Alternatively, it is replaced by TUR_{it} when we use total unemployment rate as our dependent variables. LMR_{it} represents our measure of labor market reforms index: it's an un-weighted composite index and its value varies from 1-10. MEC_{it} represent macroeconomic conditions prevailing in country i at time t . Z_{it} is a vector of other control variables and ε_{it} is the error term. We have employed fixed effect panel estimation method to estimate our baseline model. Fixed effects model was selected on the basis of Hausman test. Hausman test statistic and corresponding p-value are reported in the results table.

4.3. Econometric results and discussion

We estimate equation (1) using a fixed effects panel model over the period 1980-2010, for a panel of high income OECD countries. Results of empirical estimation are presented below in Table 3 for YUR and in Table 4 for TUR. We will discuss the results in Table 3 and Table 4 side by side, to capture and highlight the difference between results concerning youth and total unemployment rate.

In Tables 3 and 4, column 1 reports the results from our base model. In the base model, we simply evaluate the impact of labor market reform index and lagged GDP growth rate on youth unemployment rate. We observe that the LMR index coefficient is negative and statistically significant. The result implies that labor market reforms improve the YUR. This finding is true for total unemployment rate as well in Table 4. Similarly, higher GDP growth rate has favourable effect in reducing unemployment. Comparison of YUR and TUR results show that the favourable impact of labor market reforms and economic growth is particularly large for young workers. Our estimates suggest that an increase in LMR index by 1 will result in a fall of 0.98 percentage points of youth unemployment and 0.83 percentage points of total unemployment rate, *ceteris paribus*. To sum up, according to our estimates an improvement in LMR index and economic growth is likely to reduce unemployment both among total labor force and among young workers.

We then incorporate additional explanatory variables, from model 1 to model 10, to evaluate the role of various macroeconomic, demographic, institutional indicators in determining the total unemployment rate as well as unemployment rate among young people. In model 1, we incorporate the inflation rate. The coefficient for inflation rate is negative and statistically significant, implying that it lowers YUR as well as TUR (see model 1 in Tables 3 and Table 4). Coefficient of LMR index remains negative and significant implying its robustness.

In model 2, we control for share of children in total population. We incorporate population aged 0-14 years share in total population as a demographic variable. Our assumption is that a large share of 0-14 years aged population will have implications for unemployment rate specifically for young workers. We find that its coefficient is positive for both TUR and YUR but is statistically significant only for youth unemployment rate.

In model 3, we introduce the real interest rate variable. High real interest rate may lead to lower investment and decline in labor demand. Our estimates suggest that high interest rate is likely to result in high unemployment rate; however the coefficient is statistically significant only for

TUR. Our findings are in consonance with literature (Blanchard and Wolfers, 2000, Nickell et al., 2005 and Feldmann, 2010)

Table 3: Determinants of Youth Unemployment Rate

	Base Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
LMR Index	-0.978**	-1.148***	-0.775***	-1.026**	-0.386	-0.793***					-0.066
	0.219	0.228	0.241	0.389	0.501	0.239					0.167
GDP Growth (-1)	-0.971***	-0.950***	-0.914***	-0.874***	-0.932***	-0.941***	-0.740***	-0.687***	-0.854***	-0.588***	-0.650***
	0.113	0.113	0.111	0.212	0.246	0.113	0.168	0.138	0.108	0.121	0.091
Inflation		-0.189**	-0.332***	-0.161	-0.342***	-0.223***	-0.392***	-0.072	-0.07	-0.531***	-0.102*
		0.074	0.08	0.125	0.128	0.075	0.12	0.135	0.063	0.181	0.054
Pop aged 0-14			0.644***								
			0.161								
Real Interest Rate				0.216							
				0.157							
Education					-1.224*						
					0.654						
Part-time employment						-0.366***					
						0.108					
EFI							-3.836***				
							1.156				
ALMPEMP								-0.231***			
								0.041			
Employment tax									0.201		
									0.123		
Unemployment Benefits										2.316***	
										0.871	
Unempl. Rate (-1)											0.798***
											0.036
Constant	23.391***	24.972***	11.467***	23.133***	33.919***	28.608***	46.366***	20.037***	14.988***	15.453***	5.772***
	1.47	1.581	3.704	2.891	6.262	1.94	8.735	0.685	1.925	1.033	1.571
Hausman Test Statistic	8.37	10.23	10.29	21.62	219	13.9	9.31	11.87	14.06	38.41	109.97
P-value	0.06	0.03	0.02	0.00	0.00	0.03	0.05	0.04	0.05	0.00	0.00
Observations	321	321	321	248	114	308	326	329	328	260	319
No of Countries	26	26	26	25	26	26	26	19	19	25	26
R-square	0.21	0.23	0.27	0.26	0.205	0.256	0.275	0.48	0.177	0.28	0.761
Significance of Model	35.97***	29.093***	26.965***	5.914***	5.425***	23.854***	17.027***	27.495***	21.903***	30.015***	178.238***

Note: Robust standard errors are reported under the coefficient value. * significant at 10 %, ** significant at 5 %, *** significant at 1 %.

Education indicator is used as explanatory variable to capture human capital impact (model 4). Its coefficient is negative both for youth and total unemployment rate but statistically significant

only for YUR. Estimates suggest that extra year of schooling will help to find jobs among young workers.

Part time work opportunities can also lead to decline in unemployment rate. To capture this phenomenon we included the part time employment as percentage of total employment as explanatory variable (model 5). As expected high part time employment coefficient is negative and statistically significant. Result implies that part time jobs can be helpful to deal with unemployment problem.

Economic Freedom Index (EFI) is included in model 6 as an explanatory variable to capture its impact for labor market performance. EFI coefficient is negative and statistically significant. See model 6 in Tables 3 and 4. Result implies that more economic freedom can lead to decline in youth and overall unemployment rate. EFI is a summary index of governance, legal structure and property rights, access to money, freedom to international trade and regulation of credit, labor and business. Improvement in these dimensions can be helpful to deal with unemployment problem. As labor market reforms are already included in EFI, we excluded LMR index variable from our regressor's list. Our estimates for EFI suggest that the economic freedom has substantial impact in reducing unemployment especially among young workers.

To capture the impact of labor market polices and reforms, we included expenditure on active labor market policy per unemployed individual, employment tax and unemployment benefits. Results are presented in models 7, 8 and 9 in Tables 3 and 4. Active labour market policy expenditure's coefficient is negative and statistically significant both for youth and overall unemployment rate. Estimates suggest that active labor market polices appears to reduce unemployment rate especially among young workers. Employment tax coefficient is positive which implies that heavy taxes on labour will lead to high unemployment rate. However, employment tax coefficient is statistically significant only for TUR (see model 8 in Table 4). Moreover, our empirical estimates also suggest that unemployment benefits have negative implication for the labour market performance. Unemployment benefit coefficient is positive and statistically significant for both TUR and YUR. This result implies that generous unemployment benefits tend to have large and significant impact on unemployment rate for young as well as adults workers²⁹.

Short term determinants of unemployment rate are estimated by including the lagged value of dependent variable as explanatory variable. Estimation results are presented in model 10 of Tables 3 and 4. LMR variable coefficient is still negative but statistically insignificant³⁰. Lagged dependent variable coefficient is highly significant reflecting the persistence effect of unemployment. The inclusion of lagged dependent variable may lead to potential problem of multicollinearity. To detect the possible quasi-dependence between several explanatory variables we calculated the variance inflation factor³¹ (VIF). Result suggests that multicollinearity is not a problem in our analysis.

In our discussion on empirical estimation results, we found that impact and magnitude of explanatory variables are different for youth and total unemployment rate (as already highlighted in previous discussion). To statistically test the equality of coefficients for youth and total unemployment rate we employ the Wald test³². The results indicate that the null hypothesis has to

²⁹ As for an analysis of the design of unemployment benefit (amount, duration and replacement ratio), see Corsini (2012).

³⁰ In other words, LMR effect is not visible in the short run. Perhaps it affects labour market performance with a time lag. Another reason may be the very strong persistence effect of lagged dependent variable (which is also visible from high R square).

³¹ In Table 3, VIF for lagged youth unemployment rate is 3.64, for inflation 2.29, for LMR 4.01 and lagged GDP growth is 3.13. Mean value for variance inflation factor is 3.27. In Table 4, VIF for lagged total unemployment rate is 3.63, for inflation 2.21, for LMR 3.99 and lagged GDP growth 3.22. Mean value for variance inflation factor is 3.26. The low values of VIF suggest that multicollinearity is not a problem in our estimations.

³² Let β_A and β_B denote two vectors of k parameters, one for group A and one for group B, with covariance matrices V_A and V_B , then the Wald statistic

$$(\hat{\beta}_A - \hat{\beta}_B)'(V_A + V_B)^{-1}(\hat{\beta}_A - \hat{\beta}_B),$$

has a chi-squared distribution with k degrees of freedom under the null hypothesis that the estimates of β_A and β_B have the same expected value. The test statistic is 1337.36 and the p -value is 0.00. So we can reject the null hypothesis of equality of coefficients.

be rejected. It follows from this finding that age-targeted policies to tackle the unemployment rate problem may be more successful than a uniform policy.

Table 4: Determinants of Total Unemployment Rate

	Base Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
LMR Index	-0.823 ***	-0.910 ***	-0.650 ***	-0.735 ***	-0.521 **	-0.649 ***					-0.092
	0.202	0.119	0.202	0.14	0.224	0.123					0.077
GDP Growth (-1)	-0.453 ***	-0.442 ***	-0.415 ***	-0.422 ***	-0.494 ***	-0.463 ***	-0.281 ***	-0.396 ***	-0.472 ***	-0.121	-0.340 ***
	0.086	0.059	0.075	0.068	0.124	0.058	0.086	0.081	0.056	0.097	0.047
Inflation		-0.098 **	-0.196 *	-0.078 *	-0.200 **	-0.104 ***	-0.206 **	-0.041	-0.072 **	-0.238	-0.027
		0.038	0.105	0.043	0.097	0.039	0.086	0.072	0.033	0.154	0.026
Pop aged 0-14			0.445								
			0.279								
Real Interest Rate				0.153 ***							
				0.043							
Education					-0.676						
					0.546						
Part-time employment						-0.307 ***					
						0.056					
EFI							-2.375 ***				
							0.714				
ALMPEMP								-0.146 ***			
								0.04			
Employment tax									0.310 ***		
									0.042		
Unemployment Benefits										2.311 ***	
										0.525	
Unemploy. Rate (-1)											0.827***
											0.02
Constant	13.061 ***	13.865 ***	4.529	12.162 ***	19.375 ***	17.071 ***	25.798 ***	11.190 ***	4.860 ***	5.517 ***	2.838 ***
	1.39	0.817	5.357	1.065	5.375	0.992	5.391	0.665	0.704	0.609	0.683
Hausman Test Statistic	5.05	270	121.35	14.76	8.07	14.47	15.9	12.9	12.26	19.19	134.33
P-value	0.08	0	0	0.03	0.06	0.03	0.03	0	0	0	0
Observations	344	334	334	256	119	320	339	348	355	272	332
No of Countries	27	27	27	26	27	27	27	20	20	26	27
R-square	0.22	0.242	0.308	0.273	0.209	0.307	0.239	0.461	0.302	0.329	0.84
Significance of Model	14.30 ***	32.384 ***	11.512 ***	21.219 ***	6.067 ***	32.012 ***	14.244 ***	14.571 ***	47.918 ***	35.225 ***	824.876 ***

Note: Robust standard errors are reported under the coefficient value.* significant at 10 %, ** Significant at 5 %, *** significant at 1 %.

Our key result is that LMR are able to reduce the unemployment rate and their coefficients are significant in most cases (in 5 out of 7 specifications in case of YUR and in 6 out of 7 specifications in case of TUR). The inclusion of various control variables does not change the sign and significance of this variable, thus reflecting the robustness of our findings. As sensitivity analysis we included more control variables³³ in the analysis, but our findings about LMR impact remain robust.

5. Conclusions

Unemployment, especially for young people, is a key problem in many developed countries³⁴. In general total and youth unemployment depend on macroeconomic, structural, educational and labour market policies, besides the role played by labour market institutions and regulation.

This study investigates the determinants of youth unemployment rates during the period 1980-2009 for a sample of high income OECD countries. The estimation technique used is a fixed effects panel model. The empirical study highlighted the differentiated impact of various determinants on total unemployment rate and youth unemployment rate.

We find that labour market reforms (LMR) impact on the unemployment rate is statistically significant and robust and it results more substantial for the youth unemployment rate. The inclusion of many control variables – including lagged GDP growth, inflation, real interest rate, education level, part time employment and young population share in total population – does not change the sign and significance of the key explanatory variable. Moreover, our results also show that GDP growth, economic freedom, education, part time employment and active labor market policies help to reduce unemployment, especially for young people, while the share of younger population in total population and the unemployment benefits increase youth and total unemployment rate. Finally, employment taxes increase only total unemployment rate.

To sum up, the key findings of our econometric estimates are that: (i) the effect of various determinants on youth unemployment is greater than the effect on overall unemployment and (ii) the difference between estimation results for youth and total unemployment rate are statistically significant. In conclusion, our findings suggest that policy makers³⁵, in order to reduce the overall (and youth) unemployment rate, should first of all stimulate economic growth; then, they should implement appropriate labour market reforms, together with the adoption of generous “active” policies for the labour market - well integrated with the necessary “passive” labour market policies - and the fostering of economic freedom in product markets. These measures are likely to be helpful especially for countries with a more dramatic condition for the young people.

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³³ Employment share in various sector, foreign direct investment, gross capital formation, openness and financial depth. The results are available upon request.

³⁴ The lower developed economies are more affected by the “working poverty” and “working vulnerability” than “unemployment”; in fact, this latter is much more difficult to define and calculate in those countries, where the distinction between “formal” labour market and employment in the “informal” economy is frequently unclear. For a comparison across world regions based on different labour market indicators, see Brada and Signorelli (2012).

³⁵ For a recent review of policies to reduce youth unemployment, including an appraisal of what has been done in European countries after the recent crisis, see O’Higgins (2011)

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APPENDIX

Table A1: List of Countries

Australia	Greece	New Zealand
Austria	Hungary	Norway
Belgium	Iceland	Portugal
Canada	Ireland	Slovakia
Czech Republic	Italy	Spain
Denmark	Japan	Sweden
Finland	Korea, Republic of	Switzerland
France	Luxembourg	United Kingdom
Germany	Netherlands	United States

Table A2: Data description and Sources

Variable	Definition	Source
<i>Dependent Variables</i>		
Youth Unemployment Rate	Youth (15-24 years) unemployed labor force/youth labor force	Key Indicators of Labor market (KILM) 7 th Edition
Total Unemployment Rate	Total unemployed labor force/Total labor force	Key Indicators of Labor market (KILM) 7 th Edition
<i>Key Explanatory Variable</i>		
Labor Market Reforms Index	Labor Market Regulations (LMR) index as an explanatory variable. LMR is a composite index based on six measures of labor market institutions (minimum wage, hiring and firing regulations, centralized collective bargaining, mandated cost of hiring, mandated cost of worker dismissal and conscription). The LMR index is an un-weighted average of these six measures and its value varies from 1-10	Fraser Institute http://www.freetheworld.com/2011/2011/Dataset.xls
<i>Control Variables</i>		
GDP Growth	Annual GDP growth	World Development Indicator
Inflation	Annual change in the consumer price index	World Development Indicators
Real Interest Rate	The lending interest rate adjusted for inflation as measured by GDP deflator	World Development Indicators
Population aged 0-14	Share of population in age group 0 to 14 years	World Development Indicators
Economic Freedom Index	Summary index from Economic Freedom of the World, scaled to take values between 0 (least free) and 10 (most free). The index measures the degree of economic freedom in the following areas: (1) Size of government: expenditures, taxes and enterprises, (2) Legal structure and security of property rights, (3) Access to sound money (4) Freedom to trade internationally, (5) Regulation of credit, labor, and business. The summary ratings of the index are the arithmetic means of the five area ratings.	Fraser Institute http://www.freetheworld.com/2011/2011/Dataset.xls

Part time Employment	Part time employment as percentage of total employment	World Development Indicators
Education	Average years of schooling	Barro and Lee
Employment Tax	The employment tax rate is $ESS/(IE-ESS)$ With ESS equal to employers' social security contributions and IE equal to total compensation for employees. ESS is available from the OECD National Accounts detailed tables and IE from OECD Revenue Statistics	The CEP – OECD Institutions Data Set (1960-2004) http://eprints.lse.ac.uk/19789/
ALMP/UNEMP	Expenditure on Active Labour Market Policies per unemployed individual normalised on GDP per member of the labour force	The CEP – OECD Institutions Data Set (1960-2004) http://eprints.lse.ac.uk/19789/
Unemployment Benefits	Out of work income maintenance and support-Full unemployment benefits	OECD-Stats http://stats.OECD.org/index.aspx?

Table A3: Summary Statistics of Variables

Variable	Mean	Std. Dev.	Min	Max
Youth Unemployment Rate	14.460	7.463	3.200	43.800
Total Unemployment Rate	6.652	3.428	1.613	22.676
Labor Market Reforms	6.076	1.642	2.620	9.280
Population aged 0-14 year	17.989	2.679	13.322	29.675
Real Interest Rate	4.487	3.301	-10.600	12.873
Inflation	3.231	3.206	-9.629	28.303
GDP growth	2.412	2.731	-7.580	10.579
Part-time Employment	15.273	7.440	1.600	36.700
Economic Freedom Index	7.403	0.583	5.240	8.640
Unemployment Benefits	0.781	0.527	0.080	2.810
Average year of schooling	9.874	1.730	5.533	13.190
Employment Tax Rate	14.836	8.448	0.000	30.000
ALMP/UNEMP	16.468	15.082	1.570	103.560