

**DETERMINANTS OF YOUTH UNEMPLOYMENT:
EMPIRICAL ANALYSIS OF OECD AND EU MEMBER COUNTRIES
IN 2000-2017***

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This article examines the high youth unemployment rate of developed countries after the financial crisis of 2008 and examines various factors that affect the youth labor market. Persistently high unemployment, particularly among the youth, is a concern in many countries. Against this background, this article conducts empirical tests on youth employment and unemployment in OECD countries and EU Member States for the period 2000-2017. This article shows that high rates of youth unemployment in many developed countries can be attributed to the structural and institutional factors of youth labor markets as well as the economic crisis. Countries with less duality in labor market and more work–study programs display relatively higher levels of youth employment and lower unemployment in unfavorable economic conditions. This finding suggests that a high youth unemployment rate does not have to be attributed exclusively to the economic crisis and that there is room for improvement by designing a more effective youth labor policy.

Keywords: Youth Employment, Unemployment, Business Cycle, Labor Market, Dual Education

JEL Classification: E24, F66

1. INTRODUCTION

Improving the youth employment rate is one of the challenges that many developed countries have been facing in the context of low growth and population aging. The global financial crisis of 2008 deeply hurt the economic fundamentals of many countries, and its aftermath continued to affect some countries that experienced structural adjustments. The

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most evident social cost is a high and persistent unemployment rate. According to a Eurobarometer survey in May 2015, citizens in 19 of 28 EU Member States responded that unemployment is the most serious problem that their countries are facing. In southern European countries such as Greece, Portugal, Spain, and Italy, more than half of the respondents indicated that unemployment is the most important concern.

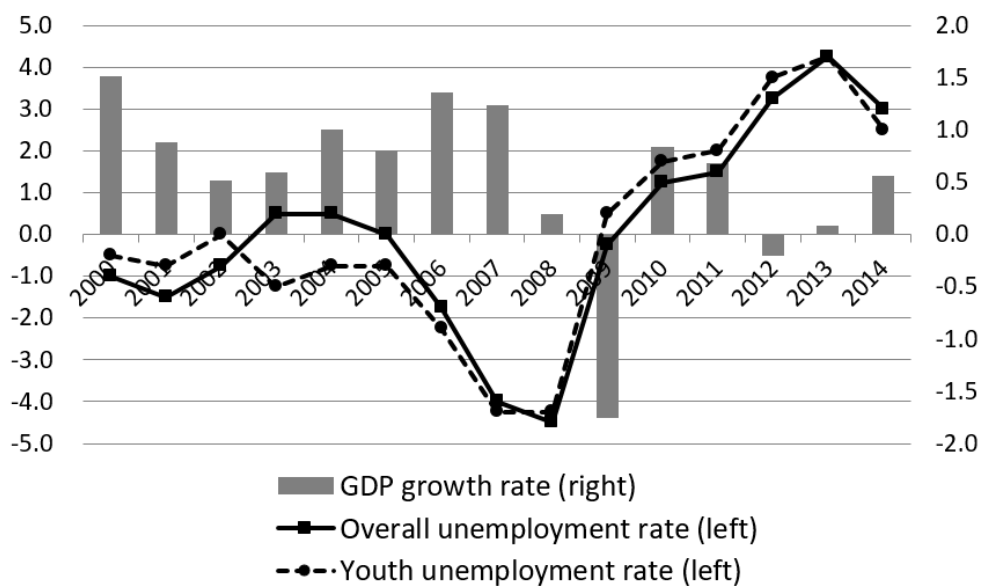
The rate of youth unemployment has remained higher than 30% in many European countries for a long period, and this has been one of the most important social issues. The young generation in fragile job conditions has been codified as ‘Generation 700 euros’ in Greece (Gouglas, 2013), ‘*Mileurista*’ in Spain (Gentile, 2014), and ‘*Generazione 1000 euros*’ in Italy. In general, young people are more vulnerable to unemployment because of a lack of qualifications and experience, dualistic labor markets with entry barriers, and various unfavorable employment practices. They face greater mismatches between demand and supply in the labor market than experienced elders. They also have more risk of job loss along with business cycles. The consensus is that youth unemployment has structural aspects to its nature but is more sensitive to cyclical conditions, particularly during the recession phase (Choudhry et al., 2012; O’Higgins, 2012; IMF, 2014; Giovanni et al., 2016); this is related to recruitment practices and the labor market structure in developed countries. Work experience is considered essential by employers when choosing new recruits. In many developed countries, employment is divided into permanent contracts, subject to higher protections and temporary contracts that are flexible and less protective. Young people are employed more with temporary contracts. If the transition from temporary to permanent contracts is not easy, it is highly likely that many young people oscillate between temporary jobs and unemployment status. In this sense, youth unemployment is highly associated with the problem of dual labor market.

Against this background, the objective of this article is twofold. First, it aims to identify various factors that may affect youth (un)employment in structural aspects. To obtain a more generalized view, it reviews different factors and their relationship with youth (un)employment through a comparative analysis of EU Member States and OECD countries. Second, this article examines the degree to which these factors contribute to improving youth employment by analyzing recent data from OECD countries during 2000-2017. The remainder of this article is organized as follows. The second section reviews the development of youth (un)employment and focuses on the EU Member States and their performance in this area since the global financial crisis. The third section examines factors that may affect youth (un)employment rates through cross-country comparisons. The fourth section includes an empirical analysis to determine the factors that affect the level of youth (un)employment in OECD countries. Based on the interpretation of the empirical analysis, the conclusion provides a future orientation of youth labor policy.

2. MAIN FEATURES OF YOUTH UNEMPLOYMENT

2.1. Business Cycle and Youth Unemployment

During the recession, youth unemployment tends to increase at a faster rate than the overall unemployment rate. Young people are often the first targets of lay-off, and their transition from school to the labor market becomes more difficult (UN, 2012). Unemployment is usually regarded as a lagging indicator of changes in the business cycle. The unemployment rate reached its lowest level just before the global financial crisis, started to soar in 2009, and continued to increase during the economic rebound in 2010-2011 in Europe. Figure 1 shows the growth rate of real GDP in the EU and the unemployment rates for youth and the total population (using standardized values).¹ The economic growth and unemployment rates move in the opposite direction. However, the youth unemployment rate shows a slightly different pattern of movement depending on business cycles. During the expansion period of 2004-2007, the rate declined more slowly than that of the total population and increased more quickly after 2009.



Note: The overall unemployment rate and the youth unemployment rate (less than 25-year-old) are the standardized values for the period 2000-2014.

Source: Eurostat.

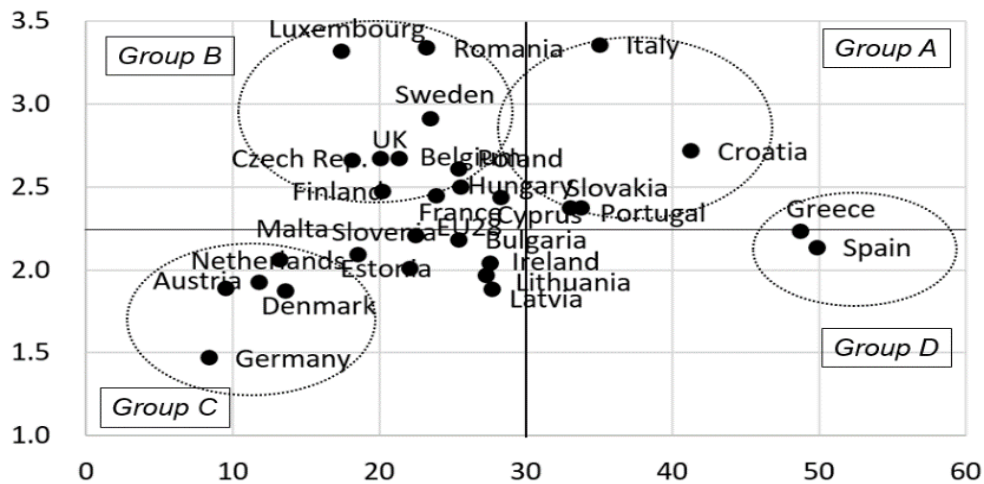
Figure 1. GDP Growth Rate and Overall Unemployment Rate of the EU

¹ We used standardized data values to show the change in unemployment and employment rates. For standardized values, the average is 0 and the variance is 1, which is useful for analyzing the data of different ranges. The normalized value Z is calculated as follows. $Z = (X - \mu) / \sigma$ (X : original data value, μ : mean value, σ : standard deviation)

This characteristic is attributed mainly to the nature of youth employment and institutional reasons. First, young people have lower human capital such as qualifications, skills, and job-specific experiences. Consequently, their productivity is lower, and they are more exposed to long-term unemployment. When overall economic activities are in a downturn, this factor becomes all the more important. In the specific case of Europe, Pastore (2015) explains that the youth experience gap is the key factor in understanding why youth unemployment is much higher. Second, the institutional aspects are relevant for explaining higher youth unemployment through the dual labor markets and temporary jobs (Booth et al., 2002; Bertola et al., 2007; Nunziata and Staffolani, 2007), regulations on employment protection and minimum wages relative to the median wage (Neumark and Wascher, 2004; Bernal-Verdugo et al., 2012), and the school-to-work-transition (Sciulli and Signorelli, 2011).

2.2. Cross-country Comparisons

In general, the youth unemployment rate moves with the unemployment rate for the rest of the population. The unemployment rate for youth is approximately twice as high as the overall unemployment rate, and they are closely related to each other. Young people are almost three times more likely to be unemployed than the rest of the population. This ratio between youth and overall unemployment rates varies across countries. Figure 2 divides EU Member States into four groups according to this ratio.



Note: Horizontal axis - youth unemployment rate (2010-14 average), Vertical axis – the ratio between youth and overall unemployment rates (2010-14 average)

Source: Eurostat.

Figure 2. Ratio of Youth Unemployment Rate to the Overall Unemployment Rate

First, Group A includes countries with a high youth unemployment rate and a high ratio of youth unemployment rate to overall unemployment rate. Italy and Croatia belong to this group. In the case of Group C, the youth unemployment rate is low and the difference from the overall unemployment rate is small. Countries in Group B have a lower youth unemployment rate than Group A, whereas the gap between this unemployment rate and the overall unemployment rate is large. This finding suggests that there are some structural reasons for this gap given that the overall unemployment rate is relatively low. Countries in Group D - largely southern European countries - have the opposite characteristics: their youth unemployment rates are high, but the gap between youth unemployment and overall unemployment is small.

3. STYLIZED FACTS: STRUCTURAL FACTORS

3.1. Youth Employment and Employment Protection Legislation

Temporary contracts are more prevalent among young workers. In the Euro Area, 50% of young employees held a temporary contract in 2007, whereas the corresponding ratio for all workers was 17% (ECB, 2014).

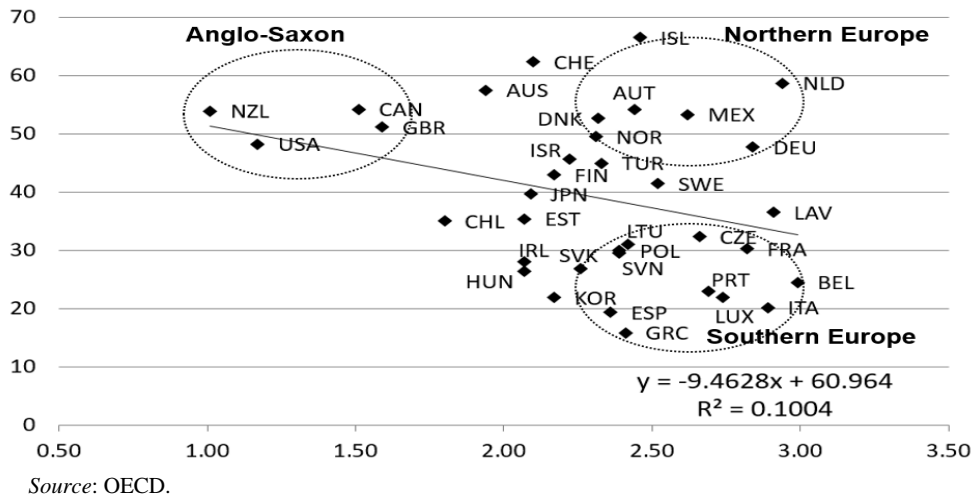


Figure 3. Protection of Permanent Workers against Individual and Collective Dismissals and Youth Employment Rate

There are various reasons for this difference. In some cases, the difference may reflect the stringent employment protection legislation (EPL) for permanent contracts, leading to

the emergence of a dual labor market split between workers with permanent contracts and others, especially the young with temporary contracts (Saint-Paul, 1998; OECD, 2002). Temporary employment is less protected from job losses than permanent employment; for this reason, young people are more susceptible to layoffs in a recession (Arpaia and Curci, 2010). European Commission (2010) indicates that the largest increase in total unemployment between 2008 and 2010 was found for the 25-34-year-old age group.

In this context, the level of protection for the regular workers (permanent contracts) may affect youth employment. The EPL published by the OECD is widely used to measure the strictness of labor markets. The EPL is generally low in English speaking countries (Anglo-Saxon) and high in continental Europe. Figure 3 shows a negative correlation between the level of EPL for regular employees and the youth employment rate for OECD member countries. A higher level of employment protection for regular workers is associated with a lower level of youth employment. Notably, two groups of countries are outliers from the trend lines. The first one is the northern European countries, such as the Netherlands, Germany, Austria, and Denmark. These countries have a much higher level of EPL than the Anglo-Saxon countries (the United States, Canada, the United Kingdom, and New Zealand), but their youth employment rate is high. The other group includes mostly southern European countries, such as Greece, Spain, Italy, and Portugal.

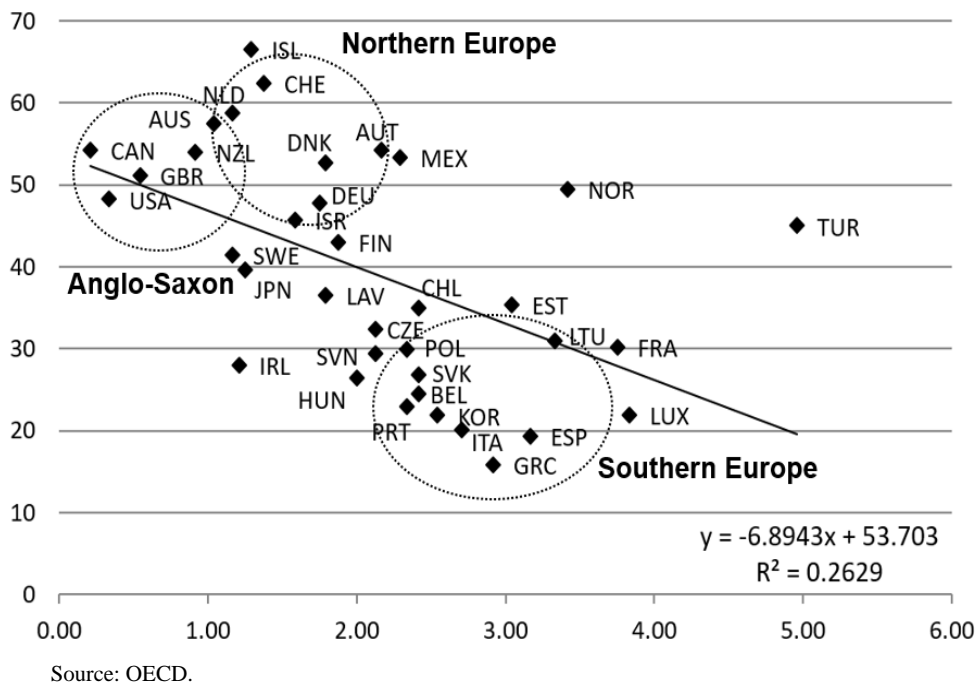
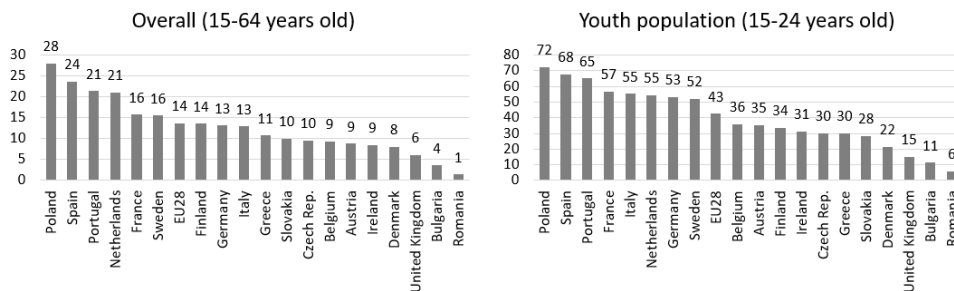


Figure 4. Regulation on Temporary Forms of Employment and Youth Employment Rate

Figure 4 shows that the correlation between the EPL for temporary workers and youth employment is negative. Its interpretation for youth employment is similar to the case of employment protection for regular workers. In general, the EPL for temporary workers is found to be low in Anglo-Saxon countries and high in continental Europe. However, it is worth noting that some countries, such as the Netherlands, Germany, and Denmark, have quite low employment protection for temporary workers, which results in a high share of temporary contracts particularly in youth employment as illustrated in Figure 5.

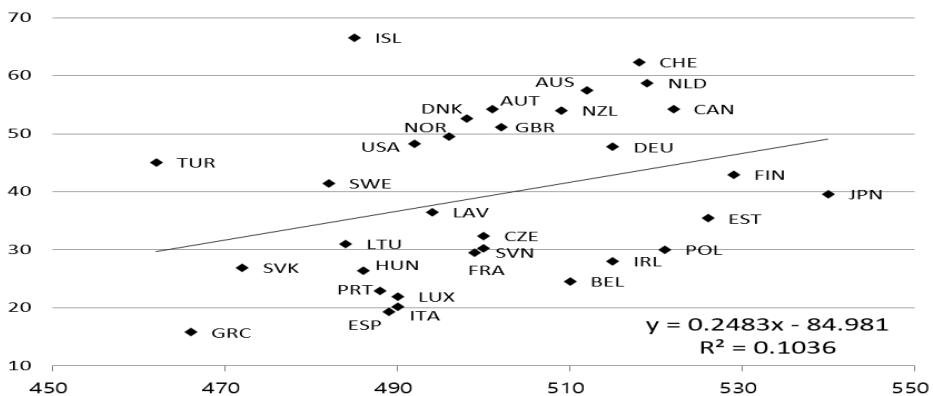


Note: Data of the 1st quarter, 2015.
Source: Eurostat.

Figure 5. Share of Temporary Workers

3.2. Education and Youth Employment Rate

Youth employment is directly associated with the employability of the youth.



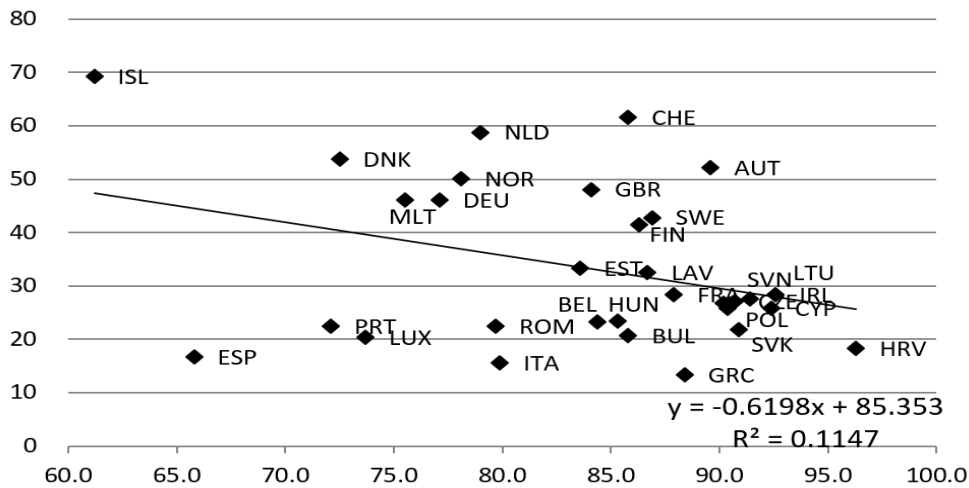
Note: 1) Horizontal axis - 2012 PISA score (reading, math, science) average, Vertical axis: 2014 youth employment rate. 2) Korea and Mexico are excluded because they are out of the baseline trend.
Source: OECD.

Figure 6. Correlation Between PISA Score and Youth Employment Rate

Young workers with a higher education and that are better qualified to meet a job’s requirements have a higher possibility for employment. From an empirical aspect, different variables can be used as indicators for education or qualification levels of the youth. The program for International Student Assessment (PISA) is widely considered the most valid instrument for measuring student achievement. PISA assesses the extent to which 15-year-old students, near the end of their compulsory education, have acquired the key knowledge and skills that are essential for full participation in modern societies (OECD, 2015).

As shown in Figure 6, a positive correlation exists between the PISA score and the youth employment rate. In general, northern European and Anglo-Saxon countries have higher PISA scores and higher youth employment rates, whereas both indicators are low for southern European countries.

The positive relationship between educational attainment and youth employment can be found in other data. Figure 7 illustrates how the youth employment rates are associated with general education levels for the EU member countries. The youth employment rate is positively correlated with the share of youth with a tertiary education. As was the case with the PISA score, educational attainment is higher in northern European countries than in southern European countries. However, a number of cases show that countries with similar educational attainment levels have different youth employment rates. For example, the share of completing tertiary education among youth in Spain and Portugal is as high as in northern European countries, but their youth employment rates are much lower.



Note: Percentage of the population aged 20-24 who is over upper secondary education.

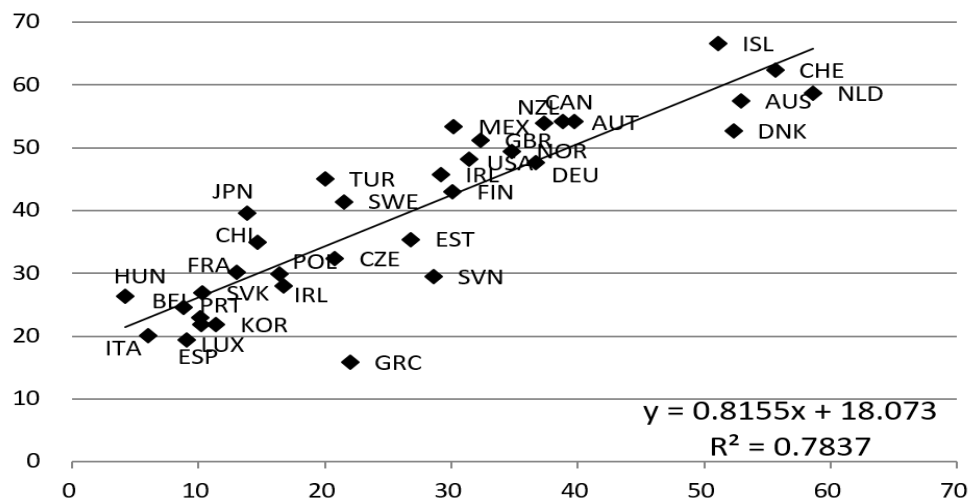
Source: Eurostat.

Figure 7. Correlation between the Percentage of Young People with more than upper Secondary Education and the Youth Employment Rate

3.3. Vocational Education and Youth Employment Rate

The transition from school to work can be a difficult period associated with spells of unemployment. This frictional unemployment often results from the mismatch in job markets between the demand of firms and the skills and experiences offered by young people, particularly those entering the labor market for the first time (Refrigeri and Aleandri, 2013; Dorsett and Lucchino, 2015). This mismatch becomes especially important when firms seek experienced workers and avoid bearing the costs related to training new workers.

In this context, dual education systems combining vocational education in school and apprenticeship in companies are discussed as a possible way to reduce youth unemployment at the entry level. Figure 8 explores the relationships between work-study programs and youth employment in OECD countries. The youth employment rate is positively correlated with the share of youth (16-29-year-olds) combining work and study. Students in the Netherlands, Austria, and Denmark go through a relatively long period of education based on a work-study program that accounts for more than half their total education. However, students in most countries in southern part of the EU are expected to have less than 10% of their total education period in a work-study program. Greece is an exceptional case in that its dual education system is better developed than that of other southern neighbors in Europe. However, its youth employment is the lowest among the OECD countries because it was in the middle of the worst recession.

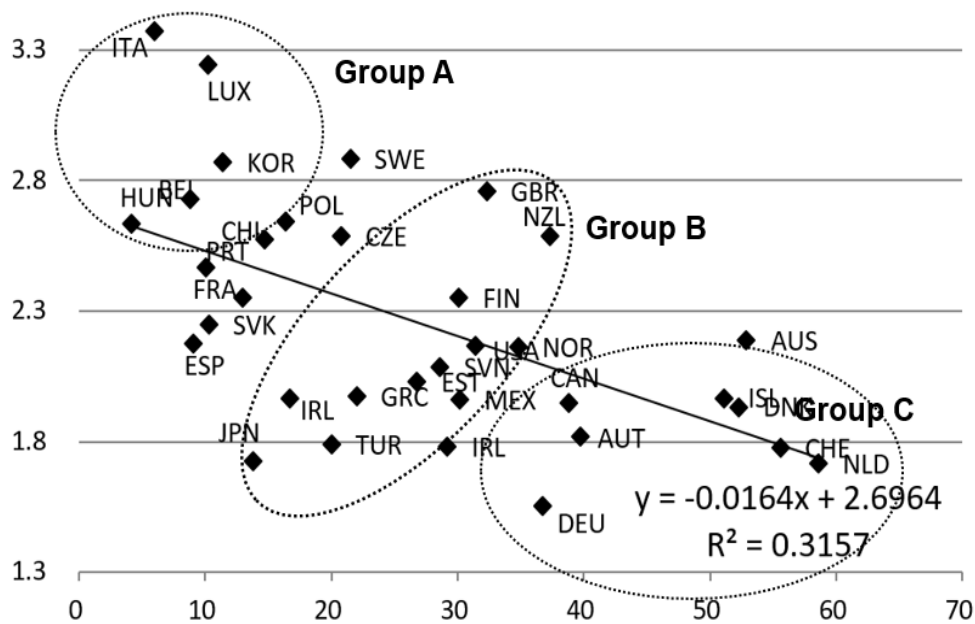


Note: Horizontal axis - the percentage of the work-study program during the total expected education period (15-29-year old) (2012, %), Vertical axis: 2014 youth employment rate

Source: OECD.

Figure 8. Correlation between the Work-Study Program and Youth Employment Rate

Figure 9 explores the relationship between the length of a dual education and the youth/overall unemployment rate ratio. As previously mentioned, youth unemployment is on average twice as high as unemployment in the total population, whereas this ratio differs significantly by country. If this ratio continues to be high for a long period, it is highly likely that youth unemployment is affected by structural factors such as dual labor markets. Figure 9 shows a largely negative correlation pattern between the two variables. In other words, the youth unemployment level is close to the overall unemployment level when the work-study program period accounts for a longer portion of the overall education. Countries with a relatively shorter dual education period tend to have a higher ratio of youth unemployment rate to overall unemployment rate. Countries in Figure 9 are divided into three groups (A, B, C) for illustration. Group A includes countries with a relatively short period of dual education in the overall education period and with a youth/overall unemployment rate ratio higher than 2.8. Italy and Korea belong to this group. In contrast, for countries in Group C, which are mostly northern European and German-speaking countries, their period of dual education is relatively long, and the ratio of youth/overall unemployment rates is low.



Note: Horizontal axis - the percentage of the work-study program during the total expected education period (15-29-year-old) (2012, %), Vertical axis: youth employment rate/overall unemployment rate in 2012
Source: OECD.

Figure 9. Correlation between the Work-Study Program and Youth Unemployment Rate/Overall Unemployment Rate

4. EMPIRICAL ANALYSIS

4.1. Literature Review

Empirical studies on youth unemployment examine how different factors determine youth unemployment and employment and are largely divided into the following groups depending on the research purpose: (1) population structure, (2) economic conditions (*i.e.*, business cycle), (3) labor market regulations, and (4) education including vocation training. Youth employment and unemployment rates are different in nature; however, a number of studies argue for the two indicators in interchangeable way. This is the result of the empirical trend that the youth employment rate is generally low when the youth unemployment rate is high. Empirical studies on each area are as follows.

First, for demographic structure, Korenman and Neumark (2000) examines how the demographic composition of the population affects the youth unemployment rate. According to this study, youth unemployment is higher in a number of countries with the increase in the ratio of young people to the elderly.

Second, studies on economic conditions focus on the impact of economic changes, especially cyclical components, over youth employment. These studies are based on the intuition that youth employment is more sensitive to changes in economic conditions, especially recessions. Condratov (2014) emphasizes that the business cycle has a greater effect on youth employment than it does on employment for other age groups. Giovanni *et al.* (2016) confirms this asymmetric impact of an economic downturn on the youth in OECD countries. They find that effects of financial crises on the youth unemployment are 1.5~1.7 times higher than same effects on the overall unemployment rate. From Bulgarian cases, Dimitrov (2012) finds additional factors, such as early school, abandoned school, and a low-quality education system, that push more of the youth into unemployment. In the same vein, Bayrak and Tatli (2018) finds that the economic growth and level of savings lower youth unemployment and increase in labor productivity increase youth employment. Focusing the EU member countries, Tomić (2018) confirms the effect of economic growth on youth unemployment and identify some non-economic factors that affect the job situation for the young.

Third, regarding labor market regulations, previous studies focus on various institutional factors that may affect youth employment (OECD, 2006). These factors include regulations regarding employment protection in different types of work contracts, minimum wages, and labor market policies. Bernal-Verdugo *et al.* (2012) argues that hiring and firing regulations and costs have the most significant effect on unemployment outcomes, particularly for youth employment. Regarding the minimum wage system, Neumark and Wascher (2004) shows that the minimum wage tends to reduce youth employment. However, Heckman *et al.* (1999) insists that the effects of the minimum wage on youth employment are ambiguous. Destefanis and Mastromatteo (2010) conducts an empirical analysis on 30 OECD countries for the period 1994-2004 and emphasize the key role played by active labor market policies (ALMP) for both employment and

unemployment. In addition, Eichhorst, Marx and Wehner (2017) identifies the labor market segmentation in European countries and argues the implications of this reality in macro-economic efficiency, workers' wellbeing and social cohesion. They appraise a new wave of labor market reforms in Europe and propose a reform framework to reduce duality in labor market.

Fourth, a number of studies examine a different set of institutional variables related to education, such as the school-to-work transition and vocational training. The transition is often characterized by continuously going between unemployment and employment, which in turn leads to high youth unemployment (Caroleo and Pastore, 2007; Refrigeri and Aleandri, 2013). Focusing on the Italian cases, Pastore (2017) argues that rigid and sequential education system is a reason why school-to-work transition is slower in Italy than other neighbor countries. The consensus is that a high level of education and vocational skills are directly associated with good performance in youth employment. However, the impacts of these policies vary in a complex manner depending on program- and country-specific circumstances (Caroleo and Pastore, 2007; Dorsett and Lucchino, 2014). Condratov (2014) argues that the number of high-quality jobs may not increase as much as the number of young people with a high level of education. This suggests that youth unemployment may arise from the mismatch between demand and supply in labor markets, whereas the overall education level of the young is high.

Gomez-Salvador and Leiner-Killinger (2008) conducts a panel analysis of the youth unemployment rate with the aforementioned groups of explanatory variables and propose conditions for a low youth unemployment rate. According to the study, youth unemployment is low in the following conditions: 1) lower youth proportion of the total population, 2) higher economic growth, 3) lower employment protection, 4) higher level of an ALMP, 5) high share of jobs in service sectors, and 6) lower labor participation of the youth. In the same context, Dietrich and Möller (2016) concludes that both structural factors and business cycle effects are important for explaining the sharp increase in the youth unemployment rate in Europe. They propose two-handed approach combining institutional improvements with growth stimulating measures to tackle with the youth unemployment problem.

4.2. Model Specification

This section intends to analyze 35 OECD countries between 2000 and 2017 to find explanatory variables that affect youth employment. We constructed equations that use the youth employment and youth unemployment rates as dependent variables.

$$\begin{aligned}
 \text{Dependent variables}_{it} = & c_1 + c_2 \text{growth}_{it} + c_3 \text{EPL}_{(r)it} + c_4 \text{EPL}_{(t)it} \\
 & + c_5 \text{temporary}_{it} + c_6 \text{PISA}_{it} + c_7 \text{youth}_{it} \\
 & + c_8 \text{manufacture}_{it} + c_9 \text{construction}_{it} + c_{10} \text{commerce}_{it} \\
 & + c_{11} \text{finance}_{it} + c_{12} \text{openness}_{it} + c_{13} \text{dual_education}_{it} \\
 & + c_{14} \text{education}_{it} + \mu_{it} .
 \end{aligned} \tag{1}$$

where $\mu_{it} = \mu_i + \epsilon_{it}$, i and t indicate country and year, respectively.

The explanatory variables include the factors used for the correlation analysis in the previous section as well as widely used variables as determinants of youth (un)employment. They are divided into the four following groups: 1) business cycle, 2) labor market regulations, 3) human resources, and 4) economic structure. First, for the business cycle, real GDP growth ($growth_{it}$) is used. A number of studies argue that youth (un)employment is very sensitive to a downturn in the business cycle than any other age groups. Second, for variables regarding labor market regulations, the equations include EPL for regular and temporary workers (respectively, $EPL_{L(r)it}$ and $EPL_{L(r)it}$). The share of temporary workers among the employed youth ($temporary_{it}$) is added as well, because the share of temporary workers among the young may affect the level of youth (un)employment. Our model includes variables for dual education (work-study program) and public spending on education because we assume that these variables represent practices in the labor market or policy efforts for youth employment. Third, for human resource-related variables, we used the PISA score ($PISA_{it}$) and the share of the youth in the total population ($youth_{it}$). Fourth, our model includes the variables related to economic structure. Youth employment would be concentrated into some particular sectors, which may affect the youth labor market. We used the shares in gross domestic value for different sectors: agriculture, industries, construction, commerce, and finance. Trade openness is added as an explanatory variable on the assumption that external openness can affect domestic employment. This is relevant, when the economies of main trade partners show a robust economic growth or experience a severe recession. μ_{it} , an error term, consists of μ_i , an error derived from lack of observable variable, and ϵ_{it} , a disturbance term derived from individual country effect. Table 2 summarizes the variables used in the empirical analysis, and the statistical description is reported in Table 3.

Table 1. Country Classification for Analysis

Country groups	OECD countries (35)	Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom
	EU Member States (23)	Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom

Our dataset covers 35 OECD countries, including 23 EU member countries, for the period 2000-2017. We conducted separate regression analysis for all OECD countries and 23 EU member countries. The reason for this grouping is twofold; on one hand, the European countries have transposed many EU laws into their national ones, so that they

have more similar policy environment each other than non-EU countries. In addition, they are more likely to be under similar business cycles due to the economic interdependence and geographic proximity. On the other hand, some data, such as EPL and dual education, are only available for OECD countries, and no time series data exist for some of the Central and Eastern European countries. The data related to dual education are available only from 2008 to 2013; for this reason, the analysis including the dual education variable was conducted for the 2008-2013 period. The OECD publishes the PISA results in three-year intervals, and the data do not fluctuate much. Therefore, we generated continuous time series data by extrapolation. The statistical description is included in Annex.

Table 2. Variables and Data

Item	Variables	Variable names	Source
Dependent variables	Youth employment rate	<i>youth_employ_{it}</i>	OECD
	Youth unemployment rate	<i>youth_unemploy_{it}</i>	OECD
Independent variables			
Business cycle	GDP growth rate	<i>growth_{it}</i>	Eurostat
Regulations in labor markets	Employment protection legislation (EPL) for regular workers	<i>EPL(r)_{it}</i>	OECD
	Employment protection legislation (EPL) for irregular workers	<i>EPL(t)_{it}</i>	OECD
	Share of temporary workers in youth population	<i>temporary_{it}</i>	OECD
Human resources	PISA score	<i>PISA_{it}</i>	OECD
	Work–study program period during total expected education period for 15-29 years old	<i>dual_education_{it}</i>	OECD
	Share of the youth in total population	<i>youth_{it}</i>	Oxford Economics
	Public spending in education (% of GDP)	<i>education_{it}</i>	OECD
Economic structure	Share of following industries in gross added value (manufacture, construction, commerce, and finance)	<i>agriculture_{it}, industries_{it}, construction, commerce_{it}, finance_{it}</i>	OECD
	Trade openness	<i>openness_{it}</i>	Global Insight

4.3. Results

We conducted the first set of analysis over 35 OECD countries for the 2000-2017 period. Given that both employment and unemployment rates might be affected by

country-specific factors, we used fixed effect models for all analysis after checking its relevance by conducting Hausman test. The models include different explanatory variables to follow the research objective and prevent multicollinearity problem between variables. The Model (1) includes the basic variables, and the Model (2) extends to the variables for the share of each sector. Lastly, the Model (3) focuses on the effect of the quality of human resources on youth employment and related policy efforts. Table 3 summarizes the analysis results. The economic growth rate ($growth_{it}$) is one of the most important explanatory variables for both youth employment and unemployment rates. The economic growth rate is positively correlated with the youth employment rate and negatively correlated with the youth unemployment rate for the most of cases. Only exceptions are when other industry sector variables are included. In particular, its effect is large for youth unemployment and its coefficient is more statistically significant. The employment protections for regular ($EPL_{(r)it}$) and temporary employees ($EPL_{(t)it}$) report rather incoherent coefficients that differ from the initial expectation. A lower protection level for temporary contracts is associated with a higher youth employment and lower rate, while the protection level for regular workers ($EPL_{(r)it}$) does not report statistically significant coefficients for the most of cases. However, the share of temporary jobs in youth employment is negatively associated with the youth employment rate and positively correlated with youth unemployment for all cases and its coefficients are statistically significant. This correlation suggests that countries with high share of temporary young workers are more vulnerable to youth unemployment crisis, when their economies are under downward pressure in business cycle.

Regarding the human resource-related variable, the PISA score ($PISA_{it}$) has very little explanatory power for both youth employment and unemployment. This result differs from the initial expectation. The proportion of the youth in the total population is positively correlated with the employment rate and negatively correlated with unemployment. This result contradicts that of some previous studies (Korenman and Neumark, 2000; Anyanwu 2013). However, the result of this analysis should be understood in the context that our analysis only covers advanced countries that have experienced aging of the population, and the relative population of the young is in decline. Among the variables related to the economic structures reported in Model (2), the share of construction in domestic gross value added ($construction_{it}$) reports the most important and coherent coefficients with statistical significance over the entire analyses set. For the robustness check, we used pooled OLS analysis, and different fixed-effect panel analysis including only one economic structure variable. The conclusion is almost same. This suggests that the construction sector employ many young workers, which contributes to increasing youth employment rate, while this sector is associated with youth unemployment at same time. Trade openness does not report coherent coefficients.

Model (3) focuses on public spending in education and dual education, including vocational training. Given the data availability, the analysis covers the 2008-2013 (six years) period over 31 OECD countries.

Table 3. Empirical Results: Determinants of Youth Employment (Panel OLS with Country Fixed Effect, 35 OECD Countries)

	(1) Youth employment rate (<i>youth_employ_{it}</i>)						(2) Youth unemployment rate (<i>youth_unemploy_{it}</i>)					
	Model (1) (2000-2017, 35 countries)		Model (2) (2000-2017, 35 countries)		Model (3) (2008-2013, 31 countries)		Model (1) (2000-2017, 35 countries)		Model (2) (2000-2017, 31 countries)		Model (3) (2008-2013, 31 countries)	
<i>c</i>	41.77***	(3.08)	11.00	(7.44)	15.36	(13.18)	2.85	(4.72)	54.65***	(10.87)	63.94***	(18.89)
<i>growth_{it}</i>	0.16***	(0.05)	0.00	(0.06)	0.13***	(0.05)	-	(0.08)	-0.16**	(0.08)	-0.37***	(0.07)
<i>EPL(r)_{it}</i>	-0.39	(0.59)	0.09	(0.58)	0.86	(1.09)	0.93	(0.90)	0.06	(0.85)	-6.39***	(1.57)
<i>EPL(t)_{it}</i>	0.10	(0.44)	-0.31	(0.42)	5.14***	(1.54)	-0.84	(0.67)	0.16	(0.61)	-9.88***	(2.20)
<i>temporary_{it}</i>	-0.52***	(0.04)	-0.27***	(0.05)	-	(0.06)	0.61***	(0.06)	0.26***	(0.07)	0.57***	(0.08)
<i>youth_{it}</i>	0.95***	(0.19)	0.37*	(0.20)	1.43***	(0.42)	-0.07	(0.28)	0.73**	(0.30)	-2.45***	(0.60)
<i>openness_{it}</i>			-0.04**	(0.02)					0.01	(0.02)		
<i>agriculture_{it}</i>			0.35	(0.32)					-0.54	(0.47)		
<i>industry_{it}</i>			0.56***	(0.12)					-0.81***	(0.17)		
<i>construction_{it}</i>			1.79***	(0.19)					-3.04***	(0.28)		
<i>commerce_{it}</i>			0.51**	(0.22)					-0.57*	(0.32)		
<i>finance_{it}</i>			-0.10	(0.22)					-0.71**	(0.32)		
<i>PISA_{it}</i>					0.00	(0.02)					0.02	0.03
<i>education_{it}</i>					-0.78*	(0.44)					0.55	0.64
<i>dual_education_{it}</i>					0.54***	(0.06)					-0.44***	0.09
Observations	429		419		167		429		419		167	
Adjusted R ²	0.96		0.97		0.99		0.78		0.84		0.93	
S.E. of regression	2.76		2.51		1.70		4.23		3.66		2.44	
Durbin-Watson	0.53		0.52		1.55		0.43		0.53		1.53	
Akaike info crit.	4.96		4.78		4.11		5.81		5.54		4.82	
Schwarz crit.	5.34		5.22		4.83		6.19		5.98		5.55	
F-statistic	300.06		308.82		334.45		39.53		48.67		59.78	
Prob(F-statistic)	0.00		0.00		0.00		0.00		0.00		0.00	

Note: ***, **, * each means 1%, 5%, 10% of statistical significance respectively. Numbers in parenthesis shows standard error.

Table 4. Empirical Results: Determinants of Youth Employment (Panel OLS with Country Fixed Effect, 23 EU member countries)

	(1) Youth employment rate (<i>youth_employ_{it}</i>)						(2) Youth unemployment rate (<i>youth_unemploy_{it}</i>)					
	Model (1) (2000-2017, 23 countries)		Model (2) (2000-2017, 23 countries)		Model (3) (2008-2013, 20 countries)		Model (1) (2000-2017, 23 countries)		Model (2) (2000-2017, 23 countries)		Model (3) (2008-2013, 20 countries)	
<i>c</i>	46.77***	(2.71)	37.50	(9.34)	47.17***	(12.94)	-8.24**	(4.14)	26.41**	(13.59)	36.16*	(21.32)
<i>growth_{it}</i>	0.15**	(0.07)	0.05	(0.07)	0.08	(0.05)	-	(0.10)	-	(0.11)	-	(0.08)
<i>EPL(r)_{it}</i>	-1.06***	(0.38)	-0.55	(0.37)	-0.68	(1.10)	2.16***	(0.58)	1.66***	(0.54)	-	(1.81)
<i>EPL(t)_{it}</i>	-0.05	(0.40)	-0.56	(0.39)	4.43***	(1.38)	-1.04*	(0.61)	-0.19	(0.57)	-	(2.27)
<i>temporary_{it}</i>	-0.68***	(0.04)	-	(0.06)	-0.87***	(0.08)	0.86***	(0.07)	0.44***	(0.08)	1.05***	(0.13)
<i>youth_{it}</i>	0.61***	(0.19)	0.06	(0.22)	0.68*	(0.40)	0.51*	(0.29)	1.13***	(0.33)	-1.59**	(0.66)
<i>openness_{it}</i>			-0.01	(0.02)					0.01	(0.03)		
<i>agriculture_{it}</i>		0.59	(0.56)					-0.19	(0.81)			
<i>industry_{it}</i>		0.17	(0.15)					-	(0.21)			
<i>construction_{it}</i>		1.79***	(0.24)					-	(0.35)			
<i>commerce_{it}</i>		-0.08	(0.28)					3.07***	(0.40)			
<i>finance_{it}</i>		-0.55*	(0.31)					-0.48	(0.45)			
<i>PISA_{it}</i>					-0.01	(0.02)					0.01	(0.04)
<i>education_{it}</i>					-0.74	(0.51)					0.54	(0.83)
<i>dual_education_{it}</i>					0.30***	(0.08)					-0.16	(0.14)
Observations	321		321		110		321		321		110	
Adjusted R ²	0.95		0.96		0.99		0.76		0.83		0.94	
S.E. of regression	3.11		2.77		1.49		4.74		4.03		2.45	
Durbin-Watson	0.50		0.52		1.73		0.43		0.59		1.44	
Akaike info crit.	5.19		4.98		3.84		6.03		5.73		4.84	
Schwarz crit.	5.52		5.38		4.53		6.36		6.13		5.53	
F-statistic	235.90		245.16		354.17		39.37		48.03		59.59	
Prob(F-statistic)	0.00		0.00		0.00		0.00		0.00		0.00	

Note: ***, **, * each means 1%, 5%, 10% of statistical significance respectively. Numbers in parenthesis shows standard error.

In this empirical analysis, it is notable that the variable representing dual education positively influences youth employment and its coefficient is statistically significant. The variable $dual_education_{it}$ is positively correlated with the youth employment rate and reports negative correlations with youth unemployment. We checked the robustness of this variable with different analysis sets, including pooled/fixed effect OLS. All coefficients of dual education are statistically significant, suggesting that dual education contributes to reducing the mismatch of labor supply and demand that is salient at the entry level in labor markets. The level of public spending on education ($education_{it}$) does not report statistically significant coefficients.

We conducted the second set of analysis focusing on European countries. The reason for this separate analysis is that they are all EU member countries that have already transposed all of the EU's *acquis communautaires* (including labor-related ones) to their domestic legal system. For some Central and Eastern European countries, important data on dual education and EPL are not available. Due to this reason the analysis covers maximum 23 countries. Table 4 summarizes the analysis results.

These results are similar to those of OECD countries in terms of the sign and statistical significance of coefficients. The high growth rate is clearly associated with higher youth employment and lower unemployment. A high share of temporary contracts among the youth is associated with low youth employment and high youth unemployment. PISA scores and the share of the youth in the total population have incoherent or statistically insignificant coefficients. Among the economic structure variables, the share of construction reports the most important coefficients over both analyses for youth employment and unemployment rates.

Similar to the previous analyses for OECD countries reported in Table 3, the share of the work-study program in education ($dual_education_{it}$), reports positive and statistically significant coefficients for youth employment.² This finding implies that the youth employment rate depends on factors related to ensuring the school-to-work transition for the young, as much as it did for other economic and institutional factors. In this sense, it is important to help the young acquire the knowledge and skills during their studies that meet the needs of the labor market.

5. CONCLUDING REMARKS

It has been a decade since the beginnings of the global financial crisis, and most macroeconomic indicators confirm that traces of the crisis have disappeared. However, persistently high unemployment, particularly for the youth, is still a concern of many countries. Countries facing high or rapidly rising youth unemployment become vulnerable to social unrest. As discussed in this article, high youth unemployment rates in many

² The relative period of the work-study program ($dual_education_{it}$) has a value between 0 and 100, while the ratio of youth unemployment to overall employment rate has a value between 1.3 and 3.5. Given the scale effect, the coefficient value of 0.30 is considered to be sufficiently large.

developed countries are attributed to the economic crisis and to the structural problems in youth labor markets. The objective of this article was to review the correlation between youth (un)employment and various factors and to find variables that may affect the labor market condition for youth.

In this article, we have shown how different factors affect youth employment and unemployment. Our tentative conclusions are as follows. First, youth unemployment moves in general with overall unemployment and is highly affected by changes in the business cycle. However, youth unemployment is more sensitive to business cycle oscillations, particularly in the downturn phase of the cycle. In contrast, the countries differ considerably in this upward change in youth unemployment. Some countries saw only a moderate increase, whereas others faced rapidly rising youth unemployment. This observation suggests that a high youth unemployment rate does not have to be attributed exclusively to the economic crisis and that there is room for improvement by designing a more effective youth labor policy.

Second, temporary jobs are highly related with youth employment and its implication should be properly considered. In many countries, young people are much more likely to be employed on a temporary basis than prime age workers. The labor markets are likely to be dualistic when this trend is associated with a low transition rate from temporary to permanent contract status and a high level of involuntary temporary employment. Some countries pursued employment flexibility in temporary job in order to increase employment and to reduce unemployment rates. However, several cases show that policy efforts of this directions were not successful for achieving expected results, but only resulted in more dualistic labor market conditions (Dolado et al., 2002; Polavieja, 2005; Gagliarducci, 2005; Calavrezo, 2007). Our finding confirms that countries with high temporary contacts have low employment and high unemployment rate for the young. Given these findings, it would be necessary to rationalize or lower the employment protection for permanent jobs – when it is excessive - in order to improve labor market conditions for the youth.

Finally, youth employment and unemployment strongly depend on the smooth transition from study to work in the dual education framework. It is often the case that youth face frictional unemployment at the first entry level into labor markets. The youth unemployment rate is lower in countries with a well-established dual education system. The development of a dual education system has been shown to be very effective in reducing this frictional unemployment at the entry level and to bring the worlds of education and work closer. This is particularly relevant during economic recession or low growth period. The risk of a “lost generation” highlights the need to have more effective youth labor policies. Developing more work-school programs specific to each country and to each sector can allow the formation of human capital that is more in line with the demands in the labor market and can minimize the number of youths losing effective contacts with the labor market. In addition, it is necessary to make efforts to reduce the mismatch between school education and actual vocational skills. These efforts should be more closely linked to an outlook for labor demand in industrial sectors. This kind of

policy efforts is more important for some countries entering a low-growth era. This paper covers mainly economic factors and does argue non-economic factors that affect youth labor markets. Given that a reform in youth labor market involve many social issues, such as education, youth life and migration, more multi-dimensional efforts will be necessary in specific contexts of each country.

APPENDIX

Table A1. Statistical Description of Data.

Variables	Maximum	Minimum	Median	Average	Standard deviation	Coefficient of variance
<i>youth_employ_{it}</i>	77.10	11.80	38.85	40.12	14.66	0.37
<i>youth_unemploy_{it}</i>	58.30	4.60	15.40	17.01	9.12	0.54
<i>growth_{it}</i>	25.56	-14.81	2.54	40.12	3.27	0.08
<i>EPL(r)_{it}</i>	40.12	11.80	2.22	40.12	0.79	0.37
<i>EPL(t)_{it}</i>	4.88	11.80	1.38	40.12	1.21	0.37
<i>temporary_{it}</i>	71.64	1.10	20.65	24.37	15.44	0.63
<i>PISA_{it}</i>	563.00	398.67	38.85	497.64	14.66	0.03
<i>youth_{it}</i>	19.9	9.4	13	13.4	2.11	0.16
<i>agriculture_{it}</i>	11.63	11.80	2.34	40.12	2.01	0.37
<i>industry_{it}</i>	39.48	11.80	21.57	40.12	5.87	0.37
<i>construction_{it}</i>	11.70	11.80	5.89	40.12	1.59	0.37
<i>commerce_{it}</i>	32.35	11.80	19.44	40.12	3.90	0.37
<i>finance_{it}</i>	40.12	1.90	38.85	5.92	14.66	2.48
<i>openness_{it}</i>	168.10	15.90	38.85	67.40	31.89	0.37
<i>dual_education_{it}</i>	65.50	3.70	38.85	26.62	14.66	0.55
<i>education_{it}</i>	8.56	11.80	5.08	40.12	1.13	0.37

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