Report

# How Active are Youth? The Interplay between Education, Youth Unemployment, and Inactivity

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# KOF

# How Active are Youth? The Interplay between Education, Youth Unemployment, and Inactivity

## Fourth Release of the KOF Youth Labour Market Index[†]

September 12, 2017

Filippo Pusterla[‡]

# Contents

## List of Figures

## List of Tables

# 1 Introduction

The Education Systems research division at the KOF Swiss Economic Institute developed the first version of the Youth Labour Market Index (YLMI) in 2014. The KOF YLMI is a multidimensional tool that allows comparisons of the youth situation on labour markets across countries and over time. The index is re-estimated and updated annually to include data from the last available year and, where possible, improve and enlarge data coverage. This fourth release expands the time series for the 178 considered countries until year 2015 and increases the data coverage altogether by about 8%.

Besides enlarging data availability, the update of the KOF YLMI also gives the Education Systems research division the opportunity to shed light on a particular aspect of the youth labour market. The third release focused on the impact the Great Recession had on the working conditions faced by youth on the labour market. With this new release, we address the relationship between activity on the labour market and participation in the education process.

This study contributes to the ongoing debate about the interplay between labour market conditions and participation in education. The basic idea is to exploit, at international level, changes occurred on the labour market after 2009 in order to verify the link between unemployment, inactivity and enrolment in education and training. This paper uses new insights to address the following central research question: Do young people decided to acquire more education in periods of economic downturn or do we observe an increase in inactivity? The analysis indicates an overall positive correlation between the scores of the Unemployment Rate and the Formal Education and Training Rate indicators. Nevertheless, when disaggregating by nation, we observe a generally negative correlation for most countries. This suggests that high scores in the Unemployment Rate indicator—meaning low levels of unemployment—are associated with low scores in Formal Education and Training Rate—meaning low participation in education and training—and vice versa. These findings are in line with the literature analysing Anglo-Saxon countries (see Section 3). However, this relationship is not observable in all countries. The analysis further considers the NEET rate (share of youth neither in employment nor in education or training) as a driver of education and training enrolment. In this regard, the report contributes to recent literature by stressing the importance of considering multiple indicators when addressing phenomena of youth unemployment and participation in education and training.

The rest of the paper is organised as follows. Section 2 presents the evolution of the index between year 2014 and 2015, focusing on the trends of the index components. Section 3 highlights the interplay between the unemployment rate, NEET rate and the participation in education and training. After presenting the correlation between these indicators at an international level, this section reports descriptive analyses of three groups of selected countries. These examples stress the heterogeneity across countries in the field of youth labour market and the importance of evaluating not just the evolution of the whole index but also the individual indicators. Section 4 provides a conclusion and briefly suggests areas of future work. Appendixes A and B reports information on data sources and lists time and geographical coverage of every indicator composing the KOF YLMI.

# 2   The Youth Labour Market Situation in 2015

This section highlights changes in the KOF YLMI between 2014 and 2015 in countries with sufficiently high data availability. The aim is to provide an overview of the main evolution occurring in the last year. Table 1 reports in the first column the KOF YLMI sorted by their aggregated index value. As already stressed in previous releases, one should not restrict the focus to a single index score, but also consider all components, namely dimensions and single indicators. Therefore, besides the index scores for 2015, this table also shows the scores for the four dimensions that compose the KOF YLMI. The 2014 scores are provided as a reference. In the KOF YLMI, all values are standardized in a scale ranging from 1 to 7 with higher scores suggest more desirable outcomes. All indicators are equally weighted in the definition of the dimensions' scores. The unweighted average of the four dimensions generates the index score. Please refer to Renold et al. (2014) for explanations about the indicators' selection, motivation for grouping indicators in four dimensions, and limitations in creating a composite index.

By inspecting the second group of columns, reporting the scores of the **Activity State** dimension, we note a general amelioration between 2014 and 2015. All countries show a positive—or at least constant—trend in this dimension, as also confirmed by the EU 28 average reported by the last row. The **Working Conditions** dimension presents a mostly stable evolution; only three countries shows a deterioration in the score larger than 5%, while only two countries ex-

Table 1: Evolution of the KOF YLMI between 2014 and 2015

| Country | KOF YLM Index | | | | Activity State | | | Working Conditions | | | Education | | | Transition Smoothness | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2014 | 2015 | Rank | Change | 2014 | 2015 | Direction* | 2014 | 2015 | Direction* | 2014 | 2015 | Direction* | 2014 | 2015 | Direction* |
| Denmark | 5.73 | 5.79 | 1 | = 0 | 5.89 | 6.01 | → | 5.43 | 5.42 | → | 5.67 | 5.70 | → | 5.94 | 6.05 | → |
| Switzerland | 5.72 | 5.71 | 2 | = 0 | 6.02 | 6.01 | → | 5.77 | 5.72 | → | 5.55 | 5.56 | → | 5.52 | 5.56 | → |
| Austria | 5.51 | 5.48 | 3 | = 0 | 5.94 | 5.92 | → | 5.73 | 5.65 | → | 4.58 | 4.66 | → | 5.79 | 5.69 | → |
| Germany | 5.47 | 5.47 | 4 | = 0 | 6.22 | 6.25 | → | 5.53 | 5.57 | → | 4.61 | 4.51 | → | 5.53 | 5.55 | → |
| Netherlands | 5.42 | 5.44 | 5 | = 0 | 5.85 | 5.99 | → | 5.18 | 5.15 | → | 5.02 | 4.95 | → | 5.63 | 5.68 | → |
| Lithuania | 5.15[†] | 5.40[††] | 6 | ▲ 3 | 5.43 | 5.62 | → | 5.74 | 5.91 | → | 4.00 | 4.35 | ↗ | 5.44 | 5.73 | ↗ |
| Estonia | 5.26 | 5.35 | 7 | ▲ 1 | 5.38 | 5.59 | → | 5.50 | 5.59 | → | 5.12 | 4.58 | ↓ | 5.04 | 5.66 | ↑ |
| Norway | 5.36 | 5.30 | 8 | ▼ 2 | 6.12 | 6.00 | → | 5.31 | 5.24 | → | 4.32 | 4.22 | → | 5.69 | 5.72 | → |
| Iceland | 5.30 | 5.20[†] | 9 | ▼ 2 | 6.02 | 6.12 | → | 4.71 | 4.34 | ↘ | 4.51 | 4.39 | → | 5.97 | 5.96 | → |
| Latvia | 5.14 | 5.19 | 10 | = 0 | 5.17 | 5.47 | ↗ | 5.68 | 5.62 | → | 4.35 | 4.32 | → | 5.37 | 5.33 | → |
| Slovenia | 5.04 | 5.16 | 11 | ▲ 2 | 5.22 | 5.46 | → | 4.14 | 4.07 | → | 6.07 | 6.23 | → | 4.72 | 4.88 | → |
| Luxembourg | 4.77 | 5.10 | 12 | ▲ 5 | 4.96 | 5.20 | → | 5.25 | 4.94 | ↘ | 3.90 | 4.49 | ↑ | 4.97 | 5.75 | ↑ |
| Finland | 5.09 | 5.02 | 13 | ▼ 2 | 5.16 | 5.02 | → | 4.51 | 4.48 | → | 4.77 | 4.78 | → | 5.91 | 5.78 | → |
| Czech Republic | 5.08 | 4.95 | 14 | ▼ 2 | 5.72 | 5.93 | → | 5.18 | 5.14 | → | 4.50 | 3.84 | ↓ | 4.93 | 4.87 | → |
| United Kingdom | 4.76 | 4.88 | 15 | ▲ 3 | 5.42 | 5.59 | → | 5.06 | 5.10 | → | 3.92 | 3.94 | → | 4.62 | 4.90 | ↗ |
| France | 4.86 | 4.88 | 16 | ▼ 2 | 5.05 | 5.00 | → | 4.90 | 4.89 | → | 4.56 | 4.66 | → | 4.91 | 4.96 | → |
| Poland | 4.85 | 4.85 | 17 | ▼ 2 | 4.99 | 5.22 | → | 4.45 | 4.50 | → | 5.25 | 4.91 | ↘ | 4.73 | 4.77 | → |
| Hungary | 4.84 | 4.85 | 18 | ▼ 2 | 5.07 | 5.37 | ↗ | 5.49 | 5.26 | → | 4.10 | 3.78 | ↘ | 4.69 | 4.99 | ↗ |
| Turkey | 4.75[†] | 4.79[†] | 19 | ▲ 1 | 4.59 | 4.61 | → | 4.66 | 4.72 | → | 4.03 | 4.08 | → | 5.72 | 5.74 | → |
| Belgium | 4.75 | 4.76 | 20 | ▼ 1 | 5.07 | 5.14 | → | 5.32 | 5.29 | → | 4.07 | 4.06 | → | 4.56 | 4.56 | → |
| Portugal | 4.53 | 4.68 | 21 | ▲ 3 | 4.18 | 4.41 | ↗ | 4.31 | 4.31 | → | 5.03 | 5.19 | → | 4.59 | 4.80 | ↗ |
| Ireland | 4.59 | 4.68 | 22 | ▲ 1 | 4.93 | 5.15 | → | 4.77 | 4.94 | → | 4.01 | 3.94 | → | 4.65 | 4.67 | → |
| Cyprus | 4.60 | 4.64 | 23 | ▼ 1 | 3.99 | 4.34 | ↗ | 4.67 | 4.30 | ↘ | 4.79 | 4.74 | → | 4.96 | 5.20 | → |
| Malta | 4.68 | 4.55 | 24 | ▼ 3 | 5.83 | 5.83 | → | 5.42 | 5.50 | → | 2.37 | 2.02 | ↓ | 5.10 | 4.86 | → |
| Sweden | 4.42 | 4.55 | 25 | ▲ 2 | 5.18 | 5.37 | → | 3.45 | 3.83 | ↑ | 3.47 | 3.36 | → | 5.57 | 5.65 | → |
| Bulgaria | 4.49 | 4.53 | 26 | ▼ 1 | 4.31 | 4.46 | → | 5.46 | 5.51 | → | 3.98 | 4.10 | → | 4.21 | 4.04 | → |
| Slovakia | 4.42 | 4.39 | 27 | ▲ 1 | 4.74 | 4.82 | → | 4.67 | 4.63 | → | 4.47 | 4.24 | ↘ | 3.79 | 3.89 | → |
| Romania | 4.46 | 4.36[†] | 28 | ▼ 2 | 4.57 | 4.65 | → | 3.65 | 3.67 | → | 5.50 | 4.87 | ↓ | 4.12 | 4.24 | → |
| Croatia | 4.11 | 4.23 | 29 | = 0 | 3.13 | 3.37 | ↗ | 4.72 | 4.76 | → | 4.66 | 4.73 | → | 3.94 | 4.05 | → |
| Greece | 3.96 | 4.13 | 30 | = 0 | 3.20 | 3.40 | ↗ | 3.64 | 3.62 | → | 5.23 | 5.56 | ↗ | 3.79 | 3.96 | → |
| Macedonia | 3.94[†] | 4.06[†] | 31 | = 0 | 2.83 | 3.12 | ↗ | 4.21 | 4.52 | ↗ | 5.22 | 5.09 | → | 3.49 | 3.53 | → |
| Spain | 3.81 | 3.93 | 32 | ▲ 1 | 3.05 | 3.42 | ↑ | 3.20 | 3.13 | → | 4.45 | 4.40 | → | 4.55 | 4.78 | ↗ |
| Italy | 3.81 | 3.91 | 33 | ▼ 1 | 2.87 | 3.02 | ↗ | 3.71 | 3.77 | → | 5.37 | 5.34 | → | 3.30 | 3.49 | ↗ |
| | | | | | | | | | | | | | | | | |
| EU 28 | 4.77 | 4.82 | | | 4.86 | 5.03 | → | 4.81 | 4.80 | → | 4.57 | 4.51 | → | 4.83 | 4.96 | → |

[†]  Only 11 indicators out of 12 available.
[††]  Only 10 indicators out of 12 available.
*  The directions describe the changes in the dimensions' score in 2015 relative to 2014. The key of lecture is the following: ↑ score changes > +10%; ↗ score changes by > +5% to +10%; → score remains stable between +5% and −5%; ↘ score changes by > −5% to −10%; ↓ score changes > −10%

hibit a marked increase. We observe the largest changes in the **Education** dimension. Although few countries exhibit a clear amelioration in the score of this dimension, many countries experienced decreases, sometimes even larger than 10% of the previous year's score. Nonetheless, a large share of countries showcase an almost stable evolution. The relatively constant score of the 28 EU group supports this view. Lastly, the **Transition Smoothness** dimension presents a generally favourable development. Many countries, independent of their position in the ranking, experience a positive trend. We also do not observe decreases larger than 5% among the remaining countries, which further shows a stable situation.

Focusing now on changes occurring at the **aggregate index**, we obverse that the **best performing** countries maintained their position in the ranking between 2014 and 2015. Denmark and Switzerland confirm the leading positions, driven in both cases by very good scores in all dimensions composing the KOF YLMI. Austria and Germany follow with more distance. The main differences between these two pairs of countries arise in the Education dimension, in which Austria and Germany report values about one point lower than Denmark and Switzerland. Room for improvements in the Education dimension also exist in the Netherlands, which ranks fifth. Furthermore, the Working Conditions in the Netherlands remain lower than in the four preceding countries. In general, all five countries show an almost stable evolution of the index and their four dimensions between 2014 and 2015. This was not the case for Lithuania and Estonia, which show a clear increase in their index score. We must interpret Lithuania's results with caution, since the number of indicators available in year 2014 and 2015 is not equal. Beyond this, we can read from the table that the amelioration was mainly driven by the dimensions Education and Transition Smoothness. In Estonia, these two dimensions evolved in the opposite direction: we observe clear improvements in the Education dimension, while in respect of Transition Smoothness, Estonia notably deteriorate. However, the aggregate index in this country increased from 5.26 to 5.35.

Looking at the **middle group** within the ranking, we observe many changes in the index score. Noteworthy ameliorations include the increase in Education and Transition Smoothness in Luxembourg, improvements in Transition Smoothness in the UK, a more favourable Activity State in Portugal, and better Working Conditions in Sweden. Significant deteriorations occurred in the Education dimension in the Czech Republic, Poland, Hungary, and Malta.

Finally, by looking at the **bottom positions** in the country ranking of Table 1, we observe encouraging improvements. The aggregated YLMI recently increased in Croatia, Greece, Macedonia, Spain, and Italy. We observe a clear amelioration in the Activity State dimension between 2014 and 2015 for all these countries. Furthermore, the score of the Education dimension developed positively in Greece, while we observe major improvements in the field of the Working Conditions in Macedonia. Lastly, Spain and Italy experienced amelioration in the Transition Smoothness dimension. These improvements are welcomed signs of a general recovery on the Southern European labour market. As the constant evolution of the Relative Unemployment Ratios suggests (with the exception of Greece), the recovery is not only limited to the youth.

# 3 How Active are Youth?

The previous section presents the changes that occurred in the index and its four dimensions between 2014 and 2015. The KOF YLMI also offers the possibility to examine individual indicators or dimensions in order to answer specific questions. In this fourth release, we put the focus on the link between Activity State and Education. In particular, the aim is to analyse the interplay between these two dimensions in determining how active the youth are. By focusing on the period 2009-2015, we use the chance to observe how young people react in situations of poor labour markets, as those observed in many European countries after the shock caused by the Great Recession.

The interplay between the local labour market and attitude toward education is a topic widely addressed by the economic literature. As already suggested by Becker (1967), acquiring education can be viewed as an economic decision. This means that youngsters consider various economic factors when choosing to enrol in post-compulsory education or to drop out of an ongoing program. Card & Lemieux (2001) argue that, beside tuition costs and expected economic return of additional education, local unemployment levels also influence school completion rates. By analysing the enrolment and educational attainment in the US over the period 1968-1996, they find that high unemployment rates lead to a rise in high school completion rates. Specifically, an increase in the male unemployment rate from 3.5% to 6.5% is predicted to raise the enrolment of seventeen-year-olds by 1 percent. The countercyclical enrolment response is further highlighted by recent literature analysing the reaction during periods of recession. For instance, Clark (2011) investigates the relationship between local youth labour market and post-compulsory education in the UK. Based on panel data covering the period 1975-2005, the author's estimations confirm a large positive effect of the unemployment rate on enrolment in post-compulsory education. According to Clark, the decrease in unemployment rate observed since 1995 helps to explain the slowdown in enrolment growth observed starting in the mid-1990s. Hillman & Orians (2013) similarly bring into focus college enrolment in the United States. Their findings suggest that the demand for community college enrolment is counter-cyclical to changes in the labour market: college enrolment rises during years of weak economic conditions. Investigations over the period 1990-2000 reveal that a 1% increase in local unemployment is associated with 1.1-3.3% increases in enrolment. Finally, Barr & Turner (2013) find a negative relationship between school enrolment and poor economic conditions for the period following the Great Recession. In particular, they suggest that much of the increase in enrolment in the United States between 2007 and 2010 occurred outside the most selective institutions.

The main limitation of these investigations is the exclusive focus on the unemployment rate as the indicator of a poor labour market situation. As already stressed by Renold et al. (2014), considering exclusively the unemployment rate as a predictor of youth labour market situations is restrictive. For instance, unemployment rate ignores people not actively looking for a job that would still want to work and accept a position if offered. These so-called discouraged workers give up looking for jobs mostly because of a lack in motivation or due to previous bad experiences on the labour market. Some youth are also involuntarily inactive in the labour market, while

others face opportunity costs too high to consider work or education. Examples include young people who passively profit from the social security system or who prefer to travel or take a gap year. These situations are especially diffused in high-income countries. Viewed in terms of human capital theory, being voluntarily inactive has negative consequences since youth are neither gaining work experience nor improving their employability through education.

The indicator in the KOF YLMI that depicts these two situations, is the rate of youth Neither in Employment nor in Education or Training (NEET Rate). By excluding youth in employment, education and training, we indirectly have a measure that encompasses unemployed, discouraged workers, and voluntarily inactive people. This indicator, complementary to the unemployment rate, allows us to better understand how effectively youth react to poor labour market situations by enrolling in further education.

The analyses subsequently presented in this section fill the gap of the existing literature by considering—beside Unemployment Rate—the interactions between NEET Rate and participation in education, and by enlarging the set of considered countries.

## 3.1 Descriptive Evidence at International Level

### 3.1.1 Unemployment Rate and the Formal Education and Training Rate

In order to check the existence of possible countercyclical effects of poor labour markets on education enrolment, we start by looking at the scores of the indicators Unemployment Rate and Formal Education and Training Rate. The scores, as defined in the KOF YLMI, are standardised values between 1 and 7, where higher values suggest more desirable outcomes. Therefore, a high level of unemployment receives a relatively small score in the Unemployment Rate indicator, while a score of close to 7 results from low unemployment. The indicator Formal Education and Training Rate is standardized in the opposing direction: high enrolment rates are associated with high indicator scores, while low participation in education and training with scores closer to 1. If the theoretical prediction of countercyclical effects of unemployment on education and training enrolment is true, we expect a negative correlation between these two indicators.

Figure 1 presents the correlation between the Unemployment Rate score and the Formal Education and Training Rate score for all countries listed in Table 1. The black trend line displays the overall correlation for the time period 2009-2015. The coloured lines show the correlation for each country separately, therefore displaying the within-country variation over time. At the aggregate level, the positive correlation between the Unemployment Rate scores and the Formal Education and Training Rate scores suggests that high levels of education enrolment—therefore high scores—are positively related with low youth unemployment—hence high indicator's scores. This would contradict the findings of the literature presented above. However, once the figure is disaggregated by nation, we observe a negative correlation for many countries. For example, the correlation is clearly negative for Slovakia, Romania, Belgium, Latvia, and Estonia. This means that years characterized by high youth unemployment—low scores—induce a relatively high enrolment in school and training—high scores—while, conversely, periods with low unemployment rate—high scores—are associated with low participation in education—low scores.

Figure 1: Scatter plot of the Unemployment Rate and the Formal Education and Training Rate
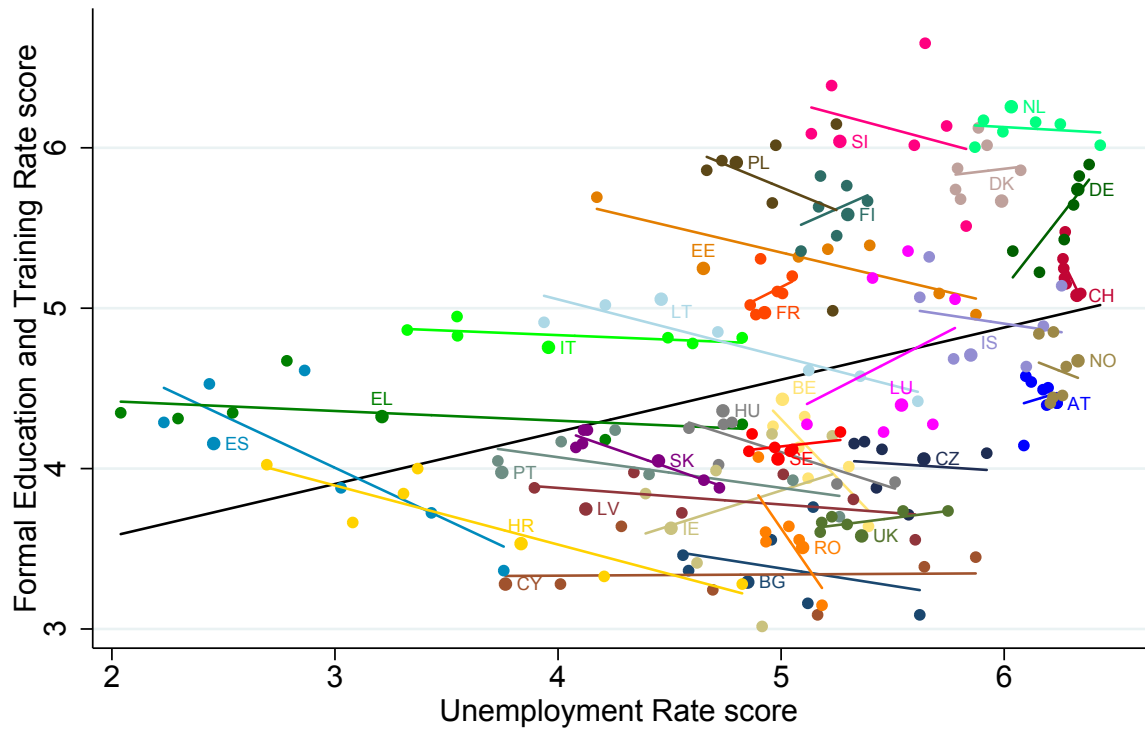


Notes: Plot reports the KOF YLMI scores of the indicators Unemployment Rate and Formal Education and Training Rate for all countries having full data availability over the period 2009-2015. Scores ranges in a scale from 1 to 7, where higher scores suggest more desirable outcomes. The black trend line displays the between-countries correlation, the coloured lines the within-country correlation over time.

Nonetheless, some countries effectively show a positive within-country relation, meaning that high scores in the indicator Unemployment Rate—hence low levels of unemployment—correlate with high participation in formal education and training, and vice versa. This is particularly true for the group of countries reporting high Unemployment Rate scores, namely Germany, Finland, France, Sweden, and the United Kingdom. Next, there is group of countries composed of Greece, Italy, and Cyprus in which the enrolment rates do not react to different levels of the unemployment rate. Finally, some countries such as Slovenia, Denmark, Norway, Austria, Luxembourg, and Ireland do not exhibit a clear pattern.

In summary, the varied patterns on a national level do not fully support the countercyclical hypothesis stated before. However, regression estimations considering country-fixed effect confirm an on average negative and statistically significant correlation between Unemployment Rate scores and Formal Education and Training Rate scores. The interplay between participation in education and training and youth unemployment rate is on average negative, but more heterogeneous than expected.

### 3.1.2   NEET Rate and the Formal Education and Training Rate

So far, the discussion was limited to the Unemployment Rate and the Formal Education and Training Rate. However, as previously mentioned, the KOF YLMI contains further indicators that allow for a multidimensional inspection of the youth labour market. An example is the

Figure 2: Scatter plot of the NEET Rate and the Formal Education and Training Rate
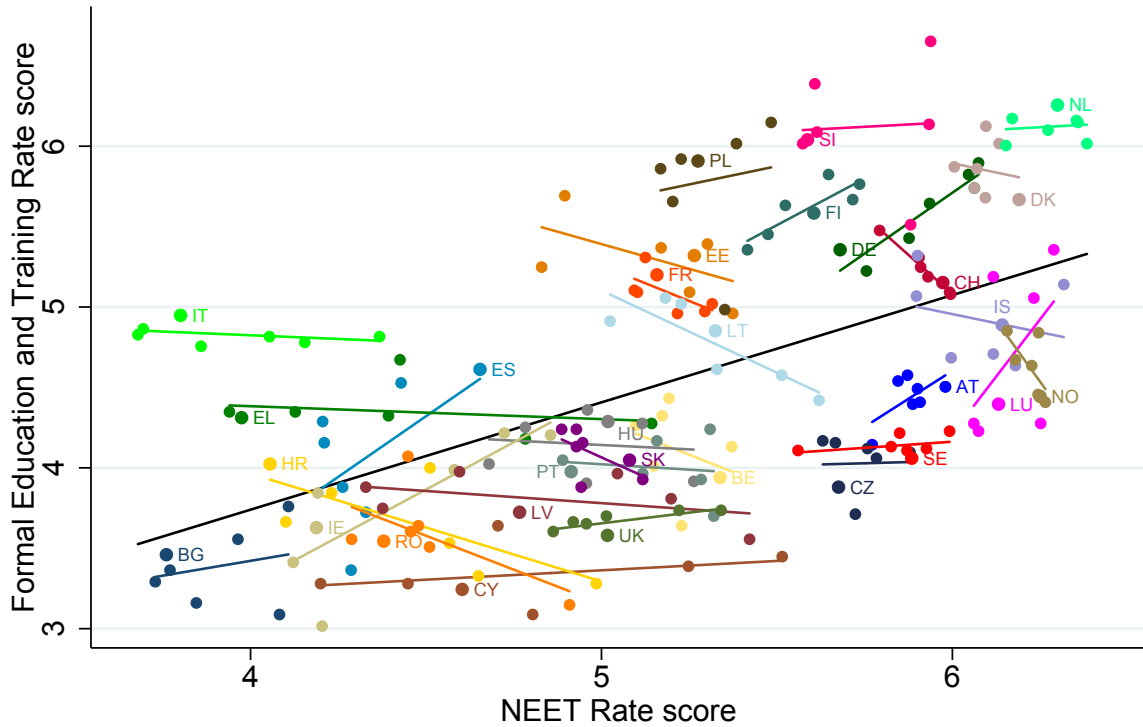


Notes: The graph reports the KOF YLMI scores of the indicators NEET Rate and Formal Education and Training Rate for all countries having full data availability over the period 2009-2015. Scores ranges in a scale from 1 to 7, where higher scores suggest more desirable outcomes. The black trend line displays the between-countries correlation, the coloured lines the within-country correlation over time.

NEET Rate, which quantifies the share of people neither involved in education nor in the labour market. This indicator accounts for unemployed, discouraged workers and voluntarily inactive people.

Unfortunately, literature on the interplay between the NEET Rate and education enrolment is scarce. Our hypothesis is similar to that for the Unemployment Rate, in that the correlation between the NEET scores and the Formal Education and Training Rate scores is negative. The reason being that the NEET Rate considers, beside unemployed, youngsters with relatively high opportunity costs, which give up looking for jobs or just prefer not to work. Large shares of inactive youth increase the incentive to enrol in education and training. Low scores in the NEET Rate, meaning high shares of unemployed, discouraged, or voluntarily inactive youth, are associated with high scores in the Formal Education and Training Rate—high participation in education—and vice versa.

Figure 2 confirms our insight to some extent. Even though the overall correlation is positive, the majority of the within-country variations suggest a negative correlation between NEET Rate score and Formal Education and Training score. The correlation is clearly negative in Belgium, Croatia, Denmark, Estonia, France, Latvia, Norway, Romania, Slovakia, and Switzerland. Denmark and Switzerland as well as Estonia will be analysed in more detail in Sections 3.2 and 3.3 respectively. On the contrary, some countries such as Austria, Finland, Germany, Ireland, Luxembourg, Poland, Sweden, and the United Kingdom present a positive correlation. In these

countries, years with relatively high NEET Rates (low scores) are associated with low enrolment rates in Formal Education and Training (low scores), and vice versa. Lastly, some countries do not show a clear trend, such as the Czech Republic, Greece, Hungary, Italy, Netherlands, and Portugal.

There is hence limited evidence of a countercyclical effect of the NEET Rate score on the Formal Education and Training Rate score. Regression estimations accounting for country fixed-effect confirms an average negative correlation between NEET Rate and Formal Education and Training Rate. However, the coefficient is small and, contrary to the case of Unemployment Rate, not statistically significant.

One possible reason for the weaker correlation between NEET Rate and enrolment in education is that changes to the latter indirectly affect the former. An increase in education and training enrolment mechanically causes a reduction of the NEET Rate, since this indicator quantifies the share of youth not in education, training or employment.

Taken together, the essence of the two figures just presented is difficult to decrypt because these figures offer two separate viewpoints of a complex problem. Considering only education enrolment and unemployment do not offer a comprehensive picture since we have no information about the people outside these two groups, namely discouraged and voluntarily inactive youth. An exhaustive analysis should consider all conditions simultaneously. By doing so, we should be able to understand if, for example, an increase in unemployment rate that does not induce an increase in education and training participation just enlarged the group of NEETs. Alternatively, we could observe an increase in education and training enrolment due to the movement of youth from the NEET group to education, despite no remarkable changes in the Unemployment Rate.

In order to gain larger insights into the interplay between youth Unemployment Rate, NEET Rate and Formal Education and Training Rate, the rest of this section graphically presents and discusses the evolution of these variables in three groups of selected countries.

## 3.2  YLMI Best-Performers at Comparison

We start our analysis on the interplay between unemployment, inactivity, and education and training enrolment with the countries that achieve the best results in the KOF YLMI. As Table 1 suggests, Denmark, Switzerland, Austria, and Germany achieved the highest index scores among countries with sufficiently high data availability in 2015. Nevertheless, before focusing on the three indicators listed above, it is worth understanding the general context of the youth labour market in these countries.

Figure 3 confirms that these four countries have reported very high index values for many years. The bar diagram (secondary y-axis) reveals that since 2007 each of these countries dispose data for all 12 indicators in the index. The line chart (primary y-axis) reports the KOF YLMI score achieved by the countries in every year. Since 2007, we can observe an almost constant trend in all four countries. Denmark and Switzerland perform slightly better than Austria and Germany, which still show a somewhat increasing trend. Note that we do not observe a worsening of the youth labour market after the start of the Great Recession in 2008 in these

Figure 3: KOF YLMI over time in Austria, Denmark, Germany, and Switzerland
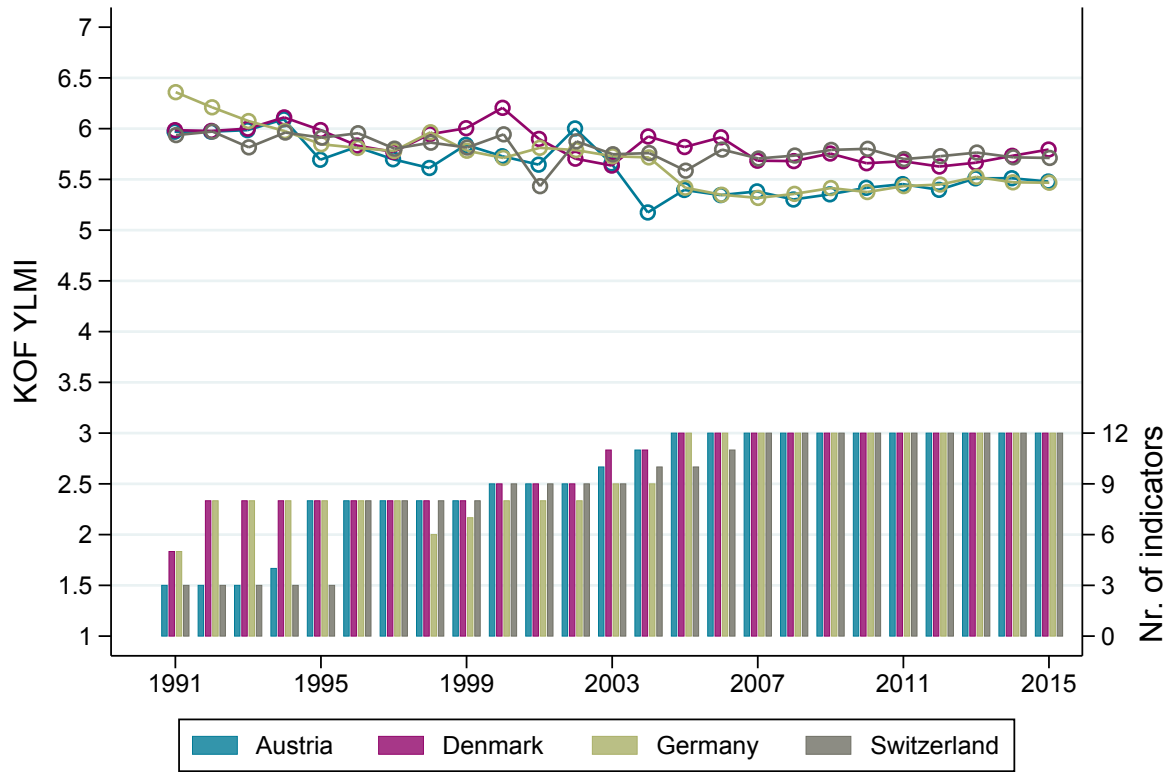


four countries. This will not be the case for other countries analysed later in the report.

Having a high aggregate index score does not necessarily mean that all indicators reach outstanding levels. The four countries analysed in this section exemplify this. In order to disentangle the different components, we display the results obtained in every indicator separately. Figure 4 reports the spider web for Austria, Denmark, Germany, and Switzerland in 2015. From this figure we can observe that these four countries have very close values in respect of the **Activity State** dimension—namely for the indicators Unemployment Rate, Relaxed Unemployment Rate, and NEET Rate. Differences between the countries are notable in the field **Working Conditions**. In this regard, Denmark scores very well in terms of temporary work and vulnerable employment, while it shows room of improvement in the field of the Involuntary Part-time Worker Rate and especially in the In Work at Risk of Poverty Rate. Austria, Germany, and Switzerland have very similar scores in the Working Conditions, but differ regarding the indicators of the **Education** dimension. Denmark and Switzerland show high values in both Skills Mismatch and Formal Education and Training Rate. Germany, while confirming a very high enrolment in education and training, reports weak conditions in the skills mismatch. The reason for the poor score in the Skills Mismatch Rate is an over-representation of youth with primary education in the group of unemployed relative to the same share within the group of employed. Lastly, Austria's performance in the Education dimension is ordinary when compared to Denmark and Switzerland. Concerning the **Transition Smoothness** dimension, all four countries report a very similar score in the Relative Unemployment Ratio, i.e. in the share of

9

Figure 4: Spider web for Austria, Denmark, Germany, and Switzerland in 2015
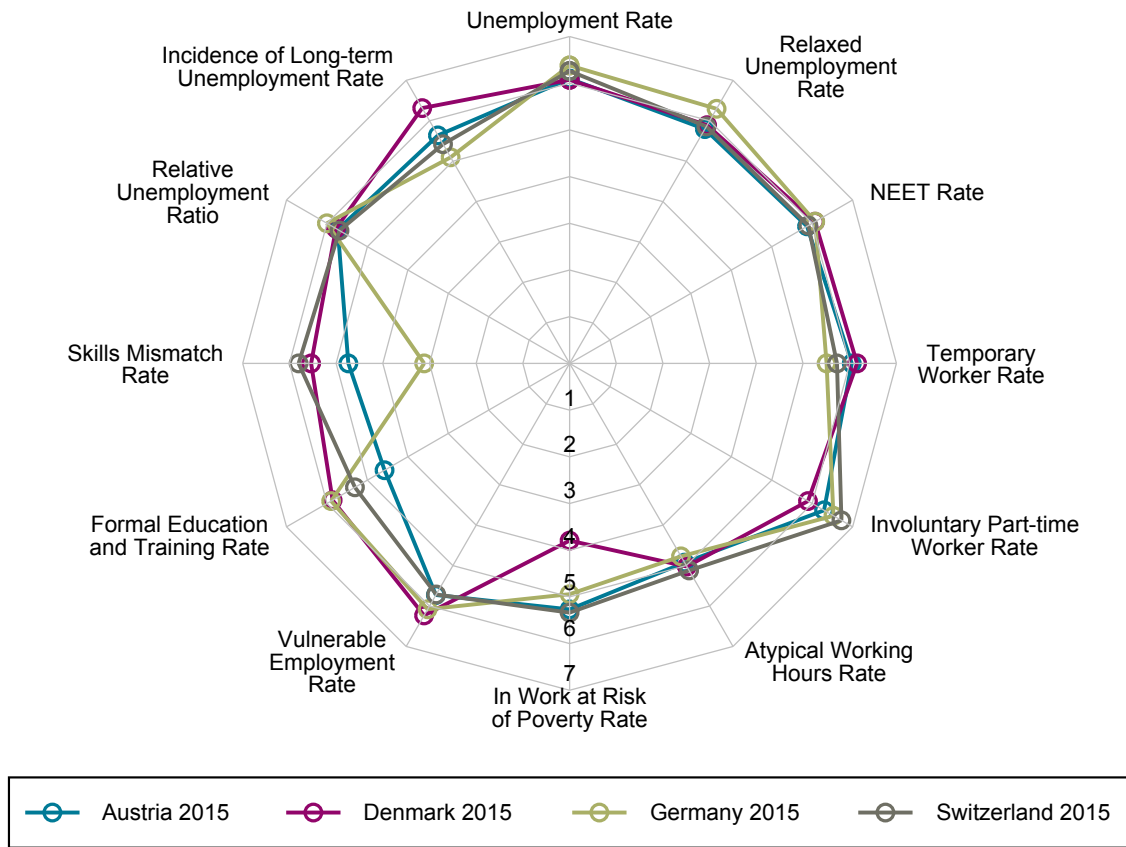


youth unemployed compared to the one of adult. Long-term unemployment is more prominent in Germany and Switzerland than in Denmark, where young people are mostly unaffected by unemployment spells lasting longer than one year.

After having described the evolution of the KOF YLMI in these four countries and analysed current strengths and weaknesses in relation to the 12 indicators, we now focus on the interplay between the Unemployment Rate, the NEET Rate, and the Formal Education and Training Rate. Figure 5 shows the evolution of the Unemployment Rate and the NEET Rate (x-axis) vis-à-vis the Formal Education and Training Rate (y-axis) for each of the four considered countries between 2009 and 2015.

Referring to **Austria**'s sub-graph, we can observe between 2009 and 2010 a large increase of the Formal Education and Training Rate score and ameliorations in Unemployment and NEET Rate scores. The increase in the participation in education and training could be related to a 2008 policy change in the field of apprenticeship subsidization, as mentioned in a recent publication of the KOF Swiss Economic Institute (2017). The improvements in unemployment and NEET rates are more difficult to contextualize. After 2011, Austria shows a fairly stable situation: the Formal Education and Training Rate remains almost constant while the indicators Unemployment Rate and NEET Rate slightly decrease. Country-specific reports should help to understand the reasons for this development.

Figure 5: Unemployment Rate, NEET Rate, and the Formal Education and Training Rate in Austria, Denmark, Germany and Switzerland over the period 2009-2015
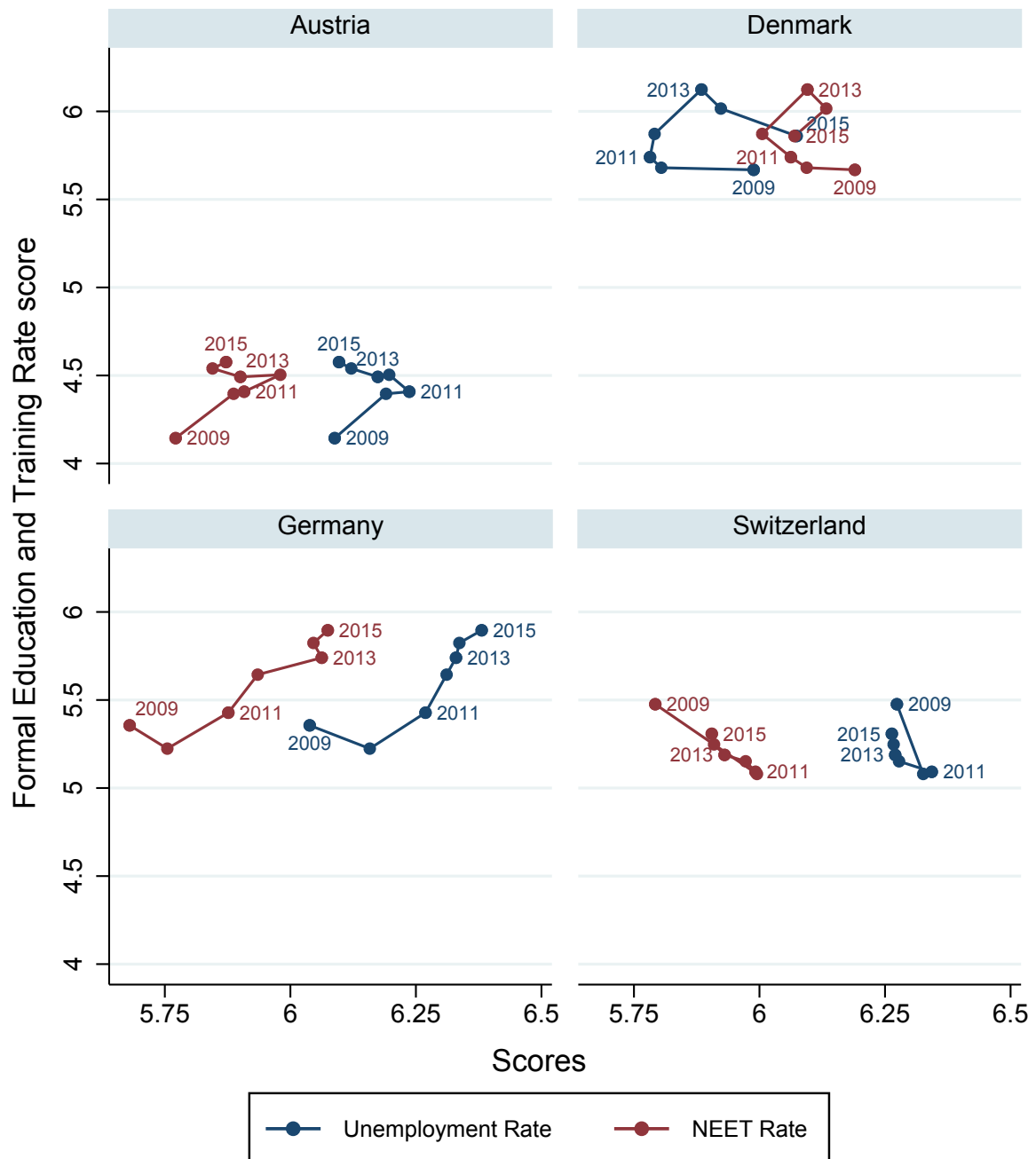


Notes: The graph reports the KOF YLMI scores, which are standardized values of effective rates, of the indicators Unemployment Rate, NEET Rate, and Formal Education and Training Rate. Indicators' values are rescaled into scores that takes values between 1 and 7, where higher scores suggest more desirable outcomes.

We observe higher participation in education and training in **Denmark** than in Austria. The already high enrolment rate further increased after 2010. Between 2009 and 2011, we observe a decrease of both Unemployment Rate and NEET Rate scores, which means an increase in unemployed and inactive youth. The increase in Formal Education and Training Rate that occurred between 2010 and 2013 can be an indirect effect of worse labour market conditions.

These findings do not suggest clear evidence for a countercyclical effect. Deeper analyses should reveal if the increase in education and training enrolment was effectively due to worse labour market outlooks. A last remark on Denmark addresses the level of Unemployment and NEET Rate: compared to the other three countries presented in Figure 5, Denmark's NEET Rate is less severe than youth Unemployment Rate.

According to the graph, **Germany** experienced an incredible evolution between 2010 and 2015. A clear amelioration in terms of both Unemployment Rate and NEET Rate was accompanied by a continuous increase in the participation in formal education and training. In respect to the predictions of the previously discussed literature, the German case contradicts the countercyclical effect of unemployment on education and training enrolment.

In contrast to Germany, **Switzerland**, presents a negative correlation between Formal Education and Training Rate and the two indicators describing the youth labour market situation. Between 2009 and 2010, Switzerland exhibits a reduction in the enrolment rate and simultaneous ameliorations in the scores of Unemployment Rate and NEET Rate. These shifts, which occurred just after the start of the Great Recession, are difficult to contextualize. A deeper analysis, which is beyond the scope of this report, should attempt to disentangle these particular patterns. The years following 2010 are characterized by a progressive decrease in Unemployment and NEET Rate scores, accompanied by a step-by-step increase in Formal Education and Training Rate. Therefore, some countercyclical effect between labour market conditions and education might exist in Switzerland.

In Summary, the evolutions in these four countries do not suggest a clear relationship participation in education and activity on the labour market. However, these countries were also not particularly affected by the crisis in terms of labour market conditions.

## 3.3   Do Leaders in PISA Test Perform Better?

The analysis of the previous section points out that the four best countries in the KOF YLMI rank have relatively different conditions and opposing developments, both in term of enrolment rates and labour market outcomes. Do countries leading in terms of learning outcomes present more uniform patterns in respect of enrolment rate, Unemployment Rate, and NEET Rate? Renold et al. (2015) hypothesize that good scholastic performance is a necessary condition for a smooth transition of youth from education to employment. The authors suggest that good results on scholastic tests are a necessary condition but not a sufficient one. A strong linkage between actors of the education and employment systems has a stronger positive effect on the youth labour market.

In order to deepen our understanding of this topic, we select leading countries according to the Program for International Scholar Assessment (PISA), a test conducted by the OECD every three years with the aim to evaluate pupils' scholastic performance[1]. Table 2 reports the scores of the PISA tests in 2009, 2012, and 2015 for all countries listed in Table 1, sorted by PISA 2015 scores. The scores reported here are the average of three subjects, that are tested in the PISA,

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[1]More details under `http://www.oecd.org/pisa/`.

namely mathematics, science, and reading.[2]

This table shows that Estonia and Finland clearly belong to the best performers on the PISA test. Among the four countries discussed in the previous section, Switzerland, Germany and Denmark perform well, while Austria only average. In respect to the PISA test, Slovenia, Ireland, Netherlands, and Norway perform well compared to the four leader in the KOF YLMI. These countries are therefore interesting subject for studying the interplay between education and youth activity state in countries leading in scholastic performance.

A further case worth of note is Poland: this country showed a sensible amelioration in term of PISA scores between 2009 and 2012. This remarkable improvement convinced the Center on International Education Benchmarking (CIEB) to include Poland among the group of the ten

Table 2: PISA test scores in 2009, 2012 and 2015 for selected countries

| Country | PISA 2015 (average of three subjects) | PISA 2012 (average of three subjects) | PISA 2009 (average of three subjects) |
|---|---|---|---|
| Estonia | 524 | 526 | 514 |
| Finland | 523 | 529 | 543 |
| Slovenia | 509 | 499 | 499 |
| Ireland | 509 | 516 | 497 |
| Germany | 508 | 515 | 510 |
| Netherlands | 508 | 519 | 519 |
| Switzerland | 506 | 518 | 517 |
| Norway | 504 | 496 | 500 |
| Denmark | 504 | 498 | 499 |
| Poland | 504 | 521 | 501 |
| Belgium | 503 | 509 | 509 |
| United Kingdom | 500 | 502 | 500 |
| Portugal | 497 | 488 | 490 |
| Sweden | 496 | 482 | 496 |
| France | 496 | 500 | 497 |
| Austria | 492 | 500 | 487 |
| Spain | 491 | 490 | 484 |
| Czech Republic | 491 | 500 | 490 |
| Latvia | 487 | 494 | 487 |
| Italy | 485 | 490 | 486 |
| Luxembourg | 483 | 490 | 482 |
| Iceland | 481 | 484 | 501 |
| Croatia | 475 | 482 | 474 |
| Lithuania | 475 | 484 | 479 |
| Hungary | 474 | 487 | 496 |
| Malta | 463 | - | - |
| Greece | 458 | 466 | 473 |
| Bulgaria | 440 | 440 | 432 |
| Cyprus | 438 | - | - |
| Romania | 437 | 440 | 427 |
| Turkey | 425 | 462 | 455 |
| Macedonia | 369 | - | - |

*Notes*: Scores are the arithmetic average of the three subjects tested in the PISA, namely mathematics, science, and reading. Malta, Cyprus, and Macedonia first took part in the assessment in 2015.

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[2]Note that some important methodological changes occurred between the test rounds 2012 and 2015. In particular, in 2015 there was a change in assessment mode from paper-based to computer. Average trends should therefore interpreted with caution.

best performing countries in the world[3], which encompasses Estonia and Finland among others. According to the CIEB, Poland's remarkable rise in achievements is likely attributable to two major rounds of reforms in the structure of the country's education system, the first in 1999 and a second round after 2009. On this point, it might be interesting to observe how participation in education and labour market evolved after 2009.

To investigate the interplay between education and training enrolment, unemployment, and NEET rates across leaders in PISA, we examine Estonia, Finland, Slovenia, and Poland. The analysis starts by observing at the evolution of the KOF YLMI at the aggregate level and the balance across the twelve indicators. Figure 6 reports the evolution of the KOF YLMI in Estonia, Finland, Poland, and Slovenia between 1991 and 2015. For our analysis, we only focus on 2005-2015, due to an incomplete set of indicators of the aforementioned countries until 2005. Estonia, Finland, and Slovenia show an almost equal value in the aggregate index in 2005. Poland scores about one point lower in this year than the other three countries. However, the subsequent years reveal an incredible amelioration of the youth labour market situation in Poland. Nonetheless, the peak reached in 2008 is followed by a steady decline, which continues until 2015. Estonia presents in some way an opposing evolution to Poland's. The score of 5.5 in 2006 decreases until 2010, and then shows a positive progression up to 2015. Finally, Finland and Slovenia exhibit more constant evolutions over the period 2005-2015.

Figure 6: KOF YLMI over time in Estonia, Finland, Poland, and Slovenia



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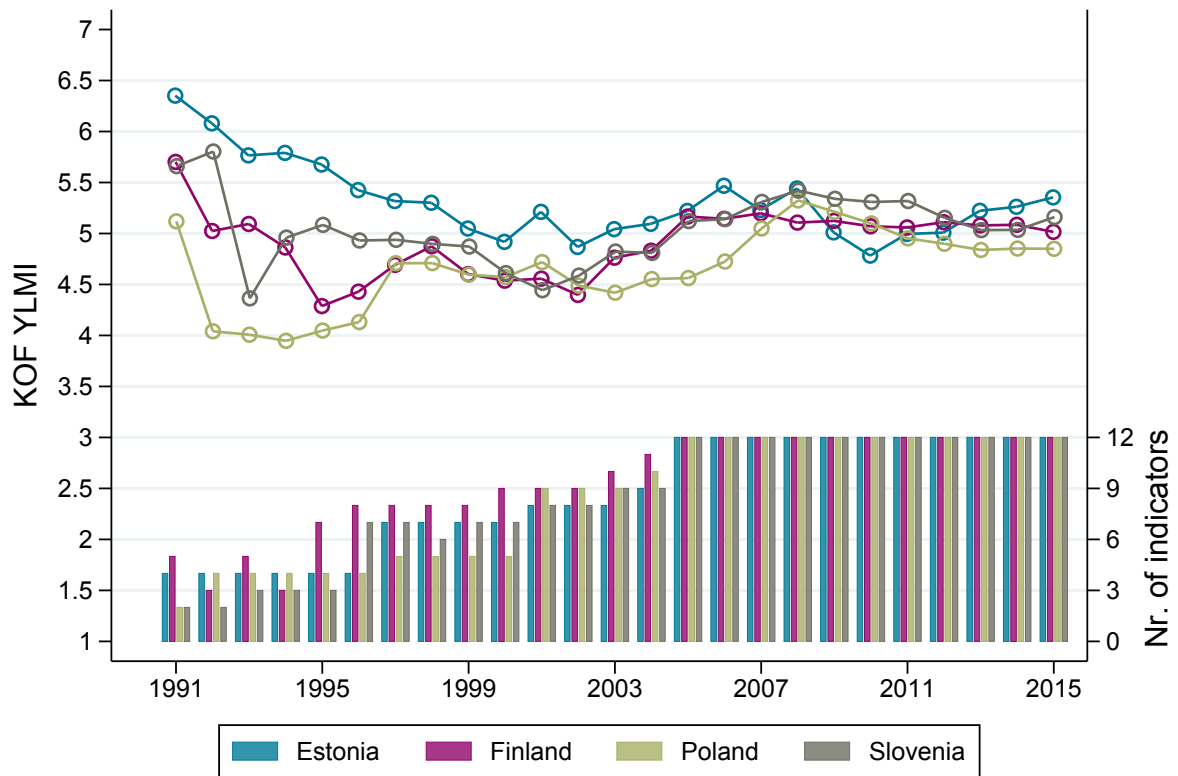
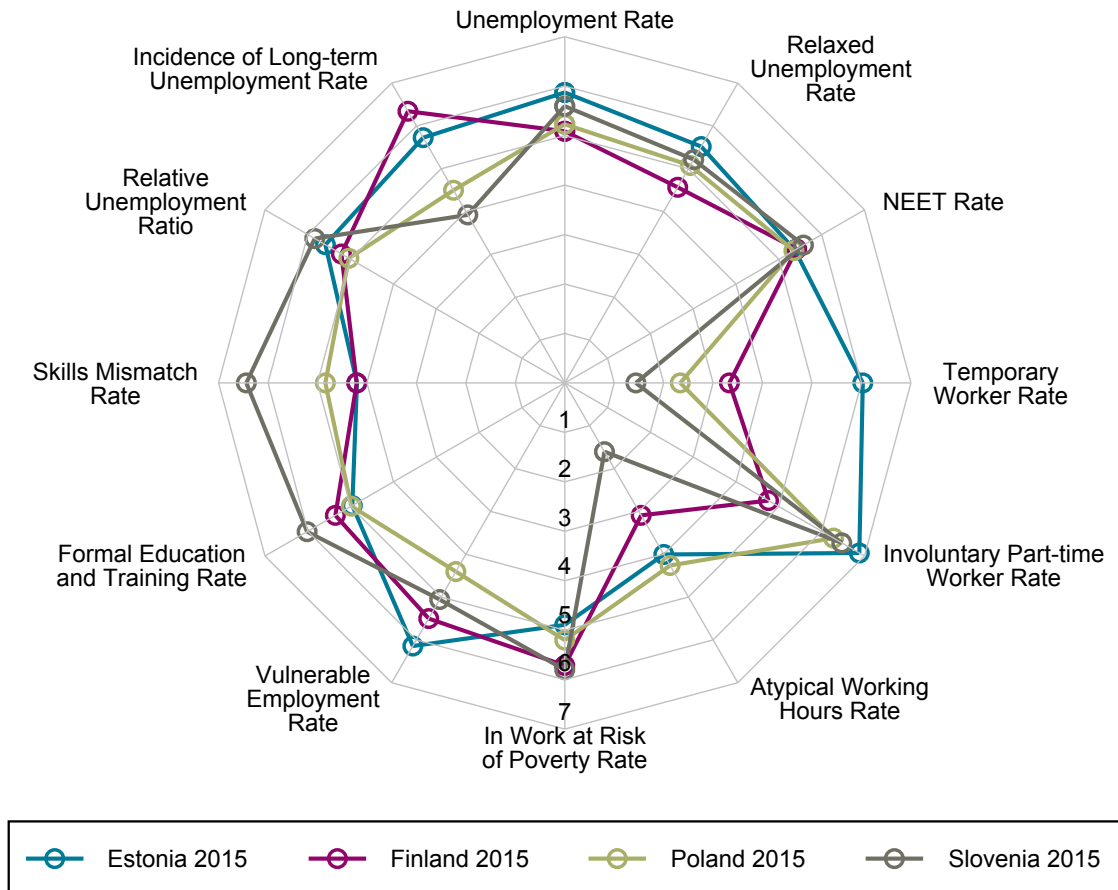Figure 7: Spider web for Estonia, Finland, Poland, and Slovenia in 2015



Figure 7 presents the spider web for these four countries in 2015. Among the four dimensions included in the index, the **Activity State**—which encompasses Unemployment Rate, Relaxed Unemployment Rate, and NEET Rate—is where these countries present the most similar scores. Larger differences exist in the **Working Conditions**. In this dimension, Estonia performs particularly well, while Slovenia reaches alarmingly low scores in the indicators Temporary Worker Rate and Atypical Working Hours Rate. Slovenia partially counterbalances these low scores with strong positions in Formal Education and Training Rate and Skills Mismatch, the two indicators composing the dimension **Education**. Finland, Poland, and Slovenia show only ordinary values in this field. Finally, the indicators of the **Transition Smoothness** dimension present contrasting pictures. Finland shows very low incidences of long-term unemployment along with a poor score in the Relative Unemployment Ratio, suggesting a large proportion of youth in unemployment compared to adults. Slovenia, on the contrary, exhibits a good score in the Relative Unemployment Ratio, while poorly performing in terms of Long-term Unemployment Rate. Lastly, the indicators for Poland suggest that young people have difficulties to transit from school to the labour market.

For the time being, this description focuses mainly on the trends of the aggregate index and

the scores of the different indicators. Let us now look at how education and training enrolment and labour market outcomes interact in best performing countries in respect to the PISA test. Figure 8 reports the evolution of the indicators Unemployment Rate, NEET Rate, and Formal Education and Training Rate in Estonia, Finland, Poland and Slovenia over the period 2009-2015.

**Estonia**'s graph shows evidence of a possible countercyclical effect between unemployment and participation in education and training. The amelioration of the Unemployment Rate score observed after 2010 is accompanied by a reduction in the Formal Education and Training Rate. A similar effect is also observed for the NEET Rate. After 2010, the share of youth that are neither in education nor in employment decreases—hence the score of this indicator increases— while the enrolment in education and training decreases—and so the score of the indicator Formal Education and Training Rate. In a nutshell, Estonia presents a reduction in education enrolment, which is compensated by better situation on the labour market in term of both unemployment and NEET.

**Finland**, similar as Estonia, experiences a decrease in the enrolment rate over the period 2010-2015. The reduction in the education and training enrolment is accompanied by a decrease in the Unemployment Rate score, meaning that youth unemployment rose. Contrary to Estonia, the concomitant decrease of Finland's NEET Rate indicates that the reduction in education attainment together with the worsening of the labour market pushed many youth in the direction of inactivity. The situation in 2015 is worse than in 2009.

**Poland**'s sub-graph in Figure 8 can be divided into two time strands. First, between 2009 and 2013, Poland experiences a decrease in education and training enrolment rate and a deterioration of the Unemployment Rate. Over this period, the NEET Rate suggests a simultaneous increase in the share of youth neither in employment nor in education or training. The second strand starts after 2013. From this point on, we observe an even faster reduction in the Formal Education and Training Rate, while the Unemployment Rate starts to recover. The NEET Rate also corrects itself after 2013, but to a lesser extent than Unemployment Rate. The evolution of these three indicator is worrisome for Poland. Young people in Poland are in a clearly worse off in 2015 than in 2009: far fewer youth are enrolled in education or training, while on the labour market youth are relatively less active. All things considered, the fact that the Formal Education and Training Rate declines regardless Unemployment Rate and NEET Rate increase or decrease, provides us neither the argument for cyclical nor for countercyclical effects.

Lastly, **Slovenia** shows an evolution in the opposite direction over the period 2009-2011. The NEET Rate increased slightly while the Unemployment Rate remained almost constant. These two patterns are accompanied by a large increase in the score of the indicator Formal Education and Training Rate, meaning an increase in the share of youth enrolled in education or training. Unfortunately, Slovenia was not able to maintain these incredibly high levels and shows signs of deterioration after 2011. Between 2011 and 2013, all three indicators—NEET Rate, Unemployment Rate and Formal Education and Training Rate—decrease. This implies an increase in youth inactivity. Finally, unemployment slightly ameliorated after 2013, while education and training enrolment and the NEET Rate almost stabilized. Altogether, the coun-

Figure 8: Unemployment Rate, NEET Rate, and the Formal Education and Training Rate in Estonia, Finland, Poland, and Slovenia over the period 2009-2015
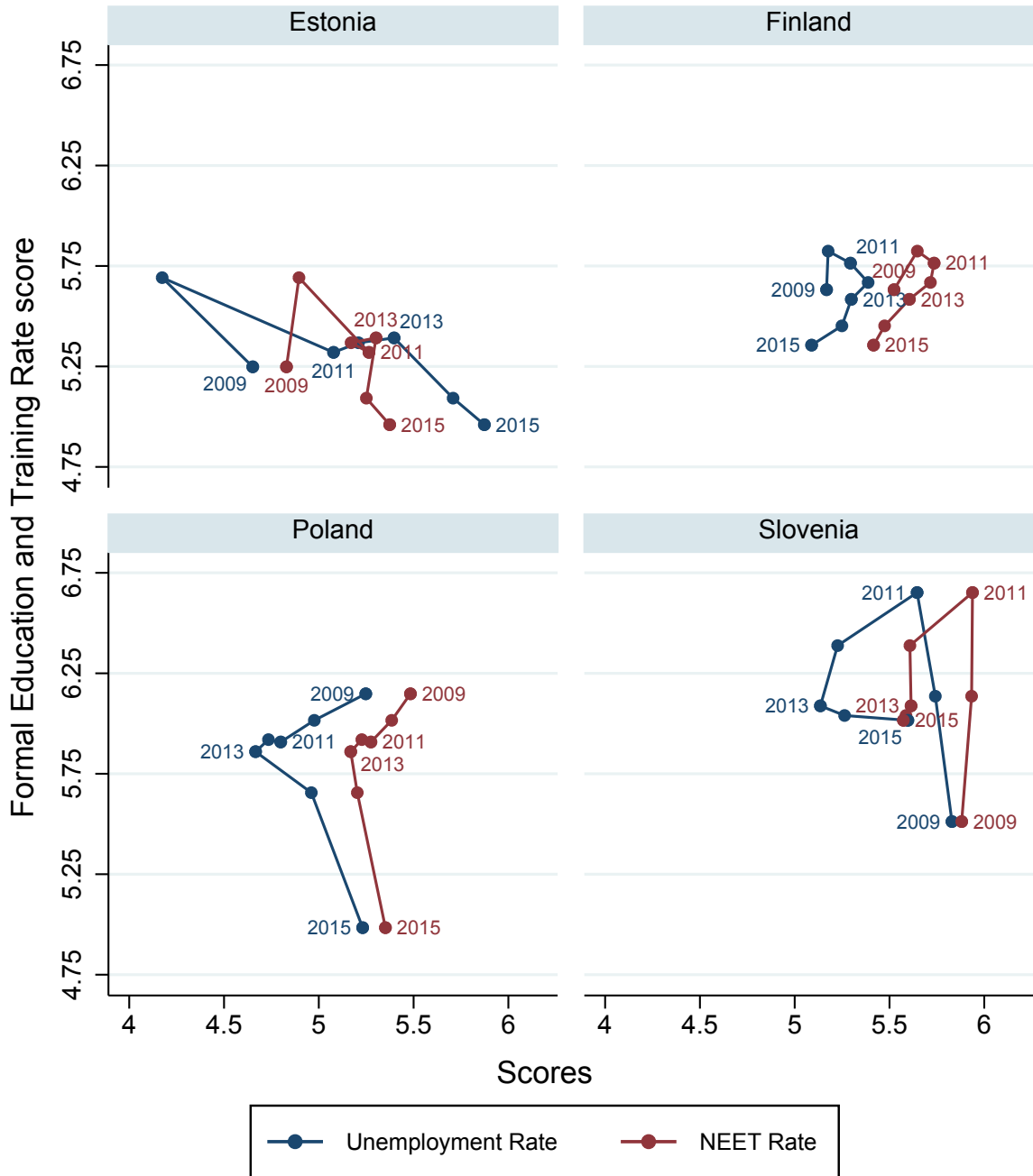


Notes: The graph reports the KOF YLMI scores, which are standardized values of effective rates, of the indicators Unemployment Rate, NEET Rate, and Formal Education and Training Rate. Indicators' values are rescaled into scores that takes values between 1 and 7, where higher scores suggest more desiderable outcomes.

tercyclical argument seems not to apply to the case of Slovenia.

In summary, the analysis of the countries with leading scores on the PISA test shows a deterioration of the Unemployment Rate accompanied by an alarming deterioration in education and training enrolment for both Finland and Poland. In Estonia, we also observe a decrease in participation, which might be the counterbalance of the amelioration occurring on the labour

market. Among these four countries, Slovenia has the best potential prospects for the future. These four examples support the argument that good learning outcomes are not a sufficient condition for a smooth transition process from education to the labour market. Furthermore, the countercyclical effects of Unemployment Rate and NEET Rate on Formal Education and Training Rate do not systematically apply in the group of PISA top-performing countries.

## 3.4   Are Youth in Southern Europe Less Active?

The report accompanying the third release[4] of the KOF YLMI draws attention to the impact the Great Recession had on the situation youth face on the labour market. In particular, the index score deteriorated in many Southern European countries strongly after 2008. As highlighted in Section 2, countries like Greece, Italy, Portugal, and Spain still rank towards the bottom in the 2015 ranking. Figure 9 recalls the evolution of the KOF YLMI in these four countries. The bar diagram, which reports the number of available indicators, suggests that full comparability across these countries is only reliable after 2006. From this point of time, we observe stability for a few years, followed by a progressive deterioration in the index scores. The first signs of worsening start in Spain already in 2009, just after the beginning of the Great Recession. Italy and Greece follow with a slight delay, while Portugal is, among these four countries, the least

Figure 9: KOF YLMI over time in Greece, Italy, Portugal, and Spain



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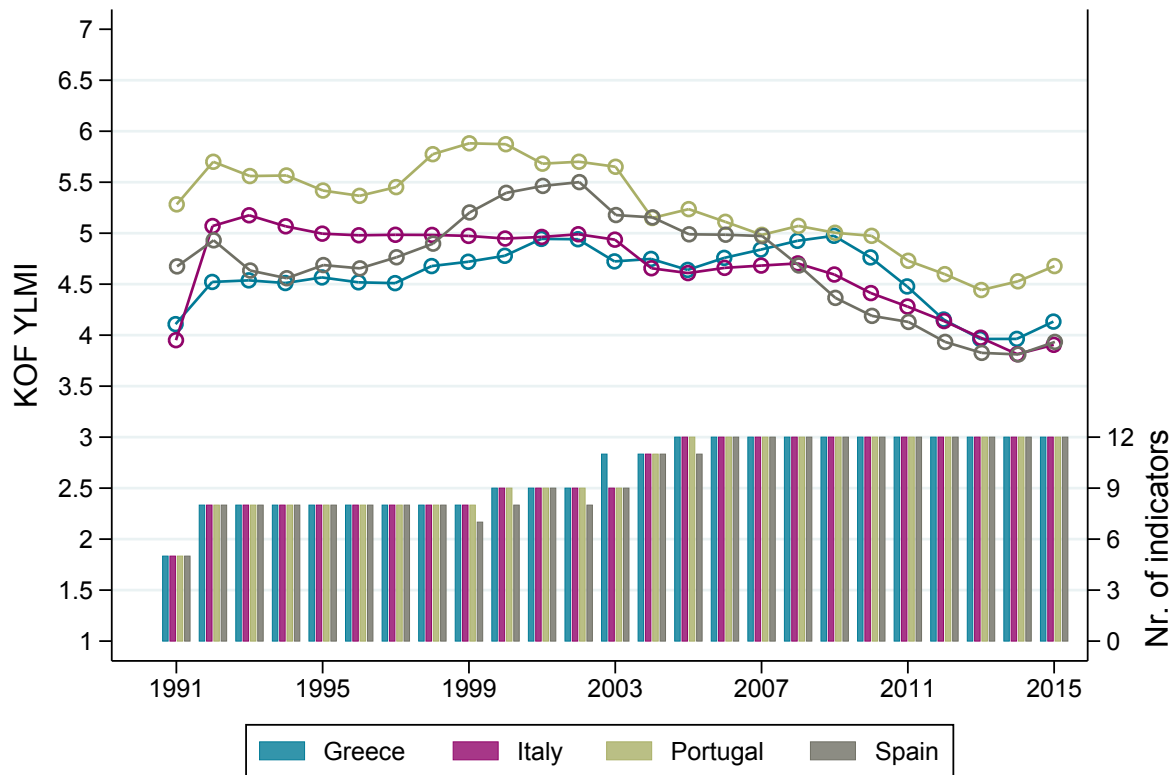
Figure 10: Spider web for Greece, Italy, Portugal, and Spain in 2015
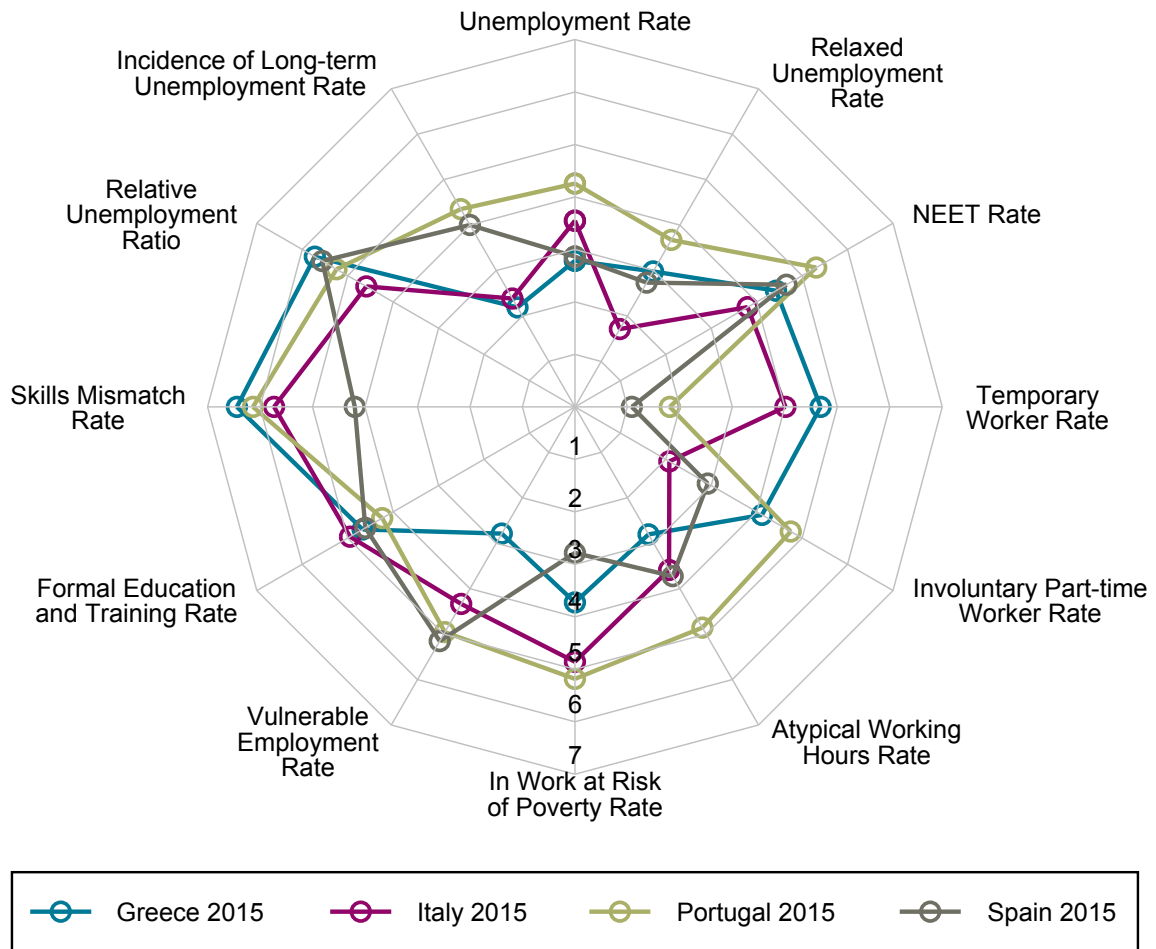


affected by the crisis and the most dynamic in terms of recovery.

Let's have a look now at the scores of the different indicators in these countries. Figure 10 presents the spider web for the year 2015—the last year with data availability. By examining the graph from a general perspective, one can quickly note that the **Activity State** dimension is most responsible for the low aggregate values of the index. In these three Activity State indicators, only Portugal exhibits mediocre scores, while Greece, Italy and Spain show very poor situations. The scores of the **Working Conditions** are highly heterogeneous, as Pusterla (2016) discusses in detail. Portugal performs well in all indicators with the only exception of the Temporary Worker Rate. In contrast, Greece emerges with good scores in this indicator, but shows weak conditions in the atypical working hours and in term of vulnerable employment. Italy presents an alarming low score in the indicator Involuntary Part-time Worker Rate, while in Spain need for intervention is required in the field of temporary employment and exposure to the poverty risk. With regard to the **Education** dimension, all four countries exhibit relatively good scores, with the only exception being Spain in the indicator Skills Mismatch Rate. Do these good scores in the Formal Education and Training Rate result as a consequence of the poor situation of the Activity State, or did these countries achieve high values already before the

start of the Great Recession? In other words, did young people decide to acquire more education in response poor labour market situation or just become less active? Once again, the interplay between the indicators Unemployment Rate, NEET Rate, and Formal Education and Training Rate help us answering these questions.

Figure 11 reports the evolution of the three critical indicators for Greece, Italy, Portugal, and Spain. **Greece**'s sub-graph shows a stable evolution of the education and training enrolment rate over the period 2009-2013, even though both Unemployment Rate and NEET Rate massively deteriorated. The countercyclical argument does not work here. The worsening of the labour market did not push young Greeks in the direction of acquiring more education[5]. However, showing a constant NEET Rate in periods of high unemployment rate is a positive sign, since it suggests that youth are actively looking for a job but not discouraged or voluntarily inactive. Only from 2014 on do we observe improvements in the enrolment rate, which, together with the reduction of unemployment and inactivity, represents encouraging signs for the future.

**Italy** presents similar patterns, although the deterioration in Unemployment and NEET Rate scores is not as large as in Greece. Apparently, young Italians left employment and became inactive—either unemployed or inactive for other reasons. Worth nothing is Italy's level of education and training enrolment, which is clearly higher than Greece's.

In 2009, **Portugal** is in a good situation with respect to the Unemployment Rate and NEET Rate. The Formal Education and Training Rate suggests a relatively low level of school enrolment. After 2009, with the start of the Great Recession, we observe a deterioration in respect of unemployment and an increase in the share of inactive people. However, this is accompanied by an increase in the education and training participation rate. It seems apparent, that the worsening of the labour market pushed many youth in the direction of more education. Most likely, thanks to this initial increment in education enrolment, the decrease in Unemployment Rate score was not as large as in other countries. Additionally, we have evidence of a recovery of the Unemployment Rate, ameliorations in the NEET Rate, and surprisingly, a further increase in the Formal Education and Training Rate since 2013.

Finally, the sub-graph about **Spain** indicates that this was the most reactive country in rising education and training enrolment during periods of increasing unemployment. Furthermore, during the years following the Great Recession, we do not observe an increase in the NEET Rate. In short, the increase of the enrolment in education and training is accompanied by a high level of youth unemployment and not by high level of inactivity. This, together with the positive evolution of the indicator Unemployment Rate after 2013, is encouraging for the future perspective of the youth labour market in Spain.

The four cases presented above do not allow us to conclude that youngsters in Southern European countries have become less active following the crisis, or that the countercyclical effect of high unemployment shifted many youth into the education system. In some cases, for example in Greece and Italy, we observe an increase in inactivity as a reaction to worse labour market

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[5]A possible explanation is that the Greek government-debt crisis, started by the end of 2009, might have impeded the additional provision of public education. As highlighted by Ayllón & Nollenberger (2016), the public spending in higher education decreased by more than 40% in Greece over the period 2008-2014. Such an important cutback in the educational budget might reduce young peoples' chances to remain or return to education.

Figure 11: Unemployment Rate, NEET Rate, and the Formal Education and Training Rate in Greece, Italy, Portugal, and Spain over the period 2009-2015
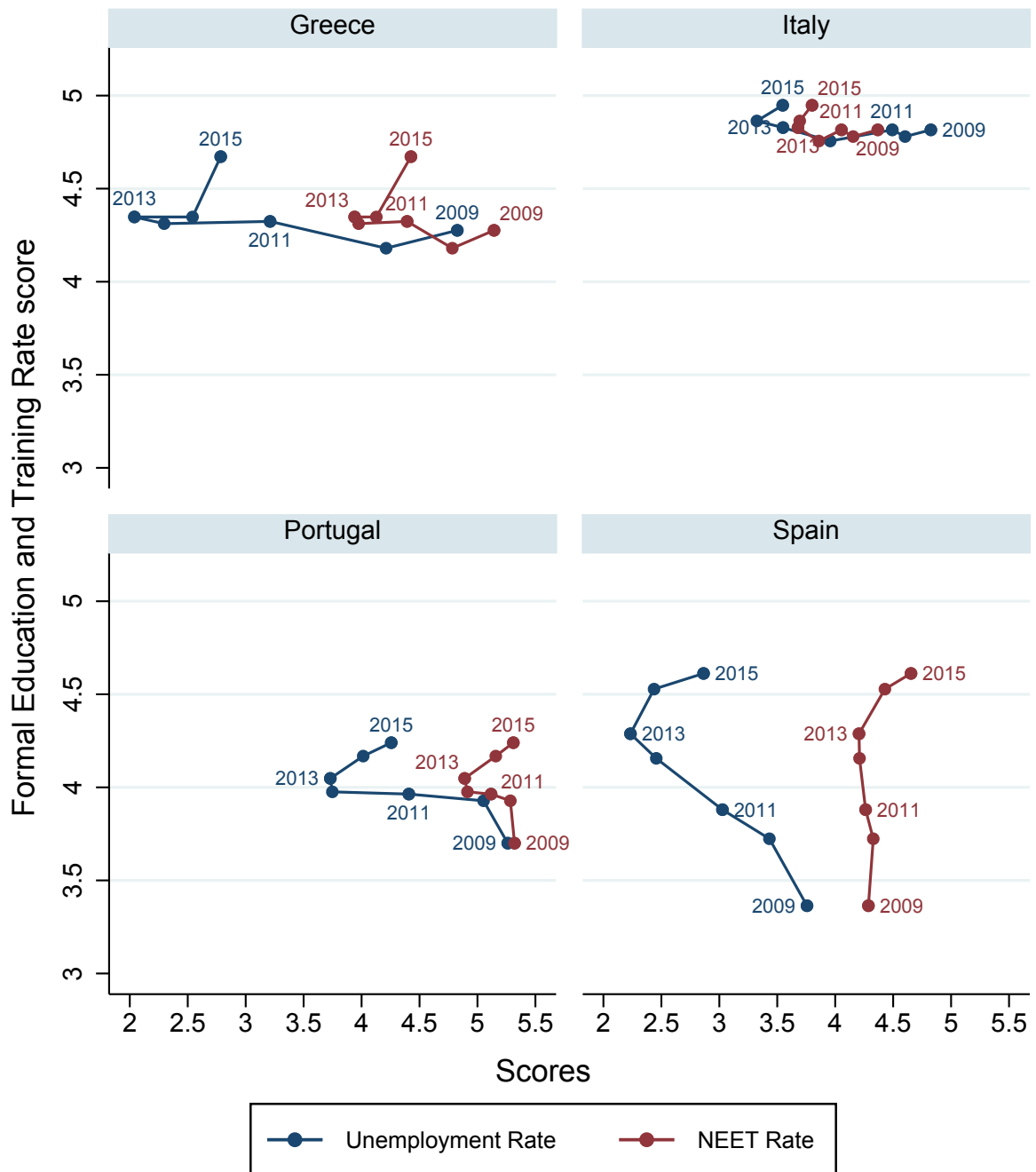


Notes: The graph reports the KOF YLMI scores, which are standardized values of effective rates, of the indicators Unemployment Rate, NEET Rate, and Formal Education and Training Rate. Indicators' values are rescaled into scores that takes values between 1 and 7, where higher scores suggest more desirable outcomes.

conditions—rather than higher participation in education and training. On the other side, the examples of Portugal and Spain suggest that enlarging education and training enrolment might be a feasible way to combat periods of poor performance of youth labour markets. Deeper analyses considering countries' educational and labour frameworks would be needed in order to further disentangle the forces affecting these indicators.

# 4  Summary and Outlook

The fourth release of the KOF YLMI mainly focuses on the extension of the time series to the year 2015. The updated values are available in the interactive web tool[6], which allows time series and cross-country comparisons. Furthermore, selections of users are displayed in graphs and scoreboards. The indicators' definitions and index aggregation procedure remain the same as in the third release of the index.

With regard to data sources, the only modification with this fourth release concerns the integration of the interactive tool Key Indicators of the Labour Market (KILM) in the online database ILOSTAT, conducted by the International Labour Organization. The relocation of the KILM-variables is unproblematic for the KOF YLMI since definitions and collection methodology of data do not change. In addition, an increase of time and geographical coverage leads to a more complete picture for a larger number of countries compared to the previous release.

Our assessment of the evolution of the index between 2014 and 2015 confirms the leading positions of Denmark, Switzerland, Austria, Germany, and the Netherlands. In the bottom of the ranking, Southern European countries present encouraging signs of amelioration. Worth noting are the changes observed in the four dimensions composing the KOF YLMI. In Activity State and Transition Smoothness we obverse generally positive evolutions. The Working Conditions remain largely stable between 2014 and 2015, whereas in the field of Education, changes occurred in both directions: some countries show a clear amelioration, while others experienced decreases sometimes larger than 10% of the score in the previous year.

The update of the KOF YLMI allows the Education Systems research division the possibility to shed light on a particular aspect of the youth labour market. With this report, we contribute to the debate about the relationship between education enrolment and participation into the labour market in determining how active youth are. In particular, the main section of this study investigates the link between unemployment, inactivity and participation in education and training. Recent literature finds evidence of increasing school enrolment during years of weak economic conditions, suggesting a positive correlation between unemployment rate and participation in education. The descriptive analyses reported in this report confirm this pattern for countries such as Belgium, Latvia, Estonia, Slovakia, and Romania. However, the correlation is not observed in all countries, as the examples of Germany and Finland have shown. The interplay between unemployment and education and training enrolment is hence not a clear-cut phenomenon. This study further stresses the importance of considering other indicators to describe youth inactivity as well as education and labour market policies.

The next areas of development of the KOF YLMI involve (i) the periodic update of indicator values, (ii) the continued check of lower and upper bounds' accuracy, (iii) the enlargement of the data coverage—in particular to developing countries—and (iv) a deeper analysis on the evolution of the indicator Skills Mismatch Rate.

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[6]Access at `https://www.kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-youth-labour-market-index.html`

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# A   Methodological Notes for the News Release

This section summarizes the data sources of the indicators composing the KOF YLMI and briefly recalls the major methodological aspects on which the index is based. The definitions of the indicators have not changed in respect to the previous three releases of the index. For detailed explanations about the indicator selection process, interpretation, and possible limitations please refer to Renold et al. (2014).

The third release of the KOF YLMI was characterized by some methodological adjustments. Due to the dramatic evolution of some indicators, we were forced to shift the upper bounds of four indicators[7]. Since the 2015 values do not exceed these bounds, we have not modified them in the fourth release. Finally, the indicators' aggregation procedure and weighting scheme remain unchanged.

The only changes occurring with this fourth release concern data sources. The International Labour Organization (ILO) decided to integrate the interactive tool Key Indicators of the Labour Market (KILM) in the online database ILOSTAT. By relocating KILM-variables into the ILOSTAT repository, the ILO reduced the time extension of the time series, which now starts in the year 2000. Nevertheless, combining these series with those previously contained in the KILM is unproblematic since both series share the same definitions and data provider.

Table 3 summarizes the data used to build the fourth release of the KOF YLMI. Principal repositories are three international institutions: the ILO, OECD, and Eurostat. In a few cases, these values are completed by data from national institutions such as the Swiss Federal Statistical Office (SFSO). As in the two previous releases, we matched datasets from these three institutions to increase geographical coverage for some indicators. Thanks to this strategy, we are now able to present an even broader picture for a larger number of countries. The number of observations increases by more than 8% with this release. Appendix B reports extensive information about data sources, time, and geographical coverage of every indicator.

Table 3: Summary of data availability

| Indicator | Source | Time coverage | No. of countries |
|-----------|--------|---------------|------------------|
| *Activity State* | | | |
| Unemployment Rate | ILO KILM & ILOSTAT | 1991 - 2015 | up to   178 |
| Relaxed Unemployment Rate | Eurostat | 2005 - 2015 | up to   33 |
| NEET Rate | Eurostat, ILO KILM & ILOSTAT | 1998 - 2015 | up to   133 |
| *Working Conditions* | | | |
| Temporary Worker Rate | Eurostat | 1992 - 2015 | up to   33 |
| Involuntary Part-Time Workers Rate | OECD & SFSO | 1991 - 2015 | up to   41 |
| Atypical Working Hours Rate | Eurostat | 1992 - 2015 | up to   33 |
| In Work at Risk of Poverty Rate | Eurostat | 2003 - 2015 | up tp   34 |
| Vulnerable Employment Rate | ILO KILM & ILOSTAT | 1991 - 2015 | up to   159 |
| *Education* | | | |
| Formal Education and Training Rate | Eurostat & SFSO | 1996 - 2015 | up to   33 |
| Skills Mismatch Rate | Eurostat, ILO KILM & ILOSTAT | 1992 - 2015 | up to   59 |
| *Transition Smoothness* | | | |
| Relative Unemployment Ratio | ILO KILM & ILOSTAT | 1991 - 2015 | up to   178 |
| Long-Term Unemployment Rate | Eurostat, ILO KILM, ILOSTAT & OECD | 1991 - 2015 | up to   99 |

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[7]The upper bounds of the indicators Relaxed Unemployment Rate, Temporary Worker Rate, Atypical Working Hours Rate, Involuntary Part-time Worker Rate, and Incidence of Long-term Unemployment Rate were shifted upward. See Pusterla (2016) for explanations about the necessity of these modification.

# B    Detailed Information on Data Availability

Table 4: Detailed information on data sources, extraction methods, number of covered countries and time coverage

| Indicator | Sources | Countries covered in at least one year | Countries covered in 2014 (3rd release) | Countries covered in 2015 (4th release) | Years |
|---|---|---|---|---|---|
| Unemployment Rate | | 178 | 178 | 175 | 1991 - 2015 |
| | **ILO** - *ILOSTAT, Key Indicators of the Labour Market (KILM): Unemployment rate – ILO modeled estimates, Nov. 2016 [Source: ILO estimate; Age: 15-24; Time: 2000-2015]* Extracted on 22.02.2017 | 175 | - | 175 | 2000 - 2015 |
| | **ILO** - *KILM 9th Edition Table 10a: Youth unemployment (ILO estimates) [Youth unemployment rate; Countries: Select all, exclude Samoa; Income group: Select all; Year: 1991-2014; Sex: MF; Type of statistic: Select all]* Extracted on 08.03.2016 | 178 | 178 | - | 1991 - 2014 |
| Relaxed Unemployment Rate | **Eurostat** - *Unemployment [lfsa_ugan; Age: 15-24; Citizen: Total; Geo: Select all; Sex: Total; Time: 1995-2015; Unit: Thousand]; Supplementary indicators to unemployment [lfsi_sup_a; Age: 15-24; Geo: Select all; INDIC_EM: NSEE_AV; Sex: Total; Time: 2005-2015; Unit: Thousand]; Population [lfsa_pganws; Age: 15-24; Citizen: Total; Geo: Select all; Sex: T; Time: 1995-2015; Unit: Thousand; WStatus: ACT]* Last update 01.06.2016 | 33 | 31 | 31 | 2005 - 2014 |

| NEET Rate | | 133 | 37 | 68 | 1998 - 2014 |
|---|---|---|---|---|---|
| | **ILO** - *ILOSTAT, Key Indicators of the Labour Market (KILM): Youth NEET rate – ILO modeled estimates, Nov. 2016 [Share of youth not in employment, education or training (NEET) (%); Source: all; Time: 2000-2015]* Extracted on 22.02.2017 | 100 | - | 68 | 2000 - 2015 |
| | **ILO** - *KILM 9th Edition Table 10c: NEET Rates [Share of youth not in education, employment, or training; Countries: Select all, exclude Samoa; Income group: Select all; Year: 1998-2014; Age: 15-24; Repository: Select all; Type of source: Select all; Coverage: Select all; Geographical coverage: Select all]* Extracted on 24.11.2015 | 106 | 37 | - | 1998 - 2014 |
| | **Eurostat** - *Young people neither in employment nor in education and training by sex and age (NEET rates) [NEET rate; Sex: Total; Age: 15-24; Year: 2000-2014; Unit: Percentage; WStatus: NEMP]* Last update 08.10.2015 | 33 | 33 | - | 2000 - 2014 |
| Temporary Worker Rate | **Eurostat** - *Temporary employees by sex, age and duration of the work contract [lfsa_etgadc; Age: 15-24; Duration: Less than 1 month, From 1 to 3 months, From 4 to 6 months, From 7 to 12 months, From 13 to 18 months; Geo: Select all; Sex: T; Time: 1992-2015]* Aggregated values (1 to 18 months) obtained from Eurostat on 16.06.2016 after direct request; *Employment by sex, age and citizenship [lfsa_egan; Age: 15-24; Citizen: Total; Geo: Select all; Sex: T; Time: 1995-2015]* Values for the period 1992-2015 obtained from Eurostat on 16.06.2016 after direct request. | 33 | 33 | 33 | 1992 - 2015 |

| | | | | | |
|---|---|---|---|---|---|
| Involuntary Part-Time Workers Rate | | 41 | 39 | 40 | 1991 - 2015 |
| | **OECD** - *Incidence of involuntary part time workers [Country: Select all; Time: 1991-2015; Sex: All persons; Age: 15-24; Employment status: Total Employment; Series: Share of involuntary part-timers in total employment]* Extracted on 15.02.2017 | 40 | 38 | 39 | 1991 - 2015 |
| | **Swiss Federal Statistical Office** - *Involuntary part-time workers (INVPT) [Involuntary part-time workers are part-timers (working less than 30-usual hours per week) because they could not find a full-time job];* Data obtained from the SFSO on 18.05.2016 after direct request. Note that the values for the years 2007-2010 and 2013-2014 have relatively low reliability. Please interpret those values with caution. | 1 | 1 | 1 | 2004 - 2015 |
| Atypical Working Hours Rate | **Eurostat** - *Employees working shifts as a percentage of the total of employees [lfsa_ewpshi; Age: 15-24; Geo: Select all; Sex: T; Time: 1992-2013], Employed persons working at nights as a percentage of the total employment [lfsa_ewpnig; Age: 15-24; Frequenc: Usually; Geo: Select all; Sex: T; Time: 1992-2013; WStatus: EMP], Employed persons working on Sundays as a percentage of the total employment [lfsa_ewpsun; Age: 15-24; Frequenc: Usually; Geo: Select all; Sex: T; Time: 1992-2014; WStatus: EMP],* Last update 26.04.2016 | 33 | 33 | 32 | 1992 - 2014 |

| | | | | | |
|---|---|---|---|---|---|
| In Work at Risk of Poverty Rate | **Eurostat** - *In-work at-risk-of-poverty rate by age and sex [ilc_iw01; Age: 15-24; Geo: Select all; Sex: T; Time: 2003-2014; WStatus: EMP]* Last update 28.03.2017 | 34 | 33 | 33 | 2003 - 2015 |
| Vulnerable Employment Rate | | 159 | 37 | 74 | 1991 - 2015 |
| | **ILO** - *ILOSTAT, Key Indicators of the Labour Market (KILM): Status in employment – ILO modeled estimates, Nov. 2016 [Own-account workers, Contributing family workers, Total employment; Sex: Tot; Time: 1991-2015]* Extracted on 20.02.2017 | 144 | - | 75 | 2000 - 2015 |
| | **ILO** - *KILM 9th Edition Table 3: Status in Employment [Share of vulnerable employment in total employment; Countries: Select all, exclude American Samoa, Anguilla, Antigua and Barbuda, Aruba, British Virgin Islands, Cayman Islands, Cook Islands, Djibouti, Dominica, French Guiana, French Polynesia, Germany (Federal Republic of), Grenada, Guam, Isle of Man, Kosovo, Marshall Islands, Montserrat, Netherlands Antilles, New Caledonia, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Sao Tome and Principe, Tonga, Turks and Caicos Islands, Tuvalu, Vanuatu; Income group: Select all; Year: 1998-2014; Age: Select all; Repository: Select all; Type of source: Select all; Coverage: Select all; Geographical coverage: Select all]* Extracted on 01.12.2015 | 157 | 37 | - | 1991 - 2014 |

| | | | | | |
|---|---|---|---|---|---|
| Formal Education and Training Rate | | 33 | 33 | 33 | 1996 - 2015 |
| | **Eurostat** - *Participation in education and training [trng_lfs_09; Age: 15-24; Geo: Select all; Sex: T; Time: 2004-2014; TYPTRAI: Formal education and training; Unit: PC]* Last update 26.04.2016. Values for 2003 obtained from Eurostat on 10.09.2015 after direct request. | 33 | 33 | 33 | 2003 - 2015 |
| | **Swiss Federal Statistics Office** - *Participation rate in formal education and training (last 4 weeks) [by sex and age (15-24), frequencies in percent]* Data available from the SFSO upon request | 1 | - | - | 1996 - 2002 |
| Skills Mismatch Rate | | 59 | 33 | 33 | 1992 - 2015 |
| | **Eurostat** - *Active population by sex, age and educational attainment level (1 000) [lfsa_agaed; Sex: Total; Age: From 15 to 24 years & from 25 to 29 years; Unit: Thousand; Time: 1992-2014]* - *Employment by sex, age and educational attainment level (1 000) [lfsa_egaed; Sex: Total; Age: From 15 to 24 years & from 25 to 29 years; Unit: Thousand; Time: 1992-2014]* Last update: 01.06.2016 | 33 | 33 | 33 | 1992 - 1999 2013 - 2015 |
| | **ILO** - *KILM 8th Edition Table 15a: Skills mismatch between labour supply and demand by educational attainment [Skills mismatch; Sex: MF; Year: 2000-2013; exclude: Samoa]* Extracted on 02.02.2015 | 59 | - | - | 2000 - 2013 |

| Relative Unemployment Ratio | | 178 | 178 | 174 | 1991 - 2015 |
|---|---|---|---|---|---|
| | **ILO** *-ILOSTAT, Key Indicators of the Labour Market (KILM): Unemployment rate – ILO modeled estimates, Nov. 2016 [Source: ILO estimate; Age: 15-24 & 25+ ; Time: 2000-2015]* Extracted on 22.02.2017 | 175 | - | 174 | 2000 - 2015 |
| | **ILO** *- KILM 9th Edition Table 10a: Youth unemployment (ILO estimates) [Ratio of youth unemployment rate to adult unemployment rate; Countries: Select all, exclude Samoa; Income group: Select all; Year: 1991-2014; Sex: MF; Type of statistic: Select all]* Extracted on 01.22.2015 | 178 | 178 | - | 1991 - 2014 |
| Incidence of Long-Term Unemployment Rate | | 99 | 44 | 69 | 1991 - 2014 |
| | **ILO** *-ILOSTAT: Unemployment by sex, age and duration [Sex: Total, Age: 15-24 Duration: Total (aggregate duration) & 12 months or more; Source: all; Time: 1991-2015]* Extracted on 22.02.2017 | 175 | - | 174 | 2000 - 2015 |
| | **ILO** *- KILM 9th Edition Table 11a: Long-term unemployment [Incidence of long-term unemployment; Countries: Select all, exclude French Polynesia; Income group: Select all; Year: 1991-2014; Sex: MF; Age group: Youth; Repository: Select all; Type of source: Select all; Coverage: Select all; Geographical coverage: Select all]* Extracted on 10.03.2016 | 87 | 43 | - | 1991 - 2014 |

| | | | | | |
|---|---|---|---|---|---|
| | **OECD** - *OECD.Stat [Unemployment by duration; Year: 1991-2013; Sex: All Person; Age: 15 to 24; Frequency: Annual ; Unit: Persons, thousands]* Extracted on 06.07.2015 - *OECD.Stat [Incidence of unemployment by duration; Year: 1991-2013; Sex: All Person; Age: 15 to 24 ; Unit: Percentage]* Extracted on 06.07.2015 | 12 | - | - | 1997-2013 |
| | **Eurostat** - *Long-term unemployment (12 months or more) as a percentage of the total unemployment, by sex, age and nationality (%) [lfsa_upgan; Age: From 15 to 24 years; Citizen: Total; Geo: Select all; Sex: Total: Time: 1995-2014; Unit: Percentage]* Last update 24.02.2016 | 1 | 1 | - | 1998-2014 |

*Notes:* Data sources might change over releases due to data availability. Values for certain countries/years, that are no longer contained in the last version of the repository, are included from previous release of the KOF YLMI.