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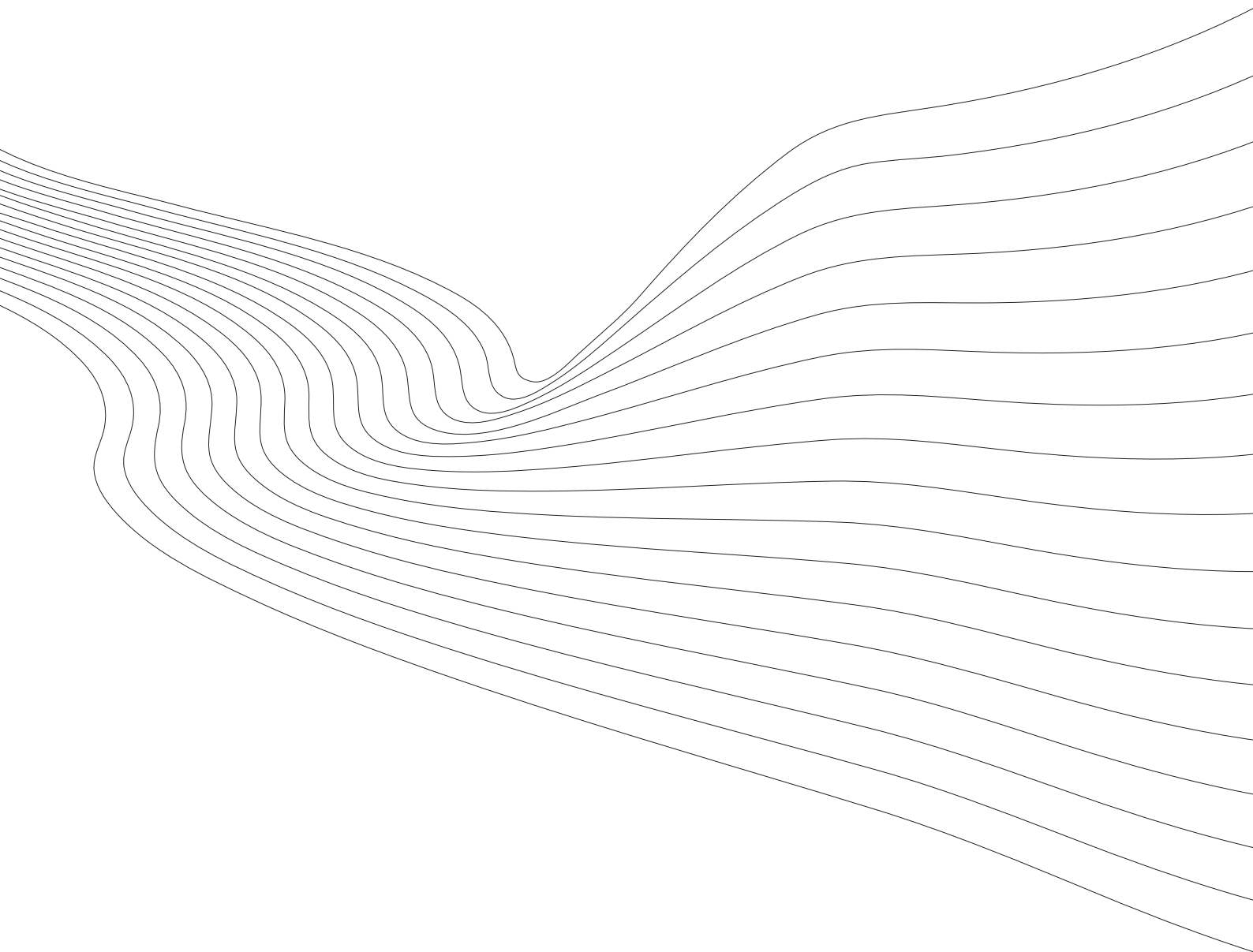
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On the Multiple Dimensions of Youth Labour Markets

A Guide to the KOF Youth Labour Market Index

Dr. Ursula Renold, Dr. Thomas Bolli, Maria Esther Egg and Filippo Pusterla



Imprint

Editor

KOF Swiss Economic Institute, ETH Zurich

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KOF Studies

On the Multiple Dimensions of Youth Labour Markets

A Guide to the KOF Youth Labour Market Index[†]

August 15, 2014

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Abstract

This report describes the development of the KOF Youth Labour Market Index (KOF YLM Index), a tool that allows to compare the labour market situation of youth across countries. This project, developed by the Research Division Education System, aims to disentangle problematic defined as "youth paradox", i.e. the fact that in these days the access to education reaches levels never reached before but even though increasingly problems in the integration process of youth into the labour market are observable. Our approach is multidimensional: the basic idea is that a single indicator (e.g. the widespread used unemployment rate) does not provide sufficient information for a comprehensive analysis. In order to foster multidimensionality we thus select twelve indicators that describe the labour market from different perspectives. The data for these indicators are collected from various international institutions and cover up to 178 countries for the time period between 1991 to 2012. On the basis of these indicators we first develop the KOF YLM Index. The evolution of this index over time, as well as the representation of the indicator set in a spider web, are displayed in a specific web application. A part of this report illustrates the usefulness of the web application in a detailed descriptive analysis of selected European countries. Beside of illustrating the developments in Europe's largest countries, a particular focus lies on countries that have struggled most during the Great Recession. The heterogeneity of the developments over time of the KOF YLM Index components highlights the relevance of accounting for the multidimensional approach of the youth labour market. This tool, which is available at <http://kof.ethz.ch/de/indikatoren/>, is part of a widespread research project aiming to identify the connections between the typology of education system and the situation on the labour market for young aged 15 to 24 years.

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1 Introduction

The news lately report nearly daily that the situation for young people on the labour market is severe. Some countries, like Spain or Greece, are experiencing youth unemployment rates¹ of 53.2% and 55.3% in 2012, respectively. Comparing the data over the period from 2006 to 2012 it is worth highlighting that also other countries, like Ireland² or the UK³ have experienced a significant increase in their unemployment rates. So the statement of Blanchflower & Freeman (2000), that the youth labour market prospects have rather worsened in spite of better education and smaller youth cohort, is still valid for the labour market prospects of today's youth around twelve years later. However, this trend is not present in all countries. Austria, Germany and Poland have managed to diminish their youth unemployment rate during the same time span.⁴ Finally, other countries like France, Belgium and Norway have stayed at the same level (around 22% for France, 20% and 9% for Belgium and Norway, respectively).

The comparison on the basis of simply the youth unemployment rates leads to the conclusion that prospects of the labour market situation for young people has not worsened everywhere. However, according to Freeman & Wise (1982), O'Higgins (2003) and Dewan & Peek (2007) the youth unemployment rate does not adequately describe the condition on the labour market by itself. They suggest a more comprehensive evaluation of the situation using a system of indicators which covers various aspects.

A growing body of literature provides possible indicator sets to monitor the evolution of the labour market extensively. The International Labour Organization (ILO) publishes a collection of 18 indicators for the labour market in general, i.e. not specifically referring to the youth cohort (ILO, 2011, ILO, 2013b). The ILO also provides a set of eight indicators specific for youth for the purpose of benchmarking (see Puerto et al., 2011). Further the Scoreboard for Youth Aged 15 to 24 developed by the OECD (2010) includes ten indicators and the most recent data can be compared with the data from ten years earlier. Ryan (2001) and Biavaschi et al. (2012) report a set of indicators specific for the youth labour market, while Dewan & Peek (2007) focus on various aspects not previously considered, mostly related to economic conditions.

Unfortunately, none of these reports combine the indicators set in order to create an instrument that allows a comparison over time and/or between countries. Only the OECD (2010) and Puerto et al. (2011) display the selected indicators in a scoreboard. This instrument offer however just a limited parallelism between countries and a restricted (both in respect of available years and countries) number of observations.

Here this report sets in. The index developed in this paper should facilitate the comparison of youth labour market situations across countries. We begin by creating our own indicator set as the ones previously presented are in our opinion either incomplete or not explicitly designed for the youth labour market. The starting point is therefore to take in consideration all relevant

¹The source for all the youth unemployment rates in this section is the OECD.

²Ireland had a youth unemployment rate of 9.9% in 2006 which increased to 33.0% in 2012.

³The UK's youth unemployment rate was 13.8% in 2006 and increased up to 21.0% in 2012.

⁴In 2006 the youth unemployment rate of Austria was 9.1%, the one of Germany 13.6% and the one of Poland was 29.8%. In 2012 the rates decreased to 8.7% in Austria, 8.1% in Germany and 26.5% in Poland.

indicators. The second crucial point is to take youth labour market peculiarities into account. To create a comprehensive indicator set we collect measures from four dimensions, those being Activity State, Working Conditions, Education and Transmission Smoothness. The indicators contained in these categories are evaluated in respect to their relevance. We end up with 12 indicators, which for clarity and comparison reasons are displayed both on a scoreboard and in a spider web. The scores of the available indicators are further weighted to generate a single number, the KOF Youth Labour Market Index.

All concepts developed in this project (scoreboard, spider web and index) are displayed in a web application available at <http://kof.ethz.ch/de/indikatoren/>. This tool is adequate to make time and cross-country comparison of the youth labour market situations. In a second step, which is beyond the scope of this report, it will be possible to use the KOF Youth Labour Market Index in order to examine the effects of education systems on labour market situations.

The paper is organised in the following way. Section 2 presents a collection of the youth labour market indicators proposed in the literature. That is followed by Section 3, which discuss which indicators should be included into the index and a brief description of each of them. Section 4 reports the calculation process used to set-up the scoreboard, the spider web and the index. We further discuss in Section 5 additional features like the creation of groups of countries and data availability limitations. In Section 6 we provide some descriptive analyses based on the graph generated by the web application. These representations aim to demonstrate the potentiality of this tool. We particularly stress the attention on the European labour market and on the effects that the Great Recession, i.e. the global economic decline in the late 2000s, had on it. The last part discusses the limitations of the index and gives a brief outlook of possible future research.

2 Review of Existing Labour Market Indicators

There is a decent amount of literature mentioning and describing possible indicators useful to characterise the labour market. The most commonly mentioned indicators are unemployment rate, inactivity rate, employment to population ratio, part-time workers, temporary contract workers, measures for wages, education attainment and employment in the informal sector.

The ILO holds a leading position in the identification of standards and criteria used to describe the labour market. From this institution we take three indicator collections into account. The first, the Key Indicators of the Labour Market (KILM), is published every two years since 1999. This collection is used by the ILO as a research tool for general labour market investigation. In this report we rely on the 8th edition (see ILO, 2013b). The corresponding country-level data range from 1980 to the latest available year. Secondly, the ILO has conducted a survey for analysing the school-to-work transition (Elder, 2009). Some of the recommended indicators are similar to the ones of the KILM. Finally, Puerto et al. (2011) defines youth labour market indicators to get a robust measure of the progress towards the employment-related Millennium Development Goals of the United Nations. To isolate the trends of the indicators over time the authors provide a scoreboards' template, which on the basis of the data provided by the user exhibits the absolute and relative change of the indicators.

Besides the indicator sets developed by the ILO, there is an indicator collection of the OECD in the so called Scoreboard for Youth Aged 15 to 24 (see OECD, 2010). It consists of ten indicators that are displayed on a scoreboard. The data of 2009 can be compared with the ones of ten years before.

Further, there are various authors discussing additional indicators in different contexts. For instance Ryan (2001) studies the school-to-work transition in different countries and compares the schooling and labour market indicators. Apart from the common indicators (like employment and unemployment rate) Ryan mentions the duration of unemployment, job mobility and labour market matching as possible indicators.

Dewan & Peek (2007) criticise the standard employment and unemployment indicators which are used to describe labour market tightness. Their argument is that the heterogeneity of the labour market in developing countries makes it impossible to capture the actual situation. The authors suggest therefore to include indicators of working conditions like the nature of the contract and job security.

Finally, the report of Biavaschi et al. (2012) focuses on the youth labour market situation, especially on the role of vocational training as well as on education policies. Further indicators mentioned there are cohort size, labour demand, training, active labour market policies, regulatory policies (like minimum wage), neither in employed nor in education and training rate (NEET rate), unemployment rate by educational achievement and shares of vocational and general secondary education enrolment.

Table 1 lists all the indicators taken into consideration in the stated reports and summarises which indicators are mentioned in which report. The last column of Table 1 pre-mentions which indicators are included in our index. The next section motivates the choice and discusses the detailed rationale for grouping the indicators into five categories, which we call Activity State, Working Conditions, Education, Transition Smoothness and Economic Conditions. The Activity State category captures inactivity of youth. The Working Conditions category entails indicators measuring the quality of jobs. We include indicators directly related to the education system in the Education Category. The Transition Smoothness category entails indicators capturing the ease of transition from education to the labour market. Finally, the Economic Conditions category assembles indicators related to the demographic, political and economic environment. As discussed in detail below, assigning indicators to these five categories is sometimes ambiguous. This is particularly true for the Transition Smoothness indicators, which are related to the Activity State category and the skills mismatch indicator.

⁵We take the indicators published by the 8th ILO KILM edition. For further details see ILO (2013b).

⁶This is a school-to-work transition survey of the ILO (see Elder, 2009).

⁷The Benchmark was developed by the ILO to measure the progress towards the employment-related Millennium Development Goals (see Puerto et al., 2011).

⁸The OECD developed this scoreboard of youth aged 15-24 (see OECD, 2010).

⁹The indicators are taken from Ryan (2001).

¹⁰The indicators are taken from Dewan & Peek (2007).

¹¹The indicators are taken from Biavaschi et al. (2012).

Groups and corresponding indicators	KILM⁵	Survey⁶	Benchmark⁷	Scoreboard⁸	Ryan⁹	Dewan¹⁰	Biavaschi¹¹	KOF YLM Index
<i>Activity State</i>								
Labour force participation rate	x							
Employment-to-population ratio	x	x	x	x		x		
Unemployment rate	x	x	x	x	x	x	x	x
Unemployment to population ratio				x				
Relaxed unemployment rate		x	x					x
Inactivity rate	x	x	x		x			
NEET rate				x	x		x	x
Discouraged workers		x				x		
<i>Working Conditions</i>								
Status in employment	x	x	x			x		
Employment by sector	x	x	x					
Employment by occupation	x		x					
Public sector employment			x					
Temporary contract worker				x	x	x	x	x
Part-time workers	x			x	x	x	x	x
Time-related underemployment	x	x				x		
Vulnerable employment rate		x						x
Employment in informal sector	x	x				x	x	
Hours of work	x							
Excessive hours worked		x				x		
Wages	x	x			x		x	
Labour productivity	x							
Poverty, working poor	x					x		x
Atypical working hours								x
<i>Education</i>								
Education attainment	x	x	x		x		x	
School drop outs				x				
Training							x	
Skills mismatch	x							x
Shares of vocational/general secondary education enrolment							x	x
<i>Transition Smoothness</i>								
Long-term unemployment rate	x			x	x			x
Relative unemployment ratio		x		x			x	x
Relative unemployment rate low skills/high skills				x				
Length of transition		x						
Duration of employment					x			
Labour market matching					x			
Job mobility					x			
Unemployment rate by educational achievement							x	
<i>Economic Conditions</i>								
Labour market programs					x			
Cohort size							x	
Labour demand							x	
Active labour market policies							x	
Regulatory policies							x	

Table 1: Collection of Recommended Labour Market Indicators

3 Indicators of the KOF Youth Labour Market Index

The indicators necessary to build an index which reflects the current youth labour market situation of countries have to be selected carefully. We put the focus on the labour market situation of the youth cohort aged 15 up to 24. Other age ranges like 15 to 19 or 15 to 29 are also possible, but are not taken into consideration due to different reasons. The age group 15 to 19 group is still in the process to transit from school to work. In particular, this kind of restriction will exclude all youth attending a tertiary education. Hence, such a short age range does not allow to observe the transition of individuals with university degree. Further, in countries where compulsory education extends till 19 (e.g. Nordic countries), the tool would not provide significant information. On the contrary, the age range from 15 to 29 offers the complete picture of the transition process of youth. However, the interval from 15 to 24 is most often used by the international organisations that provide data (like ILO, OECD and Eurostat). We are aware that the chosen age range is not optimal due to the fact that some people might still be in education after age 24, but from our point of view the advantages of a broader dataset predominate. Therefore, in the following, indicators and data refer, if not specifically stated otherwise, to the age range 15 to 24.

The basic idea on how to construct the KOF Youth Labour Market Index (hereafter abbreviated as KOF YLM Index) comes from the Global Competitiveness Report of the World Economic Forum (Schwab & Sala-i-Martin, 2012), in which a set of indicators is used to compare competitiveness across countries. The setup and the calculation methods used in the KOF YLM Index are very similar to those used in that report. To apply those methods and to fulfil our purposes we identify three conditions that an indicator has to satisfy simultaneously in order to be included in the KOF YLM Index. First, the indicator has to be an outcome variable of the labour market, i.e. the indicator has to reflect the labour market situation without influencing it. A counterexample is the amount of regulatory policies, which is not a suitable indicator because it influences the situation on the labour market. Second, it must be possible to rank the indicator, i.e. it has to be clear if either a high or a low value is desirable. This condition is essential for the construction of the KOF YLM Index and the subsequent comparableness across countries. Examples for not satisfying this condition are indicators like employment by sector or the voluntary part-time quote. For the former it is critical to state in which sector (primary, secondary and tertiary) is better to work in, while for the latter there is no agreement whether advantages or drawbacks of voluntary part-time work predominate (Sandor, 2011). Finally, data for that indicator has to be available (or at least data of a useful proxy). For instance job mobility is an indicator not fulfilling this requirement. We have not found an appropriate proxy for which data are available. Other examples for indicators not included due to a lack of data are involuntary overemployment, job contentment, workplace security, average length of transition to a decent job, informal employment and job mobility during the career.

Concerning the five dimensions in which we subdivided the indicators identified in the prior section, four of them, namely Activity State, Working Conditions, Education and Transition Smoothness contain potentially suitable indicators. The KOF YLM Index does not include

indicators of the category Economic Conditions at all, as those indicators are not capturing outcomes and therefore influence the situation on the labour market. From the indicators fulfilling the three restrictions we further select some indicators for each category. The choice occurs based on the willingness to create a set that captures the most important aspects while not containing too many indicators. Note that we additionally integrate an indicator not considered in former research describing atypical working hours. The reasons of this inclusion are further on described in part 3.2.3. The following list recalls the four categories with the corresponding indicators, included in the KOF YLM Index.

Activity State:

1. Unemployment Rate
2. Relaxed Unemployment Rate
3. Neither in Employment nor in Education or Training Rate (NEET Rate)

Working Conditions:

4. Temporary Contract Workers Rate
5. Involuntary Part-Time Workers Rate
6. Atypical Working Hours Rate
7. In Work at Risk of Poverty Rate
8. Vulnerable Employment Rate

Education:

9. Formal Education and Training Rate
10. Skills Mismatch Rate

Transition Smoothness:

11. Relative Unemployment Ratio
12. Long-Term Unemployment Rate

Each of the following parts of the section describes at first the category from a general perspective and then the details of the corresponding indicators.

3.1 Activity State

The resolution adopted in 1982 by the 13th International Conference of Labour Statisticians (ICLS) defines amongst other things the way to divide the working-age population into employed, unemployed and economically inactive. Thereby, employment covers all persons above a restricted age who within a specified brief period, were in paid employment or self-employment (see 13th ICLS paragraph 9.1). Unemployed persons (paragraph 10) are defined as all persons above a specified age who during the reference period satisfy the three cumulative conditions of being without work, currently available for work and seeking work. Finally the economically inactive group includes all persons who are below the specified age or who are neither employed nor unemployed. Reasons for being economically inactive include attendance at educational institutions, engagement in household duties, retirement, old age and infirmity or disablement (paragraph 11 and 12). Due to this agreement, most labour force statistics are reported according to this so called ILO standard, which makes statistics easier to compare between countries.

The categorization set-up is like a cascade where first all people are divided into employed and not employed. People not being employed are then further divided into unemployed or economically inactive. The employed and unemployed persons together constitute the labour force or economically active population. All persons not in the labour force are said to be economically inactive or out of the labour force. In countries with compulsory school-based education systems the inactivity rate of youth is high due to the large number of full-time students. Full-time students and unpaid apprentices are in principle economically inactive (see paragraph 9.7 and 9.8 in the resolution of the 13th ICLS as well as Hussmanns et al., 1990). Thus, comparing inactivity rates or labour force participation rates is misleading.

To capture the specificities of the youth labour market more appropriately, we choose a different approach. The aim is to identify the single effect of being unemployed, discouraged worker or not employed neither in education or training (NEET), assuming that people not falling into those categories are either working or studying. These two remaining aspects were taken into account by the categories Working Conditions (in the case of the former) and Education (for the latter).

3.1.1 Unemployment Rate

The unemployment rate is widely used to capture the unutilized labour supply in an economy (ILO, 2013b). Depending on the focus there are different kinds of unemployment. For the KOF YLM Index we use the annual unemployment rate for people between 15 and 24 years old, which is calculated as follows:

$$\text{Unemployment Rate} = \frac{\text{Unemployed}}{\text{Labour force}} * 100$$

where the denominator is calculated as:

$$\mathbf{Labour\ Force} = \mathbf{Employed} + \mathbf{Unemployed}$$

Sometimes the unemployment-to-population ratio is suggested as possible indicator, i.e. the denominator is replaced by the whole population in the corresponding age range. The advantage of showing unemployment as a fraction of the labour force rather than the population is that the share of inactive people (e.g. students, people staying voluntary at home to care for their children and/or household) does not distort the proportion between employed and unemployed. Therefore, we select the more commonly reported unemployment rate which is a standard variable in labour market economics. The ILO also differentiates between the following types of unemployment¹²: cyclical, disguised, frictional, long-term, partial, seasonal, structural and youth unemployment as well as underemployment.

However, according to Ryan (2001) the classic definition of youth unemployment rate is the most accessible indicator for labour market problems. So it is not surprising that this indicator is the only one mentioned in each of the previously presented reports. To calculate it we take data from the ILO. The set covers 178 countries for the entire time period (from 1991 to 2012).

This indicator has several limitations. To begin with, the unemployment rate says nothing about the people being unemployed, e.g. whether they are well educated or whether they have work experience. According to Dewan & Peek (2007) low income countries tend to have a low unemployment rates because they lack social safety nets and unemployment benefits. People living in these countries are forced to take any job or try to be self-employed in order to survive. Apparently unemployment is rather a rich country problem.

ILO (2011) gives a good overview over other important limitations of the unemployment measure. Those arise due to differences across countries in the data source, the measurement methodology, the reference period, the geographical coverage, the definition of the age range, the methodology of the collection and conceptual variation. So the differences in the definition of active job search and differences in treatment of army employees, people living in protected institutions, students and apprentices lead to inaccuracy in the measurement of unemployment. These problems also arise if the data is collected by international institutions such as Eurostat, which generally uses a lower bound of 15 years old, but makes exceptions for some countries (like Italy or Spain) where the age range is up to 16 years. Further, the unemployment rate ignores discouraged workers, people who want to work but are no more actively looking for a job due to previous experiences (Husmanns et al., 1990). Hence the unemployment issue is underestimated by the unemployment rate. We address this issue by the inclusion of the indicator Relaxed Unemployment Rate into the set.

Finally there are two possible limitations in respect of data. First, some countries (amongst others Switzerland) report the unemployment rate according to their national statistics (like the SECO in the Swiss case), where only the registered unemployed are gathered. However,

¹²See the ILO thesaurus for unemployment on <http://www.ilo.org/thesaurus/defaulten.asp> accessed 16.10.2013

it is voluntary to register as unemployed and hence people entitled to benefits sign up more often. For instance, long-term unemployed and young people, that are not eligible for financial assistance, have no incentive to register. This can lead to an underestimation of the extent of unemployment¹³. Luckily those countries also report the unemployment rate according to the ILO standard (like the Swiss Federal Statistics office does). Hence, the decision of taking data from the ILO solves this problem. The second limitation consists of the fact that at least four different ways to collect the data exist: labour force sample surveys, official estimates, social insurance statistics or employment office statistics (Laborsta, 2013). Another issue is that the ILO resolution is only a recommendation and countries have the choice whether to implement it or not. Further, these guidelines are not perfectly specific, so that countries have some discretion about what is meant by actively seeking work or specific age range. As examinations of Sorrentino (2000) and Statistics Sweden (2013) show, the definitions and measurement methods vary substantially across countries.

Nevertheless all listed limitations, the information gained from this indicator is basal.

3.1.2 Relaxed Unemployment Rate

The relaxed unemployment rate relates the number of unemployed and discouraged workers to the whole labour force. Discouraged workers are classified as inactive because they are not actively seeking work, although they have no job and are currently available for work (Husmanns et al., 1990). They give up looking for a job mostly because of a lack in motivation due to previous bad experiences on the labour market. Essentially they are involuntarily inactive as Elder (2009) calls them.

For Husmanns et al. (1990) the existence of discouraged workers indicates that the labour market fails to provide enough jobs in a country. As those workers are willing and available to work they are seen as unutilised labour resources. By including this indicator in the set we get a closer picture of the actual amount of people having no job but wanting one. According to Husmanns et al. (1990) youth are especially affected by this phenomenon. Puerto et al. (2011) share this opinion and call therefore the relaxed youth unemployed "youth joblessness". As already mentioned, the relaxed unemployment rate alleviates one limitation of the unemployment rate by giving a clearer picture of the joblessness situation on the labour market.

The relaxed unemployment rate according to Elder (2009) and Puerto et al. (2011) is calculated as follows:

$$\text{Relaxed Unemployment Rate} = \frac{\text{Unemployed} + \text{Discouraged workers}}{\text{Labour force}} * 100$$

The data used to calculate this indicator are provided by Eurostat and cover up to 33 countries between 2005 and 2012.

Although the relaxed unemployment is a useful complement of the unemployment rate, it

¹³For a more detailed discussion see Siegenthaler, M. (2013), *Die "Erwerbslosenquote" ist die eigentliche Arbeitslosenquote*, <http://www.oekonomenstimme.org/artikel/2013/12/die-erwerbslosenquote-ist-die-eigentliche-arbeitslosenquote/>

also has its limitations. First, the same data collection problems apply as for unemployment (this will unfortunately be the case for most of the chosen indicators). Second, Hussmanns et al. (1990) and Dewan & Peek (2007) point out that discouragement is a delicate concept because the readiness and likelihood of people to (re-)enter in the labour force is difficult to be measured. However, Hussmanns et al. (1990) found no significant difference in re-entering the labour market between discouraged workers and other inactive people. Finally, Dewan & Peek (2007) suggest that if the people's willingness to work and availability is asked (which most labour force surveys do) the discouraged workers become a good indicator.

3.1.3 Rate of Young People Neither in Employment nor in Education and Training (NEET Rate)

The NEET rate is an additional concept that allows to capture the issue of youth inactivity. As full-time students are included in the category of economically inactive people, the problem of inactivity might be overstated. Therefore the NEET Rate was developed to capture only young people who are neither in employment nor in education and training, i.e. unemployed or inactive people which have not received any education or training in the four weeks preceding the survey (Eurostat, 2013a).

The NEET rate is a suitable indicator and a useful alternative to the indicators employment rate, labour force participation rate or inactivity rate, which can not be taken into consideration due to the classification of students and apprentices as inactive. Furthermore, it shows how much of the population needs to be mobilised to get a job (OECD, 2010). According to the ILO (2013b), people being in the NEET group are longer subjected to labour market and social exclusion as they are neither gaining work experience nor improving their employability through education.

The NEET rate is, as reported in the next equation, the proportion of the NEET out of the total population (Elder, 2009).

$$\text{NEET Rate} = \frac{\text{Youth Neither in Employment nor in Education and Training}}{\text{Young Population}} * 100$$

The fact that the calculation is in proportion to the population and not to the labour force is a further advantage which avoids the problem of youth in education not being part of the labour force (OECD, 2010). The data utilised in this tool are provided by the ILO and cover up to 42 countries from 1997 to 2012.

The drawback of this indicator is that young people do not want to be in the labour force for different reasons, like travelling or taking a gap year. Especially in high-income countries, it is therefore possible that the value of the NEET rate overestimates the real problem.

A new measure suggested by ILO (2013a) reports people neither in the labour force nor in education or training (NLFET). This measure compared to the NEET not only excludes employed but also unemployed, i.e. excludes the whole labour force. Hence this estimation focuses on a smaller part of the population. However, if combined with other indicators like irregular employment and the relaxed definition of unemployment rate, offer, in particular for

developing countries¹⁴, a much sharper picture of the labour market. Unfortunately, data for the NLFET rate are only available since 2013, while the ones of NEET Rate since 2000. We therefore stick to the NEET that still offers a relative accurate measure.

3.2 Working Conditions

After discussing the Activity State category that captures whether people are unemployed or inactive, we now focus our attention on the group of employed. For instance, in countries without unemployment insurance people are forced to take any job in order to survive (Dewan & Peek, 2007), suggesting that job stability and job quality differ. So, because the activity state dimension does not reflect the decency of jobs, we need some indicators that take working conditions into account. We therefore look at the type of contracts workers have, contrasting temporary and permanent contracts. Then, the working pensum need to be regarded, where our special interest lies in people involuntarily working part-time. These two indicators measure the stability of jobs (Cedefop, 2012). Additionally, the quality of jobs is important too. For that reason we consider the share of young people accomplishing atypical working hours, the proportion of youth in work but at risk of poverty and the cases of vulnerable employment.

3.2.1 Temporary Worker Rate

Employment contracts can be either permanent or temporary, whereby the latter are bound in time by a specified duration.

According to Booth et al. (2002) and OECD (2002) young and less educated people have disproportionally more temporary jobs. This is problematic because temporary jobs tend to pay less and have worse conditions regarding paid vacations, sick leave, unemployment benefits, fringe benefits and access to training. Furthermore, the reports found that the satisfaction of temporary workers with their job is lower due to inflexible schedules and monotonous tasks. By the way some reports (Blanchard & Landier, 2002 and Kahn, 2010) claim that temporary contracts lead to higher turnover rate but have no positive effect on employment (even a negative effect in some countries). Hence, a permanent job is better due to the provided security and better working conditions.

On the other hand, Larsson et al. (2005), Goebel & Verhofstadt (2008) and Cockx & Picchio (2012) among others, state however that temporary work for young people is not per se negative, but rather can be a sort of stepping stone to long-lasting jobs. Even though some evidence exists¹⁵, we assess that the job security effect overstates this possible feature of temporary contracts. In particular Larsson et al. (2005) find a positive effect of temporary work on the probability of find a permanent one. The limitation is that they focus the analysis on a subsidized career break program, hence just a small part of the overall situation was taken into account. Cockx & Picchio (2012) concentrate their research only on job lasting one quarter or less. They

¹⁴See the examples of Armenia and Togo at pages 40-41 in ILO (2013b)

¹⁵Actually also Booth et al. (2002) find (aside the low level of job satisfaction) some stepping stone effects on the British labour market. These are however quite different between gender and kind of temporary contract. Addison et al. (2013) identify similar trends for the United States.

however mention possible long-term negative effects of temporary work in respect to job quality and wages. Finally, Goebel & Verhofstadt (2008) identify a positive effect on the probability of transits from a temporary contract to a permanent one in respect to the same transition starting by the unemployment group. This effect however occurs only after a period of 21 months. Gagliarducci (2005) finds similar results. He shows that the probability of moving from a temporary contract to a permanent contract initially decreases¹⁶ and only starts to increase after the second year of temporary work. This suggests that temporary employment can lead to permanent employment if no interruption occurs in-between. Zijl et al. (2011) identify similar pattern. They argue that the reason of the increase in the probability over time is the accumulation of human capital.

Biavaschi et al. (2012) and OECD (2010) suggest a further issue that favours to use only short-term temporary contracts for the calculation of this indicator. Apprentices usually subscribe contracts for a fixed duration of time (usually at least 2 years). Hence, the overall share of temporary workers considers apprentices the same way as workers not attending a dual educational program. As a consequence, countries having high shares of youth involved in apprenticeship process would be penalised. Indeed, because we believe that apprenticeship conditions should not be equated with the ones of short-term temporary jobs, e.g. in terms of educational opportunities, job security and so forth, we sustain the restriction on workers with a contract shorter than 18 months. Of course we are aware that in some countries apprenticeship curricula shorter than 18 months exist. We however believe that the chosen indicator represents the best proxy of the optimal solution, namely the consideration of all temporary contracts not subscribed in an apprenticeship. An ongoing research project of the Education System Division, aiming to identify the typology of the education systems, will shed some further light on this issue.

Given all these findings we insert in the KOF YLM Index an indicator that describes the concept of temporary worker, but only for the group of youth having a contract with a duration shorter than 18 months. We exclude young workers with a contract longer than one and a half year because they mostly benefit of the previously cited positive effects.

Summing up, the temporary workers rate can be calculated by dividing all employees having a contract shorter than 18 months by the total number of employees:

$$\text{Temporary Contract Workers Rate} = \frac{\text{Employees with a contract} < 18 \text{ m}}{\text{Total number of employees}} * 100$$

The data source for this indicator is Eurostat. The geographical dimension is therefore limited to 32 European countries. The time period taken into consideration ranges from 1991 to 2012.

¹⁶Note that the high starting value is explained by the screening process that employers adopt to select the most productive workers.

3.2.2 Involuntary Part-Time Workers Rate

Part-time worker have been defined by the 81st Session of the International Labour Conference in 1994 as workers who has less normal working hours than comparable full-time workers. However there exists some variations for this definition between nations because the ILO has not yet officially defined full-time work. The OECD has defined part-time work in 1997 at a threshold of 30 hours a week to make the data comparable between its members (ILO, 2011). As we take the data from the OECD (see Table 2 in Section 4) we avoid comparison problems due to the different quantifications of full-time work.

For the KOF YLM Index we restrict the attention to people working involuntarily part-time. The reason is that, considering the whole group of part-time workers, it results difficult to determine whether this condition is caused rather by choice or by the necessity to accept a job. Further, as Sandor (2011) reports, part-time work has both positive and negative consequences. For instance it allows to achieve a higher employment rate, to adjust human resources to cyclical and may facilitate employees in finding a better work-life balance. However, part-time work in some sectors has negative effects for both employers and employees. On the employers side, part-time work increases the labour costs, while in respect to the employees it is associated with lower earning, fewer possibilities to make career and finally is limited to low-skilled jobs.

The contrast between these effects make part-time worker rate not suitable to the second essential condition to create an indicator, i.e. does not allow to say if a high or a low share is optimal.

On the opposite, working involuntary part-time represents clearly a waste of human resources as these people would choose to work more if they had the chance. This point makes the share of involuntary part-time worker a convincing indicator to be included in the KOF YLM Index.

As reported in the next equation, the part-time employment rate is defined as the number of involuntary part-time employment in proportion of total employment.

$$\text{Involuntary Part-Time Workers Rate} = \frac{\text{Involuntary part time employment}}{\text{Total employment}} * 100$$

The OECD data for this indicator cover up to 39 countries from 1991 to 2012.

3.2.3 Atypical Working Hours Rate

As many statistics document, the number of workers having atypical work schedule has increased significantly during the last decades. However, working shift, during the night or at weekends can impact the personal well-being by affecting social life, health, cognitive abilities or other aspects of private life. Hence, working atypical hours is perceived as a burden by most people (Arthur et al., 2002, Rouch et al., 2005).

Eurostat (2009) defines people accomplishing atypical working hours as individuals who work either shift, in the evening, at night, on Saturday or on Sunday. Shift work is defined by Eurostat as employment with a regular schedule where at least part of the work is done outside the normal working hours (8:00 to 18:00 on weekdays). The definition of evening and night

work are similar. Work done after the normal working hours but before usual sleeping hours is considered as evening work, whereas night work occurs during the usual hours of sleep, so that night workers have to sleep at abnormal sleeping times. Then, Eurostat defines working on Saturdays or Sundays as people who usually work on two or more Saturdays or Sundays in a month.

To determine the indicator included into the KOF YLM Index we only include people working shifts, at nights and on Sundays. We therefore decide to omit values for Saturdays and evening work because considered less less damaging. The former is excluded because nowadays, on the basis of an European perspective, an increasing part of young employees (either in formal education or not) works on that day. According to Eurostat (2009) in 2007 the EU-27 average of people aged 15 to 24 working on Saturday either occasionally or regularly (one Saturday, respectively two or more Saturdays during the four-weeks reference period) was above 50%. Such a widespread tendency should be, in our opinion, not considered as "atypical". The same reason applies to the exclusion of the parameter describing working in the evening¹⁷ with the additional argumentation that evening work make it easier for students to combine formal education and (part-time) work.

The three selected values are then conducted into a single indicator. To account for the possibility that one single person might simultaneously fulfil more than only one condition (i.e. work shift, at night and on Sundays) we weight the three rates arithmetically, as reported in the equation below.

$$\mathbf{A.W.H. Rate} = \left(\frac{\textit{Working on Sunday}}{\textit{Tot. employees}} + \frac{\textit{Working at night}}{\textit{Tot. employees}} + \frac{\textit{Working shift}}{\textit{Tot. employees}} \right) * \frac{1}{3} * 100$$

Unfortunately neither the ILO nor the OECD provide data of all three components for every country. We therefore restrict our analysis to Europe, for which Eurostat provides data up to 33 countries between 1992 and 2012.

The only limitation, besides the data collection, is, as suggested by Anker et al. (2003), that this kind of data is primarily gathered for industrialised countries.

3.2.4 In Work at Risk of Poverty Rate

The basic idea behind this indicator lies in knowing how many people have a job which does not pay enough to ensure a decent and carefree life.

The ILO includes in the Key Indicators of the Labour Market an indicator for wages and one for poverty (KILM 16 and 18, see ILO, 2013b). The first one, the indicator for wages, expresses nominal and real values of wages with the aim to identify trends. The wages are expressed in the local currency unit in order to avoid distortions due to exchange rate fluctuations, which limits it's usefulness in a cross-country comparison through. In respect to poverty, the ILO provides data about the proportion of the population living below the international poverty line defined

¹⁷In 2007 the EU-27 average of young people working in the evening was slightly above 40%.

by the World Bank International of US\$1.25 (for extreme working poor) or US\$2 (for moderate working poor) per person per day (at purchasing power parity). In case of comparison across countries this is however not the best definition because the degree of deprivation that an income of less, say, US\$1.25 is not the same across countries. For instance differences in prices between regions inside a country or the impact of climate on the need for food and clothing influences the real value of the poverty line. In our view these two indicators are more meaningful when combined.

The Eurostat reports the quote of people providing work but being at risk of poverty (see Eurostat, 2013b). There the threshold for at-risk-of-poverty classification is set at 60% of the national median equalised disposable income. To account for the cost of living differences across countries the income is expressed in purchasing power standards.

The indicator is calculated as the share of employees in work at risk of poverty:

$$\text{In Work at Risk of Poverty Rate} = \frac{\text{In work at risk of poverty employees}}{\text{Total number of employees}} * 100$$

The comparison of the data should not be an issue here, because of the collection methods applied by Eurostat. Indeed the limitations lie in the restricted number of countries (i.e. only 32 European countries) and in the relatively short time range (from 2004 to 2012).

3.2.5 Vulnerable Employment Rate

To understand the dynamics of the labour market, the level of development of a country and the economic risk which the workers are subjected to, the ILO (2011, 2013b) categorises workers by six employment status categories: employees, employers, own-account workers, members of producers' cooperatives, contributing family workers and workers not classifiable by status. From those categories, the own-account workers and the contributing family workers are less likely to have formal work arrangements and are therefore less protected by the laws and more exposed to economic risk. So they are summed to build the indicator vulnerable employment (Elder 2009 and ILO 2011, 2013b).

Further proposed indicators for capturing the economic risk and vulnerability of workers are employment by sector, employment by occupation and public sector employment. For example, employment in the agriculture sector is seen as more vulnerable whereas public sector employment is seen as more secure. However, for the purpose of identifying the economic risk in employment, the indicator vulnerable employment is the simplest and most straightforward indicator.

As the interest lies in the proportion of vulnerable employment on total employment the vulnerable employment rate is calculated as follows:

$$\text{Vulnerable Employment Rate} = \frac{\text{Own account workers} + \text{Unpaid family workers}}{\text{Total employment}} * 100$$

This indicator has two main limitations. Firstly, it is limited by data availability. Even

though the ILO provides data from 1991 to 2012 for up to 145 countries, information exists only for the whole working population. This means that it is not possible to calculate the correct values for those aged 15 to 24. The situation for young people is similar or even worse. The indicator will therefore underestimate the real impact of vulnerable employment. Secondly, some employees might be in vulnerable employment whereas some own-account workers might have a secure employment (Elder 2009 and Puerto et al. 2011). Since these two effects act in the opposite direction, they partially compensate each other, suggesting that the indicator might over- or underestimate the true vulnerability of employees.

Despite these limitations, we are confident that the inclusion of this indicator brings additional value in the description of the youth labour market, especially in the case of developing countries.

3.3 Education

The two previously presented categories describe on the one side the situation of young people either unemployed or inactive (but not in education) while on the other side the conditions which young workers are faced on. This subsection focuses now on the role played by education. In respect to this dimension we include two indicators: a value describing the involvement of youth in the education system (the share of the youth population getting further education or training after completing compulsory education) and a measure for the relevance of the provided education in relation to the labour market requirements (skills mismatch). Note that the involvement of youth in the education system is related to the NEET rate, which measures the share of people inactive in both the labour market and education.

The reason for not including more indicators in this category is the use of the International Standard Classification of Education (ISCED) in the creation of the indicators. In our opinion, the ISCED method provides misleading information for some countries as the density of the qualification degrees is not considered in the classification. To give an example, some kind of Bachelor's degree acquirable in United States community colleges show a similar length, curriculum and quality as apprenticeship programs in Switzerland or Germany. Nevertheless, the ISCED classifies them in different groups, although the competences acquired are similar. At the same time this classification cannot be used to compare countries according to it as a given ISCED class in one country is not necessarily equivalent to the same ISCED class in another country. Oloffson & Wandsjö (2012) highlight that this is especially the case for ISCED 3 class. They further identify a second problem related to ISCED, namely the fact that this classification gives no information about the proportion of youth that actually have completed a certain education path as opposed to dropouts. Indeed the requirements for completing an education differs across countries and in some instances even though between the education programmes inside the same ISCED class within a single country. Silke & Kogan (2008) point out some other issues related to the ISCED classification. First of all, they argue that the educational systems evolve over time (reform, structure of the degree, etcetera) and thus create a challenge in the subdivision in classes. Further the process of coding is still different across

countries. Finally, they note that across countries different curricula end up with the same ISCED level. There is hence not enough differentiation between classes.

Unfortunately, there are no recognised indicators regarding education that does not include ISCED classification. In order to avoid the omission of an important concept like education, we still utilise indicators based on ISCED classification, but conscious of their rough limitations.

3.3.1 Formal Education and Training Rate

For young people is important to get further education after leaving mandatory school, as it increases their skills and later their chances to get a good job. Additionally, the ILO (2011) states that the advances in machinery and technology requires higher knowledge to increase economic growth and improve welfare. We therefore include this indicator in the KOF YLM Index and consider higher values as more desirable.

There exist three types of education: formal, non-formal and informal. For the KOF YLM Index we focus on the formal one, which is defined by Eurostat (2013c) as education provided by formal institutions like schools, colleges or universities. This include also training, so that apprentices attending a dual program (i.e. with both school- and work-based training) are taken into consideration. We neglect non-formal education due to its heterogeneity, i.e. because it is difficult to judge to what extent the acquired skills are relevant and useful in the workplace. Similarly informal education is excluded as it does not comply with any standards.

The rate of people in formal education and training is calculated as:

$$\text{Formal Education and Training Rate} = \frac{\text{Particip. in formal edu. \& training}}{\text{Young Population}} * 100$$

The data source for this indicator is again the Eurostat. This institution supplies data for up to 33 countries for a relatively recent time period (2003 to 2012).

This measure is just a rough indicator of how much education and skills the youth acquire. More detailed information about education levels would be desirable, but as long as there is no adequate classification, this remains the best disposable indicator.

3.3.2 Skills Mismatch Rate

The term skills mismatch describes the disequilibrium between the skills provided by workers and the skills required by companies. It is hence an imbalance between the supply and demand side of the labour market. Because mismatch is a multi-dimensional concept (see e.g. ILO, 2013a and Livingstone, 2009) no shared definition of skills mismatch exists.

As the countries do not directly measure skills or competences in their statistics, proxies like qualifications, years of schooling or occupations, are needed for capturing skills mismatch. The ILO (2013a, 2013b) uses two approximations, both based on the ISCED classification. The first one, the so called skills mismatch between labour supply and demand, examines the occurrence of unemployment rate at the different ISCED level. The aim is to investigate if some education classes are more or less affected by unemployment rather than others. The second one, called

skills mismatch between job requirement and qualification, combines the ISCED level with the International Standard Classification of Occupations (ISCO). An individual is then matched if it works in an ISCO class that is associated with the ISCED class of the achieved education. Otherwise it is defined as mismatched. This approach focuses mainly on qualification and requirement and allows statements about over- and under-qualification. The second method has however many drawbacks. As the ILO (2013b) suggests, it is more sensitive to economic fluctuations and likely to overestimate under-qualification in developing countries. For this reason we prefer the first approach. The proxy for skill mismatch is hence build according to the following index of dissimilarity:

$$\text{Skills Mismatch Rate} = \frac{1}{2} * \sum_{k=1}^3 \left| \left(\frac{\text{Emp. with edu. } k}{\text{Total emp.}} - \frac{\text{Unemp. with edu. } k}{\text{Total unemp.}} \right) \right|$$

where k is the level of education (primary or less; secondary; tertiary).

This indicator captures the effectiveness of the education and training systems to provide workers with the skills needed in the labour market (Perez et al., 2010).

The data are gathered by the ILO. The set covers up to 48 countries between 2000 and 2012. Note that the age range is stretched to 15-29 years for this indicator. The reason for this extension is that, because we are speaking about educational level, it is difficult that youth aged 15-24 have already finished a tertiary education (ISCED level 5-6). The enhancement till age 29 years enable us to consider the effects and consequences that a certain education level (especially a tertiary level) effectively have on the labour market.

The limitations are, as already mentioned, the use of ISCED classification and the systematic division of labour force in only three groups. Additionally, the problems with the collection of unemployment data apply also here.

3.4 Transition Smoothness

After focusing our attention on Activity State, Working Conditions and Education, the Transition Smoothness category aims to characterize the difficulty of youth in the transition from school to workplace, thereby allowing to analyse the dynamic component of the transition. Key indicators for a smooth transition in the existing literature are the relative unemployment, job tenure, job mobility and long-term unemployment. Job mobility and job tenure are not included in the KOF YLM Index as it is difficult to rank them. Is high job mobility respectively low job tenure positive or negative in respect of youth employed? Ryan (2001) presents two approaches to explain high job mobility, namely the informational approach and the segmentationist approach. In the first, young workers have high job mobility (respectively low job tenure) because they lack of experience and therefore their investment in information about jobs and job market is greater. In the second approach high wage firms in a segmented market use worker's age as a productivity indicator so that at the beginning of the career young people only get low wage jobs. Young workers should hence wait into low wage firms that encourage them to change

job frequently until finding a high wage firm. Depending on the approach a high job mobility (respectively a low job tenure) is desirable or not. Because the two approaches yield opposing valuation of job mobility and tenure we decide to not take into consideration job tenure and job mobility.

We thus include in the KOF YLM Index an indicator for relative unemployment and another for the incidence of long-term unemployment. Note, that both of these indicators are related to the Activity State indicators. They are assigned to this category due to their more dynamic nature. Also note, that the skills mismatch indicator included in the Education category also has a dynamic component and could hence be included in this category as well.

3.4.1 Relative Unemployment Ratio

Relative unemployment ratio compares youth unemployment rate with adult unemployment rate. The purpose is to analyse if unemployment is more specific to the youth, which would suggest a low transition smoothness, or if the whole economy is hit by unemployment ILO (2011) and hence youth are affected in the same proportion as adults.

The relative unemployment ratio calculation is:

$$\text{Relative Unemployment Ratio} = \frac{\text{Young unemployment rate (15 – 24)}}{\text{Adult unemployment rate (25+)}}$$

If unemployment rate affects the youth cohort with the same degree of strength than the adult group, than the relative unemployment ratio will be equal to one. Otherwise, if the youth are more concerned, then the ratio will be a number bigger than one. Theoretically this values could be also smaller than one; this circumstance is however not observable in the reality.

The data for this indicator are collected by the ILO and cover all countries taken into consideration in the KOF YLM Index between 1991 and 2012. Here again, the limitations of the unemployment rate measurement apply.

3.4.2 Long-Term Unemployment Rate

The long-term unemployment rate captures the share of unemployed having been unemployed continuously without occupation for a year, i.e. 52 weeks, or longer (ILO, 2011). This indicator shows whether unemployment is more a complex and elaborated problem due to the structure of labour market rather than only a short phenomenon caused by high mobility of workers.

On the one hand it is possible to argue that being unemployed is unpleasant, but sometimes only a temporary condition while searching a new job. Furthermore, short-time unemployment can be handled with unemployment insurance, savings or support of the family. On the other hand, one should bear in mind that long time unemployment implicates negative effects on the future employment possibilities (Abraham et al., 2013). Finally, it indicates if the matching between supply and demand functions so that the transition between jobs or from school to job is smooth (ILO, 2011).

The ILO reports two calculation methods for long-term unemployment. The first relates the

long-term unemployed to the labour force and is called long-term unemployment rate whereas the second measure is in proportion to the total unemployed and is called incidence of long-term unemployment (ILO, 2011). For the KOF YLM Index we choose the latter as the aim is to give a time perspective on the unemployment incidence over time. The dataset provided by the ILO cover up to 50 countries between 1991 and 2012. The calculation method is:

$$\text{Incidence of Long-Term Unemployment} = \frac{\text{Unemployed longer than one year}}{\text{Total unemployed}} * 100$$

This indicator suffers from the same limitations as the unemployment rate indicator. Additionally, it is not as relevant in developing countries as it is in developed ones due to the lack of unemployment compensations (ILO, 2011).

4 Data and Methodology of the KOF Youth Labour Market Index

Based on the labour market indicators defined in the previous section we develop the KOF Youth Labour Market Index (again hereafter abbreviated as KOF YLM Index). For the illustration, we choose a scoreboard, where we display the actual values and the scores for each indicator as well as the ranks among all available countries in a given year, the categories scores and the values of the KOF YLM Index¹⁸. In the following, we explain the data sources and calculation methods used to derive scores, ranks and the KOF YLM Index.

4.1 Data Sources

Table 2 shows that the data used to build the scoreboard and the KOF YLM Index are essentially taken from three institutions: ILO, OECD and Eurostat. The reason for using three different sources is to maximise data availability. However, the data provided by those three institutions are not always exactly the same, possibly due to different calculation methods. We therefore do not mix the data from diverse sources inside the same indicator, e.g. data about unemployment rate are only taken from the ILO and not the result of a matching process between data sets.

Indicator	Source	Years	Nr. of countries
Unemployment Rate	ILO	1991 - 2012	up to 178
Relaxed Unemployment Rate	Eurostat	2005 - 2012	up to 33
NEET Rate	ILO	1997 - 2012	up to 42
Temporary Contract Workers Rate	Eurostat	1991 - 2012	up to 32
Involuntary Part-Time Workers Rate	OECD	1991 - 2012	up to 39
Atypical Working Hours Rate	Eurostat	1992 - 2012	up to 33
In Work at Risk of Poverty Rate	Eurostat	2004 - 2012	up to 32
Vulnerable Employment Rate	ILO	1991 - 2012	up to 145
Formal Education and Training Rate	Eurostat	2003 - 2012	up to 33
Skills Mismatch Rate	ILO	2001 - 2012	up to 48
Relative Unemployment Ratio	ILO	1991 - 2012	up to 178
Long-Term Unemployment Rate	ILO	1991 - 2012	up to 50

Table 2: Information about the data sources ¹⁹

Our age restriction to the 15 to 24 years old makes the collection of data sometimes difficult because not in the case of all indicator data are available or make sense for this age range. So for the indicator Vulnerable Employment Rate we had to take the data referring to the total population. In the case of Skills Mismatch Rate the age range is 15 to 29. As already explained, the reason is that few young people aged less than 24 have finished their tertiary education yet. The ones that managed to accomplish this curriculum, either because of country specific educational path or because of personal abilities, are very few such that a statistical interpretation of employment/unemployment shares result inaccurate. To avoid extreme results

¹⁸Appendix E reports some examples of scoreboards referred to the countries considered in the descriptive analysis in Section 6.

¹⁹For an exact source path please check Table 6 in Appendix B.

in the calculation for the index of dissimilarity we thus extend the age range.

In cases where several data sources for an indicator exist, the one with the larger data set (due to more countries or longer time series) is chosen.

In total we include 178 countries. The decision to include exactly those countries is based on the data available by the ILO. This institution actually assembles data from many different sources (OECD, World Bank, Eurostat, Labour Force Survey of singles countries, etcetera) having the same statistical definitions. Our train of thought is that if a country is not included by the ILO, then the data availability of other indicators for that country will be practically non-existent. The list of all countries taken into consideration in the KOF YLM Index can be found in Appendix A.

Concerning the time range we take data from 1991 to 2012. The reason for this time period is again the data availability. Before 1991, little data is available. Table 2 displays for every indicator the number of available countries in the year with the largest amount of observations.

As mentioned in the previous section, we use indicators that show relative values (shares or ratios) to allow comparison across countries, thereby circumventing problems due to differences in population size, labour force or number of employees.

4.2 Calculation Methods

The calculation methods applied for scores, ranks and index are based on the World Economic Forum (WEF) Global Competitiveness Report 2012-2013 (see Schwab & Sala-i-Martin, 2012). However, we extend and adjust the concept slightly. Furthermore, we introduce some additional options in the KOF YLM Index like the flexible weighting process of categories and indicators. The exact procedural methods are described in the corresponding parts below.

4.2.1 Scores

The gathered data are standardized for each indicator into a scale of 1 to 7 as in the WEF Global Competitiveness Report. A higher score means that this country's labour market situation is more favourable and more efficient in integrating their youth into the labour market. Equation 1 and 2 show the formulas for this standardization which gives the scores.

The first is for indicators for which a higher value is associated a higher score. The second formula is per contra for indicators for which a higher value is undesirable and therefore should get a lower score. The score of the indicator Formal Education and Training Rate is the only one applicable to the first equation while all others are computed with the second one.

$$score_{nit} = 6 * \left(\frac{indicator_{nit} - \text{fixed min}}{\text{fixed max} - \text{fixed min}} \right) + 1$$

$$score_{nit} = -6 * \left(\frac{indicator_{nit} - \text{fixed min}}{\text{fixed max} - \text{fixed min}} \right) + 7$$

where n indicates the indicator number, i the chosen country and t the specified year.

In contrast to the WEF Report (Schwab & Sala-i-Martin, 2012) we fix the minimum and the maximum to have comparable scores over time. Else the scores would depend on the sample minimum and sample maximum and therefore change over time. Like this we would not be able to compare the scores of one country for different years. Furthermore, the set of available countries changes for almost all indicators every year. For instance, if a country starts at some point to have data for a certain indicator and this value is the highest/lowest in the dataset, then the scores of all other countries will be modified. As we do not want that any of those events influence the score we fix minimum and maximum.

Theoretically, because all indicators are expressed as a rate (only exception is relative unemployment, that is a ratio) the considered values can range between 0 and 100%. However in many cases the values are dispersed only in a small part of the spectrum. For example no country has a Temporary Worker Rate value higher than 80%. So the choice to fix the upper bound to this percentage creates a more dispersed distribution of the scores in the scale between 1 and 7. In particular this modification enables to observe the small differences between countries with similar values better. All the upper (and in one case the lower) bounds are hence shifted so that the scores fit all the spectrum of the distribution (i.e. occupy approximately the full range between 1 and 7). For some indicators happen that few countries report very high values, far away from the rest of the other countries²⁰. In this cases we arbitrarily decide to set an upper bound lower than these outliers. The countries having a value higher than the upper bound receives for this specific indicator a score of 1. The disadvantage of this methodology is that countries reporting an outlier value are hence no more comparable between each other (because both have a score of 1). We however consider the advantage of a more dispersed distribution of the remaining countries preponderant.

The lower bound for almost all indicators is 0 (the only exception is Formal Education and Training Rate that is set to 30%). On the contrary upper bounds differ from indicator to indicator. Temporary Worker Rate and Formal Education and Training Rate have an upper bound of 80%. The upper bound for the indicators Relaxed Unemployment Rate is 70%, while both Unemployment Rate and Incidence of Long-Term Unemployment Rate are set to 60%. NEET Rate, Skills Mismatch and Vulnerable Employment Rate have a upper bound of 40%. Further we set the level at 30% for Atypical Working Hours Rate and Working at Risk of Poverty Rate. Finally, the upper bound for Relative Unemployment Ratio is set to 10. This means that the score will be 1 if the unemployment rate for youth is ten times or more the one for adults.

Note that the levels of the upper bounds reflect the actual distribution of the values. Presumably in the future years the indicators' values will change and upper bounds might not be adequate any more. For example, the portion of youth in developing countries attending formal education is expected to rise in the next year and therefore a modification of the lower bound might be recommendable. Or the percentage of youth working at risk of poverty may decrease

²⁰The detail of which observations exceed the upper bounds are not reported in this guide, but available upon request from the author.

and hence an adjustment of the upper bound of this indicator might be possible.

The scores of the categories (c) Activity State, Working Conditions, Education and Transitions Smoothness for country (i) in year (t) are calculated, as reported in equation 3, as the averages of the available indicators contained in each group:

$$score_{cit} = \frac{\sum_{n=1}^{m_c} s_{cnit} * w_{cn}}{\sum_{n=1}^{m_c} w_{cn}}$$

where (s) is the score of each single indicator, (m_c) is the total number of indicators in a category (c) with score different from zero, indexed by (n). The fact that the number of indicators in a category is variable is firstly due to the different amount of indicators and secondly because indicators without available data are completely excluded from the calculation.

4.2.2 Ranks

Besides the scores, the developed scoreboard displays the ranks of the country for each indicator. The reason to do so is that the score does not allow to clearly determine if the difference between the scores of two countries is in a comparative perspective meaningful (i.e. if many other countries positioned in-between) or if actually the distribution among countries is more dispersed (i.e. only few countries have a score in-between). The rank is computed only among countries having data for that indicator, so that countries without value does not distort the ranking. Given that the number of available observations change from year to year, if a country is analysed over time, the rank is meaningless without knowing the total number of countries displayed in the ranking. Therefore the scoreboard additionally provides the total number of countries for each year and indicator separately. Even if the number of countries remains the same, the sample of countries might vary suggesting that different countries are compared. We hence recommend caution in the comparison of ranks across time.

4.2.3 The KOF YLM Index

The KOF YLM Index is a weighted sum of all scores (s) of a country (i) in a year (t). The exact calculation is displayed in the equation below. We modify the methodology of the WEF Global Competitiveness Report (Schwab & Sala-i-Martin 2012) by including two weighting factors. One gives different weights (w_c) to the classification category. The other weights the indicators within a category (w_{cn}). Again the (m_c) in the equation indicates that the number of indicators in a category is variable. Similarly (k) indicates the number of classification category which have data for at least one indicator, else the category is excluded entirely from the calculation.

$$Youth\ Labour\ Market\ Index_{it} = \frac{\sum_{c=1}^k w_c * \frac{\sum_{n=1}^{m_c} s_{cnit} * w_{cn}}{\sum_{n=1}^{m_c} w_{cn}}}{\sum_{c=1}^k w_c}$$

In the standard setting all categories are included with a weight of one ($w_c=1$ for every c). Also the weight of the single indicators (w_{cn}) within each category is set to one per default.

Table 3 summarize the subdivision of the weights inside the KOF YLM Index. As previously mentioned, each of the four categories accounts for a quarter of the whole index. The 25% is for each of the categories subdivided in an equal way between the corresponding indicators. This subdivision is a normative set justified by the belief that each of the four categories represents in an equal manner an aspect of the youth situation. Because no theoretical background exist, we give the same importance to every indicator inside each category. As soon as future insight will be provided, possible modification could be implemented.

Categories (in bolt) and indicators	Weight of the category (w_c)	Weight of the indicator (w_{cn})
Activity State	25%	
Unemployment rate		8.3%
Relaxed unemployment rate		8.3%
NEET rate		8.3%
Working Conditions	25%	
Temporary worker rate		5.0%
Involuntary part-time worker rate		5.0%
Atypical working hours rate		5.0%
In work at risk of poverty rate		5.0%
Vulnerable employment rate		5.0%
Education	25%	
Formal education and training rate		12.5%
Skills mismatch rate		12.5%
Transition Smoothness	25%	
Relative unemployment ratio		12.5%
Incidence of long-term unemployment rate		12.5%

Table 3: Summary of the standard weights

This subdivision presented in Table 3 is however the default case. In the web application, developed beside this report, we leave to the user the possibility to modify the weighting factors of the categories and/or of the indicators. For instance, the weight of a single indicator can be changed to double or triple the importance of this indicator inside the category. Setting the weight to zero excludes a category or an indicator from the KOF YLM Index. We leave this decision to the users so that they can adapt the KOF YLM Index in case they have a particular view on the meaningfulness of the chosen categories/indicators or they would like to compare two countries only on the basis of the common indicators.²¹ Additionally the weighting process can be used to differentiate the importance of categories or indicators in dependence of country-specific factors. For instance Schwab & Sala-i-Martin (2012) suggest in respect of competitiveness variable weights in accordance to the country development status. A possible differentiation related to the youth labour market can be based on the structure of the education system.

²¹Examples of this approach are presented in Section 6.

5 Additional Features: Groups of Countries and Data Availability Limitations

In this section we introduce the concept of country group. The aim of this feature is to provide a benchmark for the comparison of countries. We present the group definition. Further two main problems due to the grouping process and data availability are discussed. Finally we list some possible approaches to solve these problems as well as a short consideration about the evolution of groups over time. Alternatively the weighting process could be used to differentiate the importance of the categories/indicators in dependence on country-specific characteristics. For instance by distinguishing in dependence on the development status of the country (as suggested by Schwab & Sala-i-Martin, 2012) or the structure of the education system. In respect of this pattern we leave the choice to the user.

5.1 Definition of groups

Besides the options of comparing different countries, the possibility to observe the evolution of a single country over time or every mixed form, an additional feature allows the comparison of a country with a group of countries. A single country can for example be compared to the OECD members average or to the mean of the EU-28 countries. Group definitions can be based on geography, development status, economic condition, political system or any other criteria.

Group	Number of members	Avail. indicators out of total	Average coverage of indicators ²²	Source for classification
OECD	34	12 / 12	78 %	OECD
EU-28	28	12 / 12	99 %	EU
EU-15	15	12 / 12	99 %	EU
G8	8	12 / 12	68 %	G8
Developed Countries	53	12 / 12	62 %	World Bank
Least Developed Countries	42	4 / 12	18 %	World Bank
Developing Countries (DC)	83	12 / 12	25 %	World Bank
DC: East Asia & Pacific	18	4 / 12	20 %	World Bank
DC: Eastern Europe & Central Asia	20	12 / 12	38 %	World Bank
DC: Latin America & Caribbean	22	6 / 12	23 %	World Bank
DC: Middle East & North Africa	11	4 / 12	20 %	World Bank
DC: South Asia	8	3 / 12	19 %	World Bank
DC: Sub-Saharan Africa	44	5 / 12	18 %	World Bank
High Income	57	12 / 12	59 %	World Bank
Upper Middle Income	45	12 / 12	29 %	World Bank
Lower Middle Income	41	5 / 12	20 %	World Bank
Low Income	35	4 / 12	19 %	World Bank
Africa	52	5 / 12	18 %	Worldatlas
Americas	32	7 / 12	22 %	Worldatlas
Asia	46	9 / 12	22 %	Worldatlas
Europe	42	12 / 12	79 %	Worldatlas
Oceania	5	4 / 12	23 %	Worldatlas

Table 4: Classification in groups (in 2012)

²²Average of the coverage rate of all indicators.

The reason for the creation of groups is to give a benchmark for comparisons between a single country and a group of similar ones. Furthermore, it is also possible to compare two groups or look at the evolution of the values of a group over time.

Table 4 shows an attempt of subdivision in groups and the respective number of countries included in each group, the number of indicators for which at least one country disposes of data, the average coverage and the source used for the creation of the groups. In respect of the calculation methods we assign the same weight to every country inside a group.

We arbitrarily decide to focus our attention on socio-economic factors and therefore to integrate the subdivisions in developing status and in income classifications. Additionally we include some political groups like OECD, G8 and EU members as well as a geographical subdivision in continents. Note that the more the focus is putting on the past, the less data (both the number of indicators and the coverage of the countries) are available.

A potential future extension of this option is the grouping in accordance to the education system. A possible categorization of education systems is proposed by Biavaschi et al. (2012). This feature is however behind the purposes of this first release of the KOF YLM Index and will be implemented in a second step.

5.2 Problems of grouping due to data availability

The previously described arrangement of countries in groups points out a main problem:

Problem 1: For some indicators only few countries belonging to a group dispose of reliable values.

As a consequence the calculated average does not reflect the "right" value of the group. In an extreme case an indicator value for a group can result as the average of a single number, i.e. the value of only one country. For example, in 2011 the only Low-Income country with a value in the indicator Vulnerable Employment was Cambodia. The group value for this indicator will then simply reflect the one of Cambodia. Naturally also the whole KOF YLM Index results biased by this kind of procedure.

An additional problem is created by the low number of indicators available for the developing countries. More precisely the issue can be described as follows:

Problem 2: Some developing countries achieve high KOF YLM Index values due to low values of Unemployment Rate and Relative Unemployment Rate in combination with a lack of scores in all other indicators.

As reported in Section 3.1.1 the values for Unemployment Rate (and Relative Unemployment Rate) in developing countries are in general very low. This is often the consequence of the absence of a social safety net and scarce unemployment benefits as well as the readiness to accept jobs that offer bad working conditions. In addition, the vast majority of developing countries does not dispose of values for indicators that compensate it (like NEET Rate, In Work at Risk of Poverty or Atypical Working Hours). The result would be that, because of the very good scores

in few available indicators, a group of developing countries achieves better scores than a group of developed ones. For instance, in year 2011 the group of Sub-Saharan countries²³ have an KOF YLM Index of 5.22 in a scale between 1 and 7, while EU-28 and OECD of "only" 4.63 and 4.77, respectively.

5.3 Possible methods of resolution

To solve the two previously highlighted problems many approaches are applicable. In particular we identify five possible solutions:

i) *Index based on common indicators*

This approach is the least invasive one. The idea is to generate a second index that only takes into account the common indicators of the compared countries/groups of countries. For example if a country/group of countries have values for the indicators number 1, 3, 9 and 10, while a second country/group of countries for respectively indicators 3, 9, 10 and 12, the index of common indicators will result as the weighted average of the indicators number 3, 9 and 10. Now a comparison between for instance developed and a developing countries shows less dispersive values, but still in some cases higher values for developing countries due to good scores in the indicators Unemployment Rate and Relative Unemployment Rate. The obvious advantage of this method is that it allows a clear comparison on the basis of common indicators. However, drawbacks like the smaller set of comparable countries/groups, the loss of significance for the KOF YLM Index due to the restricted amount of indicators and a possible confusion due to the introduction of a second index tend to outshine the positive effects. This approach has no impact on problem 1 while it solves problem 2 only on the surface.

ii) *Minimum number of countries necessary to generate a group score*

The idea is to insert a lower bound for the number of available country scores necessary to create a group score. Otherwise, namely if the lower bound is not reached, the group score for this indicator will be set to zero. The lower bound can be set as a fixed number (e.g. minimum five countries should have a value for a certain indicator) or as a percentage of the number of countries enclosed in a group (for example that at least 50% of the countries member of a group should have a country score in order to create the group score). The benefit of this statement is to completely resolve problem 1, while problem 2 still occurs if the analysis focuses on single countries.

iii) *Minimum number of indicators necessary to generate a group score*

Table 7 in Appendix C reports the number of available country scores for every group in each indicator. As deducible from this table, approximately half of the groups are reasonably represented. The other half disposes of less data. A feasible procedure consists in setting a lower bound on the number of indicators, that a group should have in order to be included

²³The composition of these groups follows the one of the World Bank, see Table 4.

into the KOF YLM Index. For instance, by imposing a lower bound of eight indicators many groups would be excluded because of data availability. The remaining groups are primarily the ones composed of Developed and High Income countries. This approach partially solves problem 2, with the exception that the group Developing Countries and its subgroups Developing Countries in Eastern Europe and Central Asia still remain included in the tool, even though for these groups many scores of indicators are constructed on the basis of very few country observations. Problem 1 remains unfortunately unaffected by this method.

- iv) *Minimum number of countries necessary to generate a group score and exclusion of countries with less than a minimum number of indicators*

This approach combines the two previous methods. The idea is to set both a lower bound for the number of countries necessary to generate a group score and a minimum number of indicators required to build the KOF YLM Index of the group. This approach merges the advantages of the two precedent approaches: on the one hand, the introduction of a minimum number of countries necessary to create a group-score solves problem 1, while a lower bound for the number of available indicators allows to settle problem 2. The combination of the consequences of the two approaches further restricts the choice of feasible groups. For example by setting a lower bound of 30% for countries and a minimum of eight indicators per group we end up with only seven possible groups (namely OECD, EU-15, EU-28, G8, High Income Countries, Developed Countries and the geographical group Europe). The disadvantage of this method is essentially the exclusion of many groups. Note however that all countries remain included in the model because the restrictions apply only during the weighting process.

- v) *Exclusion of countries with less than a certain number of indicators*

The most radical solution is to drop all countries that fail to achieve a minimum number of indicators. The basic idea is that only countries with a sufficient number of indicators really describe the situation on the youth labour market. Countries that mainly report data related to the factor unemployment²⁴ do not provide sufficient information and sometimes can even display a biased picture. Table 9 in Appendix D reports the percentage of countries in dependence on the number of available data for each indicator. A substantial share of countries reports data only for few indicators²⁵, while approximately one fifth disposes values for more than 4 indicators. Finally, less than 15% of countries report values for all indicators. Such as by setting a lower bound of 8 indicators, all least developed and the majority of developing countries drop out of the sample. The remaining countries are now easily comparable and the only groups that can be created are Developed Countries, OECD, EU-15, EU-28 and High Income Countries. The obvious disadvantage is that we

²⁴Unemployment Rate and Relative Unemployment Rate are the only indicators that provide values for all countries as noted in Table 8 in Appendix D.

²⁵54.5 percent of countries report data for only two indicators.

confine our model to the developed world, with the exception of few developing countries that display of more data. This procedure is hence very restrictive.

Each of these five approach is characterised by advantages and disadvantages. In the web application, developed beside this report, we implement only some aspect of these approaches. As previously mentioned, the flexible weighting process gives the possibility to exclude some indicators and hence enable the creation of index of common indicators. Furthermore an alert message inform the user in case of the too little available indicators (less than six) for a country or group of countries as well as in case of insufficient coverage of countries in the calculation of a group score. By doing so we avoid to drop some countries or group of countries and at the same time we make the user attentive to possible interpretations risks. Finally one should keep in mind that the aim of this project is a multidimensional analysis. The index values should be compared only by keeping in mind which impact has an indicator/category in the calculation of the index. By doing so a substantial part of the problem can be solved at its root.

5.4 The evolution of groups over time

The introduction of groups is actually associated with a conceptual issue, namely the evolution over time. Indeed, the definition of group so as it is reported in the previous subsection, follows the criteria of today, i.e. we classify the countries on the basis of the actual level of income, developing status or association to a political system in 2014. However, by looking back in time it is worth nothing that the composition of these groups changed over time. For instance, countries that now are classified as developed were at the beginning of the century still in the developing process. Even more evidently is the case of political systems like the EU or OECD. For example the members of the OECD in 2012 were 34, while three years before only 30 countries were present. Hence, if we use the member stand of 2012 to generate the value for the OECD group in 2009 we should be aware that the calculated value does not perfectly describe the situation at that time.

In spite of this problem we do not introduce historical groups that present the data for each year on the basis of the effective members at that time. In our opinion this kind of exercise would be rather confusing. The only device we used is the case of the European Union for which we introduce the EU-15 variant. Therefore, we encourage caution in the interpretation of group values.

6 Application: Analysis of the Youth Labour Market Situation During the Great Recession

In the introduction of this guide we reported data about youth unemployment trends in some European countries during the last years. We however stressed the argument that the unemployment rate by itself does not suffice to adequately describe the situation on the labour market.

The tool presented in this report and available at <http://kof.ethz.ch/de/indikatoren/> enables us a comprehensive descriptive analysis of the youth labour market situation. Observing the multiple dimensions of the situation and their evolution over time, allows to identify critical aspects and to hypothesize possible linkages between them.

This section has two aims. Firstly, it demonstrates the potential of the tool by exploring the youth labour market situation of selected countries before and after the Great Recession, i.e. the global economic downturn in the wake of the financial crisis of 2007-2008. Secondly, the section provides examples of how the developed graphs should be interpreted and what the potential pitfalls in the interpretation are. We therefore choose some countries and groups of countries that offer interesting points of discussion. The analysis does not pretend to be exhaustive, rather to generate interest in issues or contexts that require a more elaborate research.

To begin with, we provide an overview on the evolution of the KOF Youth Labour Market Index (hereafter abbreviated as KOF YLM Index) from 2007 to 2012 for most European countries and the US. In a second step, the analysis focuses on the individual dimensions of the situation before the beginning of the crisis, namely in 2007, in selected countries. Finally, the third step describes the development of the situation in these countries between 2007 and 2012 and attempts to identify the aspects that were affected most by the crisis.

6.1 An overview of the KOF YLM Index in Europe and in the US before and after the Great Recession

In the introduction of the report we described the evolution of unemployment rate in some European countries. We grouped them in three rough classes, namely countries reporting increasing, decreasing or constant trend in the evolution of the youth unemployment rate.

One of the key motivations for the development of this tool was the need of a multidimensional approach. Basically, we argue that a single indicator does not provide sufficient information to capture the complex situation on the youth labour market. The prime example is the wide importance attributed to unemployment rate. Some examples reported below demonstrate for instance that two countries may have similar values or trends for this indicator but differ substantially in respect to other dimensions.

Table 5 reports the evolution from 2007 to 2012 of the KOF YLM Index for most European countries and the US. Before analysing the details for some countries, it is important to have a look at the global situation.

The first column shows the KOF YLM Index for all countries in 2007. Apart from the US,

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Country	KOF YLM Index						Change 2007-2012
	2007	2008	2009	2010	2011	2012	
Austria	5.35	5.27	5.33	5.38	5.44	5.33	-0.02
Belgium	4.84	4.87	4.89	4.81	4.71	4.86	0.02
Croatia	4.66	4.76	4.66	4.48	4.26	4.17	-0.49
Cyprus	5.39	5.50	5.50	5.33	5.04	4.85	-0.54
Czech Republic	5.06	5.03	5.12	5.02	4.93	4.84	-0.22
Denmark	5.63	5.63	5.68	5.57	5.51	5.48	-0.15
Estonia	5.15	5.32	4.82	4.62	4.82	4.87	-0.28
Finland	5.06	4.97	4.96	4.91	4.90	4.95	-0.11
France	4.98	4.90	4.81	4.72	4.78	4.77	-0.21
Germany	5.19	5.28	5.34	5.30	5.35	5.36	0.17
Greece	4.73	4.82	4.89	4.63	4.31	3.94	-0.79
Hungary	4.94	4.95	4.82	4.73	4.76	4.79	-0.15
Iceland	4.56	5.19	5.20	4.94	4.94	4.98	0.42
Ireland	5.08	5.01	4.66	4.30	4.12	3.94	-1.14
Italy	4.43	4.48	4.35	4.12	3.98	3.83	-0.60
Latvia	5.39	5.33	4.68	4.62	4.63	4.70	-0.69
Lithuania	5.67	5.66	5.05	4.71	4.87	5.10	-0.57
Luxembourg	5.24	5.20	5.22	5.10	5.21	5.21	-0.03
Malta	4.79	4.76	4.72	4.82	4.67	4.69	-0.10
Netherlands	5.59	5.63	5.65	5.55	5.58	5.57	-0.02
Norway	5.06	5.11	5.21	5.23	5.23	5.33	0.27
Poland	4.96	5.26	5.16	5.04	4.89	4.82	-0.14
Portugal	4.93	5.01	4.95	4.89	4.64	4.47	-0.46
Romania	4.11	4.40	4.36	4.28	4.28	4.30	0.19
Slovakia	4.45	4.61	4.74	4.41	4.37	4.34	-0.11
Slovenia	5.26	5.39	5.32	5.23	5.21	5.05	-0.21
Spain	4.86	4.56	4.18	3.94	3.89	3.72	-1.14
Sweden	4.49	4.43	4.47	4.45	4.49	4.45	-0.04
Switzerland	5.69	5.57	5.69	5.71	5.60	5.61	-0.08
United Kingdom	4.63	4.89	4.74	4.66	4.55	4.47	-0.16
United States	5.99	5.87	5.54	5.22	5.27	5.25	-0.74
EU28	4.98	5.02	4.92	4.79	4.73	4.69	-0.29

Table 5: The KOF YLM Index values before, during and after the Great Recession

the values are quite close the ones with the others ranging between 4.1 to approximately 5.7. Northern European countries (except Sweden), Baltic republics and the European countries with a deep rooted apprenticeship system (Germany, Austria, Switzerland and partially also the Netherlands) perform very well, while some eastern (Romania and Slovakia) and southern (Italy, Greece and Croatia) European countries achieve low values. The UK exhibits low values too, whereas the US displays the overall best result. Note however that the latter one does not dispose of a complete set of indicators. The comparison can hence provide misleading results²⁶.

²⁶Subsection 6.3.5 provides a possible approach that enable a partial comparison between between the US and the EU 28.

Lastly, the EU 28 average shows a value close to 4.9.

The subsequent columns report the KOF YLM Index for the following years till 2012. In 2012 the situation is characterised by a larger range of values. The maximum falls slightly to 5.6, while the minimum plunges to 3.7. Northern and western European countries reach again high values. The poorly performing countries are now essentially the Mediterranean ones. Further note that the difference between the EU 28 average and the US is smaller in 2012 than in 2007.

Finally, the last column provides the differences between the values of the KOF YLM Index in 2012 and the ones in 2007. It is noteworthy that the vast majority of countries experienced either a decrease (or in few cases) a constant trend. Consequentially the EU 28 average indicates a general deterioration. Only few countries (Germany, Iceland, Norway and Romania) show a considerable increase over time. The biggest drops are observable in the southern European countries and in the Baltic republics. Also the UK and, in particular, Ireland report a negative trend during the crisis. The evolution of KOF YLM Index for the US is unfavourable as well. However, as noted earlier, the values for the US should be interpreted with caution²⁷.

6.2 The sources of the 2007 levels

To start with we provide some snapshots of the situation before the beginning of the Great Recession, namely in 2007. These subsections offer examples and comparisons between some selected European countries. The countries are chosen in respect of their political importance and grouped on the basis of geo-economic reasons. The pictures reported in this subsection always include the EU 28 scores for benchmarking reasons.

6.2.1 Some large European countries

Figure 1 summarises in a single graph the scores of all indicators for three large European countries (UK, Italy and France) and the EU 28. A first glance at the spider web reveals a very important information: in almost all indicators there is at least one of these countries that exhibits a considerably different score in respect to the EU 28 average.

As already observed in Table 5, France has a KOF YLM Index score very close to the EU-28 mean in 2007. The values of the single indicators are however not always the same. For instance, in term of the Temporary Worker Rate and the Involuntary Part-Time Rate, France exhibits a below average score, while the ones of the remaining Working Conditions indicators are clearly higher than in the EU 28. In respect to Education, it denotes inversed values than the EU 28. The Formal Education and Training Rate is above average while the Skills Mismatch Rate lies below. Finally, relative to the indicators of the classes Transitions Smoothness and Activity State the scores of France are almost perfectly in line with the one of the EU 28.

Instead the UK reports in 2007 a KOF YLM Index slightly lower than the EU benchmark. This is essentially due to low scores in the category Education. In terms of Formal Education and Training Rate and Skills Mismatch Rate the UK ranks on position 28 out of the 33 countries

²⁷Part 6.3.5 provides an attempt of comparison between the EU 28 and the US. However, due to a very reduced number of available indicators for the US, the analysis results partially limited.

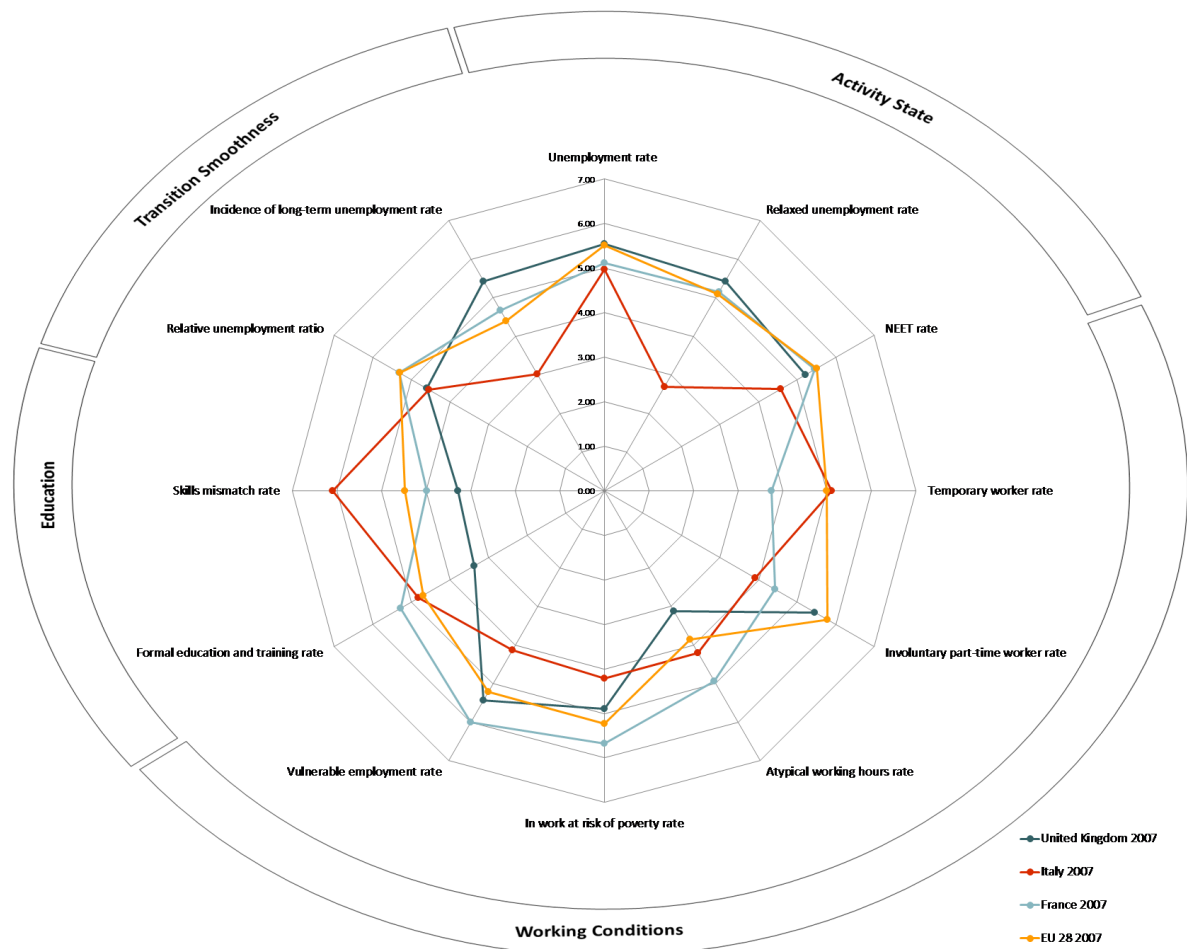


Figure 1: The situation for the UK, Italy, France and the EU 28 in 2007

with available data. Alarming is also the low value for Atypical Working Hours. This is due to higher than average shares of night and Sunday work. Notable is however the very high score in the Incidence of Long-Term Unemployment, considerably above the ones of the EU 28.

The situation for Italy is even more critical than the one of the UK. The KOF YLM Index value lies 0.6 point below (out of a scale ranging from 1 to 7) the EU 28 average. Only in respect to the category Education and the indicators Atypical Working Hours and Temporary Worker Rate scores Italy above average. For all other indicators the values are either slightly or considerably lower. It is interesting to point out the discrepancies between Unemployment Rate and his relaxed version. The high difference suggests that the share of discouraged workers is relatively high. This intuition is further confirmed by the considerably low score in the NEET Rate. Lastly observe that Italy and France provide a prime example of the previously mentioned situation in which two countries have similar unemployment rate but denote quite different scores in the other indicators.

To sum up, the UK scores quite well in respect to unemployment while substantial room of manoeuvre inside the Education category exists. France disposes of a balanced situation with strength in Formal Education and Training Rate and in some Working Conditions indicators.

Finally Italy faces a critical situation with the only exception of the Skills Mismatch Rate.

In subsection 6.3 we report the effects generated by the Great Recession on the countries and provide evidence that given these starting points, every countries experienced quite different consequences.

6.2.2 Some of the countries most affected by the crisis

The developments on the labour market that the Great Recession set off in Greece, Spain or Ireland are often highlighted as tremendous. However, to better isolate this effect, it is important to understand the situation before the crisis. Figure 2 reports the scores of these three countries and the EU 28 as a benchmark in 2007.

Greece shows a quite unbalanced picture. It reaches very high levels for some indicators (Temporary Worker Rate, Atypical Working Hours and the two indicators of the Education category), while at the same time scores badly in the remaining indicators (Work at Risk of Poverty, Vulnerable Employment Rate and Incidence of Long-Term Unemployment Rate).

Spain, displays an asymmetric pattern as well. The asymmetry however occurs in a different way than in the case of Greece. In particular, Spain obtains very high scores in the indica-

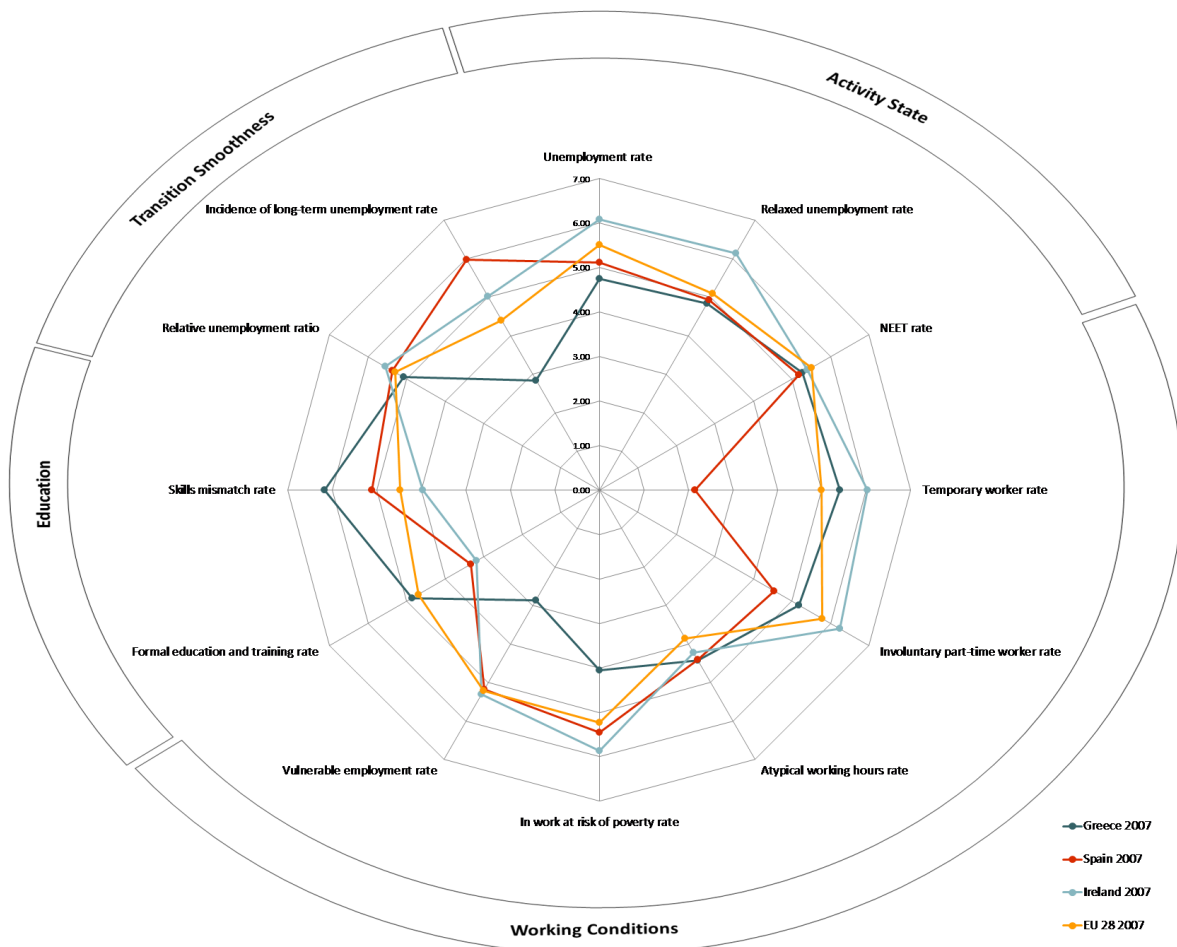


Figure 2: The situation for Greece, Spain, Ireland and the EU 28 in 2007

tors Skills Mismatch Rate and Incidence of Long-Term Unemployment Rate while the ones of Temporary Worker Rate and Formal Education and Training are far below average.

Finally Ireland, reaches a KOF YLM Index value slightly above the EU average, as it obtains an equal (or in some cases higher) scores than the EU 28 for ten out of twelve indicators. The very positive state of Ireland is damaged by low scores in Formal Education and Training and Skills Mismatch. The latter is caused both by an over-representation of youth with primary or less level of education inside the unemployed group (34.1% in spite of a share of 13.8% inside the group of employed) and a under-representation of the ones classified as tertiary educated (present in the group of employed with a share of 34.4% but accounting for approximately 17.6% inside the unemployed).²⁸

The last remark addresses the variance of the scores inside each single indicator. As notable from the spider web, the scores of these three countries are for some indicators (e.g. NEET Rate, Atypical Working Hours and Relative Unemployed Rate) very close, while in the case of others more dispersed. This pattern has to be kept in mind in the upcoming analyses over time because different trends are identifiable.

6.2.3 Are apprenticeship countries better off?

Switzerland, together with Denmark and the Netherlands, is one of the European countries that achieve a very high KOF YLM Index in 2007. However, as observable in Figure 3, Switzerland unfortunately does not dispose of a complete set of indicators (data about NEET Rate, Involuntary Part-time Worker Rate and In Work at Risk of Poverty Rate are missing in 2007). This statement implies that comparison of the KOF YLM Index values with other countries should be interpreted with caution. In fact, it can be possible that other countries have particularly low values in the indicators missing for Switzerland and therefore the comparison might be misleading²⁹. The situation of Switzerland, albeit a not fully comparable KOF YLM Index, can however be partially described by having a look at the single indicators. The Activity State indicators achieve a very high level and the same applies to for the Education category. Further note that, the score of Skills Mismatch Rate are very high. The index of dissimilarity used to calculate this indicator evidence only a slight disequilibria between the shares of employed and unemployed with a primary or less education. The worker belonging to the other classes of education results indeed quite perfectly matched. Lastly the available indicators for Working Condition point out a general positive situation.

Austria, as reported in the first column of Table 5, exhibits a substantially better KOF YLM Index than the EU 28. The spider web shows that the higher level is due to better scores in almost all indicators. Especially the probability risk of being long-term unemployed, to have a temporary contract and being at-risk-of-poverty are lower. The only two indicators getting a score below average are Formal Education and Training Rate and Skills Mismatch. With regard

²⁸All shares about the index of dissimilarity reported in this section are authors' calculations based on the data of Eurostat (Tables *lfsa_ergaed* and *lfsa_agaed* both accessed on 26.03.14).

²⁹A possibility to avoid this issue is to activate during the weighting process only the common indicators. An applied example of this procedure is addressed in a further part of the section.

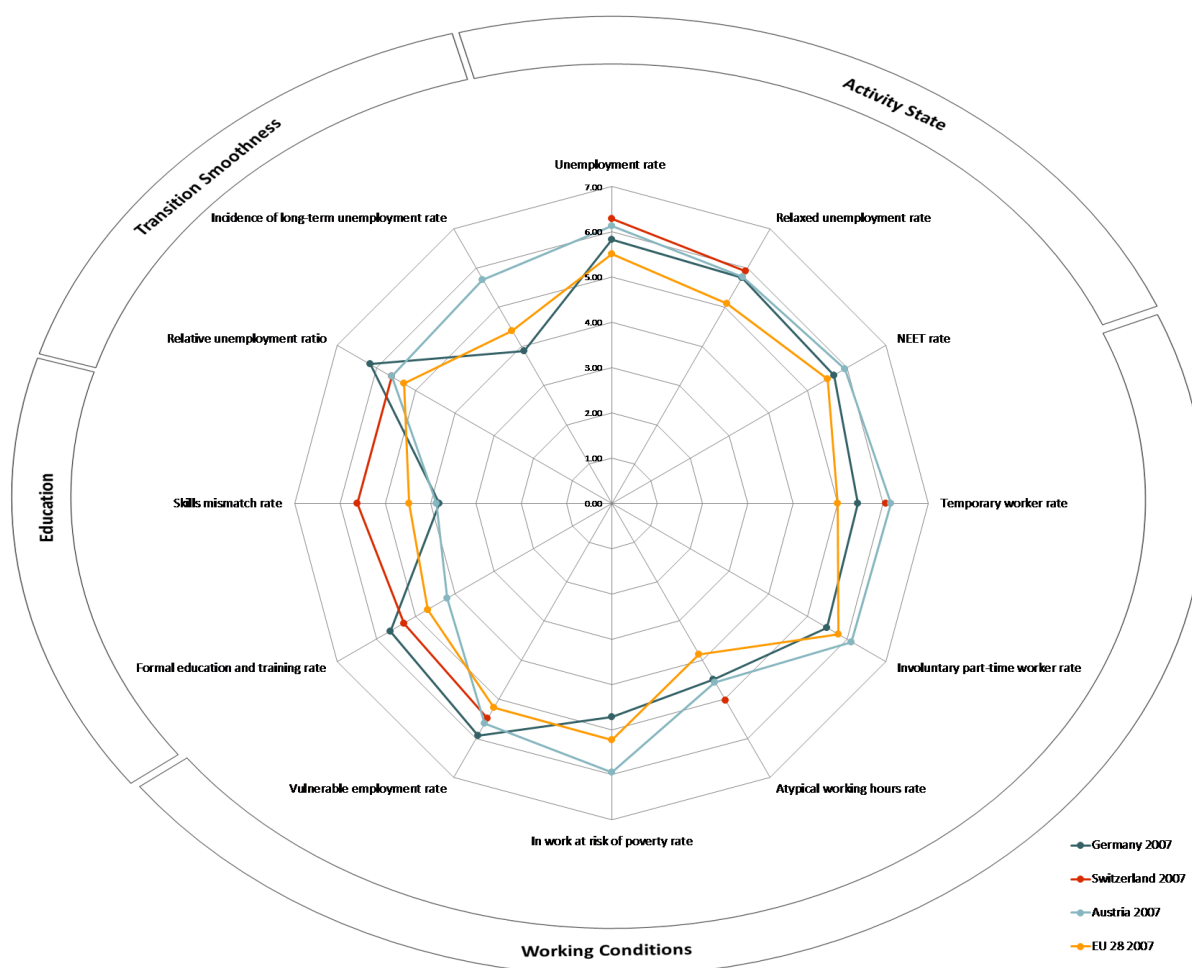


Figure 3: The situation for Germany, Switzerland, Austria and the EU 28 in 2007

to these low levels in the category about Education a consideration is noteworthy. As already we argued, a poor share of young people participating in formal education or training is not desirable. However in the case of Austria, even though this low quote, youth achieve to find a job and be integrated in the labour market. This is evidenced by the fact that the scores regarding the NEET Rate and the Relaxed Unemployment Rate are very high (i.e. the rates are very low). Taken it into consideration, one could argue that, because of the deep rooted apprenticeship system (that allows a short transition between school and work) the quote of young people at early age already integrated in the labour market is higher and therefore the share of youth in education lower. Therefore, whatever the quote of youth in education or training is not elevated, relevant is that they are able to find a job. Event though this intuition may be partially right, we suggest that a look at the Skills Mismatch Rate provides a further discussion point. The relative low level achieved by Austria in this indicator highlights some contrasts and provides advice of a non-optimal integration of youth into the labour market.

Ultimately, Germany exhibits a general situation slightly better than the one of the EU 28. The indicators of the category Activity State points out a relative small share of unemployed, discouraged or NEET people. With respect to the Working Condition the picture results more

asymmetric. In certain indicators Germany exhibits scores above while relative to other sensibly under average. The same applies for Education (where very high scores in Formal Education and Training Rate and above average in Skills Mismatch Rate are notable) and for Transition Smoothness (wherever Relative Unemployment Rate is far higher-than-average and Incidence of Long-term Unemployment Rate slightly below).

Coming back to the discussion about the Education indicators in Austria, it is worth highlighting that all this three countries, nevertheless having a deep rooted apprentices system, exhibit very different patterns. Switzerland archives high scores in both Formal Education and Training Rate and Skills Mismatch, Germany exhibits very high share of young people participating in education and training, but a low score in Skills Mismatch while Austria displays low in the education and training participation rate as in the mismatch level. This finding, even though not taking into account country specific factors (like business cycles, migration flows, youth policy, etcetera), is in our opinion quite surprisingly and worthy of deeper research.

6.2.4 A glance at the Nordic countries

Nordic countries are often cited as examples of welfare states and presented in international comparison as an aggregated group. There are still many differences in the education and labour structure and these have a particular impact on the young cohort group.

As observable in Table 5, Norway and Finland achieve approximately the same KOF YLM Index level in 2007. Norway actually does not report value for the indicator NEET Rate and therefore the comparison of the KOF YLM Index is not perfectly applicable. Nevertheless, by excluding this indicator in the calculation process we end up with a score of 4.97 for Finland, even not too different the one of Norway.

However this very similar KOF YLM Index masks substantial differences in the scores of each single indicator. Figure 4 shows the situation in 2007 for Denmark, Norway and Finland in a spider web form. The EU 28 is again reported as benchmark. The first big difference between Norway and Finland is notable with respect to the remaining Activity State indicators (Unemployment Rate and its relaxed version). Finland reports in these indicators sensibly lower scores than Norway. The predominance of Norway occurs also in the category Working Conditions. Here Norway is always better off, with the only exception of the indicator In Work at Risk of Poverty that points out a problematic situation. In 2007 the quote of employees earning less than 60% of the national median income is 26.8%, while, as comparison, the one of Finland is 12.1% and the EU 28 average is 8.8%³⁰. In contrast, Finland fills the gap by scoring high values in the Education category and in the indicator Incidence of Long-Term Unemployment Rate.

Finally, Denmark achieves a very high KOF YLM Index thanks to elevated scores in almost all indicators. Note that the scores are in the majority of the cases markedly higher than the EU 28 average, in some circumstances slightly higher and only in one case lower. This occurs for the indicator In Work at Risk of Poverty (which exhibits a value of 20.2 %). The graph shows

³⁰Table 10 in Appendix E reports the complete scoreboard of these countries.

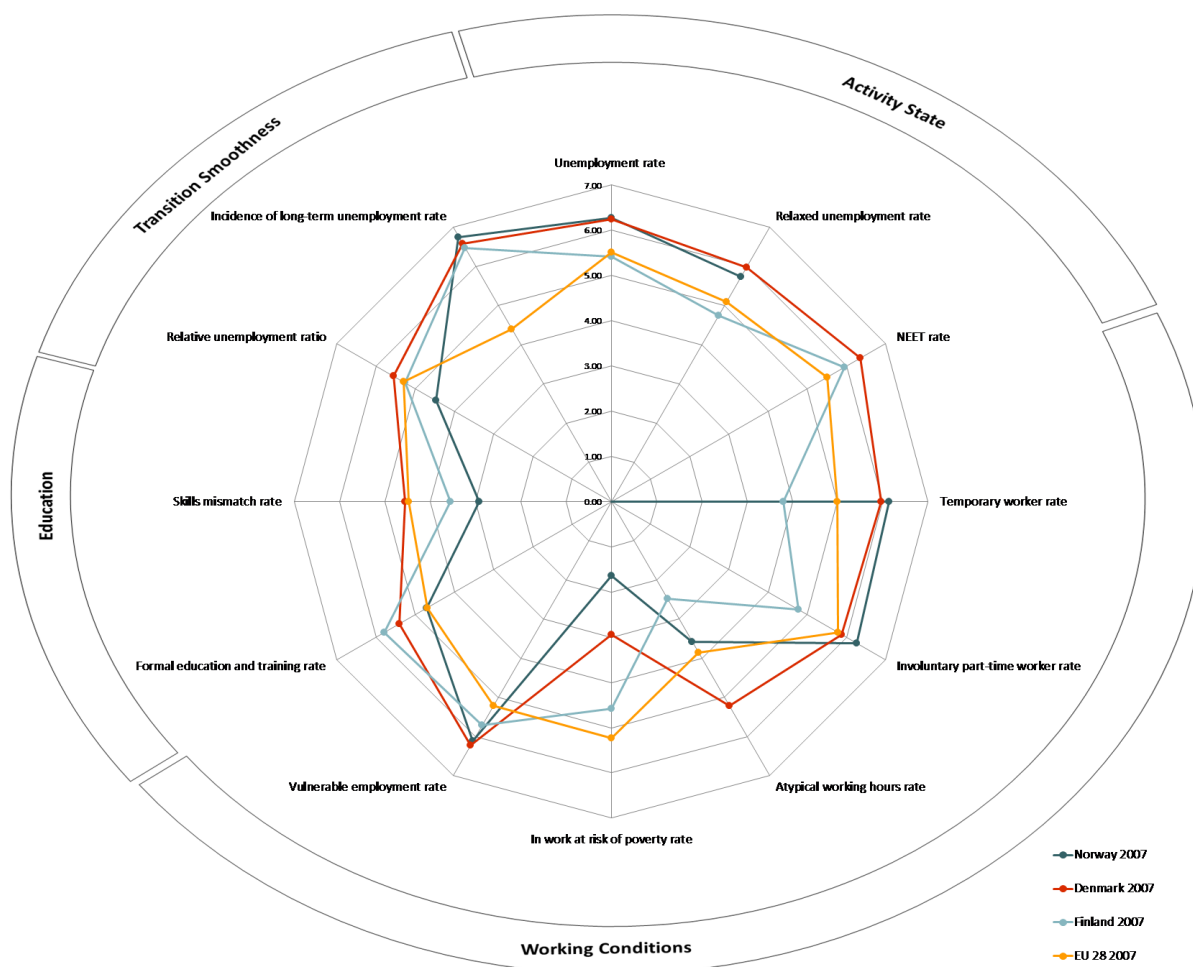


Figure 4: The situation for Norway, Denmark, Finland and the EU 28 in 2007

that actually this indicator is quite a relevant issue in all Nordic countries.

In a general perspective it is also remarkable that all three countries exhibit a very similar and significant above the EU average value in Incidence of Long-Term Unemployment. This result, combined with the very low level of Unemployment Rate means that youth in Nordic countries are only marginally affected by unemployment, and when it occurs, it is merely for a short period. A similar consideration applies in consideration of the Vulnerable Employment Rate.

Last aspect noteworthy to highlight is the comparison with the EU 28 average concerning the category Education. These three Scandinavian countries score in the indicator Formal Education and Training Rate equal or above the EU 28 average, while they score equal or lower in respect to the Skills Mismatch Rate. Especially in the case of Norway and Finland this is principally due to a very high share of unemployed with primary or less education that is much higher than the share of youth with this education inside the group of employed. On the contrary, the share of young people with secondary or tertiary education inside the unemployed is lower than the proportion of those within the employed.

This fact raises some questions that should be addressed in further research. How do these

countries manage to obtain very high quotes of youth in education (i.e. studying in secondary or tertiary education) and still have low values of Unemployment Rate for these groups? Respectively, if the share of young people leaving the school system with low education is small, how can it be that this segment of population is not able to find an adequate position in the job market?

A possible explanation to the second question is that actually the economy does not provide sufficient number of low-skilled jobs. A more critical point of view could be to say that the education system, mainly focused on the aim to maximise the share of people with high educational level, forgets to provide an adequate education path to the youth dropped out of school that, as a consequence, become either unemployed or "youth left behind" (calculated as the NEET aged 15 to 29 without upper secondary education). In line with this interpretation, the OECD (2010) shows a significant higher than average trend for the Nordic countries with respect of the "youth left behind" between 1995 and 2005.

6.3 How did the youth labour market situation change during the Great Recession?

Given the differences in the KOF YLM Index between 2007 and 2012 we now focus our attention on the dimensions giving rise to these variations. From Table 5 we select some countries with the characteristics of being affected by the recent crisis in different ways. As already mentioned this analysis does not pretend to be exhaustive nor to show the entire potentiality of the tool presented in this paper. We therefore encourage a critical approach and an extension of the analysis to other countries and groups of countries.

6.3.1 The case of the UK and Germany

To begin with we analyse two large European countries, namely Germany and the UK, which experience different evolutions. The KOF YLM Index for the UK decreased during the Great Recession, while Germany exhibits an increasing trend. Figure 5 reports the spider web for both countries in 2007 and in 2012.

The analysis of the German situation over time highlights that the indicators on the basis of the positive evolution of the KOF YLM Index are essentially related to unemployment. Indeed there are some factors, like Atypical Working Hours Rate and Skills Mismatch Rate, that show diminishments. These small decreases are however not sufficient to overcome the distinctive positive trend of the KOF YLM Index. Summing up, the evolution of all these indicators is interpretable as hints of a sharply, albeit not perfectly balanced, improvement of the labour market situation for youth in Germany.

With regard to the UK, Figure 5 illustrates that the fall in the KOF YLM Index is essentially due to a decrease in the score of the Activity State indicators as well as a substantial reduction in the levels of the scores regarding Involuntary Part-Time Worker Rate and Incidence of Long-Term Unemployment Rate. The rise of Formal Education and Training Rate and Skills Mismatch Rate partially compensate the decreases just mentioned. Noteworthy is the relationship between

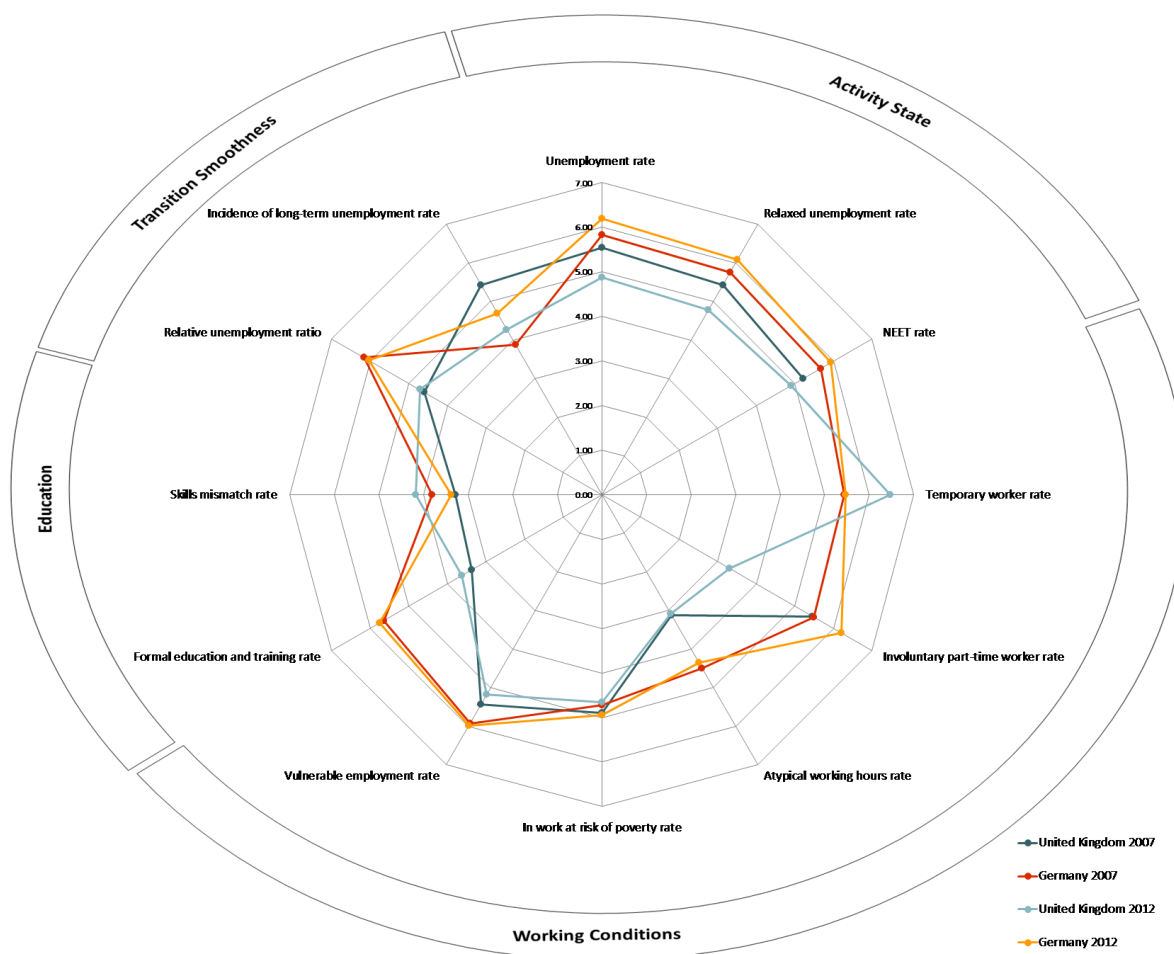


Figure 5: The evolution over time of Germany and the UK

the increase of Formal Education and Training Rate and Unemployment Rate. The rise in the share of young people participating in education or training can be the consequence of the increase of unemployment rate as well or, in some instances, even the cause. Concretely, because of the worsened conditions on the labour market, a share of the youth British people could have decided to procrastinate their entrance in the labour market in favour of an extended duration of their education. In this case we expect a negative correlation between the changes in these two indicators as is the case for the UK. However, one should keep in mind that the effect could also work in the other direction. The increase in the share of youth attending education or training can not only be driven up by unemployed, but also by youth being previously employed that, because of poor job perspectives, decide to go back to school or to accomplish a new educational path with the aim of requalification. In the latter case the shift occurs from the labour force to the inactive population. This has an (indirect) enhancement effect on Unemployment Rate because reduces the absolute number of the labour force and hence increases the Unemployment Rate (remember that unemployment rate results as the share of unemployed out of the labour force). In this case, we expect a positive relationship between the changes in these two indicators. However our model does not allow to make any conclusions about causality. The previously

explained relations are only working hypothesis about the interpretation of the correlation.

The score for Skills Mismatch Rate substantially increased over time in the UK, meaning that the relationship between employed and unemployed inside the three educational classes became more equal. This equilibrium arises due to a reduction of the index of dissimilarity for people with secondary and primary or less education. More precisely the share of employed with primary or less education decreased from 18% to 13%, while at the same time the unemployment rate for people with this education shrinks from 43% to 31%. Per contra, the share of unemployed with secondary education climbs from 46% to 52% and so converges to the share of employed with this level of education (remained approximately constant at 51%).

Finally note that, while for many indicators the scores of the two countries diverge, the Incidence of Long-Term Unemployment and Relative Unemployment Ratio convergence to some extent.

6.3.2 Similarities and differences between Greece and Spain

Figure 6 represents the spider webs for Greece and Spain in 2007 (the same previously presented) with the addition of the scores of 2012.

For both countries the situation is more asymmetric in 2012 than in 2007. Both countries report similarly very low values for the indicators of the Activity State category. In respect to Working Conditions the picture is characterised by high differential between the two countries, even bigger than in 2007. The values for the indicators Formal Education and Training Rate and Relative Unemployment Rate are very close while the differences in Skills Mismatch Rate and Incidence of Long-term Unemployment Rate are stable or even bigger. The overall comparison between the indicators in 2012 clearly suggests that the youth cohort is better off in Greece than in Spain. Observe again, that in respect to the Unemployment Rate the two countries exhibit a very close score while the other indicators evidence substantial dissimilarities. Additionally, note that five years before the situation was clearly in favour of Spain.

Anyhow, the most interesting information provided by Figure 6 are the results of the comparison of the individual countries over time. For instance in the case of Spain the declined score of the indicator Unemployment Rate has, in the same manner as previously explained for Germany, a two-way relationship with the increase in the score of Formal Education and Training Rate. Furthermore the decline in Unemployment Rate is interconnected with Relaxed Unemployment Rate. The value of Relaxed Unemployment Rate (recall that Relaxed Unemployment Rate is the fraction of unemployed plus discouraged out of the whole labour force) increased as well during the time of period between 2007 and 2012. We therefore have evidence that for Spain the share of discouraged workers follows in the same direction the variation of the unemployed stock, i.e. the number unemployed and the number discouraged worked increased both. Finding some linkages with NEET Rate results more difficult due to the use of the whole population as denominator in the calculation function. However, it is observable that the share of young neither in employment nor in education or training increases substantially. This can be partially explained by the already mentioned increase of discouraged people while being in con-

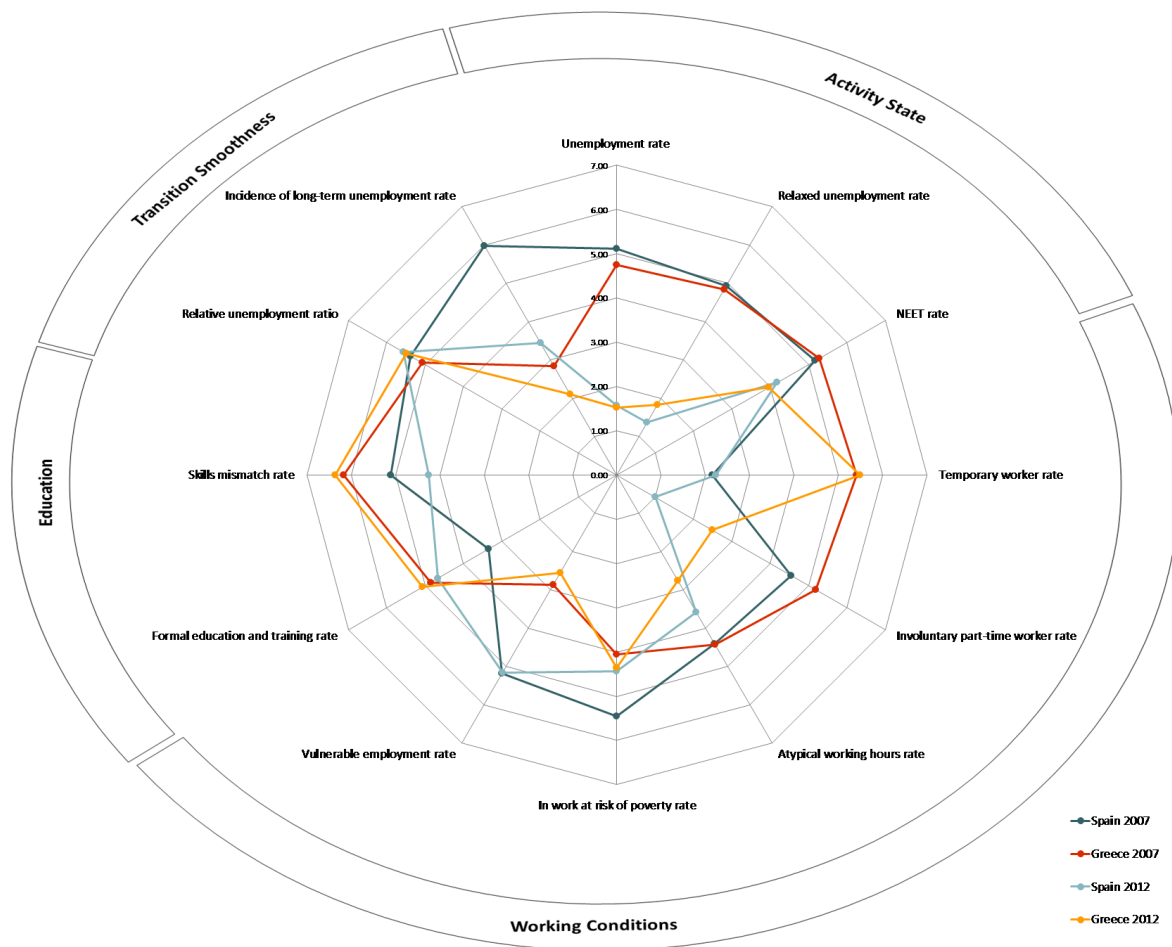


Figure 6: The evolution over time of Spain and Greece

trast with the strong increment in the share of youth in education or training. Finally, the score of Skills Mismatch Rate increased over time, meaning that the relationship between employed and unemployed inside the three educational classes became more unequal. In particular, the share of employees with a primary or less education drops, while the share of unemployed with this education level remains approximately the same. On the opposite, the quote of employees with a tertiary degree soars whereas the unemployment rate for this class remains constant.

A first glance at the evolution of Greece displays an interesting starting point for the discussion. Differently as in the case of Spain, Greece reports diminutions only in some indicators, while some other either keep the position or even ameliorate the scores. Specifically, on the one hand a huge drop for the indicators NEET Rate, Involuntary Part-time Worker Rate, Atypical Working Hours Rate and Unemployment Rate and its relaxed version is observable and amenable to the unemployment crisis affecting Greece, while on the other hand Temporary Worker Rate, Formal Education and Training Rate and Relative Unemployment Ratio display small but encouraging signs of increase. Especially the positive growth in the score of Relative Unemployment Ratio give advice that the youth cohort is proportionally less affected than the

adult group by the dramatically high unemployment rate³¹. Further, the approximately stable score of Temporary Worker Rate (i.e. a more or less constant share of youth working under temporary contract) combined with the previously described increase in Unemployment Rate is interpretable as the indication that unemployment rate affects youth with a temporary contract and others with a permanent contract similarly. Lastly, for the small rise in the Formal Education and Training Rate applies the same motivation explained in the previous analyses.

A conclusive note addresses again Table 5 and the reported KOF YLM Index trends of Spain and Greece. It is notable that Spain experiences a strong and linear deterioration beginning in 2007 and lasting till 2012. In contrast, the index for Greece continues to rise until 2009 and only afterwards begins the decline. Hence our model demonstrates that the crisis affecting the majority of European countries between 2008 and 2012 has very country specific impacts with respect to the youth labour market.

6.3.3 The difficult situations of Ireland and Italy

Ireland and Italy are interesting case studies because both were strongly affected by the recent crisis but, in respect to the youth population size, show opposite trends. In particular, as Dietrich (2012) noted, Ireland represents one of the few countries experiencing a substantial decrease in the number of young foreign citizens between 2007 and 2010. On the opposite, during the same period Italy reports an increase. Furthermore the share of active youth shrinks in the case of Ireland from 55% in 2007 to 40.5% in 2012 while Italy exhibits only a slight decrease, from 30.9% to 28.7%. Additionally, the KOF YLM Index values for these two countries are very close in 2012.

Again the scores of the twelve indicators for both countries in 2007 and 2012 are plotted in the same graph. Figure 7 tell us three main stories. First, on a general perspective Ireland is in 2007 clearly better off, with the only exception of the category Education in which Italy significantly prevails. Second, the decrease in the KOF YLM Index value of Italy is attributable to a drop in approximately half of the indicators (primarily of the Activity State category), while the other half exhibits constant scores. Third, the differences over time in the scores of some indicators are enormous for Ireland.

By going into the details of the merits of each single category, note that the indicators of the Activity State class fall violently. Visually the scores shrink for both countries in the same proportion. Because of an upper bounds smaller than 100%, this is however not necessary the case for the values. For instance, the Unemployment Rate rises in Italy from 20.3% to 35.3% (0.7 times higher), while in the case of Ireland soars from 9.1% to 30.3% (2.3 times higher)³². Further the values of Relaxed Unemployment Rate increase too, but for each country in a different way. In Italy the rate in 2012 was 0.3 times higher than five years before, while in Ireland 2.5 times. This means that the discouraged worker in Italy increased less proportionately than the unemployed, whereas in Ireland more than proportional. The causes of this opposing

³¹According to the OECD the youth unemployment rate increased from 25.8% to 55.3% while the whole labour force rise disproportionately from 9.6% to 24.5%.

³²The detailed values for all indicators are reported in Table 11 Appendix E.

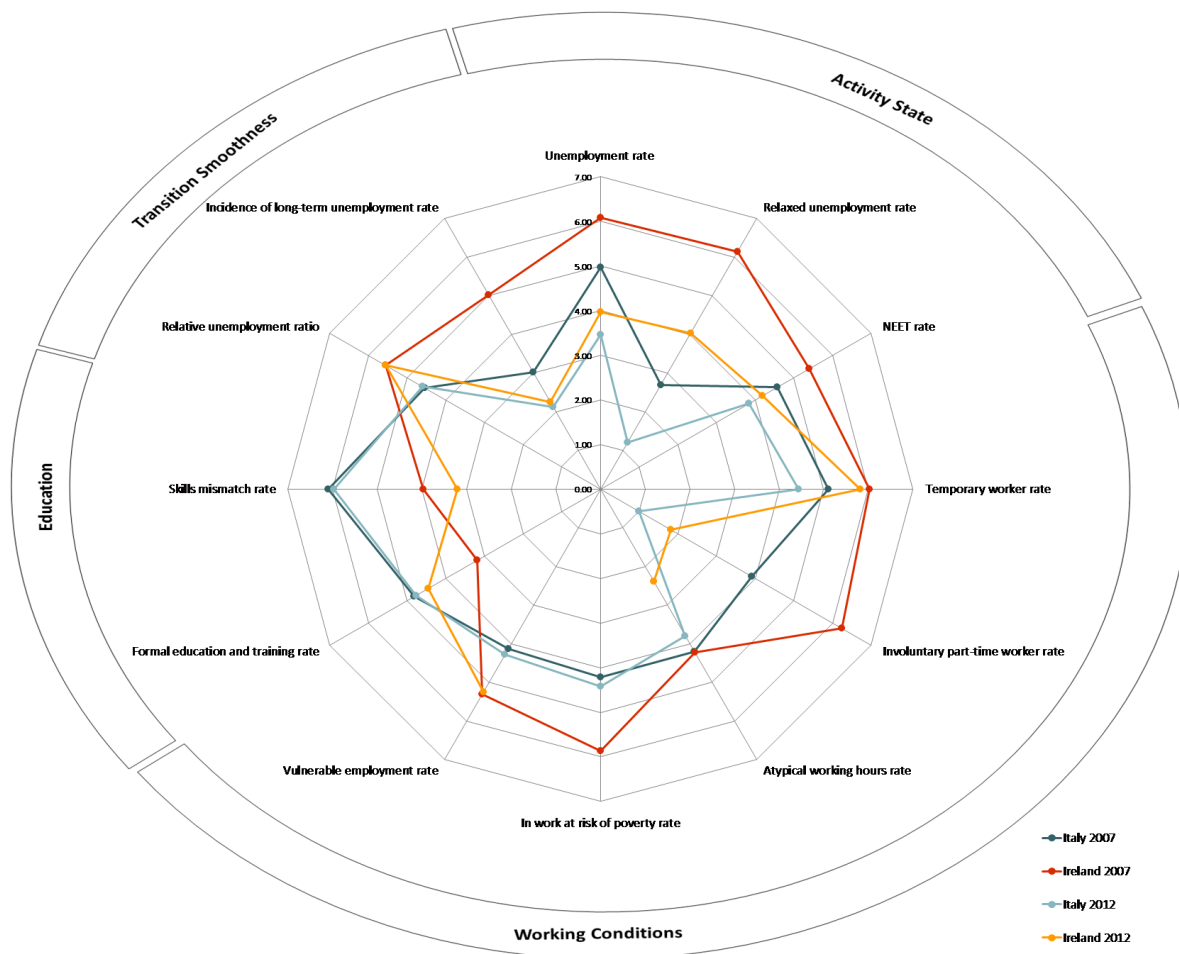


Figure 7: The evolution over time of Italy and Ireland

trends are in part the different starting level of values as well as some cultural factors or, as already mentioned, the huge decline in the labour force participation observed in Ireland.

Next, Working Conditions remain almost at the same level in Italy (with the only exception of the indicator Involuntary Part-time Worker Rate) whereas Ireland shows a general decline (in this case the only exception is Vulnerable Employment Rate that remains quite constant).

In respect to Education, the spider web offers different interesting discussion points. First, it is noteworthy that Italy displays the same share of youth in education and training and manages almost a similar level of skills mismatch³³. The result is even more surprisingly if we take into consideration that during this time period the share of Irish youth involved in education or training substantially increased.

Finally the Relative Unemployment Ratio remains roughly the same and thus the only score movements inside the Transition Smoothness category are observable in the Incidence of Long-

³³ Authors' calculation evidences a significant constant diminution of youth with primary education or less and simultaneously an increase in the share of young people with tertiary education. These trends are still followed by similar ones in the subdivision by education level inside the group of unemployed. Hence these two effects compensate each other and allow a constant (very low) level of the index of dissimilarity.

Term Unemployment. Here the score of Ireland plumbs so strongly to reach the terrible level of Italy (approximately 48%). This striking increase in the level of young unemployed longer than one year gives an even more severe perspective to the young generations.

6.3.4 The rapprochement between Norway and Denmark

As observable in Table 5 Norway and Denmark achieve quite different KOF YLM Index in 2007 (0.6 point difference in a scale ranging from 1 to 7), while in 2012 the values are much more closer with a gap of only 0.15 points. In the case of Denmark, the trend during this period of time was hence descendent, while Norway is in a positive phase since 2007.

Next, we take a closer look at the causes of the changes in trends. Figure 8 shows the spider webs for the two Nordic countries in 2007 and 2012.

We focus first on Norway, one of the few countries (together with Belgium, Iceland, Romania and the previously analysed Germany) showing a rising KOF YLM Index value. The scores of the two available indicators of the Activity State category (unfortunately we have no data about NEET Rate) slightly fall over time. On the contrast, the indicators of all other categories, with

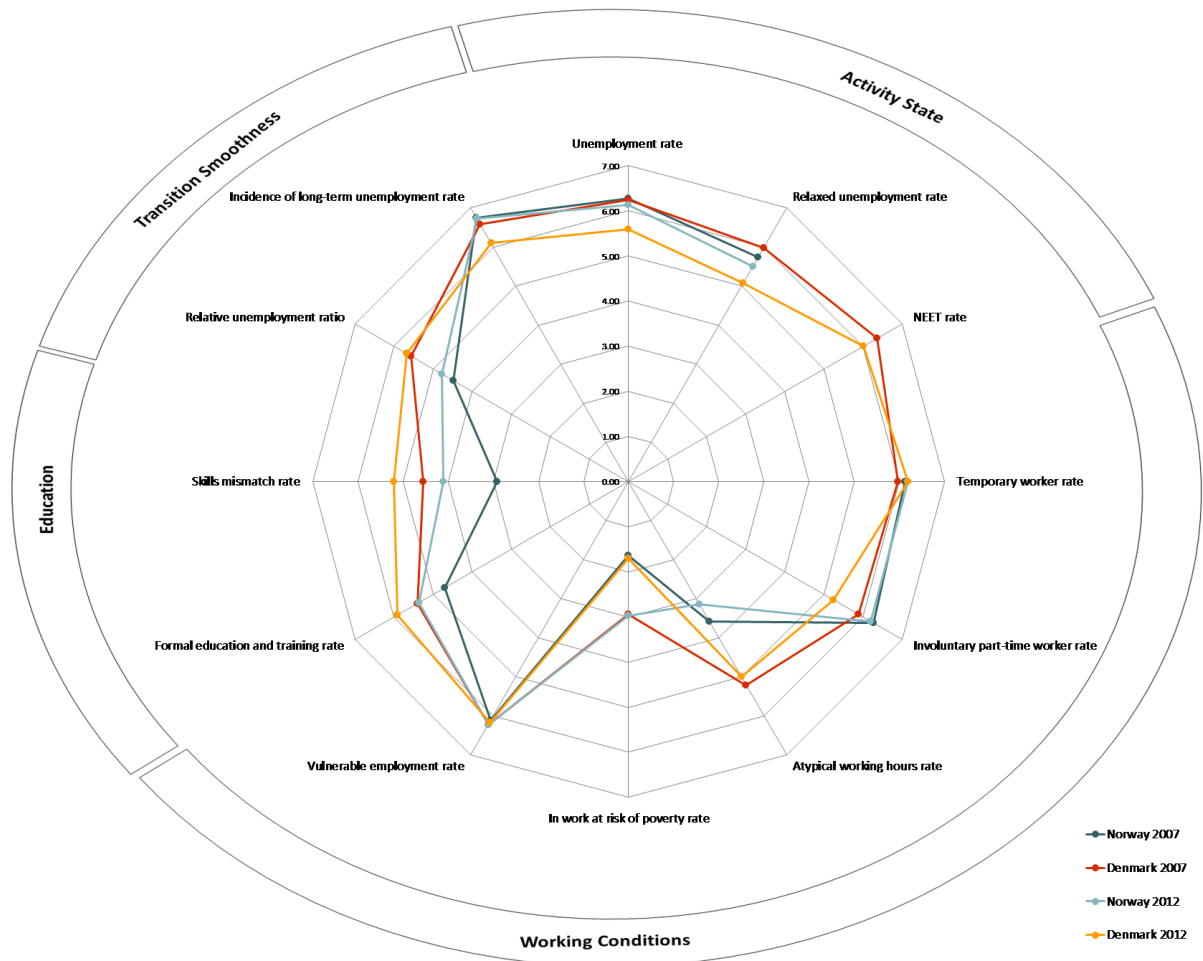


Figure 8: The evolution over time for Norway and Denmark

the exception of the indicator Atypical Working Hours, indicates a constant or positive evolution. Especially in respect to Education and Relative Unemployment Ratio, Norway receives positive notes. The high growth of the Skills Mismatch Rate is essentially due to a more than proportional decrease in the share of unemployed with primary or less education (in 2012 this level is closer to the one of employed with this kind of education).

The case of Denmark follows different pattern than Norway. On the one hand we can observe a similar path with respect of Formal Education and Training, Skills Mismatch Rate and Relative Unemployment Rate. On the other hand the decreases inside the Activity State category are stronger than in the case of Norway and even the Working Condition displays some negative signals.

Especially remarkable is the evolution of the indicator In Work at Risk of Poverty. Within the space time of five years these two countries inverted their position with each other. Note however, that with respect to other European countries the situation remains severe for both.³⁴

Coming back to a general level it is possible to assert that the Nordic countries perform well during the Great Recession, in particular thanks to better scores in Education and Transmission Smoothness. Because no indicator drops in a substantial way, there is evidence that these countries maintain a stable and balanced situation.

6.3.5 A comparison between the EU and the US

So far we focused our attention on Europe, essentially because of data availability. However, the tool presented in this report allows to compare countries across the world. In line with the previous analysis (mostly focused on the impact of the last crisis) we decide to compare the EU 28 with the United States, the country where the crisis originally started. We additionally provide informations regarding the early 2000's recession and try to find similarities or differences between these two crisis.

Table 5 and Figure 9a report the evolution of the KOF YLM Index over time for these two countries. The US reaches in 2007 a substantially higher KOF YLM Index than the EU 28 average but the trends since this moment display convergence. Nevertheless the US still achieves a better score in 2012. Figure 9a shows on the primary y-axis the evolution of the KOF YLM Index for these two selections between 1998 and 2012. However, because the number of available indicators used in the calculation process of the KOF YLM Index may vary over time, the "rough" KOF YLM Index (without a specification of the indicators) may provide misleading information. For instance, a variation in the number of indicators used in the calculation of the KOF YLM Index can have striking effects on the whole KOF YLM Index value and, as consequence, on the movements of the lines in the graph. We therefore introduce on the second y-axis a histogram that maps the number of indicators available in each year. To enhance the fact that the KOF YLM Index for a country with few available indicators should be interpreted with caution, we decide to differentiate the type of line in the graph. If the calculated KOF YLM Index results as the average of less than six indicators, then the line is dashed, otherwise

³⁴In the ranking among European countries for this specific indicator, Denmark and Norway occupy in 2012 respectively the penultimate and the antepenultimate position.

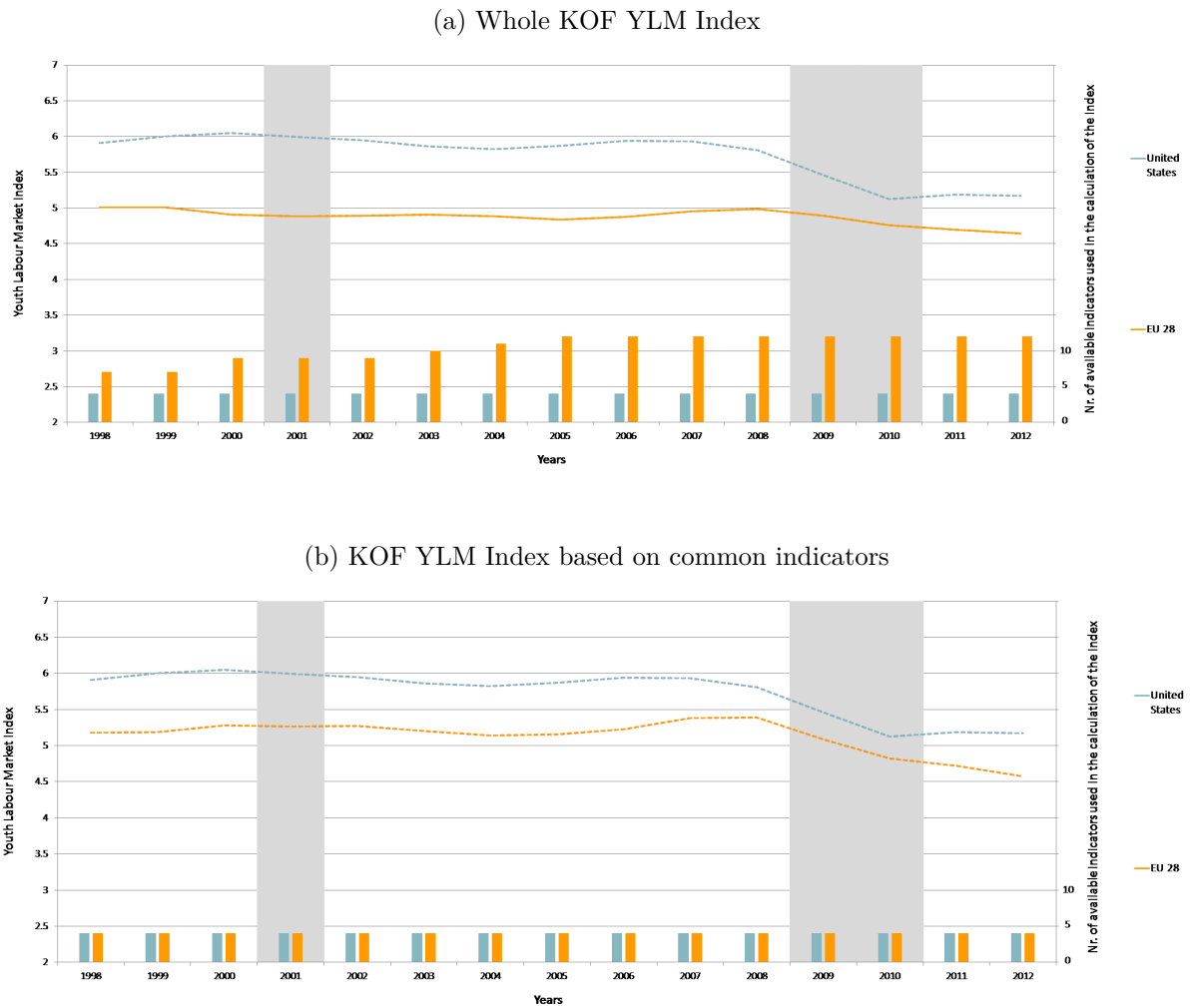


Figure 9: The evolution of KOF YLM Index over time for the US and the EU 28 average

solid. In this example, the line of the US is for all time periods dashed since there the number of available indicators is always below six. On the other hand, the EU 28 dispose of at least six indicators and therefore the line is solid at all times.

Further, the grey coloured regions approximately represent the duration of the two crisis that characterised the first decade of the 21th century. However, as already mentioned, a comparison between countries with different amount of indicators is delicate and hence a detailed analysis of Figure 9a results critical.

A possible solution is to exclude the non-common indicators during the weighting process. By doing so, in this specific case, we end up with a KOF YLM Index based on "only" 5 indicators, that allows a comparison between countries. The results of this approach are reported in Figure 9b. The histogram reports now over time the same amount of indicators for both countries, namely Unemployment Rate, Involuntary Part-Time Worker Rate, Relative Unemployment Rate and Incidence of Long-Term Unemployment Rate. Unfortunately no indicators of the category Education are available for both countries.

Even though a limited set of indicators, the graph tells an interesting story. The trends of the US and the EU 28 move constant and parallel between 1998 and 2006. The economic crisis occurred at the beginning of the third millennium has hence no visible impact on the labour market for youth. In contrast the situation during the Great Recession is more varied. On the one hand the US shows a very strong decline starting from 2007 (and specially since 2008). On the other hand the EU 28 average exhibits a steady growing trend till 2008 and only thereafter is affected by a fall similar to the one of the US. Note that this decline slow down in 2010, although continuing a negative evolution. On the contrary, the KOF YLM Index for the US stabilises by 2010, suggesting that the consequences on the American labour market are less pronounced over time.

The detailed analysis of the single indicators reveals that in the case of the EU 28 the driving factors of the decline are Unemployment Rate and Involuntary Part-Time Worker Rate, while in respect of the indicators of the category Transmission Smoothness the changes are only slightly. The US exhibits a striking drop regarding the Involuntary Part-Time Worker Rate too. In terms of Transition Smoothness the two indicators display an opposite evolution: the Relative Unemployment Ratio sinks, highlighting a better off position of youth vis-a-vis the adult group, while the Incidence of Long-Term Unemployment skyrocket³⁵. Finally the unemployment rate in the US rises too, but proportionally less than in Europe.

³⁵In 2007 the share of young people unemployed since more than one year was 6.5%. Five years later the quote soar to 18.2%.

7 Limitations and Outlook

This paper focuses on the labour market of youth by analysing the situation in multiple dimensions. We develop a tool that allows to simultaneously compare twelve indicators describing the situation of the youth, available at <http://kof.ethz.ch/de/indikatoren/>. The web application is designed as an applied instrument offering an overview of the youth situations. The multidimensional approach offer different starting point for further research. The tool will be updated each year as new data is available.

The model has five main limitations. Firstly, data availability represents a strong restriction. The KOF YLM Index includes only indicators having sufficient data. Of course the composition of the indicators' set is improvable. Measures describing for instance the amount of student involuntarily continuing education because they are unable to find a job, the expected salary that young generation will get at age of 50 or the consequences of being employed in the informal sector could enhance the quality of the tool. To create new indicators is however a difficult and long process that we relay to other institutions. Secondly, issue is that indicators might not have the same relevance in all countries, i.e. some conditions are more present in less developing countries while others affect mainly developed ones. Hence, we give the user the possibility to modify the weights of the indicators, which partially addresses this point. Further research in this field should identify a suitable approach similarly to what Schwab & Sala-i-Martin (2012) do in the WEF Global Competitiveness Report in respect of the stages of development. The third issue is that some of the used indicators represent only proxies or do not perfectly describe the target group. In particular there are indicators that do not refer to the 15 to 24 age range (as in the case of Vulnerable Employment and Skills Mismatch Rate) while others are characterised more by conceptual weak-points that need deeper research (as in the case of the position of apprenticeship in the determination of Temporary Worker Rate). Fourthly, we ignore the individuals characteristics like gender, race, migrant background, etcetera. The reason is that our focus lies on young people in general, although the situation inside some sub-group of them might vary. Fifthly, the composite KOF YLM Index depends on the weights chosen by the individual user, where the default option weights indicator categories and indicators within indicator category equally. However, further research needs to establish the robustness of the KOF YLM Index to alternative weighting schemes. Furthermore, an empirical analysis of the indicator correlations, e.g. via a factor analysis, might help to define weights on the basis of data rather than ad hoc choices.

The next step, that goes beyond the scope of this paper though, is to create a classification of the educational systems. The idea is then to analyse what kind of relationships exist between the conditions on the labour market and the way in which education is provided.

Finally, we hope that the KOF YLM Index helps to identify further crucial determinants of the country specific youth labour market situations.

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Appendix

A List of Countries	I
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A List of Countries

Afghanistan; Albania; Algeria; Angola; Argentina; Armenia; Australia; Austria; Azerbaijan; Bahamas; Bahrain; Bangladesh; Barbados; Belarus; Belgium; Belize; Benin; Bhutan; Bolivia; Bosnia and Herzegovina; Botswana; Brazil; Brunei Darussalam; Bulgaria; Burkina Faso; Burundi; Cambodia; Cameroon; Canada; Cape Verde; Central African Republic; Chad; Chile; China; Colombia; Comoros; Congo; Congo, Democratic Republic of; Costa Rica; Côte d'Ivoire; Croatia; Cuba; Cyprus; Czech Republic; Denmark; Dominican Republic; Ecuador; Egypt; El Salvador; Equatorial Guinea; Eritrea; Estonia; Ethiopia; Fiji; Finland; France; Gabon; Gambia; Georgia; Germany; Ghana; Greece; Guadeloupe; Guatemala; Guinea; Guinea-Bissau; Guyana; Haiti; Honduras; Hong Kong, China; Hungary; Iceland; India; Indonesia; Iran, Islamic Republic of; Iraq; Ireland; Israel; Italy; Jamaica; Japan; Jordan; Kazakhstan; Kenya; Korea, Democratic People's Republic of; Korea, Republic of; Kuwait; Kyrgyzstan; Lao People's Democratic Republic; Latvia; Lebanon; Lesotho; Liberia; Libya, State of; Lithuania; Luxembourg; Macau, China; Macedonia, The former Yugoslav Republic of; Madagascar; Malawi; Malaysia; Maldives; Mali; Malta; Martinique; Mauritania; Mauritius; Mexico; Moldova, Republic of; Mongolia; Montenegro; Morocco; Mozambique; Myanmar; Namibia; Nepal; Netherlands; New Zealand; Nicaragua; Niger; Nigeria; Norway; Occupied Palestinian Territory; Oman; Pakistan; Panama; Papua New Guinea; Paraguay; Peru; Philippines; Poland; Portugal; Puerto Rico; Qatar; Réunion; Romania; Russian Federation; Rwanda; Saudi Arabia; Senegal; Serbia; Sierra Leone; Singapore; Slovakia; Slovenia; Solomon Islands; Somalia; South Africa; Spain; Sri Lanka; Sudan; Suriname; Swaziland; Sweden; Switzerland; Syrian Arab Republic; Taiwan, China; Tajikistan; Tanzania, United Republic of; Thailand; Timor-Leste; Togo; Trinidad and Tobago; Tunisia; Turkey; Turkmenistan; Uganda; Ukraine; United Arab Emirates; United Kingdom; United States; Uruguay; Uzbekistan; Venezuela, Bolivarian Republic of; Viet Nam; Yemen; Zambia; Zimbabwe

B Data Sources

Indicator	Source	Years
Unemployment Rate (UR)	ILO - <i>KILM 8th Edition Table 10a: Youth unemployment (ILO estimates) [Youth unemployment rate; Sex: MF; Year: 1991-2012]</i> updated 24.01.2014	1991 - 2012
Relaxed UR	Eurostat - <i>Unemployment [lfsa_ugan; Age: 15-24; Citizen: Total; Geo: Select all; Sex: Total; Time: 1990-2012]; Supplementary indicators to unemployment [lfsi_sup_age_a; Age: 15-24; Geo: Select all; INDIC_EM: NSEE_AV; Sex: Total; Time: 2005-2012; Unit: 1000Pers]; Population [lfsa_pganws; Age: 15-24; Citizen: Total; Geo: Select all; Sex: T; Time: 1990-2012; WSTATUS: ACT]</i> updated 24.01.2014	2005 - 2012
NEET Rate	ILO - <i>KILM 8th Edition Table 10c: NEET rates [NEET rate; Sex: MF; Age: 15-29/16-29; Year: 1990-2012; exclude: Samoa]</i> updated 24.01.2014	1997 - 2013
Temporary Contract Workers Rate	Eurostat - <i>Temporary employees as percentage of the total number of employees [lfsa_etpga; Age: 15-24; Geo: Select all; Sex: T; Time: 1990-2012]</i> updated 27.01.2014	1990 - 2012
Involuntary Part-Time Workers Rate	OECD - <i>Incidence of involuntary part time workers [Country: Select all; Time: 1990-2012; Sex: All persons; Age: 15-24; Employment status: Total Employment; Series: Share of involuntary part-timers in total employment]</i> updated 27.01.2014	1990 - 2012
Working Atypical Working Hours Rate	Eurostat - <i>Employees working shifts as a percentage of the total of employees [lfsa_ewpshi; Age: 15-24; Geo: Select all; Sex: T; Time: Select all], 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: Select all; 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: Select all; WStatus: EMP]</i> updated 27.01.2014	1992 - 2012
In Work at Risk of Poverty Rate	Eurostat - <i>In-work at-risk-of-poverty rate for young people [yth_incl_130; Age: 15-24; Geo: Select all; Sex: T; Time: Select all; Unit: PC_POP; WSTATUS: EMP]</i> updated 27.01.2014	2004 - 2012

II

B DATA SOURCES

Vulnerable Employment Rate	ILO - <i>KILM 8th Edition Table 3: Status in Employment [Share of vulnerable employment in total employment; Sex: MF; Year: 1990-2012; 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]</i> updated 27.01.2014	1990 - 2012
Formal Education and Training Rate	Eurostat - <i>Participation in education and training [trng_lfs_09; Age: 15-24; Geo: Select all; Sex: T; Time: Select all; TYPTRAI: Formal education and training; Unit: PC]</i> updated 27.01.2014	2003 - 2012
Skills Mismatch Rate	ILO - <i>KILM 8th Edition Table 15a: Skills mismatch between labour supply and demand by educational attainment [Skills mismatch; Sex: MF; Year: 2000-2013]; exclude: Samoa</i> updated 27.01.2014	2000 - 2013
Relative Unemployment Ratio	ILO - <i>KILM 8th Edition Table 10a: Youth unemployment (ILO estimates) [Ratio of youth unemployment rate to adult unemployment rate; Sex: MF; Year: 1991-2012]</i> updated 27.01.2014	1991 - 2012
Incidence of Long-Term UR	ILO - <i>KILM 8th Edition Table 11a: Long-term unemployment [Incidence of long-term unemployment; Year: 1990-2012; Sex: MF; Age: Youth; exclude: French Polynesia, Germany (Federal Republic of)]</i> updated 27.01.2014	1990 - 2012

Table 6: Detailed information about the data sources

C Number of values per group

	Unemployment Rate	Relaxed Unemployment Rate	NEET Rate	Temporary Worker Rate	Involuntary Worker Rate	Atypical Part-Time Worker Rate	In Work at Risk of Poverty Rate	Vulnerable Employment Rate	Formal Education and Training Rate	Skills Mismatch Rate	Relative Unemployment Ratio	Incidence of Long-Term Unempl. Rate	Nr. of indicator with observations
OECD	34	25	21	25	28	24	23	25	25	25	34	31	12
EU-15	15	15	15	15	15	15	14	15	15	15	15	15	12
EU-28	28	27	28	28	28	28	27	28	28	28	28	28	12
G8	8	4	4	4	8	4	4	4	4	5	8	8	12
Developed Countries	53	27	25	28	33	28	27	32	28	29	53	34	12
Least Developed Countries	42	0	0	0	0	0	0	2	0	6	42	0	4
Developing Countries	83	4	5	5	4	4	3	30	5	11	83	9	12
Developing: East Asia & Pacific	18	0	0	0	0	0	0	5	0	2	18	0	4
Developing: Eastern Europe & Central Asia	20	4	4	5	4	4	3	10	5	6	20	6	12
Developing: Latin America & Caribbean	21	0	1	0	0	0	0	10	0	2	21	2	6
Developing: Middle East & North Africa	11	0	0	0	0	0	0	2	0	2	11	0	4
Developing: South Asia	8	0	0	0	0	0	0	2	0	0	8	0	3
Developing: Sub-Saharan Africa	44	0	0	0	0	0	0	2	0	5	44	1	5
High Income Countries	57	27	25	28	33	28	27	32	28	29	57	34	12
Upper Middle Income Countries	45	4	5	5	4	4	3	21	5	7	45	8	12
Lower Middle Income Countries	41	0	0	0	0	0	0	10	0	5	41	1	5
Low Income Countries	35	0	0	0	0	0	0	1	0	5	35	0	4
Africa	52	0	0	0	0	0	0	5	0	6	52	1	5
Americas	32	0	1	0	2	0	0	11	0	2	32	4	7
Asia	46	1	0	1	3	0	0	12	1	5	46	4	9
Europe	42	30	29	32	30	32	30	36	32	33	42	32	12
Oceania	5	0	0	0	2	0	0	0	0	0	5	2	4

Table 7: Number of observations for every group in every indicator

D Descriptive statistics of the indicators

Characteristic of countries	Number of countries	Number of countries in (%)	Cumulative number	Cumulate percentage
<i>1 indicator</i>	0	0.0 %	0	0.0 %
<i>2 indicators</i>	97	54.5 %	97	54.5 %
<i>3 indicators</i>	34	19.1 %	131	73.6 %
<i>4 indicators</i>	12	6.7 %	143	80.3 %
<i>5 indicators</i>	2	1.1 %	145	81.5 %
<i>6 indicators</i>	0	0.0 %	145	81.5 %
<i>7 indicators</i>	0	0.0 %	145	81.5 %
<i>8 indicators</i>	1	0.6 %	146	82.0 %
<i>9 indicators</i>	1	0.6 %	147	82.6 %
<i>10 indicators</i>	2	1.1 %	149	83.7 %
<i>11 indicators</i>	3	1.7 %	152	85.4 %
<i>12 indicators</i>	26	14.6 %	178	100.0 %

Table 8: Data availability in 2012: coverage of indicators per country

Indicators	Number of observation	Missing Values	Missing values (%)
Unemployment rate	178	0	0.00
Relaxed unemployment rate	31	147	82.58
NEET rate	30	148	83.15
Temporary worker rate	33	145	81.46
Involuntary part-time worker rate	37	141	79.21
Atypical working hours rate	32	146	82.02
In work at risk of poverty rate	30	148	83.15
Vulnerable employment rate	64	114	64.04
Formal education and training rate	33	145	81.46
Skills mismatch rate	46	132	74.16
Relative unemployment ratio	178	0	0.00
Incidence of long-term unemployment rate	44	134	75.28

Table 9: Data availability in 2012: coverage of countries by indicators

E Scoreboards of some selected countries

	Norway 2007				Denmark 2007				Finland 2007				EU 28 2007			
	Value	Score	Rank	out of	Value	Score	Rank	out of	Value	Score	Rank	out of	Value	Score	Member of the group with available data	Tot. members of the group
<i>Activity State</i>		6.00				6.19				5.38				5.37		
Unemployment rate	7.30	6.27	30	/ 178	7.50	6.25	33	/ 178	15.80	5.42	104	/ 178	14.88	5.51	28	/ 28
Relaxed unemployment rate	14.71	5.74	11	/ 32	11.91	5.98	3	/ 32	26.17	4.76	24	/ 32	22.15	5.10	27	/ 28
NEET rate				/	4.30	6.36	2	/ 31	7.00	5.95	6	/ 31	9.97	5.50	28	/ 28
<i>Working Conditions</i>		4.75				5.24				4.27				4.77		
Temporary worker rate	8.66	6.13	7	/ 30	10.32	5.97	11	/ 30	32.01	3.80	26	/ 30	31.99	3.80	28	/ 28
Involuntary part-time worker rate	1.84	6.26	11	/ 36	2.80	5.88	18	/ 36	5.56	4.78	28	/ 36	3.05	5.78	28	/ 28
Atypical working hours rate	17.10	3.58	21	/ 31	8.93	5.21	1	/ 31	22.57	2.49	26	/ 31	15.77	3.85	26	/ 28
In work at risk of poverty rate	26.80	1.64	30	/ 3	20.30	2.94	28	/ 30	12.10	4.58	22	/ 30	8.84	5.23	27	/ 28
Vulnerable employment rate	5.90	6.11	8	/ 91	5.20	6.22	4	/ 91	8.60	5.71	17	/ 91	11.91	5.21	28	/ 28
<i>Education</i>		3.81				4.98				4.67				4.59		
Formal education and training rate	60.90	4.71	16	/ 33	66.70	5.40	8	/ 33	69.90	5.79	6	/ 33	60.82	4.70	28	/ 28
Skills mismatch rate	27.20	2.92	31	/ 33	16.30	4.56	14	/ 33	23.00	3.55	25	/ 33	16.85	4.47	28	/ 28
<i>Transition Smoothness</i>		5.62				6.07				5.86				4.85		
Relative unemployment ratio	4.20	4.48	155	/ 178	2.40	5.56	61	/ 178	2.90	5.26	110	/ 178	2.84	5.30	28	/ 28
Incidence of long-term unemployment rate	2.50	6.75	5	/ 43	4.20	6.58	7	/ 43	5.30	6.47	8	/ 43	26.03	4.40	28	/ 28
<i>KOF YLM Index</i>		5.05				5.62				5.04				4.89		

Table 10: The scoreboard for Norway, Denmark, Finland and the EU 28 and Ireland

	Italy 2007				Ireland 2007				Italy 2012				Ireland 2012			
	Value	Score	Rank	out of	Value	Score	Rank	out of	Value	Score	Rank	out of	Value	Score	Rank	out of
<i>Activity State</i>		4.08				5.87				2.84				4.06		
Unemployment rate	20.30	4.97	127	/ 178	9.10	6.09	46	/ 178	35.30	3.47	158	/ 178	30.30	3.97	147	/ 178
Relaxed unemployment rate	50.25	2.69	31	/ 32	10.08	6.14	2	/ 32	67.48	1.22	31	/ 31	34.69	4.03	19	/ 31
NEET rate	16.20	4.57	28	/ 31	10.70	5.40	16	/ 31	21.10	3.83	28	/ 30	18.70	4.19	25	/ 30
<i>Working Conditions</i>		4.32				5.53				3.59				3.82		
Temporary worker rate	18.94	5.11	20	/ 30	9.70	6.03	9	/ 30	25.62	4.44	22	/ 32	11.85	5.81	11	/ 32
Involuntary part-time worker rate	7.71	3.92	33	/ 36	1.88	6.25	12	/ 36	16.66	1.00	36	/ 37	12.95	1.82	34	/ 37
Atypical working hours rate	13.97	4.21	14	/ 31	13.90	4.22	13	/ 31	16.00	3.80	15	/ 32	23.07	2.39	27	/ 32
In work at risk of poverty rate	13.90	4.22	24	/ 30	5.70	5.86	12	/ 30	12.90	4.42	25	/ 30				
Vulnerable employment rate	19.10	4.13	42	/ 91	11.30	5.30	29	/ 91	18.20	4.27	34	/ 64	11.70	5.25	21	/ 64
<i>Education</i>		5.46				3.58				5.37				3.83		
Formal education and training rate	61.80	4.82	15	/ 33	48.20	3.18	31	/ 33	61.40	4.77	19	/ 33	58.80	4.46	27	/ 33
Skills mismatch rate	6.00	6.10	6	/ 33	20.20	3.97	18	/ 33	6.90	5.96	10	/ 46	25.30	3.21	42	/ 46
<i>Transition Smoothness</i>		3.78				5.29				3.36				3.91		
Relative unemployment ratio	4.10	4.54	152	/ 178	2.40	5.56	61	/ 178	4.00	4.60	151	/ 44	2.40	5.56	55	/ 178
Incidence of long-term unemployment rate	39.80	3.02	36	/ 43	19.80	5.02	19	/ 43	48.70	2.13	39	/ 178	47.40	2.26	38	/ 44
<i>KOF YLM Index</i>		4.41				5.07				3.79				3.91		

Table 11: The scoreboard for Italy and Ireland in 2007 and 2012