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Permanent and transitory earnings inequality of young people in Europe

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<th>Report</th>
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Individuals dislike instability as it hampers important economic outcomes such as education, health, consumption and savings behaviour, housing demand and well-being in general. Economic instability is particularly harmful among youth when it comes to decisions related with residential emancipation (Becker et al., 2010), fertility (Del Bono et al., 2012, 2015) or marriage (De la Rica, 2005).

This paper provides new evidence on economic instability, as measured by earnings and labour market volatility, across Europe over the period of the Great Recession for the population group hardest hit by the severe economic downturn: youth. Our contribution complements previous evidence in two important aspects: first, we provide a consistent analysis across 28 European countries, and second, our analysis covers both the period before and after the major economic turmoil since the Great Depression.

We measure volatility in two manners: Earnings volatility, based on year-to-year earnings changes, and labour market volatility, which also considers transitions into and out of employment. This way we take account not only of the conditions received while working (earnings) but also the likelihood that young people enter or leave employment. Our results are based on data from the European Union – Statistics on Income and Living Conditions (EU-SILC) for the period 2004–2013.

Our findings show large disparities in earnings, and especially, labour market volatility levels and trends of youth across European countries, which makes it difficult to group the countries into meaningful clusters. Welfare regimes or geographical regions, for instance, do not account for differences in observed volatility across countries. With few exceptions, volatility is found not to differ across gender, age, or perhaps more
surprisingly, education. As expected, the Great Recession increases volatility for Europe's youth, offsetting the falling trend observed over the last years of economic prosperity.

A decomposition exercise has allowed to better understand the extent to which volatility is due to earnings changes or rather transitions in and out of the labour market. Interestingly, we have found that in Northern Europe, overall volatility is mostly due to changes in wages while transitions into and out of the labour market are far less important. This means that, compared to their European counterparts, Swedish or Norwegians have a high likelihood to continuously participate in the labour market, but attention should be paid to the changing conditions they receive while working. Instead in Southern Europe, it is the increased likelihood of having to leave employment and the difficulties to return to it what best explains youth economic instability. As a result, changes in earnings are a matter of smaller concern.

In terms of policy design, our results suggest that a one-size policy does not fit all: volatility should be reduced in the Nordic countries by negotiating better conditions for youth while working, while in the South, all the focus should be placed on helping youth to having long employment spells and lower turnover. According to our results, in Sweden or Denmark, for example, more than 90% of youth in our sample is consecutively employed while the same figure is below 50% in Greece after the bust of the Great Recession.

Institutions are a salient feature of European labour markets and shape important labour market outcomes. When we look at the relationship between labour market institutions and volatility, we find that more generous unemployment benefits and stricter employment protection legislation are related with reduced (earnings and labour market) volatility. This finding is consistent with the idea that the generosity of unemployment insurance and better employment protection allows better matches to take place in the labour market between youth and firms. That is, protecting individuals via employment legislation and benefits enhances job quality matches which translates into less volatility.

Our findings suggest that good job matches, leading to long and stable labour relationships are key to reducing volatility. However, accomplishing good job matches is complex in so far as it is unlikely to be fully achieved by demand or supply side policies alone. For instance, education policies alone are likely not to bear a large
influence on volatility, as observed volatility does not change across education levels. Satisfactory solutions, thus, rather call for a balanced mix of supply and demand type policies.

Of course, good job matches and the earnings and employment stability they bring about is to be a good policy target unless it comes at the cost of high and persistent unemployment, which does not contribute to measured volatility, as unemployed individuals do not change labour market status.

**References**


Permanent and transitory earnings inequality of young people in Europe *

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Abstract

We provide new evidence on earnings volatility and labour market volatility, which also includes flows into and out of employment, of young workers across Europe over the Great Recession, and examine the institutional factors that may shape both earnings and labour market volatility. Using EU-SILC data, we document large disparities in volatility levels and trends of youth across European countries, which makes it difficult to group countries with similar volatility trends into meaningful clusters. Trends do not differ by gender, age, or education. As expected, the Great Recession increases volatility for Europe’s youth, offsetting the falling trend observed over the last years of economic prosperity. Larger unemployment benefits and more stringent employment protection legislation are related to lower earnings and labour market volatility.

Keywords: Earnings volatility, Labour market volatility, Youth, Labour flows, Labour market institutions, Europe, Great Recession

JEL classification: J41, E24, C46, C23

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1 Introduction

Individuals dislike instability, as it hampers important economic outcomes such as education (Kodde, 1986; Snow and Warren, 1990), health (Caroli and Godard, 2015), consumption and savings behaviour (Meghir and Pistaferri, 2011; Guiso and Jappelli, 1992), housing demand (Haurin, 1991), divorce (Becker et al., 1977), and well-being in general (Clark et al., 2008). Economic instability is particularly relevant for youth when it comes to emancipation (Becker et al., 2010), fertility (Del Bono et al., 2012, 2015) or marriage (De la Rica, 2005). This paper provides new evidence on economic instability, as measured by labour market and earnings volatility, across Europe over the period of the Great Recession for the population group hardest hit by the severe economic downturn: the youth.

There is a growing literature on the analysis of earnings volatility (Cappellari and Jenkins, 2014; Ziliak, Hardy, and Bollinger, 2011; Venn, 2011). Most of the studies have been devoted to the analysis of prime-aged men (Shin, 2012; Daly and Valletta, 2008; Shin and Solon, 2011; Baker and Solon, 2003) and, only more recently, also women (Cappellari and Jenkins, 2014; Dynan et al., 2012). However, there is little evidence on earnings instability amongst young people, for whom economic instability is likely to be more pronounced than for other age groups and, as mentioned above, it is also likely to condition life decisions and investments. Previous evidence focuses mostly on country studies and stops right when the Great Recession is to begin. Our contribution complements previous evidence in two important aspects: first, we provide a consistent analysis across 28 European countries, and second, our analysis covers both the period before and after the major economic turmoil since the Great Depression.

Following recent literature, the measure of instability we use copes with zero earnings, which means that we do not confine our analysis to strictly positive earnings but we also take due account of entries to and exits from employment. This measure is also especially suitable for the data we use, the European Union – Statistics on Income and Living Conditions (EU-SILC), which has a short panel component where individuals are observed in 4 consecutive years, at most.

Our findings show large disparities in earnings, and especially, labour market volatility levels and trends of youth across European countries, which makes it difficult to group the countries into meaningful clusters. As expected, the Great Recession increases volatility for Europe’s youth, offsetting the falling trend observed over the last years of economic prosperity. With few exceptions, volatility is found not to differ across gender, age, or perhaps more surprisingly, education. Institutions are a salient feature of European labour markets and shape important labour market outcomes. When we look at the relationship between labour market institutions and volatility, we find more generous unemployment benefits and stricter employment protection legislation to be related with reduced (earnings and labour market) volatility. This finding is consistent with a story of these two institutions increasing the quality of job matches and thus reducing volatility.

The paper is organized as follows. Section 2 informs about the data set used throughout the paper. Section 3 sets out our measure of volatility. Section 4 presents the results for earnings and labour market volatility trends across all European countries and by relevant individual characteristics. A variance decomposition exercise contributes to our

\[\text{Venn (2011) studies earnings instability for a large (but smaller than our) set of European countries. However, like all previous studies he only covers the pre-crisis period and uses a rather crude measure of volatility.}\]
understanding on what accounts for the observed trends. Section 5 links volatility and labour market institutions. Finally, the last section concludes and discusses avenues for future research.

2 Data

We use data from all the waves available of the European Union - Statistics on Income and Living Conditions (EU-SILC) in its longitudinal form\textsuperscript{2}. The EU-SILC has the advantage of collecting detailed information on individuals and households earnings as well as socio-economic and demographic characteristics. Moreover, data is comparable across the participating European countries. In most of them, though, the longitudinal component only follows individuals for four consecutive waves which implies that, each year, 25% of the sample is replaced by a new rotational group. Thus, for the purpose of our analysis, at the most, we will be observing changes in three occasions for each individual. Our pooled dataset has been constructed by taking the information from the last file in which a given rotational group figures. This is important in order to guarantee that if there has been some change between waves as for the way the information is collected, it does not affect our results. Individual observations that appear in a file have been applied the same methodology longitudinally.

The period under analysis starts in 2004 and ends in 2013. In total, we draw results for 28 countries — only data from Germany and Switzerland have been disregarded because a sufficient number of waves is not available for these countries. The sample contains 169,385 individual observations. The smallest sample is found in Iceland with 2,175 observations and the largest in Italy with 14,450.

Our results are based on individual-level earnings changes between two consecutive years \( t - 1 \) and \( t \). Our sample is built of young people between the ages of 17 and 29 employed or not employed. We exclude: (i) individuals that either are 17 at \( t \) or 29 at \( t - 1 \); (ii) individuals with missing information on labour market status at \( t - 1 \) or at \( t \); and, (iii) full-time students at either \( t - 1 \) or \( t \).

Non-random attrition may bias our measures of volatility. Notwithstanding this, as we use volatility measures based on two consecutive years’ data only, the effects of attrition are much muted—as compared to, say, other measures based on longer sequences of panel data\textsuperscript{3}. Also, note that since our volatility measure, described in Section\textsuperscript{3}, involves differentiating the variable of interest, i.e. earnings, the effect of attrition will be attenuated if we can assume that the probability of attrition is unobserved and time invariant (Ziliak, Hardy, and Bollinger, 2011)\textsuperscript{4}.

Our measure of earnings is ‘gross employee cash or near cash income’. Earnings from second and third jobs are not included. All the nominal amounts have been converted to 2005 prices using the annual data of the Harmonised Index of Consumer Prices (HICP)\textsuperscript{2}.

\textsuperscript{2} The EU-SILC has been used before for the analysis of volatility by Venn (2011).

\textsuperscript{3} This argument is especially relevant with low year-on-year attrition rates, something that the EU-SILC can improve upon.

\textsuperscript{4} Of course, if the unobserved heterogeneity, which drives attrition, has a time-varying component first differences will not eliminate the bias. Furthermore, the size and direction of the potential bias is difficult to gauge. In their analysis of the attrition effects on poverty persistence rates in the EU-SILC data, Jenkins and Van Kerm (2014) conclude that there is substantial cross-national diversity in the characteristics of individuals lost to follow-up and that the assumptions on the poverty status of attritors have important influence on estimates for most countries. A full assessment of attrition bias and its implications in the EU-SILC is beyond the scope of this paper.
made available to researchers from the Eurostat web page. As income in the EU-SILC data set is collected referring to the previous calendar year, the HICP has been used accordingly. Importantly, the income variable is in gross amounts for the great majority of countries and waves. However, note that in the cases of Italy, Portugal and Greece for the years 2004 to 2006, Latvia for 2005 and 2006 and France for 2004, the variable is only available in net amounts. We have decided to use this information but we make sure that we do not calculate transitions for the same individual from net to gross amounts. This explains why we have a break in the time series in the aforementioned countries (see graphs). Finally, in the case of Spain, in 2004 and 2005, the income information is given either in gross amounts, net or both. Again, we derive results for both years but only for those individuals we can calculate transitions in net or gross amounts. If for a given individual only a transition from net to gross or from gross to net can be calculated, we disregard this information.

3 Methodology

Adopting the terminology used in Cappellari and Jenkins (2014), in this paper we analyse 'earnings volatility' and 'labour market volatility'. Earnings volatility studies the instability of earnings for young people that have positive incomes at the two time points under analysis so it captures changes in the conditions received while working. The labour market volatility measure includes all potential workers even those with zero earnings so it summarises not only changes in wages but also transitions into and out of employment.

Our principal measure of volatility among young people is the standard deviation of the arc percentage change in individual earnings between \( t - 1 \) and \( t \) as proposed by Dynan et al. (2012). That is,

\[
l = \sqrt{Var[100 \times \frac{y_{it} - y_{it-1}}{\overline{y}_i}]} \tag{1}
\]

where \( y_{it} \) is earnings for person \( i \) at time \( t \) and \( \overline{y}_i \) is the mean across the matched pair of years. The main advantage of this measure is that it can be computed even if earnings are zero in one of the two years — thus, it allows for the measurement of labour market volatility. At the individual level, it is bounded between -200% and 200% and equals zero in those cases when a young person is out of employment at \( t - 1 \) and \( t \). At the aggregate level, \( l \) is bounded below by zero, when earnings changes are exactly the same for every individual. Otherwise, the larger the dispersion, the greater the measure of volatility. We employ the standard deviation for the whole descriptive analysis (and not the variance) except for Section 4.3, where we undertake a decomposition exercise of the variance.

Unlike other methods that have been used to estimate the instability of earnings, such as the variance component approach developed after the pioneering contribution by Lillard and Willis (1978), the method we employ does not allow to distinguish between transitory and permanent earnings changes. However, several authors have claimed that such a distinction may not be that useful since both type of changes are likely to influence the

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5See Cappellari and Jenkins (2014) for a discussion on the different methods for the measurement of earnings instability.
6In the sample used, there is no cases of individuals having negative earnings.
7Earnings change for those that move into work is 200% while for those that move out of work is -200%.
welfare of an individual (Shin and Solon, 2008; Dynan et al., 2012). Shin and Solon (2011) argue that parametric models of earnings dynamics that decompose earnings inequality into permanent and transitory components are sensitive to arbitrary variations in model specification: “We therefore sympathize with the inclination of several other researchers [...] to eschew complex earnings dynamics models and focus instead on transparently simple statistics that might be reasonable indexes of earnings volatility under a wide range of data-generating processes” (p. 975).

Indeed earnings volatility measures based on dispersion in year-to-year earnings capture permanent and transitory shocks but this is appropriate when the objective of the research is to learn about possible increases in earnings risk. Another advantage of the method we use in this paper is that is less data-intensive. On the negative side, this measure of volatility based on year-to-year changes is more subject to measurement error.

4 Results

4.1 Youth volatility trends

Figure 1 shows the trends in earnings volatily and labour market volatility for youth aged 17-29 across Europe. It is important to remember at this point that the earnings volatility measure does not include individuals with zero earnings at any of the two time points while labour market volatility takes into account individuals that are not employed and therefore do not receive earnings from the labour market. Each graph also contains confidence intervals that have been computed using bootstrap standard errors with 1000 replications. A vertical line has been drawn in 2008 to ease comparison between the period before and after the Great Recession bust.

We start examining the volatility estimates of Figure 1 by classifying the countries into low, medium and high volatility countries, according to the distance between the country average volatility level over the sample period, \( \bar{l}_i \), and the overall average volatility level across all countries and over all years, \( \bar{l} \). In particular, we consider a country to display ‘low volatility’ when

\[
\bar{l}_i < \bar{l} - 0.5\sigma_l,
\]

where \( \sigma_l \) is the standard deviation of overall volatility. Likewise, countries will be said to display medium levels of volatility when

\[
\bar{l}_i < \bar{l} + 0.5\sigma_l < \bar{l}_i,
\]

and high levels of volatility when

\[
\bar{l}_i > \bar{l} + 0.5\sigma_l.
\]

The countries found to display ‘low earnings volatility’ are the Czech Republic, Greece, Luxembourg, Malta, the Netherlands, Romania, Slovakia, and the United Kingdom. Actually, Romania in 2012 displays the lowest estimate of earnings volatility amongst all countries and years (\( l = 26 \)). The group with medium earnings volatility also includes a great variety of countries: Belgium, Cyprus, Denmark, Hungary, Ireland, Iceland, Italy, Poland, Portugal, and Slovenia. Finally, high earnings volatility levels are found in Austria, Bulgaria, Estonia, Finland, France, Latvia, Lithuania, Norway, Spain, and Sweden. The highest earnings volatility (\( l = 70 \)) is found in Latvia in 2011. The composition of the different groups makes it difficult to come up with a variable, such as the region or welfare regime, that could identify the three clusters of countries — perhaps the only

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8 We refer the interested reader to Shin and Solon (2011) for a discussion on the disadvantages of using complex decomposing models and arguments that advocate for the use of simpler measures (especially if data is close in time, like year to year).

9 The Great Recession did not start at the same time in all countries but 2008 is possibly the year when the crisis hit hardest in most of Europe.
Figure 1: Earnings and labour market volatility in Europe for young people aged 17–29, 2005–2013

Source: Own calculations based on the EU-SILC, 2005–2012. Confidence intervals have been calculated using bootstrap standard errors with 1,000 replications.

exception being the Scandinavian countries, as they all belong to the medium or high volatility groups.

Over time, we find great heterogeneity in trends. Youth earnings volatility increased by more than 20% between 2008 and 2013 in Iceland, Italy, Spain, Latvia and Malta. On the contrary, earnings volatility decreased in another eight countries, being particularly strong in Austria, Belgium, and Poland, where it fell by more than 10%.[10] A simple visual inspection of Figure 1 shows that year-on-year changes in earnings volatility are not statistically significant for many countries and years.[11] Furthermore, there appears not to be any relationship between the economic crisis and earnings volatility. However, multivariate analysis in Section 5 shows volatility to increase with the Great Recession.

A somehow different picture emerges if we turn to the results relative to labour market volatility. Again, we can group countries by their volatility levels but they are formed

[10]Note that the value for 2013 is not available for all countries analyzed.
[11]Furthermore, note that most countries remain in the same low, medium or high earnings volatility group when the analysis is carried out by time periods (before and after 2008) — the only exceptions being Cyprus, Greece and Portugal that move from the low to the medium group, Slovakia that goes from the medium to the low group, and Hungary, Poland, and Slovenia that change from the high to the medium group.
by different countries than the ones relative to earnings volatility. In the low labour market volatility group, there is still the Czech Republic, Malta, the Netherlands and Romania and we need to add Denmark and Iceland. The majority of countries are found in the medium labour market volatility group while in the high volatility group we find Bulgaria, Estonia, Hungary, Latvia, Lithuania and the Southern European countries of Greece, Spain, and Portugal. Therefore, it is again difficult to define clear clusters of countries — except once again for the Scandinavian countries that are all located in the low and medium volatility group and the Southern European ones that are either in the medium or high group.

As for the evolution of labour market volatility, we observe large increases above 20% between 2008 and 2013 in Spain and Cyprus, and relatively high increases also in the Netherlands (17%) and Slovenia (18%). A fall larger than 10% is found in Austria, Bulgaria, Ireland, Malta, Norway and Poland. With the only exception of few countries (e.g. Spain, Lithuania, Poland, Portugal, and Slovakia), observed changes between the first and the last sample year are not large enough as to talk about a significant increase or decrease in labour market volatility across Europe.12

Earnings and labour market volatility trend are close to each other in Northern European countries and in the Netherlands, indicating that much of the labour market volatility can be mostly accounted for by earnings volatility, and much less so by entries to and exits from the labour market. On the contrary, where both volatility measures are far apart, as in Greece, Spain, and Portugal, our estimates indicate that labour market volatility is much more affected by worker turnover while earnings changes play a less important role. We have a closer look at the importance of earnings changes, separations and accessions in explaining labour market volatility in Section 4.3 below.

4.2 Youth volatility trends by characteristics

Figures 2 to 7 show earnings and labour market volatility trends when accounting for certain socio-demographic characteristics, in particular, gender, age and educational attainment.13 Trends by gender indicate that there is no difference between boys and girls in terms of the earnings volatility measure used. The two curves that represent each gender clearly overlap for the majority of countries analyzed. Only in Sweden and Slovenia we find higher earnings volatility among females than males. In the case of labour market volatility, there are points that indicate higher volatility for girls than for boys, particularly in the Scandinavian countries, Austria, and the Czech Republic. However, note that in the great majority of countries and years, no differences are observed and, therefore, the rest of our analysis will consider males and females jointly.

We have also considered earnings and labour market volatility by distinguishing between younger youth (17–23) and older youth (24–29). Again, both curves overlap for most years and countries, indicating that overall younger and older youth experience similar levels of volatility. Earnings volatility is systematically higher for younger than older youth only in Finland and in France, while only in Spain the younger youth systematically displays higher labour market volatility than the older youth.

12 In the case of labour market volatility, the number of countries that change volatility category is larger than in the case of earnings when we do the analysis by period. Belgium, Finland, Italy, Poland and Slovakia move from high to medium, Portugal from low to high, Czech Republic, Luxembourg, Malta, Norway and Slovenia from medium to low and the United Kingdom from low to medium.

13 We also considered the possibility to study trends by type of contract but the variable contained a large number of missings in some countries.
Figure 2: Earnings volatility for young people aged 17–29 by gender, 2005–2013

Source: Own calculations based on the EU-SILC, 2004–2013. Confidence intervals have been calculated using bootstrap standard errors with 1,000 replications.
Figure 3: Labour market volatility for young people aged 17–29 by gender, 2005–2013

Source: Own calculations based on the EU-SILC, 2004–2013. Confidence intervals have been calculated using bootstrap standard errors with 1,000 replications.
Figure 4: Earnings volatility for young people aged 17–29 by age group, 2005–2013

Source: Own calculations based on the EU-SILC, 2004–2013. Confidence intervals have been calculated using bootstrap standard errors with 1,000 replications.
Figure 5: Labour market volatility for young people aged 17–29 by age group, 2005–2013

Source: Own calculations based on the EU-SILC, 2004–2013. Confidence intervals have been calculated using bootstrap standard errors with 1,000 replications.
**Figure 6:** Earnings volatility for young people aged 17–29 by educational level, 2005–2013

Source: Own calculations based on the EU-SILC, 2004–2013. Confidence intervals have been calculated using bootstrap standard errors with 1,000 replications.
**Figure 7:** Labour market volatility for young people aged 17–29 by educational level, 2005–2013

Source: Own calculations based on the EU-SILC, 2004–2013. Confidence intervals have been calculated using bootstrap standard errors with 1,000 replications.
By highest educational level attained (ISCED), we also find an overlap between the curve that shows the volatility measure for individuals with tertiary education and the rest. Only in Finland, France, Spain, and the United Kingdom, we can observe some years where labour market volatility is higher for those with primary or secondary degree compared to those with University degree.

4.3 A decomposition exercise

For a better understanding of the observed volatility trends, we next decompose our measure of labour market volatility. As explained in Cappellari and Jenkins (2014), since we have mutually exclusive groups in the labour market (employed or non employed at different points in time), we can compute the variance of the arc percentage change as the weighted sum of the ‘within’ and ‘between’ group variances. The ‘within-group’ variance is the sum of the variance of each group weighted by the proportion of the group in the population. In total, there are four groups depending on whether individuals have positive earnings at $t - 1$ and at $t$ ($P_{11}$), positive earnings only at $t - 1$ ($P_{10}$), positive earnings only at $t$ ($P_{01}$) or they do not have earnings from the labour market in any of the periods analyzed ($P_{00}$). The ‘between-group’ variance is the variance of a counterfactual distribution where each individual is attributed the mean value of her group.

Using the same notation as in Cappellari and Jenkins (2014), the population mean arc percentage earnings change, $M$, can be decomposed as follows:

$$M = M_{11}P_{11} + M_{10}P_{10} + M_{01}P_{01} + M_{00}P_{00}$$

(2)

where $M_{00} = 0$, $M_{01} = +200$, $M_{10} = -200$ and $P_{11}$, $P_{01}$, $P_{10}$ and $P_{00}$ are the population shares that add up to 1. Thus $M$ can be written as,

$$M = M_{11}P_{11} + 200(P_{10} - P_{01})$$

(3)

Moreover, since $V_{10} = V_{01} = V_{00} = 0$, the ‘within-group’ variance is equal to the variance in the always employed group, $V_{11}$, weighted by its population share $P_{11}$. Therefore, the overall variance ($V = t^2$) can be computed as the sum of the within-group variance and the four components of the between-group variance,

$$V = t^2 = V_{11}P_{11} + P_{00}M^2 + P_{01}(200 - M)^2 + P_{10}(200 + M)^2 + P_{11}(M_{11} - M)^2.$$ 

(4)

Figure 8 shows for each country the importance of the different components of the labour market volatility variance over time. The blue color shows the percentage of the within-group variance ($V_{11}P_{11}$) over the total variance while in green and yellow, respectively, the components that are a measure of the variance due to entries to the labour market ($P_{01}(200 - M)^2$) and exits from the labour market ($P_{10}(200 + M)^2$) are shown. The rest of the variance components, $P_{00}M^2$ and $P_{11}(M_{11} - M)^2$ are drawn in red and grey but they represent a very small part of the total labour market variance in the great majority of the countries and therefore, these results can hardly be seen in the graphs and are not commented any further.

As can be seen, there is a great variability in terms of the importance that earnings volatility variance has in relation to total labour market volatility variance in the different

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14The variable gives information for all household members that are 16 and over and therefore includes individuals that may not have finished yet their education.
Figure 8: Decomposition of labour market volatility (within and between variances), individuals aged 17-29, 2005–2013

Source: Own calculations based on the EU-SILC, 2004–2013. The right axis refers to overall volatility while the left axis to the components.

countries. It is in Northern Europe where earnings volatility explains the biggest share of the labour market volatility variance — the maximum being in Iceland in 2006 when 85% of the total variance is explained by changes in earnings. This means that in these countries, as well as in Slovenia and the Netherlands, young people are more likely to face changes in the wages they receive from the labour market than in the opportunities they are given to enter the labour market.

Instead it is in the Southern European countries and in the United Kingdom or Romania where earnings volatility variance plays the least significant role as part of the overall labour market volatility variance. In these contexts, less than 30% of the variance is due to wage changes. Necessarily, this means that entries to and exits from the labour market are more important in these contexts. For example, in the case of Spain, at the beginning of the studied period, entries represented 41% of the total volatility variance and exits 31%. Thus, even in a period of economic growth, the Spanish youth labour market is characterized by great worker turnover. The same is also true for Greece, Portugal, Italy, or Belgium.

With the bust of the Great Recession, the situation has changed for a considerable number of countries and we can observe an increase in the importance of transitions in and out of the labour market as components of the overall volatility variance. Figure 9...
Figure 9: Labour market volatility variance components trends, 2005–2013

Source: Own calculations based on the EU-SILC, 2004–2013.

shows the trend in absolute value of the volatility measure and the evolution of the three main components and helps visualize these changes. In particular, note the parallelism between the yellow line representing the 'exits' component \(P_{10}(200 + M)\) and the blue line for the total volatility variance \(V\) in Greece, Norway, or Portugal. Again, taking Spain as an example, we find that 26% of total volatility variance is accounted for by exits in 2008, while the same figure is 39% in 2011 when the consequences of the economic crisis were still much present. For Greece, the corresponding figures are 28 and 46%.

The increase in the importance of the variance component relative to transitions out of the labour market has come along with a decrease in the weight that either the component for entries has or that the component for earnings changes has, being the evidence rather mixed. For example, in the case of Finland, the 'exits' component increased its percentage from 17% to 28% between 2008 and 2012 while the 'entries' component indicates no variation. Instead it is the earnings change component that compensated with a decrease from 56% to 46% in the same period. Results show a similar pattern for Denmark or Sweden. On the contrary, for example, in the case of Greece, the increase of the 'exits' component already commented, has been balanced by a decrease in the 'entries' component from 56% to 41% while earnings changes have changed little its importance as a component of labour market volatility.

Figure 10 sheds additional light to understanding these trends. It shows the evolution of the percentage of individuals that belong to each of the four population subgroups. Note
Figure 10: Percentage of individuals according to their employment status at $t - 1$ and $t$, 2004–2012

Source: Own calculations based on the EU-SILC, 2004–2013.
that the trends in the variance contributions are related to changes in these percentages. The first thing one notices is the great diversity as for the percentage of individuals in the $P_{11}$ group which is, at the beginning of the period, as high as 90% in the Nordic countries (except Finland) and as low as 53% in Greece. This allows understanding why earnings volatility is the main driver of labour market volatility in Nordic Europe while its importance is so low in Southern Europe, Romania or Poland. Second, we can also observe that the percentages of individuals entering or exiting the labour market (and thus, contributing to labour market volatility) are rather low even in countries with sky-high unemployment rates. The percentage of individuals exiting the labour market reached the highest values around 2011 in Spain, Greece and the three Baltic countries (with percentages between 9 and 11%). This brings us to a third piece of evidence: those countries hit hardest by the Great Recession show high percentage of individuals in the $P_{00}$ (even before the economic bust). Such results help understanding why we do not find more labour market volatility: young people out of the labour market remain in this situation for long periods of time and therefore do not contribute to measured volatility.

5 Accounting for volatility

This section examines the institutional factors that may shape both earnings and labour market volatility. First we draw on existing theoretical work and empirical evidence to briefly outline how relevant institutions are supposed to influence volatility, and then we report our findings on the relationship between estimated labour market and earnings volatility and labour market institutions. In our empirical analysis we consider the following institutions: unemployment insurance (through its replacement rates), trade union (density), active labour market policies (expenditure as % of GDP), employment protection legislation (using two indices of strictness of EPL of temporary and permanent contracts), minimum wages (relative to median wages of full-time workers), and openness to trade (by means of a globalization index). In addition we also consider the percentage of youth aged 15 to 29 not in employment, education, or training (NEET), as a proxy of the quality of the education system and school drop-outs, for which there is no consistent information for all our sample countries over our sample period, the unemployment rate, and GDP level and growth.

5.1 How should we expect institutions to matter?

Since the main difference between our two measures of labour market and earnings volatility lies in the entries to and exits from employment, we first examine the expected impact of the six institutions mentioned above on workers turnover, and then discuss the possible effects on the variability of individual earnings growth.

5.1.1 Labour market volatility

*Employment Protection Legislation:* That by increasing the cost of worker turnover, hiring and firing restrictions and costs are likely to reduce workers flow is a standard result, often analytically derived from matching models (Mortensen and Pissarides, 1994). For

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\[^{15}\]Trade openness clearly is not an institution. Notwithstanding this, with a slight abuse of terminology, henceforth when we refer to institutions we will include trade openness, to avoid writing "institutions and other economic features" for instance.
instance, Blanchard and Portugal (2001) argue that higher employment protection directly leads to lower layoffs and results in longer unemployment duration by increasing firm’s costs and workers bargaining power. The longer unemployment duration inhibits quits. Also, Pries and Rogerson (2005) find that as it becomes more expensive to terminate matches, workers and firms need greater assurance about their match being a good one, firms find it less profitable to open new vacancies, and thus workers flow is lower.

Minimum Wages: Consistent with search models with endogenous separations, minimum wage hikes have been found to have a negative effect on workers turnover, by reducing separations and accessions.[16] Using data on teenage and restaurant workers in the US, Dube et al. (2015) find such turnover fall to affect especially workers with lower tenure, a salient feature of young workers. Using Canadian data, Brochu and Green (2013) find that hires, quits and layoffs of low-skilled teenage workers fall as a result of a minimum wage hike. Portugal and Cardoso (2006) find that a selective raise in minimum wage for teens in Portugal reduces worker turnover by reducing separations.

Unemployment Insurance: Unemployment insurance (UI) or benefits schemes have two key features that may influence worker turnover: benefit level and potential benefit duration.[17] We focus on benefit level as this is the data we have for the empirical analysis.[18] According to search theory, which has become the dominant approach to examine UI, benefit levels affect worker turnover through at least three channels, and has an ambiguous effect. First, since salaried work may provide entitlement to future UI, the so-called 'entitlement effect', increases the appeal of employment to the unemployed who do not qualify for benefits. This channel, then increases turnover by increasing accessions of individuals not qualified for benefits. The second channel has an ambiguous effect. Higher benefit levels may induce insured and newly unemployed workers to increase their reservation wage, which reduces the possibility of accepting a new job, but are also likely to promote a reduction in reservation wages of unemployed workers close to benefit exhaustion, thus increasing exit rates from unemployment. The third channel brings about a turnover reduction. Higher benefit levels are likely to promote job matches of higher quality, higher productivity[19] and wages, and longer employment spells, which will in turn decrease turnover.

Labour market institutions have been usually studied one at a time, paying much less attention to the likely interactions that different institutions may have in determining outcomes. As Blanchard and Tirole (2008) argue, such interaction may be especially pertinent for unemployment insurance and employment protection. For instance, the negative effect of employment protection on accessions pointed out by Pries and Rogerson (2005) may be larger in the presence of low benefit levels, which induce workers to job matches of poorer quality. The likely negative effect of stricter employment protection legislation for temporary jobs may also depend on the generosity of the unemployment

---

[16] As Dube et al. (2015) suggest, reduced flows may be due to a fall in either quits or layoffs. A job-ladder model, in which minimum wages reduce job-to-job transitions by lowering the arrival rate of better paying job offers, predicts a fall in quits, while an extended match quality learning model (Brochu and Green, 2013), where match quality is realized after an initial probationary period, predicts a fall in layoffs, as now search has sunk costs that increase with the minimum wage.

[17] See Tatsiramos and van Ours (2014) for a recent review of labour market effects of unemployment insurance systems.

[18] Which is unfortunate, since the empirical evidence shows that potential benefit duration has a larger impact on unemployment duration, and thus on exit rates to employment (Tatsiramos and van Ours (2014)).

insurance, which allows (unemployed) workers to await better matches, possibly in terms of a permanent job.

The empirical evidence for continental European countries seems to suggest a positive effect of benefit levels on turnover. On the one hand, benefit levels are normally found to have a weak or no effect on exit rates from unemployment into employment in continental European countries \(^{20}\) (Holmlund, 1998; Tatsiramos and van Ours, 2014). On the other hand, the level of benefits are found to have a significant positive effect on the inflow into unemployment (Winter-Ebmer, 2003; Lalive and Zweimüller, 2004). Finally, Rebollo-Sanz (2012) finds the above effects of unemployment insurance (i.e. longer unemployment spells and increased (employer-initiated) exit rates from employment) to be especially relevant for workers with a more marginal attachment to the labour market. She examines temporary workers and women, but much the same should apply to young workers.

**Openness to Trade**: Trade openness has an ambiguous effect on job turnover and wage inequality (Coçar, Guner, and Tybout, 2015). On the one hand, it increases the sensitivity of firms revenues to their productivity and employment levels, which in turn increases job turnover. More successful firms are also likely to reap larger rents in more open economies, which widens the wage dispersion across firms. On the other hand, lower trade frictions make workers to concentrate at larger, more stable firms, which tend to reduce turnover and wage inequality. Coçar, Guner, and Tybout (2015) examine the impact of trade liberalization in Colombia in the 1980s and find the sensitivity effect to dominate over the distributive effect, which implies higher turnover and larger earnings inequality.

**Trade Unions**: In so far as trade unions are an effective manner through which discontent workers may negotiate better conditions, it may reduce exit, which is the alternative way out from dissatisfaction. In other words, trade unions may provide voice to workers, which may lead to reducing separations (Freeman, 1980). The higher wage pressure generally related to trade union presence is also likely to help reduce turnover. However, unionized firms have also been found to increase the use of layoffs by reducing quits and discharges, but also by limiting the elasticity of wage (growth) and hours worked to changing demand conditions (Medoff, 1979; Dustmann and Schönberg, 2009). While the former may be thought of as perfect substitutes of layoffs and thus have no effect on overall separations, the latter lead to an increase in worker flow. The net effect is a priori ambiguous. Existing empirical evidence mostly provides support to the negative union density effects on turnover, as suggested by the voice hypothesis (e.g. Drago and Wooden, 1991, for Australia, Antcliff and Saundry, 2009, for the UK, Hirsch et al., 2010, Lucifora, 1998, for Italy, or García-Serrano and Malo, 2002, for Spain).

**Active Labour Market Programmes (ALMP)**: Youth employment is especially sensitive to economic fluctuations (Verick, 2011), and the last economic crisis has not been an exception. ALMP seek a fast reintegration of unemployed workers into employment. Are they effective? Evidence from a recent meta-analysis points to positive albeit limited effects. In particular, job search assistance and training programmes are generally found to have positive effects, though the latter mostly in the mid-term. In contrast, public sector employment programmes are much less effective (Card et al., 2010). These findings seem

\(^{20}\)In contrast, benefit levels are found to have a negative impact for the UK and the US, with a positive elasticity of unemployment duration with respect to benefit level lower than 1 and larger for the short-term unemployed.

\(^{21}\)According to Eurostat figures, the unemployment rate is substantially larger for youth than for adults, being twice as large in some countries.
to hold for the youth unemployed (Caliendo et al., 2011). Hence, ALMP may be expected
to contribute to increase accessions and turnover.

5.1.2 Earnings Volatility

Employment Protection Legislation: By increasing tenure as well as the bargaining power
of protected workers, stricter EPL is likely to reduce wage volatility. Given the lack
of direct evidence of EPL on wage volatility, the most suggestive evidence comes from
the indirect evidence through tenure. Conditional on employment, stricter EPL brings
about longer tenure, which in turn, has been found to have a negative effect on earnings
instability in Italy (Cappellari and Leonardi, 2015).

Minimum Wages: Higher minimum wages tend to compress wages at the lower end
of the distribution (Holmlund, 2014; Autor et al., 2015). However, there is no theoretical
or empirical guidance about their effect on earnings volatility. In a period of stable eco-
nomic growth, we presume that minimum wages are likely to increase earnings volatility,
compared to a situation with no minimum wages.

Indeed in the midst of the Great
Recession that characterizes our sample period, minimum wages have most likely con-
tributed to reduce earnings volatility by providing non-negative earnings growth rates to
the lower-end of the distribution, at least for the countries that have opted to adjust via
prices and not quantities.

Unemployment Insurance: Unemployment insurance is unlikely to have a direct influ-
ence on earnings volatility, but may do so by inducing job matches of higher quality and
longer tenure, which will in turn decrease earnings instability (Cappellari and Leonardi,
2015).

Openness to Trade: As outlined above, trade openness is likely to increase wage in-
equality (Coçar, Guner, Tybout, 2015). Traca (2005) also finds that trade liberalization
brings about higher wage inequality.

Trade Unions: Trade unions compress the wage distribution (Card, 1996; Card et al.,
2004; Dustmann and Schönberg, 2009; Lemieux, 1998) and limit the capacity of firms to
adjust to demand shocks through wage growth (Medoff, 1979; Dustmann and Schönberg,
2009). Hence, we expect earnings volatility to be lower in more unionized countries.

Active Labour Market Programmes: We do not have theoretical insights to foresee the
effect of ALMP on individual wage growth variability, and empirical studies so far have
not paid much attention to the impact on wages, let alone wage growth and its variability
(Card et al., 2010).

5.2 Data on institutions

In order to examine the relationship between institutional features and our volatility
estimates at country level from Section 4, we gathered information from different sources
on salient features of the six institutions referred to above, as well as data on other
controls, i.e. GDP, unemployment rate, and NEET, for the 28 European countries over
the eight years covered by our sample period 2005-2013. Next we briefly describe each

22 Minimum wage earners are usually low productivity workers with limited (below average) productivity
increases. Thus, if proportional to the evolution of their productivity, their earnings growth rate would
tend to be positive, albeit small, and definitely smaller than average. Minimum wages, however, tend
to remain rather fixed over time in real terms, which implies lower growth rates than the small positive
growth rates of minimum wage workers in a counterfactual situation with no minimum wage, and thus
contribute to increase the growth rate variance, i.e. our measure of volatility.
institutional variable. Detailed data definitions and sources are reported in Appendix Section A.1.

Employment protection legislation includes many provisions that regulate both monetary and non-monetary aspects of hiring and firing for both permanent and temporary jobs. To capture the most salient of these aspects we use the OECD composite index of employment protection regulation of temporary contracts, a score measured on a 0-6 scale, with higher values representing stricter regulation, that builds on 8 items and considers the regulation of fixed-term contracts and of temporary work agencies.

Our measure of minimum wages is the commonly used minimum relative to median wage of full-time workers, as reported by the OECD.

Unemployment insurance or benefits schemes have two key features that may influence volatility: benefit level and potential benefit duration. Given the lack of harmonized and consistent data on potential benefit duration, we use information on benefit levels. In particular, our variable is the replacement rate of unemployment benefits. Effective replacement rates depend on personal and household characteristics. We use OECD estimates for a single person with no children and average worker earnings. Further details can be found in the Appendix.

To capture openness to trade we use Dreher (2006)’s index of actual flow, measures trade liberalization through realized outcomes instead of using other aspects of trade openness, such as legal and economic restrictions and barriers (e.g. tariffs). This measure is a weighted sum of four components (all expressed in percentage of GDP): Trade, foreign direct investment, portfolio investment, and income payments to foreign nationals. The index ranges between 0 (null openness) and 10 (complete openness). A composite index of restrictions to trade, also put forth by Dreher (2006) showed no correlation with either volatility.

Trade union density corresponds to the ratio of wage and salary earners that are trade union members, divided by the total number of wage and salary earners taken from the OECD Labour Force Statistics. Density is calculated using survey data, wherever possible, and administrative data adjusted for non-active and self-employed members otherwise.

The variable on active labour market programmes is the expenditure spent on ALM programmes, expressed in percentage of GDP, as reported by the OECD. It includes expenditures on placement and administration, training, employment incentives, sheltered and supported employment and rehabilitation, direct job creation, and start-up incentives. We do not use passive labour market policies, as they include programmes that are not so relevant for the youth, such as expenditures on early retirement.

Finally our control variables, i.e. proportion of 15-29 year olds not in employment, education or training (NEET), GDP, and unemployment rate are also drawn from the OECD.

Table A.4 shows descriptive statistics. Due to limited data availability we have unbalanced panel, as we lack some institutional data for some years and some countries. The countries for which the lack of data is more severe include some former Easter Eu-
ropean countries, such as Bulgaria, Romania, and Lithuania, but also Cyprus and Malta. Table A.3 provides full details about data availability for each country and year in our sample.

To gain a first insight about the raw impact of each of the institutional features, Table 1 reports coefficient estimates of separate fixed-effect regressions of labour market and earnings volatility on each variable, year dummies, and a constant term.

According to the simple correlations, three institutions show a significant and negative effect on youth earnings volatility. The negative relationship between unemployment insurance replacement rates and earnings volatility is consistent with benefit levels inducing job matches of higher quality and longer tenure. The negative association with the strictness of employment protection legislation (of temporary and permanent jobs, the latter not displayed) is also consistent with longer tenures that are brought about by stricter EPL. Active labour market programmes, for which, we do not have any prior also correlates negatively with earnings volatility. The other three institutions, i.e. trade unions, minimum wage and trade openness, seem not to have a significant correlation with earnings volatility. Turning to the control variables, earnings volatility seem not to depend on GDP level or growth and shows a positive correlation with the unemployment rate as well as with the proportion of youth not in employment, education, or training.

The same three institutions that correlate with earnings volatility do also correlate, and with the same sign, with labour market volatility. Contrary to what we found for earnings volatility, though, now trade openness shows a positive link on labour market volatility. This finding is consistent with the empirical evidence for Colombia provided by Coçar, Guner, and Tybout (2015), and suggests a sensitivity effect that dominates over the distributive effect.

Table 1: Raw effect of institutions and controls on volatility, 2005-2013

<table>
<thead>
<tr>
<th></th>
<th>EV</th>
<th>LMV</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita</td>
<td>-0.0001</td>
<td>-0.0006 ***</td>
<td>225</td>
</tr>
<tr>
<td>GDP growth</td>
<td>0.1475</td>
<td>0.2817 *</td>
<td>225</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.5567 ***</td>
<td>0.8058 ***</td>
<td>225</td>
</tr>
<tr>
<td>NEET</td>
<td>0.3213 *</td>
<td>0.7926 ***</td>
<td>225</td>
</tr>
<tr>
<td>UI replacement rates</td>
<td>-0.2443 ***</td>
<td>-0.2250 ***</td>
<td>218</td>
</tr>
<tr>
<td>Trade Openness</td>
<td>0.1717</td>
<td>0.4160 **</td>
<td>200</td>
</tr>
<tr>
<td>Trade union density</td>
<td>-0.2354</td>
<td>0.0622</td>
<td>178</td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>-7.8859 ***</td>
<td>-11.4620 ***</td>
<td>174</td>
</tr>
<tr>
<td>ALMP</td>
<td>-32.5857 **</td>
<td>-57.6533 ***</td>
<td>169</td>
</tr>
<tr>
<td>Minimum Wage</td>
<td>5.9937</td>
<td>-13.1082</td>
<td>142</td>
</tr>
</tbody>
</table>

Note: Each row reports the coefficient estimate of a separate fixed effect regression that also includes year dummies and a constant term. *** significant at 1%; ** at 5%; * at 10%.

25This findings do not change in a substantive manner when we use the sample that results from selecting the country-year observations for which there is available information on the other variables not included in the regression.
5.3 What institutions account for volatility?

The simple correlations of Table 1 ignore possible correlation among variables that capture relevant aspects of the institutional setting, and between these institutional variables and other controls. Table 2 reports coefficient estimates of a fixed-effect regression that includes a set of institutional variables, $N$, a set of controls, $X$, and year dummies, $t$:

\[ l_{it} = \alpha + N_{it}'\beta + X_{it}'\gamma + t'\tau + \epsilon_i + \upsilon_{it} \]  

where the vector $\beta$ collects our parameters of interest, $\epsilon_i$ denotes the country fixed-effect, and $\upsilon_{it}$ is an i.i.d error term.

Column (1) in Table 2 is concerned about earnings volatility. It presents the results of our preferred model, which includes the variables that show a statistically significant raw correlation in Table 1. Two institutions seem to be associated to earnings volatility: Unemployment insurance and employment protection legislation. As suggested in Section 5.1, our findings corroborate the importance of the possible interaction between these two institutions. Thus, the effect of either of the institutions on earnings volatility depends on the value of the other variable.\(^{26}\) Since the estimated coefficients of UI and EPL are positive and the estimated coefficient of the interaction term is negative, the impact of either institution will be positive for sufficient low values of the other variable while it will be negative for sufficient high values of the other variable. That is, the effect of the two institutions offset each other. In particular, the degree of generosity of unemployment insurance has a negative effect on earnings volatility for levels of EPL higher than 1.275 (recall that the EPL variable takes values from 0 to 6), which corresponds to the 28th percentile of the EPL distribution in our sample. Stricter EPL also has a negative effect on earnings volatility for unemployment insurance replacement rates higher than 49.6%, which corresponds to the 10th percentile of the sample distribution. Therefore, both variables correlate negatively with earnings volatility for most of the support. As outlined above, the negative relationship between these two variables and earnings volatility is consistent with a story where benefit levels and the strictness of employment protection legislation induce job matches of higher quality and longer tenure, which in turn reduces earnings volatility.

It is also worth noting that while earnings volatility increases with the unemployment rate for the whole population, it is not sensitive to changes in the percentage of youth who are not in employment, education or training. Conditional on all the other covariates, year effects show a U-shaped pattern with a minimum in 2009.

Columns (2) and (3) refer to labour market volatility. Column (2) displays the estimates of a specification that includes variables that show statistically significant raw correlations with LMV in Table 1 while our preferred model in column (3) keeps the significant covariates from the previous column and shows that estimates are stable to the excluded variables and to the slight change in sample size that this exclusion implies. Estimates in column (3) tell a story analogous to that of earnings volatility: only unemployment insurance and employment protection legislation seem to matter for labour market volatility, the interaction of the two institutions is also important, and the relation

\(^{26}\)For instance, the marginal effect of the unemployment insurance replacement rate ($UIrr$) is $\partial l_{it}/\partial UIrr = \beta_{UIrr} + \beta_{UIrr\cdot EPL} \cdot EPL$, where $\beta_{UIrr}$ is the coefficient estimate of unemployment insurance replacement rate and $\beta_{UIrr\cdot EPL}$ is the coefficient estimate of the interaction term between unemployment insurance replacement rate and EPL.
between the two institutions, on the one hand, and LMV, on the other, is negative for most part of the support.\textsuperscript{27} Year dummies also show a U-shape pattern with a minimum in 2009, but unlike earnings volatility, labour market volatility decreases as GDP per capita grows.

\textsuperscript{27}Now the degree of generosity of unemployment insurance has a negative effect on earnings volatility for levels of EPL higher than 1.20, which corresponds to the 29th percentile of the EPL distribution in our sample, while stricter EPL also has a negative effect on earnings volatility for unemployment insurance replacement rates higher than 47.8\%, which corresponds to the 14th percentile of the sample distribution.
Table 2: What accounts for Earnings and Labour Market Volatility, 2005-2013

<table>
<thead>
<tr>
<th></th>
<th>Earnings Volatility (1)</th>
<th>Labour Market Volatility (2)</th>
<th>Labour Market Volatility (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>Std. Err.</td>
<td>β</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>-0.0003 **</td>
<td>0.0002</td>
<td>-0.0004 **</td>
</tr>
<tr>
<td>GDP growth</td>
<td>-0.0018</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.64 **</td>
<td>0.28</td>
<td>0.30</td>
</tr>
<tr>
<td>NEET</td>
<td>-0.33</td>
<td>0.33</td>
<td>0.02</td>
</tr>
<tr>
<td>UI replacement rates</td>
<td>0.51 ***</td>
<td>0.17</td>
<td>0.91 ***</td>
</tr>
<tr>
<td>EPL Temporary</td>
<td>19.84 ***</td>
<td>7.00</td>
<td>41.57 ***</td>
</tr>
<tr>
<td>Trade Openness</td>
<td>-0.34</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>UI RR*EPL Temp</td>
<td>-0.40 ***</td>
<td>0.11</td>
<td>-0.81 ***</td>
</tr>
<tr>
<td>Year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>-2.10</td>
<td>1.35</td>
<td>-0.17</td>
</tr>
<tr>
<td>2007</td>
<td>-3.22 **</td>
<td>1.43</td>
<td>-2.25</td>
</tr>
<tr>
<td>2008</td>
<td>-3.26 **</td>
<td>1.34</td>
<td>-2.94</td>
</tr>
<tr>
<td>2009</td>
<td>-3.84 ***</td>
<td>1.34</td>
<td>-4.81 *</td>
</tr>
<tr>
<td>2010</td>
<td>-3.17 **</td>
<td>1.38</td>
<td>-2.73</td>
</tr>
<tr>
<td>2011</td>
<td>-2.97 **</td>
<td>1.35</td>
<td>1.49</td>
</tr>
<tr>
<td>2012</td>
<td>-2.69</td>
<td>1.39</td>
<td>-0.14</td>
</tr>
<tr>
<td>2013</td>
<td>-2.02</td>
<td>1.45</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>35.01 ***</td>
<td>11.07</td>
<td>79.29 ***</td>
</tr>
<tr>
<td>N</td>
<td>156</td>
<td>140</td>
<td>174</td>
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</table>
This paper studies youth earnings and labour market volatility across 28 European countries for the period 2004–2013. Using data from the European Union – Statistics on Income and Living Conditions (EU-SILC) on young people between the ages of 17 and 29, we compute the standard deviation of the arc percentage change in individuals earnings between \( t-1 \) and \( t \). This index measures earnings volatility when only year-to-year changes in positive wages are considered, and also labour market volatility if we include zero wages, i.e. transitions into and out of employment.

Our findings show large disparities in earnings, and especially, labour market volatility levels and trends of youth across European countries, which makes it difficult to group the countries into meaningful clusters. As expected, the Great Recession increases volatility for Europe’s youth, offsetting the falling trend observed over the last years of economic prosperity. With few exceptions, volatility is found not to differ across gender, age, or perhaps more surprisingly, education.

To what extent overall labour market volatility is due to earnings changes or to workers flows into and out of employment? A variance decomposition exercise reveals earnings changes to account for a large share of overall labour market volatility in Nordic Europe. On the contrary, employment flows are most relevant in Southern Europe. This suggests that a one-size policy does not fit all. Instead, different policies are required to address the differential nature of labour market volatility in different European regions. Also notice that the different nature of labour market volatility is consistent with the way different labour markets adjusted to the shocks that came with the Great Recession.

Our analysis of the influence of the most relevant labour market institutions on volatility singles out unemployment insurance and employment protection legislation. Our interpretation is that these institutions contribute to reducing volatility by increasing the quality of job matches. Accomplishing good job matches is complex in so far as it is unlikely to be fully achieved by demand or supply side policies alone — volatility not differing across education levels seems a relevant example of this. It rather calls for a balanced mix of supply and demand type policies. If as we presume, job matches are important, this means that heterogeneity is relevant, and this has implications for scholarly research but also for policy making.

Our paper has several limitations. On the one hand, we were not able to determine how much of the earnings shocks translate into economic risk. As argued by Blundell et al. (2008) and Cunha et al. (2005), one requires more information to assess whether changes were anticipated or chosen and whether they were insured against or not. In our paper, however, as we refer to young people, and given the context of the Great Recession, it is unlikely that such changes were a matter of choice for young people. On the other hand, this paper is about changes in the labour market and therefore ignores the situation of young people who are continuously unemployed, which are possibly the ones who suffer the most the consequences of the Great Recession.
References


### A Appendix

#### Table A.1: Youth earnings volatility in Europe, individuals aged 17-29, 2005-2013

<table>
<thead>
<tr>
<th>2013</th>
<th>AT</th>
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Table A.2: Youth labour market volatility in Europe, individuals aged 17-29, 2005-2013

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A.1 Variable definitions

When necessary, this section provides further details on the description of the institutional and control variables we have employed to examine the relationship between labour market institutions and volatility.

Employment Protection Legislation of temporary jobs: As outlined in the main text, we use the OECD composite index of employment protection regulation of temporary contracts, which is a score measured on a 0-6 scale, with higher values representing stricter regulation. This index includes 8 items and considers the regulation of fixed-term contracts and of temporary work agencies employment. The different items gather information on the types of work for which the two forms of employment are allowed, their renewal and cumulative duration (of assignments at the user firm in the case of temporary work agencies). For further details on the methodology of this index, see http://www.oecd.org/els/emp/EPL-Methodology.pdf.

Unemployment insurance: We use OECD replacement rates estimates for a single person with no children and average worker earnings, who qualifies for cash housing assistance or social assistance "top ups" if available. The individual is assumed to be in an initial phase of unemployment but following any waiting period. Any income taxes payable on unemployment benefits are determined in relation to annualised benefit values (i.e. monthly values multiplied by 12) even if the maximum benefit duration is shorter than 12 months. Social assistance and other means-tested benefits are assumed to be available subject to relevant income conditions. For further details see http://www.oecd.org/els/soc/Methodology2013.pdf.

Openness to Trade: We use Dreher (2006)’s index of actual flow, which is a weighted sum of four components (all expressed in percentage of GDP): trade (23%), foreign direct investment (29%), portfolio investment (27%), and income payments to foreign nationals (22%), where figures in parentheses are the contribution of each component. The index ranges between 0 (null openness) and 10 (complete openness). Further details on data sources and methods can be found in Dreher (2006).

Trade Union: Trade union density corresponds to the ratio of wage and salary earners that are trade union members, divided by the total number of wage and salary earners taken from the OECD Labour Force Statistics. Density is calculated using survey data, wherever possible, and administrative data adjusted for non-active and self-employed members otherwise.
Table A.3: Missing information on institutional variables, 2005-2013

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Table A.4: Summary statistics

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