



# Youth and gender-specific unemployment and Okun's law in Germany and Poland

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## Abstract

The unemployment rates, especially youth unemployment rates, increased in various countries of Europe over the last years. This paper examines gender-specific youth unemployment developments in Germany and Poland with Okun's law to test the hypothesis that young male employees are more vulnerable to the business cycle. I estimate gender- and country-specific Okun coefficients for five different age cohorts. The results show that young men are more sensitive to the business cycle, while for women the reaction is less strong.

A further examination of the different labour markets regarding gender-specific youth employment results in policy recommendations beyond GDP growth, such as a reduction of the discrepancy in employment protection between permanent and temporary contracts and an approach to maintain youth connected to the labour market.

Keywords: Youth Unemployment, Okun's Law, Poland, Germany

JEL classification: E24, E32, J64

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# 1 Introduction

The financial and economic crisis strongly affected the European labour markets but with cross-country differences. The gender-specific youth unemployment development in Germany and Poland is investigated because the cases of those two countries in the recession are special. In Germany, the youth unemployment rate had been quite stable after the financial crisis, even declining after 2009. But the development of the growth rate of the real gross domestic product (GDP) was negative in 2009. In contrast, Poland had permanent positive GDP growth rates, but the youth unemployment rate increased. EU-15 countries as an aggregate is used for comparison and includes all countries that were members of the European Union before the eastern enlargement in May 2004<sup>1</sup>. I examine whether young men are more sensitive to the business cycle than young women which also includes a comparison with older age cohorts. I am using Okun's law (Okun, 1962), i.e. the negative relationship between changes of the unemployment rate and the growth rate of the GDP. My hypothesis here is that young male employees are more vulnerable to cyclical shocks, because they are mainly working in the more cyclical sectors such as construction and it is expected that their unemployment rate reacts more to changes in GDP than the female unemployment rate (Hutengs and Stadtmann, 2014a). I further examine how strong the differences between the various age cohorts are and therefore estimate gender- and country-specific Okun coefficients for five different age cohorts. The results show that young Polish males are not only more prone to the business cycle fluctuations than adults, but also more prone than young Polish females. But the differences between age cohorts are only significant between young (15-24) and old men (55-64). In Germany, young people are also more sensitive than other age cohorts, but the cohort differences are not statistically significant. This result will then lead to an examination of

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<sup>1</sup>The statistics are weighted averages of the individual EU-15 countries.

youth- and gender-specific characteristics of those two labour markets to find possible causes of those differences.

The structure of the paper is as follows: Section 2 provides a literature review and Section 3 describes the data set. I discuss the methodology and empirical results according to Okun's law in Section 4. Section 5 provides the examination of the labour markets of Germany and Poland for an explanation of the differences found in Section 4, while Section 6 concludes the paper with policy recommendations.

## 2 Literature review

When reflecting about practical macroeconomics, Blinder labels the foundations of Okun's law to be „atheoretical“ or even „antitheoretical“. Nonetheless, he also regards that this linear relationship between real output and changes in unemployment to be „stunning“ reliable (Blinder, 1997). Therefore, Blinder considers Okun's law as one building block for practical macroeconomics that we should all believe in!

Several studies show that youth unemployment is more sensitive to the business cycle (see e.g. OECD (2008), Verick (2009), Scarpetta et al. (2010), Bell and Blanchflower (2011), Choudhry et al. (2012), EC (2013), Berlingieri et al. (2014), Hutengs and Stadtmann (2014a), Hutengs and Stadtmann (2014b), Pastore (2015)). Reasons for this sensitivity are, according to the European Commission (EC, 2013), e.g. that young people are new entrants in the labour market and therefore suffer from reduced job opportunities and the competition with more experienced and skilled adults if the economic cycle is weak. Additionally, young workers are more likely to be hired with temporary contracts, and are the first to be laid off. And even in case that young people are hired with permanent contracts, they are subject to the LIFO (last-in-first-out) rule as the companies have lower opportunity costs when discharging young employ-

ees (EC, 2013).

Studies, such as Wall (2009), Albanesi and Sahin (2013), Hutengs and Stadtmann (2014a) as well as Brincikova and Darmo (2015), present statistical evidence of gender differences in unemployment caused by the business cycle, especially higher sensitivity for men. This is explained by strong fluctuations in the industrial sector which is predominantly employing men (Hutengs and Stadtmann, 2014a). Therefore, I combine the results for youth and for gender-specific unemployment and examine the hypothesis that young male employees are more vulnerable to business cycle conditions.

### **3 Data set and descriptive statistics**

I use annual real GDP, measured in prices of the year 2010 and published in the Annual Macro-Economic Database (AMECO) of the European Commission (EC, 2015), as well as the annual unemployment rates for various age cohorts provided by the Organisation for Economic Co-operation and Development (OECD, 2015). The data set starts in 1992 (the first available entries for all countries and variables) and ends in 2014. The unemployment rate is based on International Labour Organisation (ILO) standards to ensure that the countries are comparable with each other.

Figure 1 highlights GDP growth in Germany, Poland and EU-15 from 1992 until 2014. Poland has positive GDP growth rates during the financial crisis, while Germany and EU-15 show a negative GDP growth in 2009. The following figures (Figure 2 for Germany, Figure 3 for Poland and Figure 4 for EU-15) present youth unemployment rates for the age cohort of the 15-to-24-years old for both sexes. The rates vary between the countries. In Germany, the unemployment rates for both sexes are low as well as declining after the crisis. Additionally, the rate for women is lower than the one for men for approximately the last 20 years. The opposite can be seen in Poland for the whole period. The rates

were declining before the crisis, but after 2008 the rates rose again despite the fact that Poland had always positive GDP growth. Here, the rate for young women is always higher as the rate for young men. For EU-15 as aggregate the development starts with higher rates for women in the 1990s and after some periods with nearly identical rates in the early 2000s, the unemployment rates of women are lower than for men after 2008. Overall it had the expected increase in unemployment rates after the financial crisis. With these developments in GDP growth and youth unemployment rates in mind, I am examining in detail the relationship between changes in the unemployment rate of the various age cohorts and gender and the real GDP growth in the next section.

## 4 Regression analysis

### 4.1 Methodology

The regression is based on Okun's law, who examined the relationship between changes of the unemployment rate and the growth rate of the GDP. There are several versions of Okun's law with the original ones suggested by Okun (1962), the so-called gap and difference version, and further derivations developed in the course of time, so-called dynamic versions (see e.g. Knotek, 2007). Here, the difference version will be used to analyse the sensitivity of the unemployment rate to changes in the growth rate of GDP. The regression is given by:

$$\Delta u_t = \alpha + \beta \cdot GDPgrowth_t + \epsilon_t, \quad (1)$$

where  $\Delta u_t$  is the change in the unemployment rate from period  $t - 1$  to  $t$ ,  $GDPgrowth_t$  represents the GDP growth rate<sup>2</sup> and  $\epsilon_t$  is an error term. The parameter  $\beta$  is the so-called „Okun coefficient“ and, according to Okun's law,

<sup>2</sup>The GDP growth rate has been calculated as a percentage change in GDP moving from  $GDP_{t-1}$  to  $GDP_t$ :  $GDPgrowth_t = \left( \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}} \right) \cdot 100$ .

the coefficient should be negative, i.e. positive GDP growth should lead to a decrease of the unemployment rate (Hutengs and Stadtmann, 2014b). I estimate equation (1) per country via Ordinary Least Squares (OLS) for each age cohort and gender.

The residuals of the regressions have been checked for heteroscedasticity and serial correlation which was discovered in some country and gender regressions (see test results given in the result tables). As autocorrelation could eventuate in inefficient estimates with biased standard errors and therefore misleading results, I fitted the model with Newey-West standard errors.

Additionally, the equality of coefficients between age cohorts has been tested with an interaction term using the following equation:

$$\Delta u_t = \alpha + \delta \cdot d_a + \beta \cdot GDPgrowth_t + \gamma \cdot (GDPgrowth_t \cdot d_a) + \epsilon_t, \quad (2)$$

where  $d_a$  symbolizes a dummy variable representing the different age cohorts, coded as 0 and 1, and the other variables are defined as presented above. The parameter  $\gamma$  gives the difference in the coefficients between the reference age-cohort and the comparison age-cohort. This is used for testing whether the slopes ( $\beta$ 's) are the same. If the estimated effect size ( $\hat{\gamma}$ ) is zero, the difference between the age cohorts is not statistically different. I estimate equation (2) per country via OLS for males and females separately.

## 4.2 Results

The results are presented in Tables 1, 3 and 5 for men and women per country. Overall, the Okun coefficients are negative across all countries and gender as well as all age cohorts. Thus, the expected negative relationship between changes in the unemployment rate and the real GDP growth can be confirmed. The strength of the effect differs between all countries and the aggregate EU-15. The highest Okun coefficients in absolute terms are estimated for

the age cohort of the 15-to-24-years old. This indicates that youth is more sensitive to business cycle conditions than adults, especially in comparison to the age cohort of the 55-to-64-years old.

There are differences between the countries. In Poland, Okun coefficients in absolute values are larger than in Germany, so the Polish youth unemployment rates fluctuate more than the German youth unemployment rates. This is valid for both sexes.

The male coefficients in absolute values are higher than their female counterparts. This holds for all countries and age cohorts, except for Poland for the cohorts of the 35-to-44-years and 45-to-54-years old. Within these age cohorts, women have higher coefficients in absolute values than men.

The female coefficients are not significant for the age cohorts in Germany. In Poland, the coefficients are significant for all age cohorts, except for the oldest one, while in the EU-15 they are significant for all age cohorts. The male coefficients are significant for Poland and EU-15 for all and for Germany for the first four age cohorts. This points to the fact that the hypothesis, that young men are more sensitive to the business cycle, is correct.

In Poland, the strongest increase in the male Okun coefficient is observed from the 15-to-24-years cohort to the 25-to-34-years cohort, while in Germany the differences are not that distinct. In Germany, the strongest increase for men is observed between the 25-to-34-years cohort and the 35-to-44-years cohort. The strongest increase in the female Okun coefficient is observed from the 15-to-24-years cohort to the 25-to-34-years cohort for Poland and EU-15. For German women, the highest increase in absolute values is observed between the 45-to-54-years cohort to the 55-to-64-years cohort.

In addition, the equality of coefficients for each country between age cohorts has been tested with an interaction term using equation (2) which gives the difference in the coefficients between the reference age-cohort and the comparison age-cohort. The results are presented in Tables 2, 4 and 6 as



p-values for the test of the null hypothesis that the coefficients are equal. For EU-15, it is confirmed that the male coefficient for the youngest cohort differs significantly from all older age cohorts. For Poland, this is valid only for the difference between the youngest and the oldest age cohorts for men. For women, only for the EU-15 the coefficients for the youngest cohort are different from the three oldest age cohorts. And for Germany, the differences between the age cohorts are not statistically significant for both sexes.

The results show that business cycle effects are not explaining all differences between the countries and sexes in the level of youth unemployment. Therefore, in the next section I examine the labour markets of Poland and Germany regarding youth- and gender-specific characteristics to answer the question regarding the underlying causes for the differences between young women and men in those countries.

## 5 Labour Markets in Detail

There are different aspects in the labour market that may affect youth employment and explain the differences between the age cohorts and sexes as found in section 4. Besides institutional variables such as labour taxes, unemployment benefits, unionization and collective bargaining which are affecting overall unemployment, some specific variables are important for youth unemployment. Those include e.g. Employment Protection Legislation (EPL) according to Berlingieri et al. (2014) or the minimum wage and the share of temporary contracts according to Brada et al. (2014). In addition, a differential between male and female labour force participation and the proportion of women in manufacturing and service sectors (among other things such as the level of mandatory family benefits or the extensiveness of equal employment opportunity laws) could explain differences between gender according to Queneau and Sen (2009).

Here, I focus on the analysis why young men are more vulnerable to the business cycle than young women and discuss the following issues in detail in the next subsections:

- labour market participation plus youth Not in Employment, Education or Training (so-called NEETs),
- the duality of the labour market,
- the segregation of the market regarding sectors and the share of men in sectors (industry, service and selected sectors),
- as well as migration vs. immigration.

## 5.1 Labour market participation plus NEETs

The labour force participation rate of young persons should decrease, as difficulties in finding work force some young persons to stay in school, to re-enter school and/or university, to start an apprenticeship, etc. Young people in education are not counted for the unemployment rate and the labour force, so youth unemployment rate should decline as well. As shown in Figure 5 for Germany and Figure 6 for Poland, the labour force participation rate of youth (age cohort 15-24) is only slightly decreasing and almost constant. As expected (see e.g. Signorelli et al., 2012), on overall women have lower participation rates than men in both countries, but the level in Poland is for both sexes lower than in Germany.

Changes in the unemployment rate can stem from an exchange between unemployed and employed (i.e. within labour force), but they can also be caused by an exchange with an inactive group (outside the labour force) according to Dietrich (2012). The labour force participation rates do not include those young people that are outside of the labour force. This group is called the „youth left behind“ and can be defined by the number of people who

are neither employed nor in education or training, so-called NEETs (Scarpetta et al., 2010). Figure 7 reports the share of this group for Germany and Figure 8 for Poland. The data is an indicator provided from the International Labour Organization (ILO, 2016), but only for the time period 2003 (Germany) or 2004 (Poland) until 2014. For Germany, the share is decreasing for both sexes, but the male rates are lower than the rates for women. For Poland, after a trough in 2008 both rates are rising, trending toward convergence in 2014. Overall the rates in Poland are higher than in Germany, e.g. the male rates or in Poland are nearly the double than the male rates in Germany.

## 5.2 Duality of the labour market

According to IMF, 2010, in economies with a relatively higher share of workers on temporary contracts, unemployment should be more responsive to changes in output, because workers with temporary contracts have less employment protection relative to those with regular (open-ended) contracts. And also Scarpetta et al. (2010) suggest that the dominant related factor for the higher business-cycle sensitivity of youth is their high presence among those holding temporary jobs. With data from Eurostat (2016a), the incidence of temporary employment for youth (age cohort 15-24) for both sexes are presented for Germany in Figure 9 and for Poland in Figure 10. In Germany, the share of men is higher than that of women with a temporary contract. This could explain their higher sensitivity, even when temporary contracts are mainly apprenticeship contracts (Scarpetta et al., 2010). In Poland, women have a higher share of temporary contracts than men, but the level for both sexes are higher in Poland than in Germany. Here, the overall higher level could explain the overall higher sensitivity of Polish youth, but not for Polish young men in comparison to Polish young women.

According to ILO (2012), time-related underemployment such as involuntary

part-time work should be considered as well. It could be that many people, and in particular men, are pushed into unemployment, while in contrast women increase their share of involuntary part-time. As presented in Figures 11 and 12 with data from Eurostat (2016a), the share of part-time employment as percentage of total employment for youth has increased in Germany, while in Poland the share is quite stable for men and slightly increasing for women in the last years. For both countries, young women have a higher share than young men. Figures 13 and 14 report involuntary part-time employment as percentage of total part-time employment for both countries for youth. The reason why people work involuntarily part-time is that they „could not find a full-time job“ (Eurostat, 2016a). In Germany, since 2005 (for men), respectively 2006 (for women), the share of young people working involuntarily part-time decreases, while the share of young people working part-time increases. Another reason for working part-time, i.e. because they are „in education or training“, could explain this development. Whereas in Poland, the share of young people working involuntarily part-time increases after 2008, while the share of young people working part-time is quite stable for men and slightly increasing for women. This implies that in Germany young women are quite voluntarily working part-time, while in Poland, they might increase their share of part-time work instead of being unemployed.

Additionally, so-called Civil Code contracts exist in Poland, which add to the labour market duality (Polakowski, 2012). Contracts in this category are not subject to regulations regarding minimum wage, working time, holidays, overtime remuneration and include reduced social protection rights (e.g. sickness, maternity or unemployment are not compulsorily covered). According to OECD (2014b), approximately 7% of total employment and over 50% of workers between 18 and 32 are employed under such a Civil Code contract.

### 5.3 Sectoral labour market segregation

According to Hutengs and Stadtmann (2014a) as well as Albanesi and Sahin (2013), a substantial part of cyclical differences between male and female unemployment rates can be explained by industry distribution of men and women. Scarpetta et al. (2010) explain the higher business-cycle sensitivity of youth with their high concentration in certain cyclically-sensitive sectors such as construction. With data from Eurostat (2015), the developments in employment between the second quarter of 2008 (period from the official onset of the last recession) and the fourth quarter of 2014 (until the latest data point used at the time of writing) are presented in Table 7 for industry and service as well as in Table 8 for selected sectors.

Table 7 lists the overall composition of the countries regarding industry and service for the age cohort of the 15-to-64-years old (overall), for the age cohort of the 15-to-24-years old for both sexes and for men in the age cohort of the 15-to-24-years old as the most affected. Overall and in all countries, industry shows a decline in employment, while service shows an increase between 2008Q2 and 2014Q4. Overall the main share of employment is in the service sector and this is valid for both countries.

For the age cohort of the 15-to-24-years old for both sexes, industry in Germany shows not the expected minus sign for the change of employment, while in Poland the change is higher than for the overall employment. But service shows a loss in Germany and Poland in contrast to the overall employment. The shares, except for industry in Poland, are quite similar to the ones for overall employment.

While the changes for men in the age cohort of the 15-to-24-years old are showing the same signs as for the overall age cohort of the 15-to-24-years old, the shares differ. Industry is having a higher share in both countries and might therefore explain the higher sensitivity of young men.

Table 8 presents employment changes overall (including men and women of the selected age cohort) and the share of men in selected sectors for the overall age cohort of the 15-to-64-years old and the age cohort of the 15-to-24-years old. Two sectors with an overall high share of men (manufacturing and construction), two sectors with an overall high share of women (education and human health) and one sector with overall an almost equal share of men and women (wholesale/retail trade) have been selected following Hutengs and Stadtmann (2014a) as well as Leschke and Jepsen (2011). In addition, those five sectors together account for 55% up to 60% of overall employment in both countries.

For the age cohort of the 15-to-64-years old, the manufacturing sector shows a loss of employment between 2008Q2 and 2014Q4, while all other sectors show a positive sign in Germany. In Poland, the sectors manufacturing and construction show the expected minus sign, while all other sectors have positive growth. The shares of men on total employment show the beforehand explained rates.

For the age cohort of the 15-to-24-years old, the extent of the changes in the sectors manufacturing and construction are higher than overall. In Poland, there are now negative signs also in front of the changes of other sectors, i.e. wholesale, education and human health. In Germany, the three remaining sectors show lower changes for this age cohort, even negative for the sector education. The shares of men in the sectors is only slightly different. In manufacturing, young men have now higher shares in Poland, but not in Germany. In construction, higher shares can be found in Germany, but not Poland. In wholesale and human health, the shares are lower for all, while in education the shares for young men are higher than overall. Unfortunately, the values are not available for Poland for education and human health. However, young people have higher losses in the sectors, in Poland for example in all selected sectors. All in all, this confirms the higher sensitivity of young people,

especially young men due to their high concentration in cyclically-sensitive industries such as construction.

## 5.4 Migration vs. Immigration

Youth unemployment can also be seen as a push factor for migration (Kaczmarczyk et al., 2014). I.e. young people have poor or no job offer at home and are leaving the country to work abroad. But as bad economic conditions exist in the destination countries as well, young people might stay instead of leaving or are coming back increasing the unemployment rate. Or, people are immigrating as the economic conditions are worse in other countries. With data regarding migration and immigration from Eurostat (Eurostat, 2016b), the share of youth on total emigration and immigration (and level) as well as the share of men for youth and total as well as the share of young emigrants on population is presented in Table 9.<sup>3</sup> According to Kaczmarczyk et al. (2014), Polish migrants are almost equally distributed with respect to gender. This is valid for overall emigration in Poland, but not for youth (age cohort 15-24). Here, men have a higher share on emigration and immigration, while for Germany youth has a lower share of men than overall. The level as well as the share of Polish and Germany emigrants (age cohort 15-24) is the same, while the share of the population is different between the countries, but small. Regarding immigration the level and the share of youth is high for Germany, but small for Poland. Germany has high immigration, while Poland has higher emigration which confirms the image of both countries. This result is not confirming the hypothesis about the unemployment rates of youth in both countries as well as not explaining the higher sensitivity of young men.

Unfortunately, „immigration“ only denotes the action by which a person estab-

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<sup>3</sup>Data is presented for 2013, but the numbers are not that distinctive for the four years before. Unfortunately there is no comparable data available for the years before 2009 as there was a break in the collection (Eurostat, 2016b).

lishes his or her usual residence in one state for a period of at least 12 months (assumed), having previously been usually resident in another country (Eurostat, 2016b). There is no distinction between foreigners and nationals returning to the country which would show if there are e.g. returning Polish citizens. So, there is no evidence for the hypothesis that due to returning young Polish people unemployment rates are increasing in Poland.

## 6 Conclusions and policy implications

In this paper I examined the development of the gender-specific youth unemployment rate in Germany and Poland, using the estimates of age-cohort and gender-specific Okun coefficients. The main empirical results can be summarized as follows:

1. Germany: The Okun coefficient for young men (age cohort 15-24 as well as age cohort 25-34) is larger than for other age cohorts as well as for women in absolute value, so young men are more sensitive to the business cycle as expected, but the differences between the age cohorts for both sexes are small and not statistically significant.
2. Poland: The Okun coefficient for young men is larger than for other age cohorts as well as for women in absolute value, so young men are more exposed to fluctuations as expected. The differences between the age cohorts, especially between 15-to-24-years old and the subsequent age cohort of the 25-to-34-years old, as well as sex, are large. Statistically significant are only the differences between the coefficients for young (15-24) and old men (55-64).
3. The Okun coefficients are higher in absolute values for men than for women, except for the age cohort of the 35-to-44-years and the 45-to-



54-years old, where Polish women are more sensitive to business cycle conditions than Polish men.

As possible explanation for these empirical results, I looked into the labour markets of both countries in detail. The results for labour market participation show that in both countries young men have higher labour market participation rates than young women, but decreasing levels for all. According to Dietrich (2012), a change in youth labour market participation points to the fact that a change in the youth unemployment rate captures only part of the dynamic caused by the business cycle and should therefore be investigated in detail in future research.

The rising number of NEETs in Poland is a reason of concern which should be dealt with. E.g. Scarpetta et al. (2010) propose a better cooperation between public employment services and the education system to get hold of young people as soon as there is a risk of disengagement, plus an early job-search guidance to school-leavers and a „learn/train-first“ approach to maintain youth connected to the labour market.

In Poland, young women have a higher share on temporary contracts as young men. But their higher share in part-time employment, especially in involuntary part-time employment, could indicate that young Polish women are rather increasing their share of part-time work instead of being unemployed. Overall, the higher level of temporary contracts in Poland than in Germany could explain the overall higher sensitivity of Polish youth. Scarpetta et al. (2010) propose to change the employment protection, so that a smooth transition from temporary to more stable and rewarding jobs is possible which could reduce the labour-market duality and the sensitivity of youth to business cycles. OECD (2009), too, suggests to diminish the gap in employment protection between the various contracts in Poland and OECD (2014a) proposes to reduce the differences in employment protection between permanent and temporary contracts in Germany.

The share of young men in industry, especially in the sectors construction and manufacturing, in both countries might explain their higher sensitivity as already found by Scarpetta et al. (2010). Furthermore, I examined migration vs. immigration and could not find a satisfying explanation for the empirical results.

Overall, GDP growth should be considered in any policy recommendation, because youth unemployment is more sensitive to business fluctuations for both sexes. And without economic growth no youth policy can ever be effective (Pastore, 2015).

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## Appendix

Table 1: Regression Results - Germany.

age cohorts	coefficients (Newey-West standard errors)	$R^2$	$N$	$BP$ (p-value)	$DW$ (p-value)
men					
15 – 24	–0.3788*** (0.0863)	0.357	22	1.0537 (0.3047)	0.9603 (0.0047)
25 – 34	–0.3631*** (0.0717)	0.483	22	1.6315 (0.2015)	0.9724 (0.0052)
35 – 44	–0.2082** (0.0653)	0.316	22	0.1268 (0.7218)	1.071 (0.0113)
45 – 54	–0.2200** (0.0706)	0.277	22	0.4335 (0.5103)	0.5698 (0.000)
55 – 64	–0.1382 (0.0733)	0.051	22	0.0348 (0.8521)	1.371 (0.0683)
women					
15 – 24	–0.1954 (0.0987)	0.118	22	0.6914 (0.4057)	1.2044 (0.0276)
25 – 34	–0.1558 (0.0826)	0.154	22	2.0992 (0.1474)	1.1702 (0.0223)
35 – 44	–0.1541 (0.0802)	0.172	22	2.3374 (0.1263)	1.2138 (0.0292)
45 – 54	–0.1305 (0.0658)	0.128	22	1.2668 (0.2604)	1.119 (0.0159)
55 – 64	–0.0404 (0.0695)	0.004	22	0.3209 (0.5711)	1.1769 (0.0233)

Source: Own elaboration with data from OECD (2015). Notes: N - number of observations; significance at \*\*\* 1% level, \*\* 5% level, \* 10% level. Nullhypothesis for BP: Homoscedasticity. Nullhypothesis for DW: No autocorrelation.

Table 2: Test for equality of coefficients between age cohorts - Germany.

	$\beta_{25-34}$		$\beta_{35-44}$		$\beta_{45-54}$		$\beta_{55-64}$	
	men	women	men	women	men	women	men	women
$\beta_{15-24}$	0.9125	0.7862	0.2064	0.7718	0.2595	0.6493	0.1781	0.413
$\beta_{25-34}$			0.1608	0.9874	0.2234	0.8211	0.1620	0.490
$\beta_{35-44}$					0.9111	0.8268	0.6433	0.489
$\beta_{45-54}$							0.6015	0.584

Source: Own calculations. Notes: p-values are given for the test of the nullhypothesis that the coefficients are equal.

Table 3: Regression Results - Poland.

age cohorts	coefficients (Newey-West standard errors)	$R^2$	$N$	$BP$ (p-value)	$DW$ (p-value)
men					
15 – 24	–1.4799** (0.4428)	0.3183	22	0.3632 (0.5468)	0.9874 (0.0034)
25 – 34	–0.7059** (0.1917)	0.3635	22	0.0671 (0.7956)	1.1874 (0.0162)
35 – 44	–0.5291*** (0.1331)	0.3359	22	0.3658 (0.5453)	0.9151 (0.0018)
45 – 54	–0.4698* (0.2683)	0.237	22	0.0503 (0.8225)	0.9993 (0.0038)
55 – 64	–0.3598* (0.1308)	0.2147	22	0.7024 (0.402)	1.3457 (0.0427)
women					
15 – 24	–1.0644* (0.3964)	0.184	22	0.7385 (0.3901)	1.0237 (0.0046)
25 – 34	–0.6500* (0.2554)	0.244	22	0.7384 (0.3902)	1.1712 (0.0145)
35 – 44	–0.5488* (0.2093)	0.276	22	1.7966 (0.1801)	0.9089 (0.0016)
45 – 54	–0.4821* (0.2116)	0.258	22	1.7105 (0.1909)	1.1766 (0.015)
55 – 64	–0.1990 (0.1239)	0.076	22	0.153 (0.6957)	2.168 (0.6196)

Source: Own elaboration with data from OECD (2015). Notes: N - number of observations; significance at \*\*\* 1% level, \*\* 5% level, \* 10% level. Nullhypothesis for BP: Homoscedasticity. Nullhypothesis for DW: No autocorrelation.

Table 4: Test for equality of coefficients between age cohorts - Poland.

	$\beta_{25-34}$		$\beta_{35-44}$		$\beta_{45-54}$		$\beta_{55-64}$	
	men	women	men	women	men	women	men	women
$\beta_{15-24}$	0.1500	0.4662	0.0707	0.3450	0.0590	0.2819	0.0333	0.1072
$\beta_{25-34}$			0.5117	0.7565	0.4064	0.5964	0.1897	0.1401
$\beta_{35-44}$					0.8147	0.8061	0.4594	0.1734
$\beta_{45-54}$							0.6538	0.2449

Source: Own calculations. Notes: p-values are given for the test of the nullhypothesis that the coefficients are equal.

Table 5: Regression Results - EU-15.

age cohorts	coefficients (Newey-West standard errors)	$R^2$	$N$	$BP$ (p-value)	$DW$ (p-value)
men					
15 – 24	–0.8395*** (0.0465)	0.807	22	0.0008 (0.9777)	1.7081 (0.0082)
25 – 34	–0.5257*** (0.0238)	0.804	22	0.0336 (0.8545)	1.3026 (0.0375)
35 – 44	–0.3385*** (0.0179)	0.780	22	0.2055 (0.6503)	1.6844 (0.2067)
45 – 54	–0.2803*** (0.0220)	0.745	22	0.0828 (0.7735)	1.2068 (0.0208)
55 – 64	–0.2542*** (0.0384)	0.421	22	0.0207 (0.8855)	1.6244 (0.1875)
women					
15 – 24	–0.5524*** (0.0883)	0.523	22	1.0138 (0.314)	0.9288 (0.0022)
25 – 34	–0.3475*** (0.0465)	0.622	22	1.2913 (0.2559)	1.3497 (0.0488)
35 – 44	–0.2451*** (0.0482)	0.495	22	1.1901 (0.2753)	1.3808 (0.0576)
45 – 54	–0.1999*** (0.0396)	0.492	22	0.3083 (0.5787)	1.4789 (0.0936)
55 – 64	–0.1535** (0.0471)	0.227	22	0.0743 (0.7852)	0.956 (0.0028)

Source: Own elaboration with data from OECD (2015). Notes:  $N$  - number of observations; significance at \*\*\* 1% level, \*\* 5% level, \* 10% level. Nullhypothesis for BP: Homoscedasticity. Nullhypothesis for DW: No autocorrelation.

Table 6: Test for equality of coefficients between age cohorts - EU-15.

	$\beta_{25-34}$		$\beta_{35-44}$		$\beta_{45-54}$		$\beta_{55-64}$	
	men	women	men	women	men	women	men	women
$\beta_{15-24}$	0.0062	0.1301	0.0000	0.0233	0.0000	0.0080	0.0000	0.0049
$\beta_{25-34}$			0.0114	0.2197	0.0009	0.0585	0.0038	0.0326
$\beta_{35-44}$					0.292	0.5325	0.285	0.2830
$\beta_{45-54}$							0.733	0.5543

Source: Own calculations. Notes: p-values are given for the test of the nullhypothesis that the coefficients are equal.



Table 7: Employment changes between 2008Q2 and 2014Q4 in % and sectoral composition of employment as % of total employment.

Country	Age cohort and gender	Industry		Service	
		2008Q2-2014Q4	share	2008Q2-2014Q4	share
Germany	15-64 all	-2.44	28.51	1.98	65.45
	15-24 all	1.51	28.78	-0.75	68.76
	15-24 men	1.70	40.56	-0.49	55.61
Poland	15-64 all	-2.69	31.02	4.53	54.52
	15-24 all	-4.9	26.68	-3.97	53.63
	15-24 men	-3.59	35.97	-9.22	38.29

Source: Own elaboration with data from Eurostat (2015). Industry includes NACE Rev. 2 sectors B-F. Service includes all sectors except industry and agriculture (NACE Rev. 2 sector A). A comparison between the time periods 2007 and 2014 is not possible due to the revision of the NACE classification in 2008.

Table 8: Employment changes between 2008Q2 and 2014Q4 in % and share of men in selected sectors in % in 2014Q4.

Country	Age cohort	Manufacturing		Construction		Wholesale		Education		Human health	
		2008Q2-2014Q4	share	2008Q2-2014Q4	share	2008Q2-2014Q4	share	2008Q2-2014Q4	share	2008Q2-2014Q4	share
Germany	15-64	-0.37	72.82	8.52	87.54	8.74	47.51	8.26	28.68	15.45	22.74
	15-24	-12.02	72.63	10.95	92.35	0.24	52.23	-3.17	31.51	2.87	21.36
Poland	15-64	-2.34	67.72	-2.61	92.42	0.07	46.18	4.81	21.54	8.87	19.57
	15-24	-20.79	76.23	-6.78	90.76	-32.74	45.29	-17.78	-	-39.12	-

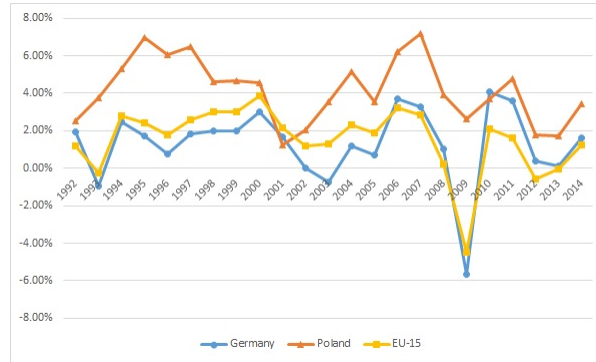
Source: Own elaboration with data from Eurostat (2015). NACE Rev. 2 sectors are C (Manufacturing), F (Construction), G (Wholesale and retail trade; repair of motor vehicles and motorcycles), P (Education) and Q (Human health and social work activities). A comparison between the time periods 2007 and 2014 is not possible due to the revision of the NACE classification in 2008. „-“ represents „not available“.

Table 9: Emigration and Immigration in 2013.

Country		share of youth	level	share on	share of men	share of men
		(age cohort 15-24)	(age cohort 15-24)	population	(age cohort 15-24)	(overall)
		on overall		(age cohort 15-24)		
		in %		in %	in %	in %
Germany	Emigration	11.96	31,004	0.35	53.07	59.13
	Immigration	23.32	162,952	-	54.82	57.59
Poland	Emigration	11.43	31,589	0.65	54.88	49.54
	Immigration	9.65	21,249	-	57.51	58.32

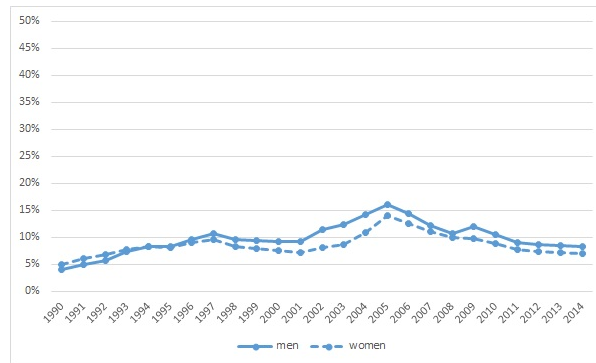
Source: Own elaboration with data from Eurostat (2016b).

Figure 1: GDP Growth.



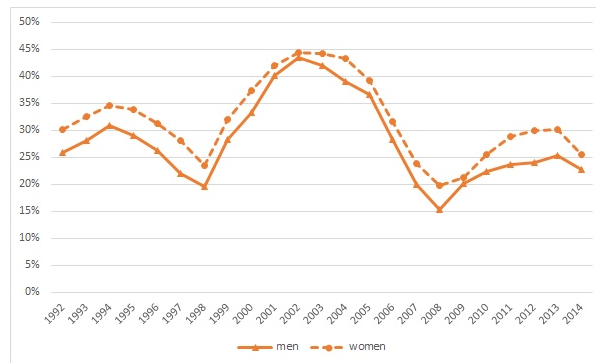
Source: Own elaboration with data from EC (2015).

Figure 2: Youth unemployment rate (age cohort 15-24) in Germany.



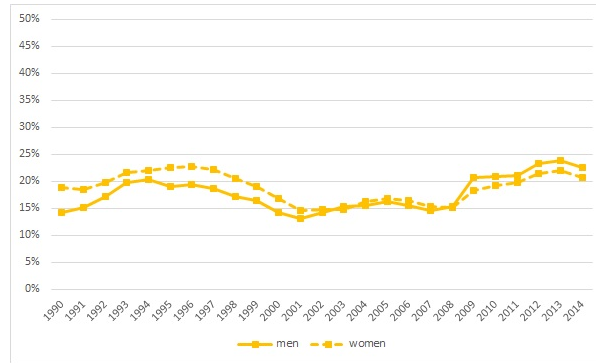
Source: Own elaboration with data from OECD (2015).

Figure 3: Youth unemployment rate (age cohort 15-24) in Poland.



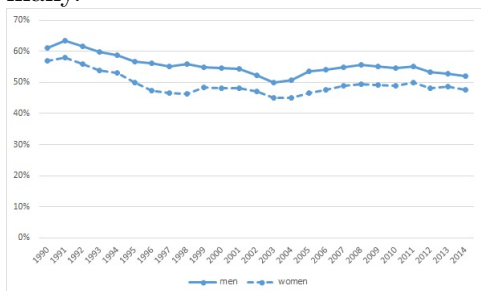
Source: Own elaboration with data from OECD (2015).

Figure 4: Youth unemployment rate (age cohort 15-24) in EU-15.



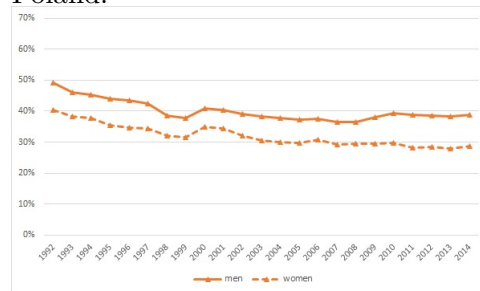
Source: Own elaboration with data from OECD (2015).

Figure 5: Labour market participation rate youth (age cohort 15-24) in Germany.



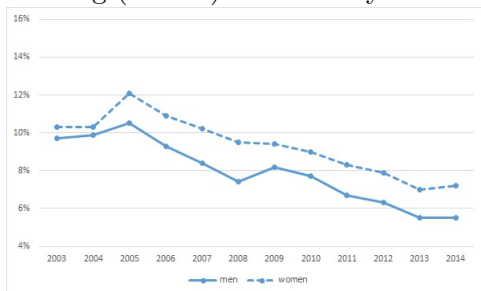
Source: Own elaboration with data from OECD (2015).

Figure 6: Labour market participation rate youth (age cohort 15-24) in Poland.



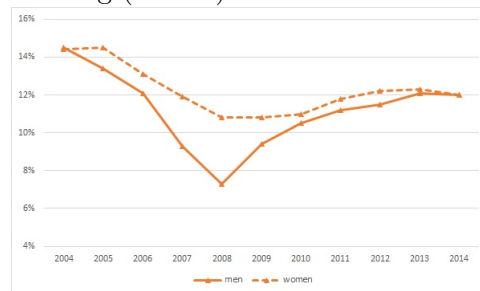
Source: Own elaboration with data from OECD (2015).

Figure 7: Youth (age cohort 15-24) not in employment and not in education or training (NEET) in Germany.



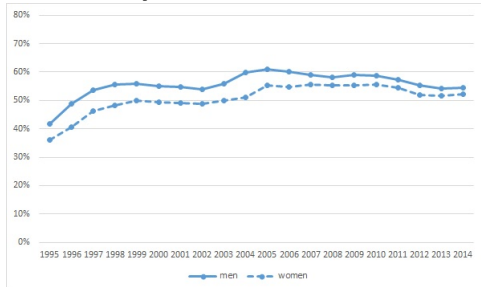
Source: Own elaboration with data from ILO (2016).

Figure 8: Youth (age cohort 15-24) not in employment and not in education or training (NEET) in Poland.



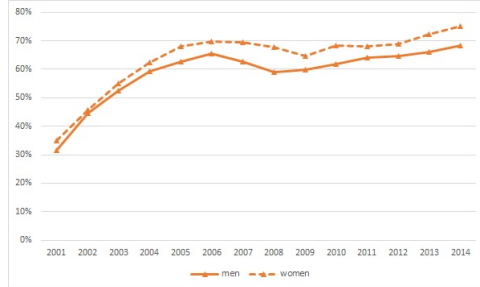
Source: Own elaboration with data from ILO (2016).

Figure 9: Incidence of temporary employment for youth (age cohort 15-24) in Germany.



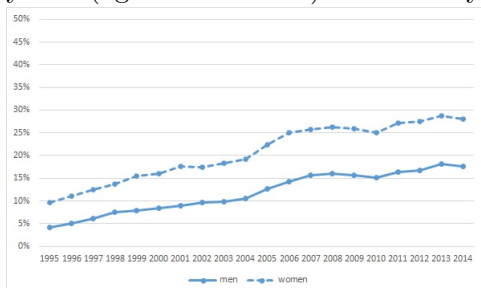
Source: Own elaboration with data from Eurostat (2016a).

Figure 10: Incidence of temporary employment for youth (age cohort 15-24) in Poland.



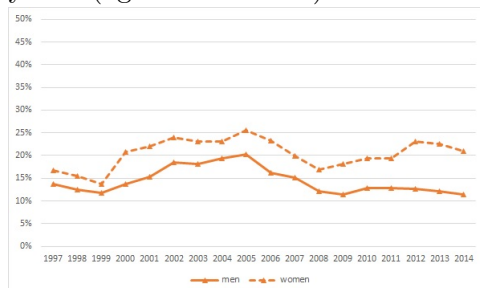
Source: Own elaboration with data from Eurostat (2016a).

Figure 11: Part-time employment for youth (age cohort 15-24) in Germany.



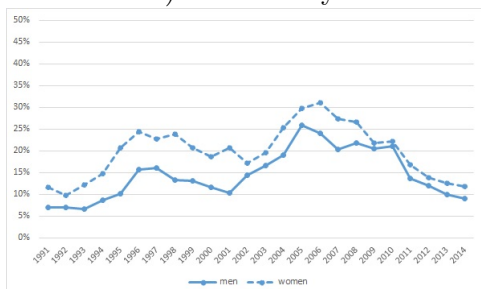
Source: Own elaboration with data from Eurostat (2016a).

Figure 12: Part-time employment for youth (age cohort 15-24) in Poland.



Source: Own elaboration with data from Eurostat (2016a).

Figure 13: Involuntary part-time employment as percentage of the total part-time employment for youth (age cohort 15-24) in Germany.



Source: Own elaboration with data from Eurostat (2016a).

Figure 14: Involuntary part-time employment as percentage of the total part-time employment for youth (age cohort 15-24) in Poland.



Source: Own elaboration with data from Eurostat (2016a).