



Job Polarisation has increased inequality across Western Europe

Troels Lund Jensen, Economist

Jon Nielsen, Senior Economist

Andreas Gorud Christiansen, Research Assistant

at the Economic Council of the Labour Movement (ECLM)

A compressed wage structure with many jobs in the middle range is important for maintaining cohesion in society and securing that most people have access to the middle class. However, in the last decade, many scholars have pointed out that the share of jobs in the middle range is declining. Thus, the European job structures are polarizing with more and more jobs earning either a high pay or a low pay. In this analysis, we show that this trend was strong in the late-1990s and the 2000s but that it has slowed down since then. Nonetheless, it has led to increased inequality in most Western European countries. Further, we shed some light on the differences between the Western European countries.

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1. Introduction and Literature

During the last decade, numerous studies have shown that Western European labour markets are getting more and more polarised. That is, there are fewer and fewer of the jobs with wages in the middle-range; and the labour markets are to an increasing extent divided into separate markets for low-wage jobs and high-wage jobs. According to the European Commission (2018), this trend peaked during the crisis, aggravating the effects that the crisis had on the employment prospects of low-skilled workers. In consequence, the unemployment rate among low-skilled workers in Europe soared during the crisis and is only slowly crawling back towards its pre-crisis level.

This development has been linked to the joint effects of several parallel developments:

- 1) First of all, the production technology has changed in a way where skills are in higher demand across job types. Routine tasks, on the other hand, are to an increasing extent automated.
- 2) Secondly, the increasing global trade and the decreasing transportation costs have meant that some tasks have been off-shored to countries outside Western Europe.
- 3) Finally, the aging of populations and the sectoral shift towards service jobs have kept up the demand for the occupations that used to yield a low pay.

A central study by Goos et al. (2009) documents this trend towards polarisation. Their method for measuring job polarisation has since become common-place. Specifically, they classify occupations according to the average wage of the occupation in 1993. Job polarisation is then measured by the evolution in the size of high, middle and low paying occupations. In a later study, Goos et al. (2014) find that European job polarisation is primarily the result of new technologies displacing routine work. Several studies have echoed this result (e.g. Harrigan et al. 2017, Fonseca et al. 2016) while other studies emphasize the effects of de-unionisation (Firpo et al. 2011), population aging (Morena-Galbis & Sopraseuth 2014) and inequality in education (Sebastian 2017).

Farnández-Marcías (2012) paints a more nuanced picture of the European labour market trends than Goos et al. (2009, 2014). He concludes that there has been a clear trend towards polarisation in Continental Europe, most likely fuelled by labour market deregulations in the 1990's and 2000's. In the already deregulated countries of UK and Ireland, the polarisation trend has been weaker and has

* Corresponding author: Jon Nielsen, Senior Economist, ECLM, jn@ae.dk, +45 33 55 77 14.



been countered by an expansion of the financial sector. In the Scandinavian countries, employment shares in the top have increased, but not in the bottom. This could be a result of strong labour unions making low-wage jobs comparatively well-paid in Scandinavia. Finally, in the Southern Europe, employment has increased in the middling occupations, partly driven by booming construction sectors.

Another branch of the literature has studied how the income distribution in European countries has been affected by job polarisation and its driving forces. In particular, the literature has investigated how inequality has been affected by changes in technology which favoured high-skilled labour and capital holders and which disfavoured routine work. For Germany, Reinhold (2016) shows that job polarisation has increased wage inequality mechanically and that the driving forces behind job polarisation have driven up the wage inequality further. Asplund et al. (2011) also find that job polarisation has been followed by wage polarisation in Norway, Finland and Sweden using the methods of Goos et al. (2009, 2014). Dauth et al. (2017) show that German capital holders and high-skilled workers have profited from automation while the bulk of low and medium-skilled workers have not. In consequence, automation has contributed to the decline of the labour share.

In this analysis, we apply the methods of Goos et al. (2014) to describe how the degree of job polarisation has varied between Western European countries (EU15 and Norway). Overall, we find that: labour markets are polarising in all countries but, in contrast to the European Commission (2018), we find that the polarisation process has slowed down since 2010. Further, we find that workers with mid-level education are increasingly employed in low-paying jobs. On the other end of the scale, high-paying jobs are increasingly preserved for high-educated workers. We show that these developments are not equally strong in all countries and do not necessarily run in parallel.

Finally, we show that job polarisation in itself has increased the wage inequality in all countries – apart from the effects that automation etc. might have. This has contributed to the general rise in the income inequality.

Main Findings

- ✓ labour markets are polarising in all countries but the polarisation process has slowed down since 2010
- ✓ workers with mid-level education are increasingly employed in low-paying jobs
- ✓ high-paying jobs are increasingly preserved for high-educated workers
- ✓ job polarisation in itself has increased the wage inequality in all countries, therefore contributing to the general rise in the income inequality

2. Labour market polarisation is slowing down

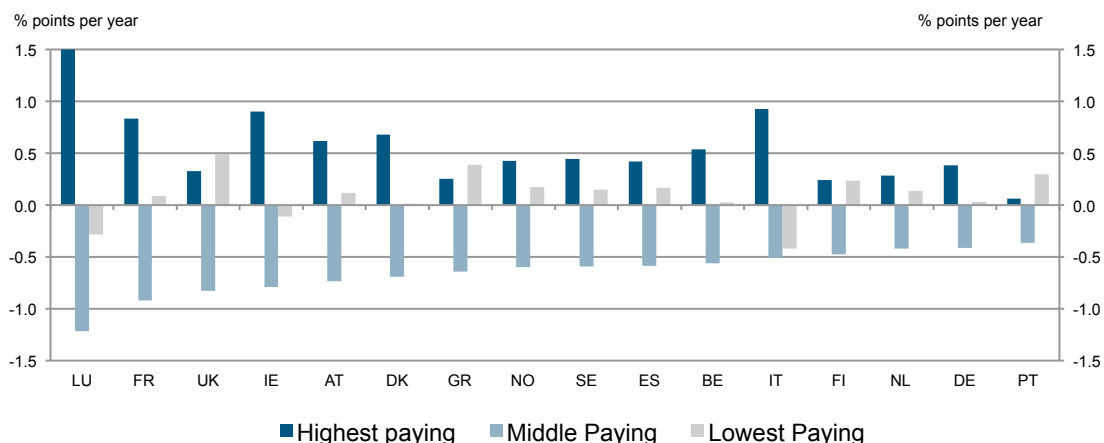
In this section, we describe the development of employment shares in the three employment groups suggested by Goos et al. (2014), namely high, middle and low paying occupations ranked by the average wage of all Europeans in the occupation in 1993-2010. According to this wide-spread measure, the labour markets are polarising in each of the “old” EU countries and in Norway. Thus, a declining share of workers are employed in middle paying occupations. And, conversely, an increasing share of workers are employed in high-paying and low-paying occupations. This is evident from chart 1 and 2 below. We have described the calculations behind the two charts in appendix 1.

Together, the two charts cover the period from 1997 to 2017. The development before and after 2011 should be compared with some caution as there is a data break in 2010-2011. The data break is clearly visual at low aggregation levels, but it does not seem to have a big impact on the rather aggregated development illustrated in chart 1-2.

From the late 1990s to 2010, the share of middle paying jobs fell in all countries. Middle paying jobs include plant and machine operators, sellers, secretaries, and electricians. In France and Luxembourg, the share of middling jobs fell by more than 0,9 percentage points per year, and in UK and Ireland, it fell by 0,8 percentage points per year. In a large number of countries counting both the Scandinavian countries and some Southern European countries (Greece, Spain and Italy) the share of middling jobs fell by 0,5-0,7 percentage points per year. The most stable occupational structures were seen in the Netherlands, Germany and Portugal.

In all countries, the decline in the share of middling jobs were followed by an increase in the relative size of high-paying occupations such as managers and highly skilled professionals (accountants, doctors etc.). This trend was particularly pronounced in Luxembourg, France, Ireland and Italy. In most countries, the share of low-paying jobs increased as well, but – in general – less so. Low-paying jobs include e.g. labourers within construction, cleaners and shelf fillers. In UK, Portugal and Greece, the share of low-paying jobs increased the most.

Chart 1 - Development in the shares of high, middle and low paying jobs, 1997-2010



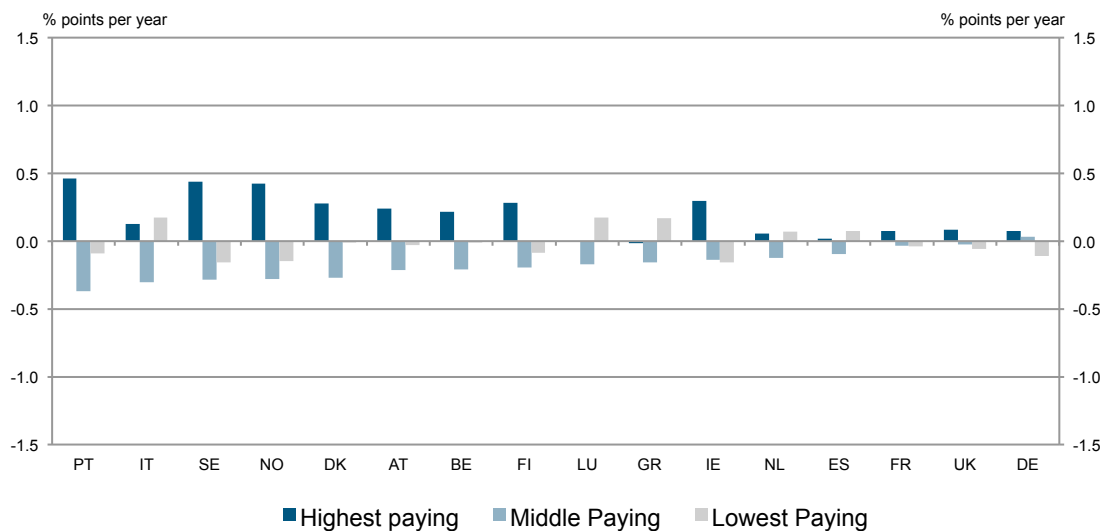
Source: ECLM calculations based on EU LFS

Since 2011, the polarisation process seems to have slowed down in all countries. At least, the employment structures have been relatively stable when viewed in terms of the overall job categories defined here (based on average wages in 1993-2010). This is shown in chart 2.



This conclusion is at odds with the conclusion of the European Commission (2018) who find that the trend towards job polarisation peaked in 2011. The European Commission interpret their result as a sign that the crisis fuelled off-shoring efforts. However, when we take account of the data break in 2010-2011, we find strong evidence that the polarisation process slowed down in recent years. Therefore, the conclusion of the European Commission could be an artefact of the data break. Even so, there is still a small shift from middle-paying occupations to low and high paying occupations going on in all countries.

Chart 2 - Development in the shares of high, middle and low paying jobs, 2011-2017

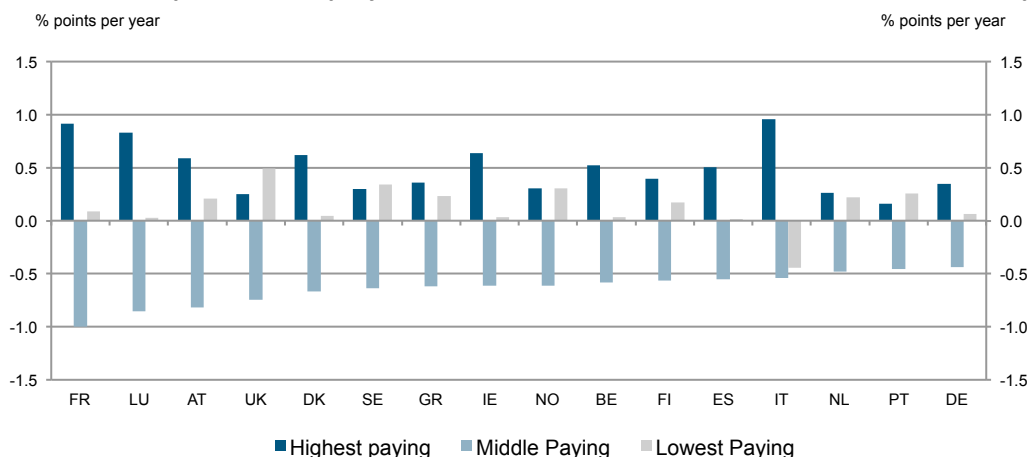


Source: ECLM calculations based on EU LFS.

As noted, job polarisation is related to a shift from manufacturing sectors to service sectors. Therefore, some of the differences across countries can probably be explained by differences in the relative size of manufacturing and service sectors. In chart 3 and 4, we have shown how the shares of high, middle and low paying jobs would have evolved if all countries had the same sectoral composition. More specifically, we have normalised the relative size of each industry to the European average. In all other respects, chart 3-4 are similar to chart 1-2 above. Please note, that the charts do not correct for the shifts in industry structures over time but only differences between countries.

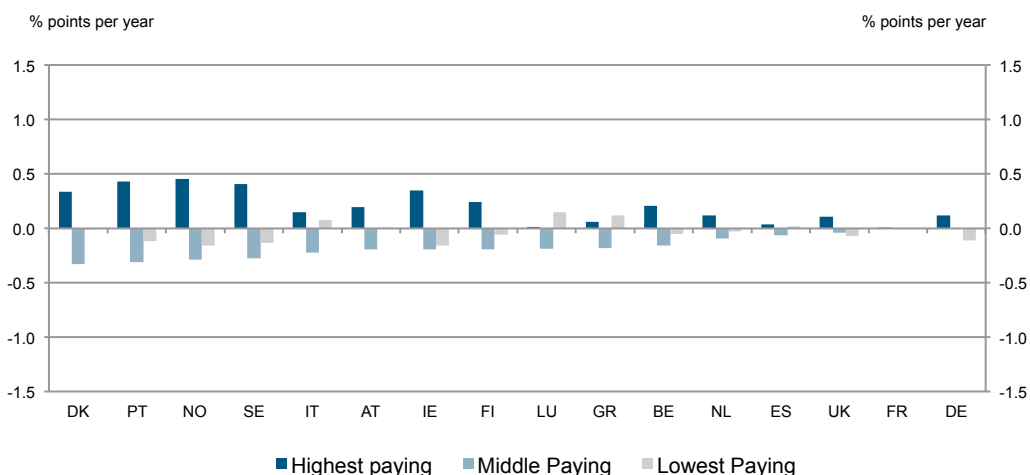
The industry structure does not seem to explain much of the differences between countries. There is a correlation of 0,8-0,9 between the actual developments shown in chart 1-2 and the developments in chart 3-4 where we have evened out differences due to industry structure. The two countries where industry structure had the largest effect on the relative pace of polarisation are Sweden and Ireland.

Chart 3 - Development in employment shares, 1997-2010 – corrected for sectoral composition



Source: ECLM calculations based on EU LFS.

Chart 4 - Development in employment shares, 2011-2017 – corrected for sectoral composition



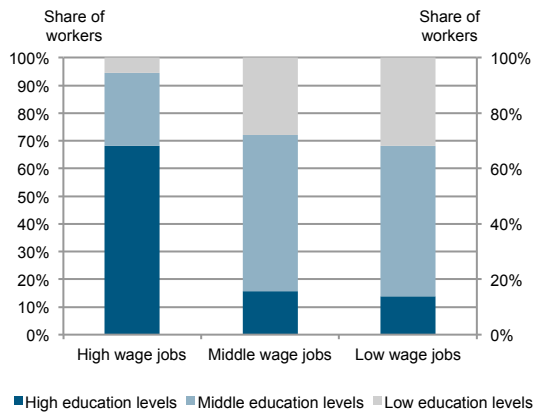
Source: ECLM calculations based on EU LFS.

3. Workers of middling educations find job in low-wage occupations

Workers of both low, middling and high education levels are employed in each of the three occupation groups defined above. Low-wage jobs and middle-wage jobs are dominated by workers of low and middle education levels whereas high-wage jobs are dominated by highly educated workers, as described in chart 5.

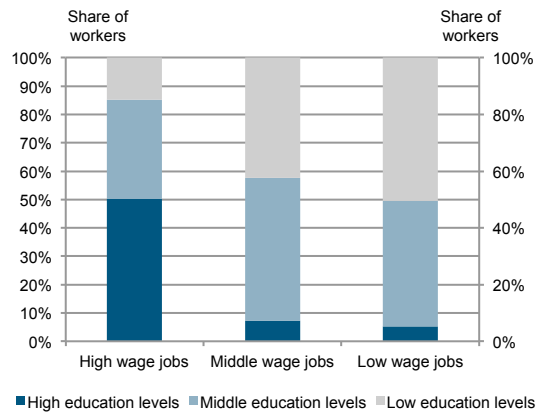
Since 1997 there has been an increase in education levels in all job types as more and more workers have educations at high or middle levels. Conversely, the share of low-educated workers is falling, even when we focus on workers in low-paying occupations. This can be seen from comparing chart 5 and 6. This development is commonly viewed as the joint effect of a higher access to education and a higher demand for skills across job types. The latter effect could both be a result of skill-biased technological change or a result of a general “race to the top” with respect to education levels (cf. Beblavý & Veselková 2014).

Chart 5 - Education of workers in high, middle and low paying jobs, 2017



Source: ECLM calculations based on EU LFS.

Chart 6 - Education of workers in high, middle and low paying jobs, 1997



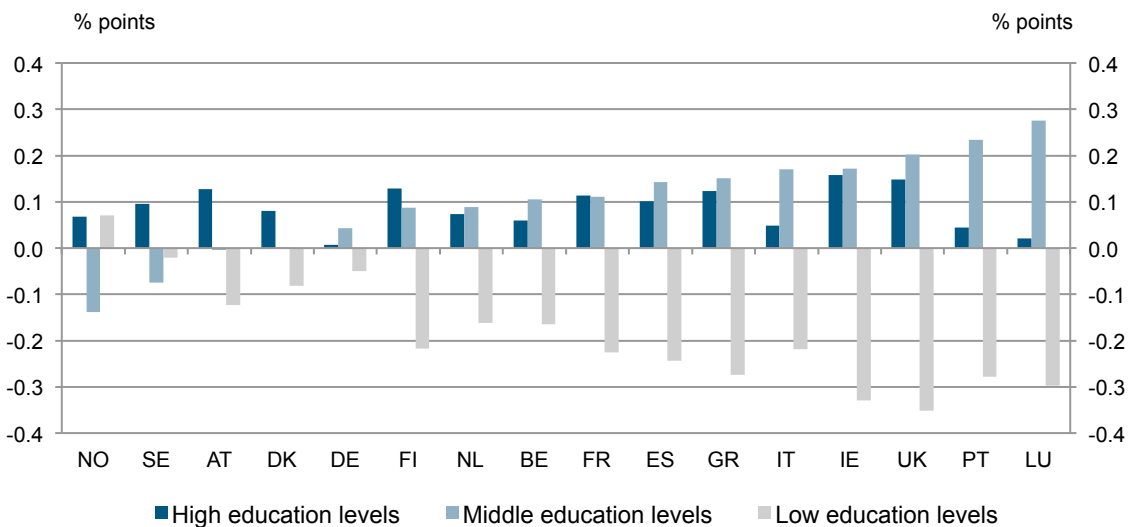
Source: ECLM calculations based on EU LFS.

Chart 7 shows how the education levels of workers in low-paying jobs have evolved since 1997. In all countries except Norway, the share of low-educated workers has fallen in the low-paying occupations. And in all countries except Norway, the low-paying jobs are to an increasing extent held by workers with high or middle educations. Luxembourg, Portugal, UK and Ireland have seen the most pronounced shift towards middle-educated workers in low-paying jobs. The trend has been less pronounced in the Nordic countries as well as in Germany and Austria.

Overall, a similar development is seen when we look at the remaining middle paying jobs, cf. chart 8. As a general trend, more and more of the middle paying jobs are held by workers with long or middle educations.

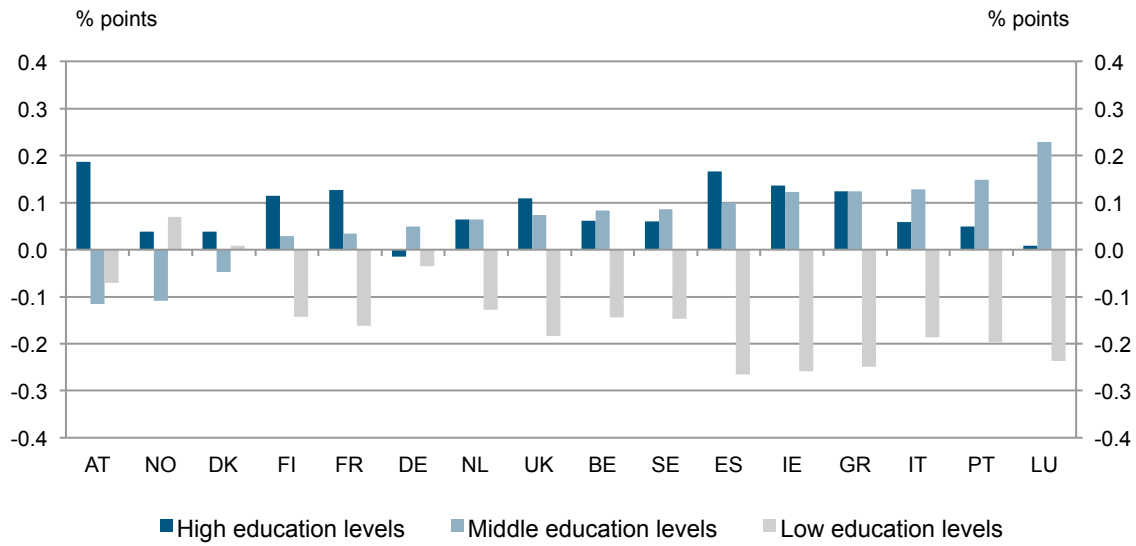
In Austria, Norway and Denmark, educations in the middle range have become a more rare sight among workers in middle paying jobs. In Luxembourg, Portugal, Italy and Greece, on the other hand, middle paying jobs are to an increasing extent dominated by middle-educated workers.

Chart 7 - Development in the education of workers in low paying jobs, 1997-2017



Source: ECLM calculations based on EU LFS.

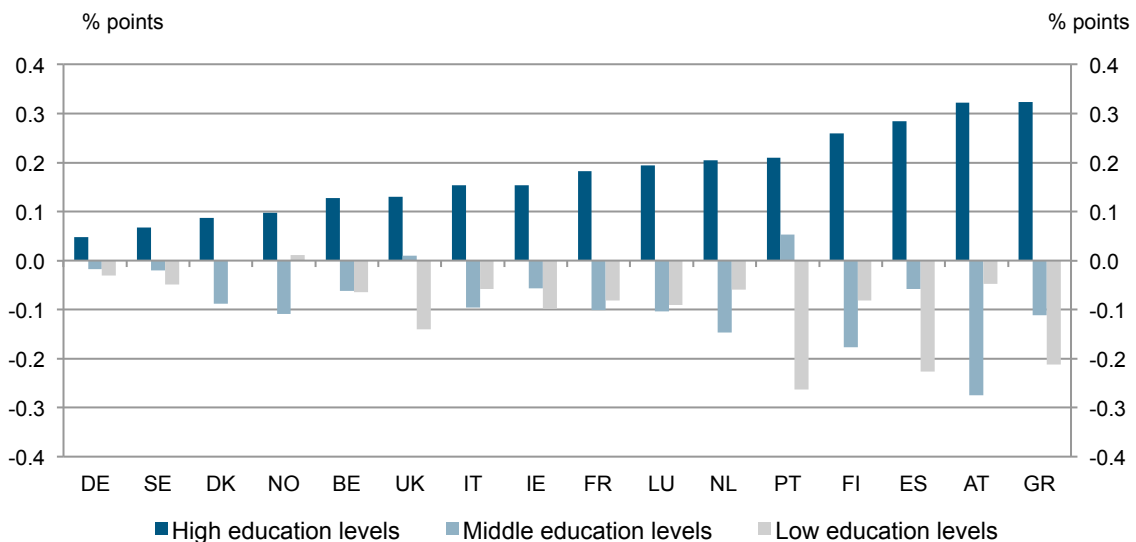
Chart 8 - Development in the education of workers in middle paying jobs, 1997-2017



Source: ECLM calculations based on EU LFS.

In all countries, high-paying jobs are increasingly preserved for highly educated workers. This is shown in chart 9. This trend is strongest in Greece, Austria, Spain and Finland. In Germany and in Sweden, Denmark and Norway, the development is somewhat slower than in other countries. Such result suggests that inequality in education is one of the main causes of job polarisation; it makes clear the relevance of policy intervention to enhance access to high and quality education.

Chart 9 - Development in the education of workers in high paying jobs, 1997-2017



Source: ECLM calculations based on EU LFS.



4. Job polarisation has increased the wage inequality

The shift from middle paying occupations to high and low paying occupations has also meant that the income inequality has risen. In this section, we calculate the mechanical effect of job polarisation on the wage inequality.

Income inequality is often measured by the so-called “Gini coefficient”. The Gini coefficient measures how big the income differences are. In a completely equal society where everyone has the same income, the Gini coefficient is 0. Conversely, it takes the value 1 (or 100%) in a society where all the income accrues to one person and everyone else gets nothing.

The wage inequality is affected by many different developments in society. For example, it is affected by:

- **The distribution of skills.** The wage distribution tends to be more skewed when skills are distributed very unevenly – e.g. when few workers get an education at middle levels.
- **The share of workers working in high, middle and low paying jobs.** When people in middle-paying jobs instead find work in high and low-paying positions, the inequality will tend to increase.
- **The wage distribution of workers with the same education doing the same job.** The overall income inequality increases if there are larger differences in the wages of workers with the same education level doing the same job.

The mechanical effect of job polarisation is the sheer effect of the movements towards high and low paying jobs – given the skill distribution and the income distributions among workers of the same education doing the same job.

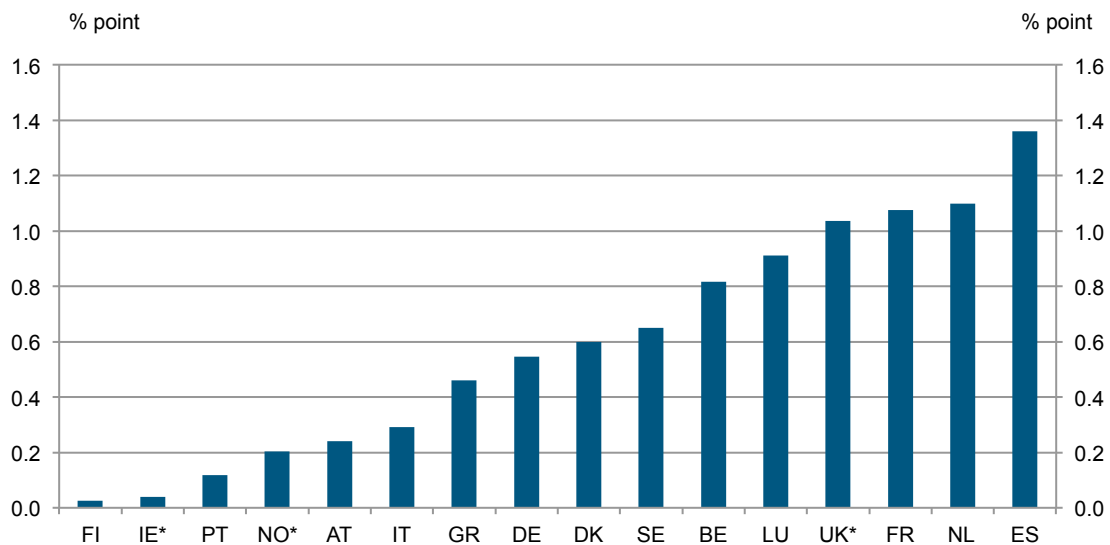
Specifically, the fraction of low-educated workers who work in low-paying jobs fell from 51% in 1997 to 23% in 2017. When we calculate the mechanical effect of job polarisation on the wage distribution, we compute how much the Gini coefficient in 2017 would be affected if 51% of the low-paying workers were still employed in low-paying jobs etc. etc. This is only the mechanical effect, because the decreasing demand for workers in the middling occupations might affect the incentive of workers to take an education and it might affect the income distribution of each occupation.

In particular, job polarisation might cause some workers to leave the labour market altogether – especially among those who cannot keep pace with the skills race. Further, job polarisation and its causes might make it more attractive to take an education. And they might affect the income inequality among workers with the same education doing a high paying or a low paying job. Our calculations do not capture these indirect effects. However, to the extent that these effects are correlated with the mechanical effect our calculations shows which countries have been hit the hardest and which countries have steered clear. We have described our calculations in appendix 2.

The mechanical effect is shown in chart 10. The income inequality has increased in all countries as a direct consequence of job polarisation. On average, the Gini of wage inequality has increased by 0,6 percentage points as a direct effect of job polarisation. In comparison, the Gini coefficients of disposable income has on average increased by 1,7 percentage points.

Job polarisation has had the largest effect on inequality in Spain and the Netherlands and in some of the countries where the trend towards polarisation was most pronounced (France, UK and Luxembourg). In contrast, it has only led to a small increase in the earnings differences in Finland and Ireland.

Chart 10 - Increase in Gini coefficients of wage inequality due to job polarisation, 1997-2017



Note: (*) Development from 1997 to 2016.
Source: ECLM calculations based on EU LFS and EU SILC.

The direct effect on income inequality shows a correlation of 0,2 with the degree of polarisation. Thus, the effect that job polarisation has on income inequality does depend on the degree of job polarisation but not to a great extent. This indicates that it is possible to mitigate the effect of job polarisation on wage inequality – the effect is not just brought about by production technology and global value chains. Labour market institutions can have mitigating effect, e.g. by compressing the wage differences between occupations.

Further, the fact that job polarisation seems to have had a rather limited effect on the wage distribution indicates that wage inequality is not the most stressing issue when discussing job polarisation. The more stressing problem is securing that no one is left behind; and that a fair share of the total income is distributed to workers.

In our calculations above, we do not capture the effect that job polarisation has had on people without a job. As noted above, the trend towards job polarisation has been followed by an increase in the demand for skills across job types. This might have forced persons on the margins of the labour market into longer spells of unemployment or inactivity.

Further, we have not explored the effects on the distribution of capital and labour income. As noted above, job polarisation has been found to be largely driven by automation (Goos et al. 2014), which, in turn, drives down the labour share of income (cf. e.g. Dauth et al. 2017).



5. Concluding Remarks

Job polarisation has led to increased wage inequality in all Western European countries. On average, the Gini of wage inequality has increased by 0,6 percentage points as a direct effect of job polarisation. In comparison, the Gini coefficients of disposable income has on average increased by 1,7 percentage points.

The polarisation process is still taking place but at a slower pace than in the late 1990s and the 2000s. That is, the share of jobs in the middle of the pay range is declining. Workers with mid-level educations are instead employed in low-paying jobs where, on the other hand, the share of low-educated workers is on the fall as more and more workers get an education. High-paying jobs are increasingly being dominated by high-educated workers.

These developments are not even across countries.

In Germany, Belgium and the Netherlands, the polarisation process has been rather weak. In Austria and France, on the other hand, the trend has been very pronounced. In all of these countries, the educational characteristics in low and middle paying jobs have followed the general trend towards higher education levels but at a slower pace than in many other countries.

In Southern Europe (Portugal, Greece, Spain and Italy), the polarisation process has been relatively weak, especially in Portugal where the take-up of new technologies is comparatively slow (Fonseca et al. 2016). The general shifts in the educational characteristics of low, middle and high paying jobs have been relatively pronounced in the Southern European countries.

In the Anglophone countries (Ireland and UK), the polarisation process was rather strong before 2010. These countries have seen a clear increase in the education level of low-paying jobs, whereas the education levels in middle and high paying jobs have increased by the average pace.

In the Nordic countries (Denmark, Norway, Sweden and Finland), the extent of labour market polarisation has corresponded to the EU average. The educational characteristics of low, middle and high paying jobs have been relatively stable compared to other countries.

The direct effect that job polarisation has on income inequality, of course, depend on the degree of job polarisation in the country. However, the dependence is not very strong.



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Appendix 1. Calculations of job polarisation – this is what we did

Like the European Commission (2018), we grouped the employment into the three occupation groups suggested by Goos et al. (2014). The three groups are constructed based on average European wages in 1993-2010.

In Goos et al., jobs are defined by the two first digits of the ISCO code, with discard of a few occupations as well as industries based on the NACE classification. We do a more brute grouping as we only look at the first digit of the occupation classification (ISCO 1-3: High-paying, ISCO 4,7,8: Middle-paying, ISCO 5,9: Low-paying). In contrast to Goos et al. we have access to EU-LFS data from 1997 onwards for all the EU15 countries and Norway making it unnecessary to adjust with other data sources of lower reliability. Furthermore the 2011 transition from ISCO-88 to ISCO-08 classification is harder to translate on the two-digit ISCO level than on the one-digit ISCO level, potentially introducing a more profound data break. However, when we calculate the developments in the employment shares of each occupation group, we get roughly the same results as Goos et al. and The European Commission.

As noted, there is a break in the ISCO system in 2010-2011, when the ISCO88 system was replaced by the ISCO08 system. It is not possible to completely map the two systems into each other. Therefore, we have analysed the time periods before and after 2010 separately.

In chart 3-4, we have corrected for country differences in the industry structure. For each country, we have grouped the employment of each industry into the three occupation groups of Goos et al. We have then calculated what the fraction of the total employment working in high, middle and low paying occupations would be in 1997 and 2017 if the relative size of each industry corresponded to the average in the 16 countries in 1997 and 2017, respectively. We have done this for each country by taking the sum-product of the European-level employment share of each industry and the industry-specific shares of the three occupation groups.

The grouping of education levels for chart 5-9 follows the usual practice (ISCED 1-2: Low, ISCED 3-4: Middle, ISCED 5-6: High).

Appendix 2. Calculations of the mechanical effect on income inequality – this is what we did

For the calculation of the direct effect on wage inequality, our calculations followed the steps below:

1. We divided the population in each country into nine “labour markets” according to the three occupation groups and the three education groups. That is, there is a “labour market” for low-educated workers doing low-paying jobs, another one for low-educated workers doing middle-paying jobs etc. etc.
2. For each “labour market” we calculated a wage distribution using EU-SILC data on yearly gross employee cash or near cash income (PY010G) from 2017. We only calculated the wage distribution for employees working all year. Specifically, for each “labour market” we constructed a weighted wage distribution based on the personal weights in EU-SILC.
3. We found the actual wage distribution of all workers by weighing together the wage distributions of each “labour market”. Specifically, we rescaled the personal EU-SILC weights within each “labour market” with the employment shares calculated from EU-LFS:

$$\text{Actual weight}_{\text{low education, low pay}} = \frac{\text{Employment}_{\text{low education, low pay, 2017}}}{\text{Total employment}_{2017}}$$

The employment shares from EU-LFS is calculated as the share of total usual weekly hours multiplied by the EU-LFS survey weights, following the approach of Goos et al. (2014).

4. We found a counterfactual wage distribution by changing the weights. For each education group we set the share of workers in each occupation group equal to its 1997 value:

$$\text{Counterfactual weight}_{\text{low education, low pay}} = \frac{\text{Employment}_{\text{low education, low pay, 1997}}}{\text{Employment}_{\text{low education, 1997}}} \times \frac{\text{Employment}_{\text{low education, 2017}}}{\text{Total employment}_{2017}}$$

The resulting counterfactual wage distribution disentangles the effect of workers moving into low and high paying jobs from the remarkable education expansion which most European countries have experienced since the 1990s. In other words, the counterfactual case is the case where the education expansion took place as in the real world, but the movements towards low and high paying jobs did not.

5. We computed the Gini coefficients of the actual wage distribution and the counterfactual wage distribution for each country. The difference between the actual and the counterfactual Gini coefficient is the mechanical effect of job polarisation on wage inequality.