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Current profile and recent trends  
— Executive Summary

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# Study on the Average Wage in Portugal: Current profile and recent trends

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# Executive Summary

## Keywords

base wage, salary distribution, trends, well-being, salary enigma, productivity, qualifications, demographics, inequality.

This study analyses developments in the average (real gross base) wage from the introduction of the euro until 2017, focusing on full-time employed workers with a full monthly basis salary aged 18 to 65 years. Since the average obscures a number of different realities and fluctuation patterns, measurements of salary dispersion (e.g., ratios between wage distribution percentiles) are also analysed. The analysis for Portugal is done using workforce staff figures, allowing practically all employed Portuguese workers from the private sector to be studied. However, to put trends in the average wage in Portugal into perspective, there is also a comparison against three European Union countries: Germany, as an example of a high average wage; Spain, as an example of a workforce and institutional structure identical to those of Portugal; and Poland, representing a country whose average wage is lower than Portugal's. By including several cycles in the Portuguese economy, this study also analyses the consequences of the Great Recession (2008-2012), by comparing this period with the phases of economic expansion which preceded and followed it.

This study aims to answer the following questions: Which groups of workers had above-average rates of wage growth from 2002 to 2017? Which groups saw a decline in their average wage? Are Portuguese wages becoming increasingly more uniform, or more disparate? How did the Great Recession impact trends in wages? How does Portugal weigh up to other European countries in terms of average wage trends, tax burden and productivity?

## **How have Portuguese wages changed since the introduction of the euro?**

The subject of wage growth has drawn the attention of political decision-makers and academic researchers alike. This concern revolves around the low level of salaries seen in Portugal, and the fact that wage growth in the recent past remains slower-paced than before the financial crisis of 2008 (OECD, 2018a). The nearly stagnant average wage in Portugal has contributed towards the downgrading of our country in the OECD's average annual wage ranking since 2015; in 2019, Portugal held the third worst position among European Union countries in this ranking (OECD, 2020). This trend is concerning, since the average wage is one of the main indicators of a society's economic



well-being (Abraham *et al.*, 1998; Myck *et al.*, 2006).

The average wage in real terms, i.e., the average wage discounting the effect of inflation, was €879 in 2002, rising to €925 in 2017. This means that the real average wage grew only 5.2% over 16 years (Figure 1).

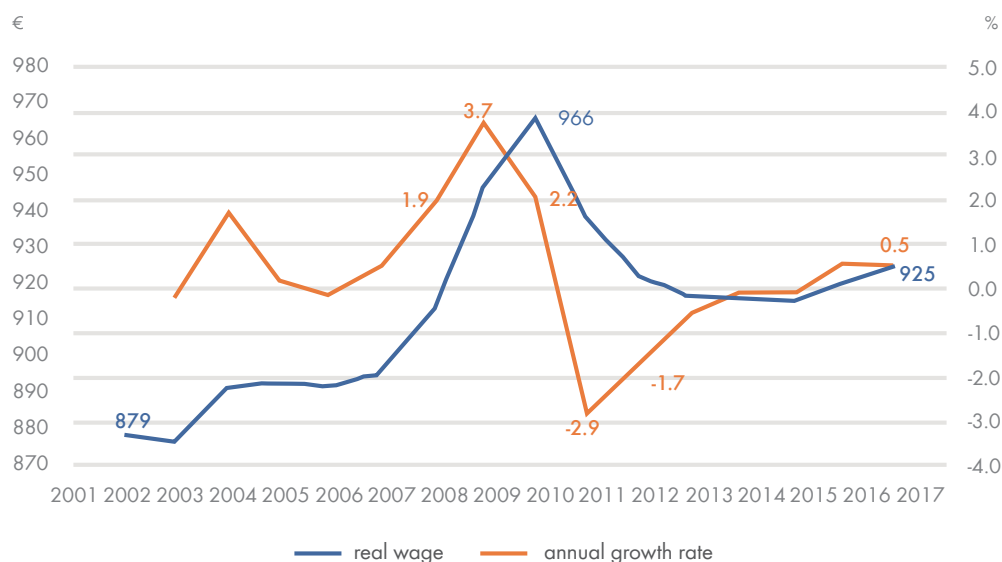


Figure 1. Change in average wage

Source: Workforce Staff Figures, Ministry of Labour, Solidarity and Social Security. Calculations by the authors.

### Which groups had above-average rates of wage growth from 2002 to 2017?

Women, youth under age 25, less qualified workers, workers in Industry & Energy and Construction, permanent employees and workers at companies employing up to 50 people had average wage growth of more than 5% (Figure 2).

- Average wage growth among women was significantly higher than that of men (11% vs. 3.5%) over the period in question, thereby lessening the pay gap between genders. Even so, the average wage of men was nearly €150 higher than that of women in 2017. One could contend that characteristic gender differences – such as variations in age, education and business sector – justify the pay gap in the descriptive analysis. However, a multivariate (regression) analysis suggests that, on average, women receive a salary which is 15.6% lower compared to men, even when women and men are equal in all attributes considered. The regression analysis also confirms that the pay gap between genders has decreased over time.
- In 2017, an individual under age 25 received, on average, a salary 10% higher than someone of the same age in 2002. The multivariate analysis found,

however, that from 2013 to 2017, the wage gap of these workers vis-à-vis the group of older workers (aged 55+) was, on average, roughly the same as prior to the Great Recession. Even so, these workers' wage growth has not been sufficient to bridge the gap in their pay in comparison to older workers. Furthermore, the average wage of youth aged under 25 is becoming increasingly closer to the minimum wage: the difference between the average wage of this group of workers and the minimum wage has fallen around 30% between 2002 and 2017.

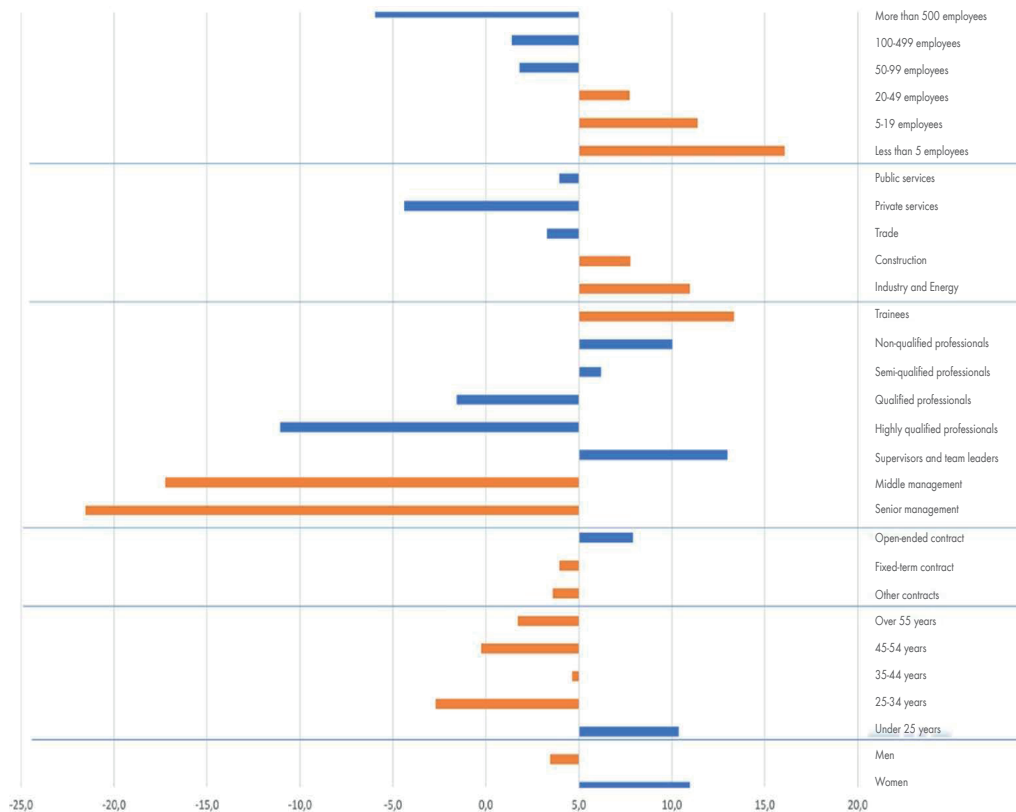


Figure 2. Average wage growth rate (2002-2017) for different groups

Source: Workforce Staff Figures, Ministry of Labour, Solidarity and Social Security. Calculations by the authors.

Note: The overall growth rate (5%) was used as a reference.

The average wage of less qualified workers has grown more as a function of their (lower) level of qualification: 6.2%, 10% and 13.3%, for semi-qualified professionals, non-qualified professionals and trainees, respectively. However, the findings of the multivariate analysis suggest that the wage gap of these workers vis-à-vis the salary received by senior management (the category corresponding to the highest degree of qualifications) has changed little over time. In terms of groups of professions, those working in personal services<sup>4</sup> and non-qualified workers (in terms of profession) had

<sup>4</sup> For example, personal care and services, protection and security services and salespeople, together with cleaning workers and street vendors.

wage increases above the general average (8% and 13%, respectively).

- The only business sectors which saw above-average wage growth were the Industry & Energy and Construction sectors: 11% and 8%, respectively. These were the two sectors where the difference between the average and minimum wages was smaller in 2002 and, as such, likely to have greater repercussions from the increase in the legal minimum wage. Conversely, due to faster-paced growth in the average wage, the Industry & Energy sector had the smallest decline between the average and minimum wages between 2002 and 2017. One could contend that this is due to the attributes of the workers employed in these sectors. However, this result persists in the conditional analysis (which considers qualifications, age, gender and other attributes), meaning that higher wage growth in these sectors cannot be explained by systematic differences in the traits of workers.
- Among the generations with average wage growth above the general average (those born after 1965), the generation born after 1985 (workers aged 18-32 during the period in question) enjoyed higher growth in their average wage.<sup>5</sup> The younger generation's higher wage growth can be explained by the fact that salaries rise more at the start of a career, and then tend to stabilize. The average wage of the generation born after 1985 rose more than 60% over the 16 years in question; even so, in 2017, their average wage was around half that of other generations. Note that older workers from the generation born after 1985 (those born between 1985 and 1989) entered the workforce slightly before the crisis of 2008, while younger ones (born after 1990) did so right in the middle of the Great Recession. In other words, this generation's wages are low, and close to the minimum wage, not only because these workers were at the start of their career, but also because salaries in new employment contracts are lower in times of economic contraction.

### **Which groups saw a decline in their average wage?**

The groups of workers whose average wage decreased the most between 2002 and 2017 were university graduates (-24%), senior and middle management, (-22% and -17%, respectively), managers (-16%), private service sector workers (-4.4%) and workers at companies with more than 500 employees (-6%). Purely descriptive in nature, these results are not sufficient to conclude, for example, that a university course is of any lesser value. In fact, the findings of the multivariate analysis suggest the opposite. This apparent contradiction occurs because, in the descriptive analysis, we do not analyse what happens to these same individuals (or individuals with the same characteristics) over time.

In the case of education, the wage declines observed do not occur because there is no longer

<sup>5</sup> The average wage growth rates among the various generations are not shown in the graph because, given that the analysis of the changes in the different generations' average wage is not a transversal analysis, the magnitudes of the growth rates are highly different.

a wage premium for university degrees, but instead because university graduates in 2017 were younger than workers with this level of education in 2002 – and age is positively associated with wages. In other words, with everything else remaining constant: younger workers receive, on average, lower salaries.

With regard to company size, the results of the multivariate analysis confirm those obtained from the descriptive analysis, in that they rule out the possibility of this result being because these companies employ more workers with traits associated with lower wage growth (such as a higher level of qualifications or education, for example), and confirm a decrease in the wage premium at larger companies. Even so, on average, smaller companies pay salaries much closer to the minimum wage: in 2017, the difference between the average and minimum wage was around €146 at companies with fewer than five workers, and €538 at companies with more than 500.

### **Are Portuguese wages becoming increasingly more uniform, or more disparate?**

The average wage allows us to answer the question: “if all workers were the same, how much would each one earn?”. This measure is easy to understand, and helps to paint a picture of the country’s economic performance on the whole. However, workers are not equal, and their salaries span a very broad range. The distribution of wages shows us how many workers receive each wage level over this range. In theory, the average wage can remain unchanged, even when there are major changes in salary distribution.<sup>6</sup> A comparison of wages at different points of the distribution (percentiles 10, 50 and 90) allows us to draw conclusions on wage inequality (Figure 3).

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<sup>6</sup> Percentile 50 corresponds to the median, i.e. the amount which divides the wage distribution into two parts. Percentile 90 (10) is the point at which 90% (10%) of workers have a salary below this amount, and 10% (90%) have a salary which is higher. The gap between the median and average wages gives us a measurement of the pay dispersion between half of the workers with higher salaries.

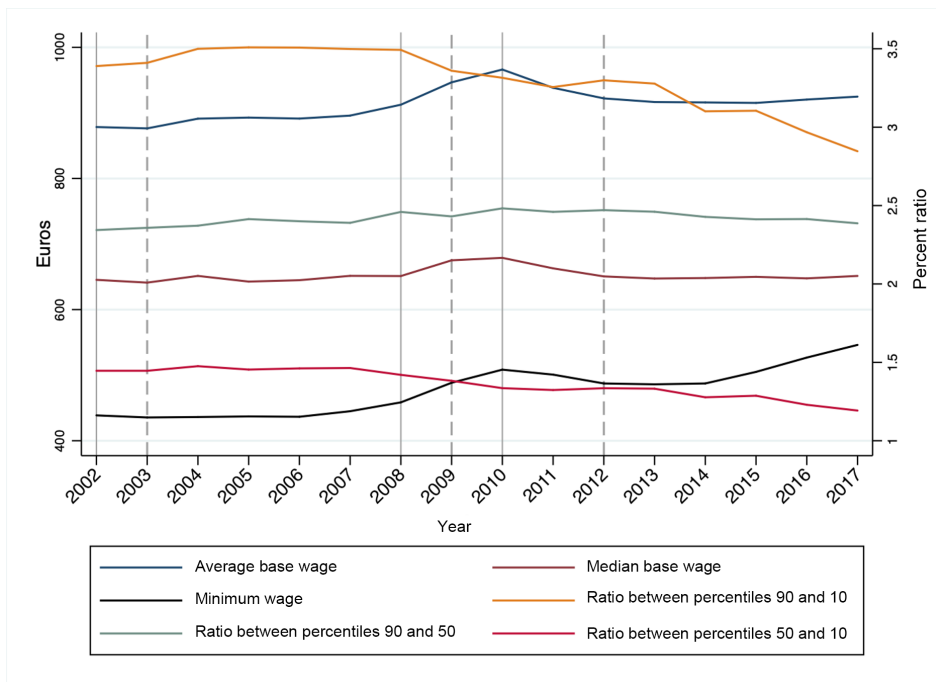


Figure 3. Distribution points of real (average and median) wage and inequality measurements  
 Source: Staff, Ministry of Labour, Solidarity and Social Security. Calculations by the authors.

While the average wage grew little between 2002 and 2017, the median wage remained completely stagnant, rising slightly more than €5 (less than 1%) in 16 years. Between 2002 and 2017, half of the workers receiving lower wages have salaries which are increasingly more the same (and closer to the minimum wage). Since the decreased pay dispersion in the lower part of the distribution (P50/P10) was much more pronounced than the higher dispersion in the upper part of the distribution (P90/P10), wage distribution was compressed on the whole (P90/P10 ratio decreased). This result also means that the wage inequality dynamic is determined more and more by the upper part of the salary distribution. The wage distribution’s compression is in line with the waning monetary income inequality observed between 2005 and 2015 (Alves et al., 2020), and contrasts with the mounting wage inequality of the 1980s and 1990s (Machado and Mata, 2001; Cardoso, 1998).

Generally speaking, the salaries of the Portuguese people were more equal in 2017 than in 2002, but pay compression did not have the same magnitude in all groups of workers (Figure 4).



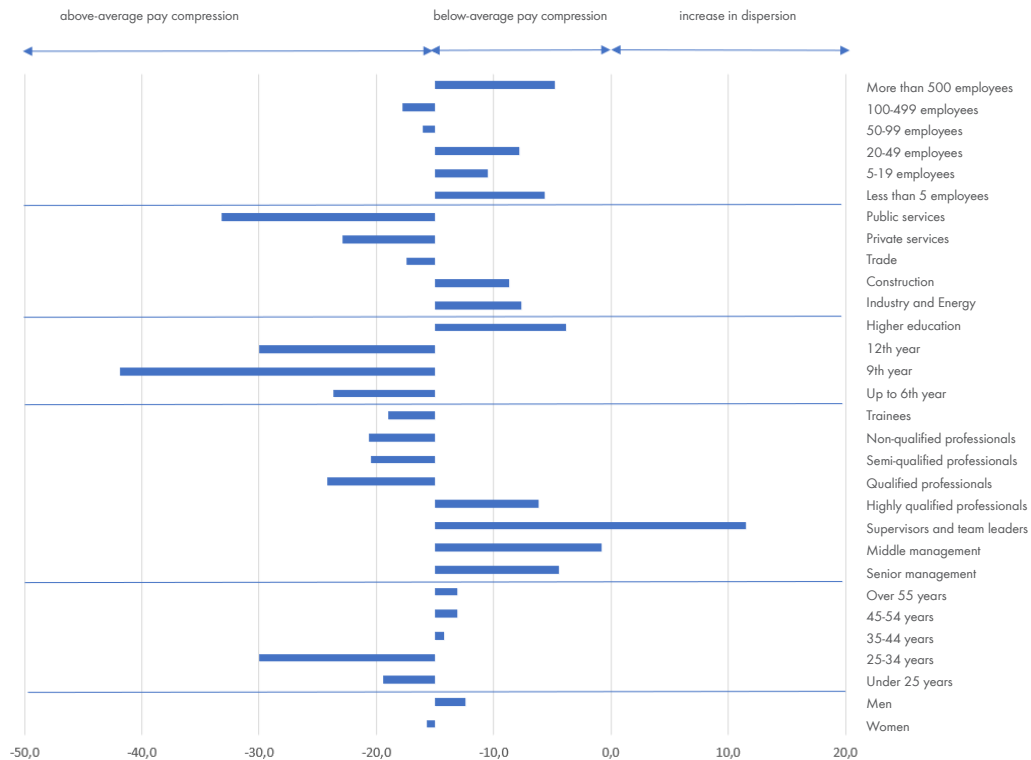


Figure 4. Growth rate of pay dispersion (2002-2017) for different groups

Source: Staff, Ministry of Labour, Solidarity and Social Security. Calculations by the authors.

- Pay dispersion has decreased more for women than for men.
- The age group of 25-34 has a higher pay compression. This compression occurred in both parts (higher and lower) of the salary distribution.
- Pay dispersion decreased in all professional categories, except for supervisors and team leaders. The highest pay compression can be seen in qualified professionals, for whom pay dispersion in the lower part of the distribution decreased the most.
- The wages of workers with intermediate education (9th grade) had the highest pay compression. In the upper part of the distribution, pay dispersion decreased for all groups, except for university graduates. The decrease in pay dispersion in different education groups was due simultaneously to a wage increase in P10 and a wage decrease in P90.
- Between 2002 and 2017, there was greater pay compression in sectors where pay dispersion was higher in 2002. In terms of sectors, pay dispersion decreased less in the sectors of Industry & Energy and Construction, with a substantial rise in pay compression in the Public Services sector. The lower reduction in pay dispersion in the Industry & Energy and Construction sectors is tied to an increase in pay

dispersion in the half of the distribution where the wages are higher.

- Among companies with more than 50 employees, the largest (those with more than 500 employees) are noteworthy for a less pronounced pay compression and, as such, a pay dispersion trend more similar to that of companies with less than 50 employees. The underlying pay dynamics are, however, quite different. At companies with more than 500 workers, although the wage was down (-2%) in P90, the wage in P10 also rose very little (2%). At companies with fewer than 50 workers, the wage increase in P10 was largely accompanied by an increase in P90, indicating indirect effects from the rise in the minimum wage over the salary distribution.

### **How did the Great Recession of 2008-2012 impact trends in wages?**

The average wage had minor annual fluctuations through 2007 (Figure 1). In 2008, 2009 and 2010 there were annual increases of 1.9%, 3.7% and 2.1%, with the period of 2009-2010 coinciding with the short economic growth phase (enabled by the 2008 European Union stimulus plan) of the cycle preceding the sovereign debt crisis. A downward trend in wages began in 2011, which was not reversed until 2016. Without the wage increases immediately following the 2008 financial crisis and prior to implementing the 2011-2014 Economic and Financial Assistance Program, average wage growth would have been even weaker over these 16 years.

Pay dispersion began to decline starting in 2008, and was lower in 2017 than it was in 2002. This change is explained by the pay compression in the lower part of the distribution observed starting in 2007, the year in which the legal minimum wage – until then practically stagnant – increased 2%. Growth continued in the real minimum wage in the following years: 3%, 6.5% and 4% in 2008, 2009 and 2010, respectively. This result is consistent with the notion that the national minimum wage plays a major role in salary distribution in Portugal (Centeno et al., 2011).

### **The Great Recession was not the same for everyone:**

- Compared to the period of 2002-2007, the pay gap between genders decreased during the Great Recession (0.6 percentage points), and even more during the economic recovery (1.1 percentage points).
- Older workers (aged 55 and over) were impacted more than workers from other age groups in the Great Recession, during which time there was a lesser wage difference between these workers and other age groups. The convergence effect in relation to the average wage of older workers is greater as the initial difference increases. In the economic recovery phase, the difference between the wages of the youngest and oldest once again increased, albeit slightly, which did not occur in intermediate age groups.
- Workers with a 9th grade education were affected most by the Great Recession. The difference between the wages of these workers and those with a lower

education level decreased, as opposed to university graduates and workers with a 12th grade education.<sup>7</sup>

- Highly qualified, qualified and semi-qualified professionals had greater average wage declines during the Great Recession and the ensuing economic recovery phase. In other words, these workers did not recover from the negative shock experienced in the Great Recession.
- The wage premium of employees at larger-sized companies decreased starting in the Great Recession.
- Public service sector workers were the hardest hit by the Great Recession, compared to workers from other sectors, and continued to “lose ground” after the crisis.

## How does Portugal weigh up to other countries?

### Change in average wage

As in Portugal, between 2007 and 2018, the average real wage did not change substantially in Germany, in Poland or in Spain.<sup>8</sup> The recovery times, however, did vary: Germany and Poland had a slight rise in the average wage starting in 2011; Portugal has been rebounding slowly since 2013; and Spain has seen a downward trend in the average wage since 2009. During the Great Recession of 2008-2012, all countries saw downturns in real wages.

Compared to other countries, Portugal had higher pay compression between 2007 and 2018. In Poland, a country which saw major growth in the minimum wage, there was also a decrease in pay dispersion. By contrast, in Spain, the 2017 distribution of pay was more unequal than in 2007.

While workers with university degrees in Portugal experienced the highest wage losses, in Spain it was less educated workers who lost the most. Conversely, wages rose for all levels of education in Germany. In Poland, workers with university degrees were the only ones to experience wage losses. Portugal has the highest wage premium for workers with university degrees, which is substantially higher than in Spain or Germany, although it has fallen since 2011. In Poland, the wage premium was similar to Portugal’s in 2007, but has decreased significantly since 2007.

Portugal has witnessed a rebound in average wages after the Great Recession for workers at micro and small enterprises (up to 10 employees), but not for workers at larger companies,

<sup>7</sup> A similar result is obtained by analysing generations.

<sup>8</sup> This comparative analysis uses data from EU-SILC (2007-2018). Germany, Poland and Spain were chosen, respectively, for being examples of a high average wage, an average wage lower than that of Portugal, and a workforce and institutional structure identical to those of Portugal.

whose average wages continue to decline (losses from 3%-7%). In Spain, there have been wage losses in the period following the Great Recession at companies of all sizes, exactly the opposite of what has occurred in Germany. In Poland, workers at very small enterprises (fewer than 5 employees) are the only ones continuing to see their average wage drop after 2013 (relative to the period of 2007-2012).

### **Productivity**

Wages in Spain are higher than in Portugal, although both countries have a comparable cost of living. However, in 2002, Spain's productivity was 32% higher, and rose slightly more than Portugal's productivity from 2002 to 2018. Germany also has a higher productivity index, and is noteworthy for having an average real wage which is much higher than the average wage of other countries. Therefore, differences in labour productivity seem to explain the wage differences between countries.

From 2002 to 2018, German and Spanish productivity was always higher than Portugal's, a difference which has remained relatively stable over this entire time. Productivity in Poland, which was almost one third lower than Portugal's in 2002, grew at a faster pace than in other countries, and was essentially equivalent to Portuguese productivity in 2018. These findings suggest that the average wage differences seen between countries correlate to varying levels of productivity.

However, none of the four countries seems to have any synchrony between annual wage growth and growth in labour productivity. One could contend that the growth in each of these series occurs in a staggered (more than simultaneous) manner. Even so, by following developments in wages and productivity over time, one can see that the average productivity has grown faster than the average real wage in every country.

### **Tax burden**

This study is based on the gross wage. However, disposable household income depends on the net salary which, in turn, depends on the structure of the tax system and the tax burden on employment income.

The average tax rates applicable to gross wages vary over the distribution of income. Between 2002 and 2019, there was a reconciliation of average tax rates, primarily due to the tax hikes for individuals with low and intermediate-level salaries (more so than the tax rate cuts for higher incomes.). For example, the average tax rate for individuals earning the average wage was 16.15% in 2005, climbing to 21.29% in 2017. For those earning €40,000 in 2005 (or the equivalent with deflation in 2017), the increase was merely from 27.87% to 32.44%. Since wages remained practically stagnant during the period in question, this higher tax burden resulted in less disposable household income.

There was greater inactivity in all countries during the Great Recession, regardless of the type of household considered. A simulation of the tax burden's effect on the inactivity rate shows that the increased inactivity in Portugal was not caused specifically by the country's

additional tax burden between 2009 and 2013 (resulting from higher marginal income tax rates and the creation of new tax brackets starting in 2010). In Germany, the lower rates of inactivity (although slight) began earlier than in Spain and Portugal, whose lower rates of inactivity did not start until 2012. Even so, in 2018, all countries had inactivity rates which were higher than those preceding the Great Recession.

### Average wage in Portugal: 2017 snapshot

The average wage in 2017 was €925 (around 40% above the median), but half of workers received, at maximum, €651 (median salary).

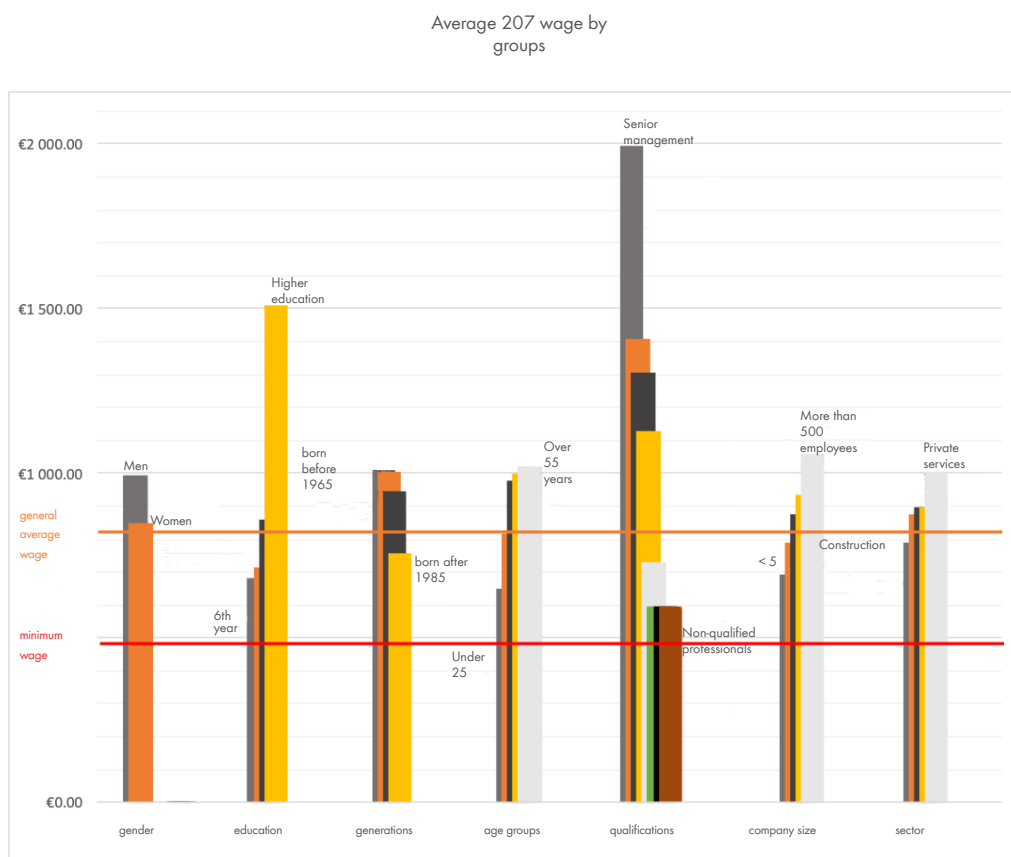


Figure 5. Average wage in 2017, by groups

Source: Staff, Ministry of Labour, Solidarity and Social Security. Calculations by the authors.

### Discussion of findings

Although an exhaustive analysis of the causes of wage stagnation in Portugal is beyond the scope of this study, our findings suggest several explanations, and exclude some others.

Developments in the average wage may be due to modifications to the wage structure and/or breakdown of the employed population over time, the latter strongly determined



by a country's demographics. Our findings show that there was a substantial overhaul in generational terms: the older generation (born before 1965), which accounted for 46% of workers in 2002, represents only 17% of workers in 2017. Moreover, the average wage of youth aged under 25 is becoming increasingly closer to the minimum wage: the difference between the average wage of this group of workers and the minimum wage has fallen around 30% between 2002 and 2017. As older generations are being replaced by younger workers receiving lower salaries, the average wage has gone down.

Some studies suggest that, to offset the higher minimum wage imposed upon them, companies limit growth in other salaries. Such behaviour could help to explain the stagnation in the average wage, and its closer proximity to the minimum wage between 2002 and 2017. However, in years when the real minimum wage saw its biggest increases (from 2008 to 2010), both the average wage and the wage at the top of the distribution increased. Since it is impossible to know what the counterfactual scenario would have been – how much wages would have grown without the higher minimum wage – one could say that the latter did not keep wages from rising above the minimum wage. At companies with fewer than 50 employees, where the P10 wage increase from 2002 to 2017 was more pronounced, this rise was largely accompanied by an increase in P90, indicating a spillover effect. Companies with more than 500 employees saw a very slight decline in the P90 wage, although such companies were most likely little affected by the minimum wage increase. On the one hand, the P10 wage increase was extremely minor, while on the other hand, the percentage of employees receiving minimum wage at these companies is low. In this situation, one would expect that the impact of the higher minimum wage on the company's total costs would be lower (Alexandre *et al.* 2020). Companies where a cost containment strategy potentially limited salary increases above the minimum wage are those which employ 100-500 workers, where the P10 wage rose significantly and the P90 wage went down. Note, however, that the percentage of employees receiving minimum wage is only slightly higher than at companies with more than 500 employees.

The suggestion of potential containment of salary increases above minimum wage draws attention to corporate hiring and compensation policies. Some studies suggest that, specifically after the 2008 financial crisis, companies have sought greater flexibility in staff costs by reducing base and fixed remuneration, while increasing other types of compensation (Lemieux *et al.*, 2009). Since this study focuses on the base wage, we did not test this hypothesis. However, it may ultimately partially explain the stagnation seen in higher salaries at some companies. Another means of streamlining by companies is the more frequent use of less permanent contractual obligations, a trend seen continuously since the Great Recession. Between 2002 and 2017, there was a deterioration in the status of employees with fixed-term contracts, who simultaneously account for a greater proportion of full-time workers with full remuneration: their average salaries grew at a lower rate than workers on the whole, with significant wage compression caused by the median wage's closer proximity to the minimum wage, while even the salaries of the highest-earning workers decreased.

In Portugal, workers' education level has gotten higher. In the most recent years, around half of the working population has at least completed minimum compulsory education (12th grade). According to Portugal *et al.* (2018), workers' education level

has contributed most to wage increases from 1988 to 2013. The sharp decline in the average wage of university graduates between 2002 and 2017 may have contributed towards the stagnation of the average wage. Moreover, given the weight of education in explaining pay dispersion in Portugal (Carneiro, 2008), the decline in the average wage of individuals with higher education levels may have also contributed towards the pay compression observed. As such, contrary to expectations, the expansion of education does not seem to have resulted in higher pay dispersion.

However, one cannot conclude that higher education has lost importance as a protective factor in relation to low salaries stemming from descriptive results. This type of (descriptive, not conditional) analysis does not allow us to study the same individuals over time, or individuals with the same traits. In the case of education, the lower average wage results largely from the fact that the average age of university graduates in 2017 was lower than in 2002 – and that age is positively associated with wages. Coupled with this is the fact that young people from more recent generations have entered the workforce during two phases of economic contraction (one quite severe), meaning that current university graduates earn lower salaries than their peers from the start of the century. It should also be noted that workers with a 9th grade education were the most penalized between 2002 and 2017, which agrees with the hypothesis that workers with intermediate qualifications have been the “hardest hit” by recent transformations in the workplace.

Although there does not seem to have been an unequivocal process of job polarization among full-time workers with full remuneration (who are the focus of this study), the qualified professionals group (intermediate level in the hierarchy of qualifications) had the highest (negative) variation in relative weight in the sample group throughout the period of 2002-2017. This result might help to explain the change in the average wage, especially since the salaries of workers in P90 grew below the overall average between 2002 and 2017.

Inflexibility to lower nominal wages is another potential explanation for wage stagnation: since companies are aware that cuts in salaries are hard to implement in times of economic contraction, they likewise do not increase them during times of expansion. In Portugal, the average wage has hardly increased over the economic recovery observed since 2013, despite its 5% decline between 2010 and 2013, a figure which may even underestimate the decrease in salaries. If, as is likely, less qualified workers were more affected by unemployment in the period of economic contraction, their departure from the workforce would favour a rise in the average wage. In other words, any inflexibility to lowering it does not seem to have been the main reason for wage stagnation in the economic recovery phase.

## References

- Abraham, K. G., Spletzer, J. R., and Stewart, J. C (1998) "Divergent Trends in Alternative Wage Series", in J. Haltiwanger, M. E. Manser and R. Topel (eds.) *Labour Statistics Measurement Issues*, (pp. 293 - 325). University of Chicago Press.
- Alexandre, F., Bação, P., Cerejeira, J., Costa, H. and Portela, M. (2020) "Minimum Wage and Financially Distressed Firms: Another One Bites the Dust.", IZA Discussion Paper no. 13526.
- Alves, N., Cardoso, F. and Monteiro, N. (2020) "Uma caracterização da desigualdade do rendimento e do consumo em Portugal." ["A profile of income inequality and consumption in Portugal."], *Revista de Estudos Económicos*, 6(1). Banco de Portugal, Lisbon.
- Cardoso, A. R. (1998) "Earnings inequality in Portugal: High and rising?", *Review of Income and Wealth*, 3: 325-343.
- Carneiro, P. (2008) "Equality of Opportunity and Educational Achievement in Portugal.", *Portuguese Economic Journal*, 7(1): 17-41.
- Centeno, M., Duarte, C. and Novo, A. A. (2011) "The impact of the minimum wage on low-wage earners". *Economic Bulletin Autumn 2011*. Banco de Portugal, Lisbon.
- Lemieux, T., MacLeod, W. B. and Parent, D. (2009) "Performance Pay and Wage Inequality", *Quarterly Journal of Economics*, 124(1): 1-49.
- Machado, J. and Mata, J. (2001) "Earning Functions in Portugal 1982-1994: Evidence from Quintile Regressions." *Empirical Economics*, 26 (1): 115-134.
- Myck, M., Morawski, L. and Mycielski, J. (2006) "Employment fluctuations and dynamics of the aggregate average wage in Poland 1996 – 2003.", IZA Discussion Papers, No. 2456, Institute for the Study of Labour (IZA), Bonn
- OECD [Organization for Economic Co-operation and Development] (2020), Average annual wages (indicator), [stats.oecd.org/viewhtml.aspx?datasetcode=AV\\_AN\\_WAGE&lang=en#](https://stats.oecd.org/viewhtml.aspx?datasetcode=AV_AN_WAGE&lang=en#)
- OCDE (2018a) *OECD Employment Outlook 2018*. OECD Publishing, Paris.
- Portugal, P., Raposo, P. S. and Reis, H. (2018) "The distribution of wages and wage inequality.", *Economic Bulletin and Financial Stability Report Articles and Banco de Portugal Economic Studies*.

